

Perioperative nutrition care and dietetic practices in the scope of bariatric surgery in Saudi Arabia using adapted protocols for evaluation

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journals.sagepub.com/home/smoElham Abbas Aljaaly 

Abstract

Objectives: This study evaluates the availability of perioperative nutritional care protocols and the practices of bariatric registered dietitians in Saudi Arabia. The primary outcomes of the study were conducted using an adapted American survey “with permission.”

Methods: A cross-sectional survey of a selected 32 dietitians providing bariatric services completed a self-administered online questionnaire from 12 hospitals in Jeddah, Saudi Arabia.

Results: All surveyed dietitians were females, mainly Saudi nationals (93.9%, $n = 30$), and accredited by the Saudi Commission for Health Specialties (93.8%, $n = 30$). Only 37.5% ($n = 6$) of the dietitians were specialized in bariatric surgery. Perioperative common practices of dietitians included a conduct of screening for nutrition risk before (44%, $n = 14$) and after surgery (62.5%, $n = 20$) and applied a nutrition management protocol that is mainly based on the application of nutrition care process (62.5%, $n = 20$). Dietitians (81%, $n = 26$) reported the importance of having standardized protocols for nutritional management of patients undoing bariatric surgery, where 69% ($n = 22$) confirmed the availability of pre-operative written protocols in hospitals and 75% ($n = 24$) confirmed the existence of post-operative protocols. Pre-operative practices included using approaches for weight loss before surgery, for example, very low and low-calorie diet. Dietitians (25%, $n = 8$) see two to ten patients per month. The sleeve gastrectomy procedure is the most often performed surgery.

Conclusion: This is the first study to evaluate the perioperative nutrition care protocols and practices related to bariatric surgery in Saudi Arabia. Perioperative bariatric protocols are available, but some dietitians are not aware of their availability and contents. Researchers emphasize the importance of creating national protocols by the Saudi Credentials Body to standardize practices within the field.

Keywords

Bariatric surgery, perioperative, protocols, nutrition care, registered dietitians, practice

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Introduction

Medical practices demonstrated that the Surgery Approach is the most effective treatment for patients with obesity who fulfill specific criteria.

Examples of specific criteria are patients with severe obesity and body mass index (BMI) of $\geq 40.0 \text{ kg/m}^2$ or patients with both BMI $\geq 35 \text{ kg/m}^2$ and associated comorbidities.^{1,2} Bariatric surgery may result in improvements in health such as hypertension remission and diabetes remission; however, patients may have increased risk of undergoing further gastrointestinal surgical procedures and developing deficiencies

in macronutrients such as protein and micronutrients, for example, ferritin levels.³

An Associate Professor & Consultant in Clinical Nutrition at the Clinical Nutrition Department, Faculty of Applied Medical Sciences, King Abdulaziz University, Jeddah, Saudi Arabia

Corresponding author:

Elham Abbas Aljaaly, An Associate Professor & Consultant in Clinical Nutrition at the Clinical Nutrition Department, Faculty of Applied Medical Sciences, King Abdulaziz University, 3625, Unit No. 75, Jeddah 22254-7783, Saudi Arabia.

Email: ealjaaly@kau.edu.sa



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Saudi Arabia reported that 15,000 weight loss surgeries are performed annually.⁴ The healthcare system requires standard protocols to ensure optimal medical care for patients and including protocols for nutrition care provided to the patients undergoing bariatric surgery. A protocol should be based on a sequence of orders and therapies so as to describe the predictable care of bariatric patients and related metabolic events, starting from pre-surgery through to post-surgery evaluation and up to a long-term follow-up.⁵ Findings from the literature, quality, safety programs,^{5,6} and reports from the US bariatric dietitians have supported the importance of standardized protocols for the perioperative nutritional management of patients undergoing bariatric surgery, and reported concerns of the insufficiency of these protocols and the need for improvement.⁷ However, if a protocol does not use the multidisciplinary perioperative team approach, it would not be acceptable.^{8,9} The multidisciplinary team approach to perioperative care is critical to deliver benefits to patients and members of the medical team. This approach can improve the critical management of patients, and enhance their health outcomes and satisfaction for the provided services. It can also facilitate the use of available resources by team members and enhance their job satisfaction.¹⁰ The Saudi Arabian Society of Metabolic and Bariatric Surgery (SASMBS) has established Evidence-based Guidelines for prevention and management of overweight and obesity. These guidelines are adapted from international guidelines targeting healthcare practitioners in their practice of obesity management.¹¹ The Saudi Guidelines also include both the indications and complications of obesity surgical therapy and the inclusion of dietitians as part of a well-trained multidisciplinary team.

Furthermore, the Australian and US Evidence-based Guidelines confirmed that an experienced and competent registered dietitian (RD) is the main health professional responsible for providing nutritional care for patients undergoing bariatric surgery.^{12,13} RDs should practice in a scope that incorporates a variety of well-defined protocols by dietetics practitioners to protect and improve patients' health.¹⁴ The RD should also include medical nutrition therapy (MNT), which integrates the systematic problem-solving method known as the nutrition care process (NCP). The Academy of Nutrition and Dietetics (A.N.D.) has established the NCP in which the RD should adapt its standardized language for nutrition diagnosis. The dietetics professionals' application to the NCP and its four defined components—assessment, diagnosis, intervention and monitoring/evaluation—improved the provided nutritional care services for patients in different settings.^{14,15} In bariatric surgery practice, RDs were found to be using different strategies concerning MNT for pre-operative weight loss.¹⁶ Nutrition Assessment requires primary data collection with repeated assessment, analysis of data and should start with nutrition screening or client referral.¹⁵ Impaired nutritional status of patients with obesity is observed before undergoing surgery. The aim of

the observation is so as to evade post-operative nutritional deficiencies and metabolic complications.^{17,18}

It is common among patients undergoing bariatric surgery to have long-term nutritional complications including intolerances and nutrient deficiencies and particularly for micronutrient concentrations.^{19,20} Thiamin, vitamin B₁₂, folic acid, iron and vitamin D are the most reported pre-operative nutrients deficiencies.^{21–23} Pre- and post-surgical nutritional deficiencies were linked to different surgical procedures, for example, selenium deficiency was reported in patients undergoing Roux-en-Y gastric bypass (RYGB) and biliopancreatic diversion (BPD) malabsorptive procedures since it is mainly absorbed in the duodenum.²² This requires special consideration to patients' nutritional care and particularly to their metabolic status,⁹ where dietetics professionals working with patients are expected to nutritionally assess, reassess, analyze and interpret the relevant data which contributes to patients' nutrition-related problems before and after surgery.¹⁵ This will necessitate RDs to conduct a comprehensive perioperative nutritional assessment, monitoring and long-term follow-up for patients who might need a lifelong vitamin and mineral supplements to avoid further nutritional deficiencies.^{22,24–26}

Patients with surgical intervention require nutritional education provided by RD.²⁷ Patient's education is a good opportunity to discuss any knowledge deficits and suggest strategies to achieve the goals of care.²⁸ Studies showed that education intervention led by dietitians resulted in a significant weight loss and increased diet quality in patients.²⁹ Although patients' nutrition education is traditionally conducted face-to-face by RDs, they are also recommended to use other communication methods such as social media, telephone consultations and online educational programs, which are expected to increase the engagement with patients and to minimize barriers such as time and distance.³⁰

Research conducted by Sherf Dagan et al.³¹ confirmed that nutrition counseling can help in building up self-monitoring skills and strategies to overcome difficulties and to improve the efficiency of patients undergoing bariatric surgery. Conducting educational, counseling and behavioral change sessions by an RD, indicated a more positive pre-operative outcome and nutritional education about fundamentals of weight loss surgery (WLS) after operation, was also recommended earlier to be included in the first visit of an RD, particularly for bariatric surgery of adolescents' candidates.^{32,33}

Although the SASMBS included dietitians as part of the healthcare team who provides services for patients undergoing bariatric surgery and to the best of the researcher's knowledge, there are no available published protocols for nutritional care of patients undergoing bariatric surgery in Saudi Arabia. In addition, there are no published data on nutrition and dietetic practices or on individualized nutrition care strategy in the scope of bariatric surgery. Therefore, the following are the aims of this study:

- Explore the availability of perioperative nutritional care protocols in hospitals providing bariatric services in Jeddah City, Saudi Arabia.
- Define the current common dietetic practice by RDs in the scope of perioperative services for patients undergoing bariatric surgery using an adapted American survey for evaluation.
- Providing recommendations for enhancing nutrition and dietetic practices for patients undergoing bariatric surgery and their care in Saudi Arabia.

Research design and data collection methods

Study design. This study utilized a cross-sectional survey via Web-based *Google Forms* for data collection and analysis. It is part of a larger study which includes four divisions concerning nutrition and dietetics services for bariatric patients. The survey was sent to 43 RDs who currently work or worked previously with bariatric patients in Jeddah City, Saudi Arabia. Only 32 RDs responded to the survey. The researcher made use of a descriptive pre-developed, adapted and validated cross-section survey⁷ to define the current dietetic practice among dietitians working with patients undergoing bariatric surgery in Jeddah hospitals (see Supplemental Appendix II for the questionnaire). The survey questions were adapted and modified with a permission from the main supervisor of the author's thesis of Master of Science degree (see Supplemental Appendix I for permission to adapt the survey). Candace Pumper's survey was developed in 2017 to determine the nutritional care practices among dietitians working with patients undergoing bariatric surgery in the United States, which included specific data for the perioperative care and this was used in combination of a Saudi validated survey on nutrition care services in Jeddah hospitals.³⁴

Procedure of data collection. The Candace Pumper 2017 survey questionnaire included 96 items in total. While adapting these survey questions to this study, the following information was considered: demographics of the participating RDs, number of patients seen, types of bariatric surgical procedures conducted in hospitals and the availability of policies and protocols related to patients undergoing bariatric surgery and its content. This survey also included questions about perioperative nutritional care practices such as nutrition screening, assessment and follow-up with patients. This study has chosen the 2017 Candace Pumper's survey because it includes similar population in the profession of nutrition and dietetics who were also RDs and incorporates a comprehensive approach to determine the RD's practice in the scope of perioperative services for patients undergoing bariatric surgery, which "to the best of the Researcher's knowledge" has not been studied in previous or recent Saudi research. Other questions related to licensure and registration within the Saudi credentials and number of practice years within specific dietetics fields and nutrition care services were

adapted from Aljaaly and Khalifa³⁴ local survey. Two RDs, who are specialized in services for patients undergoing bariatric surgery at the Department of Clinical Nutrition in King Abdulaziz University, carried out the review process and the validation of the survey questionnaire. Modification of the reviewed questionnaires included choices of the questions' answers and particularly the adapted questions from Candace Pumper's survey. This was carried out to fit RDs practice in Saudi Arabia.

Research setting choice. Identifying the number of hospitals that are providing bariatric services (n=12) in Jeddah City, Saudi Arabia, was conducted through a direct contact with the credentials body: the Saudi Commission for Health Specialties (SCFHS) via their electronic services system "Tawasul." Tawasul is an electronic system that serves the registered health practitioners by answering their health services related inquiries in Saudi Arabia. Based on Jeddah's municipality website, the number of governmental and private hospitals in Jeddah is 30 hospitals. Therefore, 40% of hospitals in Jeddah (n= 12 out of 30) are providing bariatric services. This study took place between October 2019 and August 2020, which included contacting hospitals who are providing bariatric services and recruitment of RDs for data collection.

Recruitment of research participants. The contact numbers of RDs were obtained via direct contact with the medical directors of 12 governmental and private hospitals in Jeddah City, who provide bariatric services. Telephone and fax numbers and/or electronic mail addresses listed on hospital websites were used to contact the medical directors. Letters were sent to ask for the medical directors' permission to contact their employed dietitians in bariatric services. Based on the defined number of RDs provided by the 12 hospitals, 43 RDs were practicing and providing services for patients undergoing bariatric surgery in hospitals (refer to Figure 1). Contact emails and mobile numbers of all RDs were obtained through their hospitals.

The inclusion criteria were for any clinical dietitian who is working or worked previously with bariatric services in Jeddah City's 12 hospitals. Any non-clinical dietetic staff such as general dietitians/nutritionist or diet technicians providing services for bariatric patients were excluded from the study.

The RDs who responded have received a preliminary electronic mail request for participation. This assisted the researcher by controlling who receives a copy of the survey, send reminders and follow-up of the survey. Voluntarily participation was confirmed by all participants. Before circulating the Web survey online, RDs who agreed to participate in the study have electronically confirmed and signed a participation agreement. There was no allowance for further access and completion of the online survey for anyone who did not already sign the informed consent. Anonymity was guaranteed and data confidentiality was confirmed to all institutes

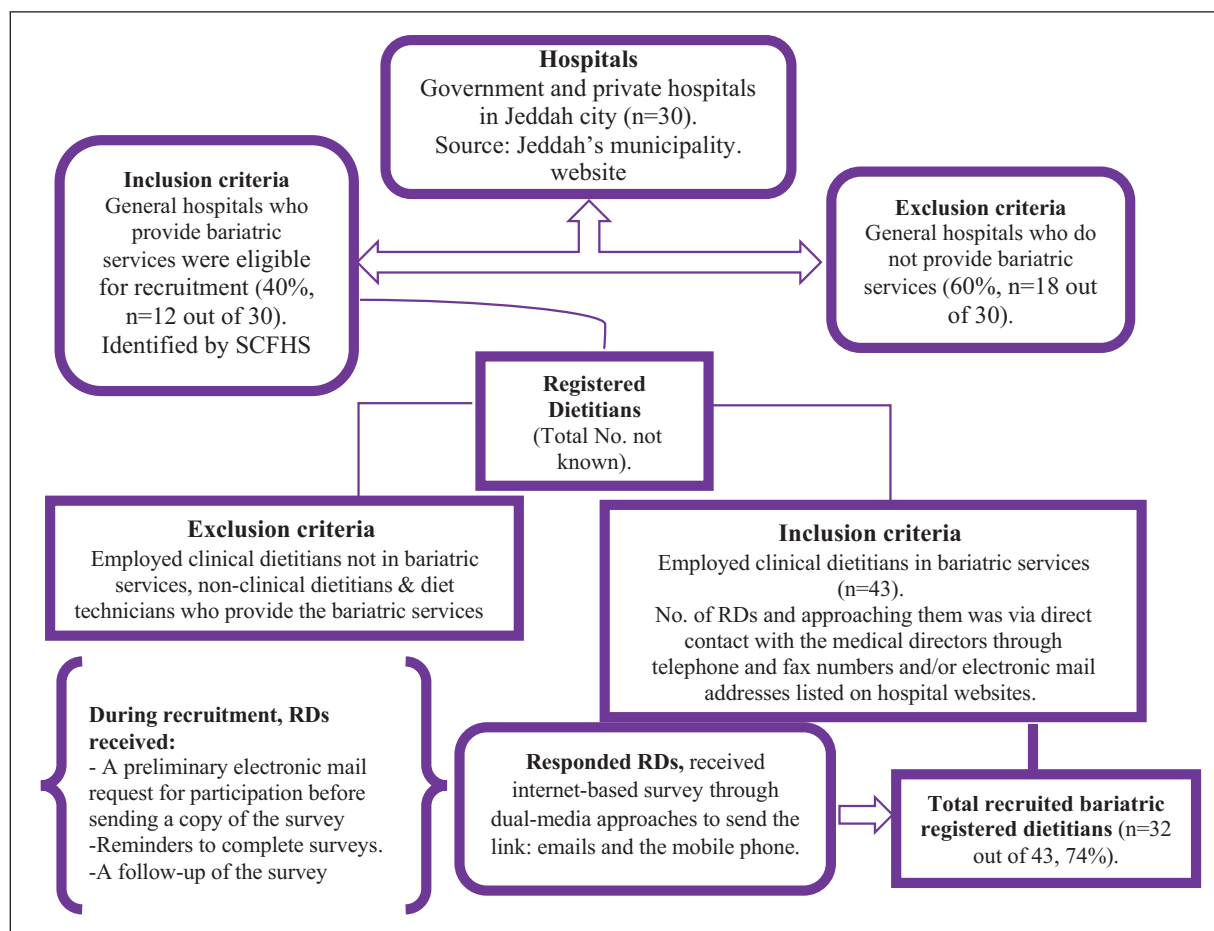


Figure 1. Flowchart of the study sample recruitment criteria (figure is original to this article).

and participants. This Web-based survey was managed using an interactive form via an online link. The researcher used dual-media approaches to send the online survey link, the email and RD's mobile number so as to allow respondents to choose the preferred method of responding.

Sample size calculations. Currently, there are neither previous studies conducted in Saudi Arabia investigating the common dietetic practice by RDs in the scope of perioperative services for patients undergoing bariatric surgery, nor any studies that are comparable to be used as a reference. Therefore, the researcher aimed to recruit all RDs from Jeddah City, based on the 12 contacted hospitals' statistics and provided number of RDs in the practice of bariatric surgery, that is, 43 RDs in total.

Data analyses. The descriptive statistics survey's results were directly recorded in the online databases and reports were exported. Frequencies and proportions were used to summarize all the survey data including continuous and categorical variables. Approaches such as the "Save and Continue" option which was used to allow the respondents to save their responses, go back to complete the questions

later time and to review their previous answers. This option was used because the survey included various questions which require longer time to answer. This approach also helped to control incomplete survey responses and missing data. Data were also exported to Excel and SPSS for visualizations, organization and for further detailed analysis performing. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) cross-sectional reporting guidelines were used to guide the reporting of this cross-sectional study.³⁵

Research results

Sample size and response rates. The total number of respondents RDs who completed the survey questionnaire was 32 out of 43 RDs (74%) from 12 private and governmental hospitals in Jeddah City.

Sample characteristics. All respondents were females 87.5% (n=28) and aged between 20 and 30 years old. The largest subset of respondents was Saudi nationals (93.8%, n=30). About 81.3% (n=26) of the participants reported as holders of a bachelor's degree while 18.8% (n=6) hold a master's degree.

Registration status, membership and dietetics' practice

Registration status and membership

- The registered clinical dietitians accredited by the SCFHS were 93.8% (n=30) and the rest of RDs (6.2%, n=2) who were working in private hospitals were non-Saudi and accredited by A.N.D. Half of the RDs (n=16) either had practical experience or are currently practicing in the field of services for patients undergoing bariatric surgery.

The majority of RDs (75.0%, n=24) were not members of any national or international dietetic association. However, four of them are members of the Saudi Society of Clinical Nutrition (SSCN), while two are members in the American Society for Metabolic and Bariatric Surgery. The two non-Saudi dietitians were registered with the A.N.D. in the United States.

Dietetics' practice

- Results demonstrated that RDs with 1 year or less experience were 50% (n=16), while RDs with 2–7 years experience were 37.5% (n=12) and RDs with more than 7 years of experience were 12.5% (n=4) (refer to Tables 1 and 2).
- Fifty percent of the RDs were practicing in specific scope of which 37.5% (n=6) were specialized in providing services for patients undergoing bariatric surgery.
- Most of the RDs (25%) see between 2 and 10 patients per month and the rest of them (43.75%) saw more than 20 patients per month (refer to Figure 2). This draw attention to the fact that most surveyed RDs see more than 10 bariatric patients per month, while only 25% see 10 patients or less per month.
- No reports from respondents confirm that they were seeing patients between 41 and 99 per month. Moreover, the survey did not specify if the patients they see per month were initial visits or follow-up visits.
- Results demonstrated that RDs mainly saw (81%, n=26) patients with sleeve gastrectomy surgery, 6.25% patients with intragastric balloon and 4 (12.5%) of the RDs were unaware of the type of procedure their patients performed.

Protocols and components of perioperative nutritional care services. The surveyed RDs' opinions about the need for and importance of homogeneous protocols for perioperative nutritional management in hospitals were confirmed by 81% (n=26 out of 32) of the participants. The importance of following a homogeneous guidelines and protocols was rated as either "very important or extremely important." The perceptions on the need to improve the current perioperative protocols and the possibility of improvement in hospitals were reported by 18.75% (n=6) of the respondents.

Table 1. General descriptive characteristics of surveyed respondent dietitians (n=32)*.

	n	%
Age		
20–25 years	14	43.8%
26–30 years	14	43.8%
31–35 years	2	6.3%
36 or more	2	6.3%
Gender		
Male	0	0.0%
Female	32	100.0%
Nationality		
Saudi	30	93.8%
Non-Saudi	2	6.3%
Educational level		
Bachelor's degree	26	81.3%
Master's degree	6	18.8%
Doctorate degree	0	0.0%
Registration with the Saudi Commission for Health Specialties (SCFHS)?		
No	2	6.3%
Yes	30	93.8%

n (%) shows data are presented as the number and percentages.

*Table included 100% (n=32) of responses to all questions.

Reports about availability of written protocols for nutritional management in hospitals confirmed the availability of pre-operative by 69% (n=22). Seventy-five percent (n=24) of RDs confirmed the availability of post-operative practice (refer to Table 3). However, about 73% of the written pre-operative protocols were for WLS, which are based on very low-calorie diet (VLCD, 450–800 kcal) and low-calorie diet (LCD, 800–1500 kcal) regimen, while the remaining (27%) were in support of liquid diet regimen.

In relation to the post-operative written protocols, it included reports of dietary instructions on healthy eating (100%), nutrition interventions during the immediate and post-operative meal initiations and progressions, and metabolic controls (100%).

The enteral and parenteral nutrition result was 50% (n=12), while the vitamin and mineral supplementations results were 66.7% (n=16) and the ordering of laboratory tests were 62.5%.

Screening for nutritional risk. The RDs conducted perioperative screenings for nutrition risk to identify patients at nutrition risk before surgery which were 43.8% (n=14), while the patients after surgery were 62.5% (n=20). 37.5% (n=12) of the dietitians categorized patients undergoing bariatric surgery who are at nutritional risk to correct nutrition deficiencies after surgery and 12.5% (n=4) used the approach to correct nutrition deficiencies before surgery (refer to Table 4).

Components of NCP. Sixty-two percent of the surveyed RDs (n=20) reported that they apply the components of NCP and continuously complete a full nutritional assessment for

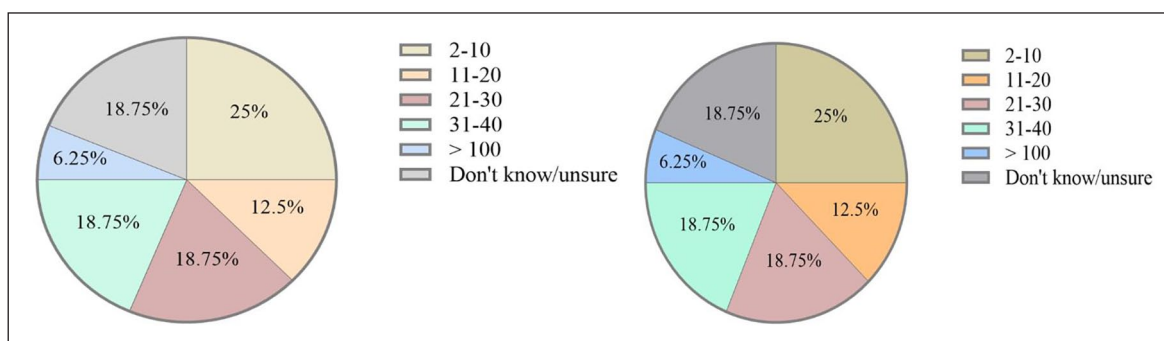
Table 2. The information of dietetics' practice (n=32)*.

	n	%
Do you practice dietetics in a specific scope only?		
No	16	50.0%
Yes	16	50.0%
Bariatric	6	37.5%
Diabetes	4	25.0%
General surgery	2	12.5%
ICUs	2	12.5%
Obesity/weight management	2	12.5%
How many years have you previously practiced or currently practicing in the scope of bariatric surgery (inpatient or outpatient)?		
0–1 years	16	50.0%
2–3 years	6	18.75%
4–7 years	6	18.75%
More than 7 years	4	12.5%
Please indicate if you are a member of these societies		
The Saudi Society for Clinical Nutrition (SSCN)	4	12.50%
The Academy of Nutrition and Dietetics	2	6.25%
The American Society for Metabolic and Bariatric Surgery	2	6.25%
None	24	75.0%
Which procedure do you see most often in your patients with bariatric surgery?		
Adjustable gastric banding	0	0.0%
Roux-en-Y gastric bypass	0	0.0%
Sleeve gastrectomy	26	81.25%
Intragastric balloon	2	6.25%
I do not know	4	12.5%

ICU: intensive care unit.

n (%) shows data are presented as the number and percentages.

*Table included 100% (n=32) of responses to all questions.

**Figure 2.** Number of bariatric patients seen by RDs per month.

patients including histories (past/present medical, social and dietary), physical examination and diagnosis.

Reports also confirmed the practice of monitoring and re-evaluating patients, particularly for failed weight loss attempts and abilities to follow and adhere with all pre- and post-operative dietary and lifestyle recommended changes. Thirty-seven percent of the RDs in this study reported that they conduct assessment related to the patients' psychological problems such as eating disorders. Based on hospital policies, 62.5% (n=20) of the RDs are always documenting their nutrition notes in the patients' medical records.

Discussion of results

This study reports on 32 female RDs from 12 governmental and private hospitals in Jeddah City in Saudi Arabia, who participated in the survey to assess the availability of perioperative protocols for nutrition care and the existing RDs' practices in the scope of nutrition care provided for patients undergoing bariatric surgery. Figure 3 presents a mind map that illustrates the nutritional care components and surveyed bariatric RDs' common practices in Jeddah hospitals.

In Saudi Arabia and as in many other countries, women dominate the profession of nutrition and dietetics.³⁶

Table 3. The reports of surveyed RDs about hospitals' protocols and common components of perioperative nutritional care services at all stages (n = 32)*.

	n	%
Does your hospital have a written guidelines, policies, or protocols concerning pre-operative nutritional management for bariatric patients?		
No	8	25.0%
Yes	22	68.8%
Do not know/unsure	2	6.3%
If yes, which of the following options does your management guidelines contain? (out of 22 RDs)		
Pre-operative very low-calorie diet (450–800) or low-calorie diet (800–1500) regimen as part of weight loss surgery program	16	72.7%
Pre-operative liquid diet regimen as part of weight loss surgery program	6	27.3%
Glycemic control	0	0.0%
Do not know/unsure	0	0.0%
Does your hospital have a written guidelines, policies, or protocols concerning post-operative nutritional management of the bariatric surgical patient?		
No	4	12.5%
Yes	24	75.0%
Do not know/unsure	4	12.5%
If yes, which of the following options does your management guidelines contain? (out of 24 RDs)		
Follow-up and management of post-operative dietary complications	22	91.7%
Nutrition education by the RD	24	100.0%
Nutrition interventions during the immediate post-operative period	24	100.0%
Interventions: meal initiation and progression	24	100.0%
Glycemic control	10	41.7%
Enteral and parenteral feeding/nutrition	12	50.0%
Preventing and treating weight regain	18	75.0%
Vitamin and mineral supplementations	16	66.7%
Ordering lab tests	15	62.5%
Do not know/unsure	0	0.0%
Others, please specify . . .	0	0.0%

RD: registered dietitian.

n (%) shows data are presented as the number and percentages.

*Table included 100% (n = 32) of response to all questions.

Accordingly, the respondents to this survey were all females. However, a similar survey results conducted in the United States showed that 94% of the total surveyed population were female dietitians.⁷ Although 50% of the present survey respondents were practicing their dietetics in a specific field of practice, where only six of them were

specialized in bariatric services. This is not consistent with the international guidelines, which recommends that professional dietitians should be skillful in bariatric services to be able to manage the bariatric patients' nutrition regime.²⁴ Furthermore, 25% of the surveyed dietitians saw between 2 and 10 bariatric patients per month.

Sleeve gastrectomy is the most performed surgery in Saudi hospitals. This result matches with data from the United States³⁷ and with the fourth International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) report in 2018, which confirmed that sleeve gastrectomy is the most performed bariatric surgery procedure in Saudi Arabia, followed by Kuwait and Australia.³⁸ The sleeve gastrectomy was reported as significantly related to nutritional deficiencies, particularly in micronutrients such as calcium, vitamin B₁₂, iron, folate and vitamin D. Furthermore, the reduction in the micronutrient's levels from baseline to post-operative could be improved or worsened based on the follow-up period.^{39,40} However, the fourth IFSO report reinforced that there are no previous explanations for choosing this procedure by Saudi surgeons and possible reasons referred to the prevalence of the procedure used in other countries.

Eighty-one percent (n = 26 out of 32) of the surveyed RDs believe in the importance of available consistent protocols to manage patients undergoing perioperative bariatric surgery. This was in agreement with reports from the bariatric RDs in the United States.⁷

The results of this study demonstrated that Saudi hospitals have written protocols for 68.8% of pre-operative patients and 75% of post-operative nutrition care services for bariatric patients. These findings are in consistent with other national previous studies⁴¹ and with similar international studies.⁷

Although most of the surveyed dietitians confirmed the availability of perioperative written protocols in their hospitals, the rest reported a nonexistence of these protocols or lack of awareness of its availability in their hospitals. RDs in the practice of bariatric surgery should not only be aware of the importance of having protocols and their existence in their institutes, but also implement the protocols related to the perioperative care because they are frequently evidenced based and are reported to improve outcomes in patients undergoing bariatric surgery.^{42–44} Moreover, perioperative protocols, including protocols for nutrition interventions, are always standardized and continuously revised and updated based on the current evidence, to progress post-operative outcomes and enhance recovery after surgery.⁹

Although no Saudi national unite for nutrition and dietetic practices was reported in some other fields of dietetic practice,³⁴ some of the surveyed RDs confirmed that they are following the A.N.D. guidelines in using the MNT and NCP-related components in nutrition care for patients undergoing bariatric surgery.¹⁴ The results of this study showed that only 12.5% of the surveyed RDs were members of the Saudi Dietetic Association, and this could answer the

Table 4. Perioperative screening for patients at nutritional risk and components of NCP (n = 32)*.

	Never		Rarely		Sometimes		Often		Always	
	n	%	n	%	n	%	n	%	n	%
Screening for patients at nutritional risk										
A healthcare team screening procedure is followed routinely before surgery to identify patients with nutrition risk	2	6.3%	4	12.5%	6	18.8%	6	18.8%	14	43.8%
A healthcare team screening procedure is followed routinely after surgery to identify patients with nutrition risk	2	6.3%	2	6.3%	6	18.8%	2	6.3%	20	62.5%
I usually categorize nutritional risk of surgical patients to correct nutrition deficiencies before surgery	4	12.5%	0	0.0%	10	31.3%	14	43.8%	4	12.5%
I usually categorize nutritional risk of surgical patients to correct nutrition deficiencies after surgery	4	12.5%	2	6.3%	6	18.8%	8	25.0%	12	37.5%
NCP components										
I complete a history, physical examination, diagnosis, monitoring and re-evaluation, for example, for failed weight loss attempts and past medical history	6	18.8%	0	0.0%	4	12.5%	2	6.3%	20	62.5%
I assess for psychological status (e.g. eating disorders) in bariatric candidates	6	18.8%	0	0.0%	8	25.0%	12	37.5%	6	18.8%
I assess for patient ability to follow and comply with all pre- and post-operative dietary and lifestyle change recommendations	6	18.8%	0	0.0%	2	6.3%	4	12.5%	20	62.5%
I document my conducted nutrition assessments and reassessments within the defined time by my hospital and according to policies	6	18.8%	0	0.0%	0	0.0%	6	18.8%	20	62.5%

NCP: nutrition care process.

n (%) shows data are presented as the number and percentages.

*Table included 100% (n = 32) of response to all questions.

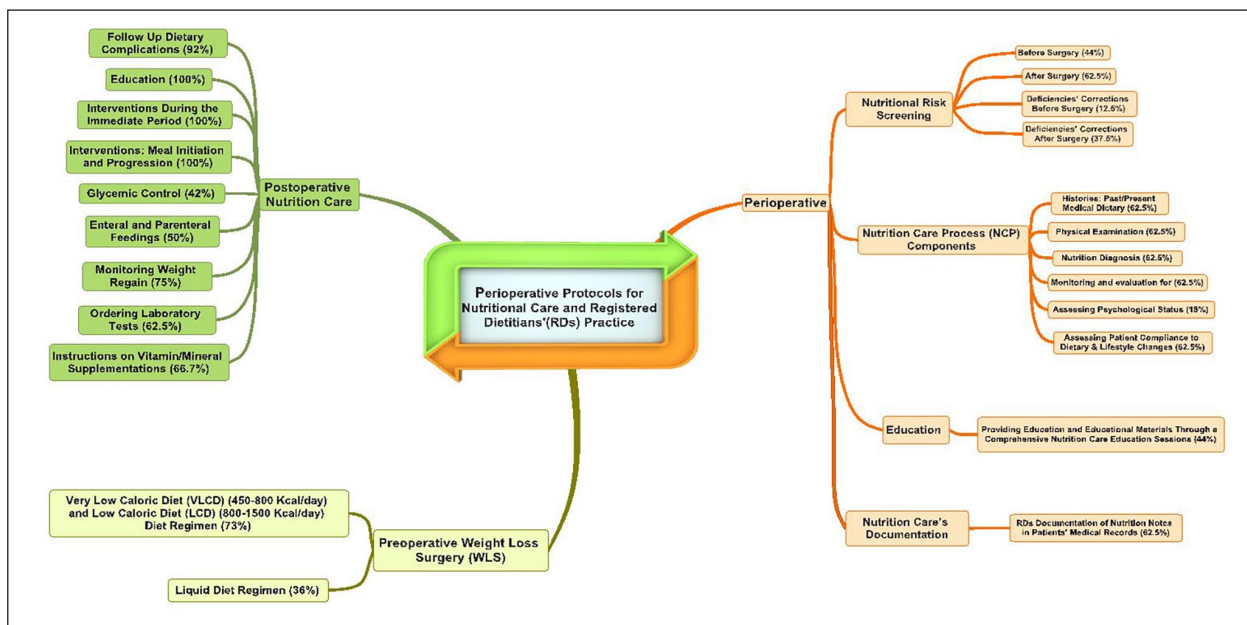


Figure 3. Mind map of nutritional care components and RDs' common practices in the scope of perioperative services for patients undergoing bariatric surgery in Jeddah hospitals (figure is original to this article).

question on why surveyed RDs have no unified guidance for their dietetic practice.

International guidelines recommend perioperative screening and comprehensive assessment to evaluate patients at

nutritional risk and modifiable risk factors, and prevent nutritional depletion in patients and complication of surgery.^{24,45,46} However, reports from the surveyed RDs showed that 12.5% of RDs do not undertake nutritional screening

pre-operatively or post-operatively to correct nutritional deficiencies and only 12.5% perform this practice before surgery, while 37.5% perform the practice after surgery.

Survey results demonstrated that the perioperative screening approach for patients at nutrition risk was not only applied by RDs but also by other healthcare professionals. This has been endorsed by other international studies.³¹

A review of studies related to clinical practice of nutrition for adult patients undergoing bariatric surgery confirmed that as part of the pre-operative preparation, clinicians should provide dietary recommendations for patients in all perioperative stages.²⁴ In addition, more than half of the surveyed dietitians reported on other practices such as dietary instructions, exercise, changes of lifestyle and vitamin and mineral supplements, which include doses, timing and precautions about overdoses.

Pre-operatively, surveyed RDs' practices counted in prescriptions for weight loss that could promote controlling of post-operative complications.⁴⁷ Surveyed RDs also reported using VLCD, LCD and liquid diet regimen as part of weight loss regimen. Although there was no previous medical evidence to prove that the pre-operative recommendations of WLS, it was recommended by either individual surgeons or programs depending on the specific needs and state of the patient. Similarly, an earlier circulation of a statement on pre-operative weight loss concluded no evidence-based reports to document benefits or necessity for a period of insurance to suggest dietary weight loss before surgery.⁴⁷

Nevertheless, some studies showed positive influence of pre-surgery weight loss on reducing post-operative complications. Recently, Martínez-Ortega et al.⁴⁶ reported in their conducted systematic literature search, which also used a critical appraisal following the SIGN and AGREE-II procedures, a support for the recommendation to use a VLCD for 4–8 weeks prior to surgery. The study was aiming to develop evidence-based guidelines for nutrition care of patients undergoing bariatric surgery.⁴⁶

Surveyed RDs (56.3%, n=18) further reported that bariatric surgeons in their hospitals provide patients advice on weight loss prescriptions, particularly on multivitamin supplements for post-operative use. This is not in agreement with the international guidelines, which confirm that the RD's role in the WLS process is part of the clinical nutrition assessment and care. The weight loss process takes account for the identification of nutritional deficiencies and in evaluating patients' abilities to adhere with nutritional alterations pre- and post-surgery.²⁴

Dietitians in Jeddah Hospitals reported that written post-operative protocols include immediate meal initiation, meal progression and management of dietary complications. Patients' health and nutrition education is also provided and included nutritional therapy as an essential part of the bariatric patients' care.

Education is important to be followed by bariatric dietetic practitioners as patients undergoing bariatric surgery in

Saudi Arabia were previously reported to be lacking general and post-bariatric nutritional awareness.⁴⁸ Saudi studies reported a significant improvement in nutrition information after providing post-operative educational session for patients.⁴⁸ However, the improvement was for short-term periods and authors recommended bariatric practitioners to deliver nutritional pre-operative educational sessions for patients who continue post-operative follow-up. This is in order to improve patients' long-term compliance to the taught dietary recommendations.⁴⁹

The Jeddah surveyed dietitians reported that MNT-based perioperative worthy practices in the scope of services were provided for patients undergoing bariatric surgery. Practices included obtaining patient medical and nutritional histories, completing nutrition assessment, defining nutrition diagnosis and monitoring and re-evaluation, for example, failed weight loss attempts and documentations on patients' medical records based on MNT and NCP components.

Using NCP could help in providing evidence-based nutrition care and improving the dietitians' critical thinking while making decisions for managing the patient's nutritional status.³¹ However, reports showed that 18.8% of Jeddah bariatric RDs had never applied any of the NCP components including assessment, diagnosing and monitoring or documenting their notes when managing their patients. This has been confirmed by other Saudi research showing that 13% of dietitians in Jeddah Hospitals were not following NCP practice in all the fields of dietetic practice and only 85% (n=35 out of 41) of RDs were using the NCP, that is, applying the process in all hospital wards.⁵⁰ The same study reported that only 26% of Jeddah Hospitals are following international regulated NCP practice and the rest (63%) are using the nutrition care system of the hospital. The reasons for not applying NCP by RDs were due to the lack of RDs numbers, less experience and training on the process and lack of following the hospital's nutrition care system. This could explain the reported diversity in applying the NCP components by the surveyed RDs in this study while managing patients undergoing bariatric surgery.

Although the NCP has been proven to better document patients' nutrition care and outcomes, standardize recorded patient data and facilitate better communication between healthcare providers,^{51–53} 18.8% of the surveyed RDs were not documenting their patients' notes and only 18.8% were often documenting their notes.

In this study, some important protocols such as conducting blood tests to define nutritional-related deficiency were only reported by RDs to be used post-operatively and no pre-operative protocols were reported to include blood tests. Although Marshall et al.⁵⁴ have highlighted in their recent systematic review and meta-analysis that post-operative support of patients undergoing bariatric surgery has positive effects on their health, and the fundamental role of dietitians has been well acknowledged during the pre- and post-operative care of bariatric patients in the literature.^{55,56}

A recent study conducted in Saudi Arabia stressed for the need of including RDs in the WLS team.⁵⁷ In this study, some of the surveyed RDs reported that the international recommendation practices such as regular follow-up, patient education and instructions on dietary progression, weight and glycemic control in addition to supplementation with vitamin and mineral were followed. This could have a positive impact on the patients' safety and satisfaction levels and about the provided services.^{8,24,25} However, contrary to expectations, this study included only six RDs specialized in the bariatric services, in which half of the RDs had 1 year or less practical experience and a quarter of the RDs were only seeing very low numbers of patients.

However, a previous Saudi research of patients' satisfaction revealed reports of 34% (n = 12 out 35) of patients with less involvement of RDs in perioperative nutrition services.⁵⁸ However, the same research confirmed that 77.8% of RDs explained nutrition care plans to their patients. Eighty-five percent of the patients found that dietitians are supportive and collaborative when managing and planning their nutritional requirements. Patients also found that the delivered information by RDs is clear and comprehensible.

Study limitations

The following are the study limitations:

- No sample size calculation was performed as the researchers had to consider all RDs in the bariatric surgery practice in Jeddah City.
- The study included RDs who are currently involved with patients undergoing bariatric surgery-related services. However, only six of them were specialized in the surveyed scope of practice and 50% of them were considered new in the field of bariatric surgery because of the 1 year or less practical experience.
- Although responses from the surveyed RDs confirmed the availability of protocols and good practices of perioperative nutrition care in Jeddah Hospitals, all the above situations could overvalue the dietitians' practices in this scope.
- The non-response from some RDs in the practice could also understand the more experienced RDs in the same practice, which should have been considered when the present survey results were interpreted.

Recommendations and conclusion

The study indicated the existence of some perioperative bariatric protocols in Jeddah Hospitals as a part of the nutrition care. However, some dietitians who practice in the field of services for patients undergoing bariatric surgery are not aware of the protocols' availability and contents. Therefore, further studies to audit the existing followed protocols and the current practice in this scope are required. This could help in unifying

the RDs' practice in the scope of services for patients undergoing bariatric surgery, particularly when the protocols for practice are standardized and guided by the national professional or governing bodies to consider updated evidence and conduct extensive education and training sessions for all RDs on procedures such as the NCP process. Practicing bariatric RDs should be permitted to join the SASMBS to access nutritional guidelines and to be always up to date with the national and international guidelines.

Researchers recommend that nutrition education services for patients undergoing bariatric surgery should be conducted by RDs. Furthermore, circumstances such as COVID-19 pandemic should not influence the RDs redeployment of the traditionally conducted face-to-face education, which could be replaced by digital communication methods of education and virtual clinics.

The adapted American-based survey was applicable to evaluate the available protocols and practices of dietitians. Nevertheless, it is expected that hospitals with specific practical service protocols for patients undergoing bariatric surgery will have better outcomes for patients, which will consequently render weight loss and its sustainability.

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Author contribution

The author has conceptualized this study, conducted the data with the help of her students under her supervision as part of their research project and as part of a larger study containing four surveys concerning nutrition care services for bariatric patients in hospitals, dietetic practice and patient satisfaction. The author constructed the study, contacted the local governing body of the profession and hospitals to related information, obtained the ethical approval of the whole study, and contacted all hospitals and dietitians for study recruitment. She analyzed and interpreted all data, wrote the original draft preparation and reviewing and edited the last version of the present work. She approved the final version of the manuscript before submission.

Declaration of conflicting interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

The ethical approval for this study was obtained from the Research Ethics Committee of the Faculty of Applied Medical Sciences, King Abdulaziz University, Ministry of Higher Education, Jeddah, Saudi Arabia on 21 October 2019 with the reference number FAMS-EC19-0010. Further ethical approvals were obtained from the Ethics Committees of some hospitals where the research study was conducted, while most of the hospitals waived further ethical approvals. The reason behind the ethical approval waiver of those hospitals was because it is a survey-based research that was completed online, has no immediate risk on the participants or their institutes and no names of participants or institutes was required. However, a basic approval by these hospitals was obtained to access hospitals and facilitate formal contacts with medical directors of hospitals and registered dietitians.

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Informed consent

RDs who agreed to participate in the study had electronically confirmed and signed agreement for participation. No allowance for further access and completion of the online survey was made for anyone who did not sign the informed consent.

ORCID iD

Elham Abbas Aljaaly  <https://orcid.org/0000-0002-0787-1875>

Supplemental material

Supplemental material for this article is available online.

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