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## Development of a Reference Guide for Primary Care Providers Caring for Post Surgical Bariatric Patients

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**Development of a Reference Guide for Primary Care Providers  
Caring for Post Surgical Bariatric Patients**

**Systems Change Project  
Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Doctor of Nursing Practice**

**St. Catherine University  
St. Paul, Minnesota**

**Donna Marie Schneider**

**May 2011**

ST. CATHERINE UNIVERSITY  
ST. PAUL, MINNESOTA

This is to certify that I have examined this  
Doctor of Nursing Practice systems change project  
written by

*Donna Marie Schneider*

and have found that it is complete and satisfactory in all respects,  
and that any and all revisions required by  
the final examining committee have been made.

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DEPARTMENT OF NURSING

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## Executive Summary

The primary care provider (PCP) plays a vital role in the post surgical follow-up care of the bariatric patient. Comprehensive care for these patients is essential for long term, successful outcomes. Primary care providers must have an understanding of the different clinical complexities these patients present.

The purpose of this system change project was to develop a reference guide to improve the PCP's ability to care for the post surgical bariatric patient. A survey was sent to 5,120 physicians and nurse practitioners in the state of Minnesota concerning the knowledge demands of post surgical bariatric care. The major elements of care included knowledge of the different bariatric procedures, their immediate post operative complications, and nutritional requirements and potential deficiencies. The survey results were analyzed and integrated into a reference guide.

## Introduction

Obesity in the United States has reached epidemic proportions. One third of American adults and sixteen percent of children are obese. These numbers are true in spite of age, sex, race, ethnicity, socioeconomic status, education level or geographic location (Center for Disease Control [CDC] 2009). Obesity is associated with multiple co-morbid conditions such as: (a) type II diabetes; (b) hypertension; (c) depression; (d) dyslipidemia; (e) sleep apnea; (f) osteoarthritis; (g) asthma; and (h) polycystic ovarian disease (CDC, 2009).

The financial expense associated with obesity is large. In 2008, obesity-related medical care costs were estimated to be as high as \$147 billion (CDC, 2011). There are other indirect costs such as loss of productivity in the work place, from morbidity and mortality (Tsuda & Jones, 2008).

Obesity is defined by the body mass index (BMI), which is a subject's weight in kilograms divided by height in meters squared ( $\text{kg}/\text{m}^2$ ). The BMI of an individual is used by health care providers to assess the degree of obesity. The categories of obesity, as determined by the BMI, are presented in the table below (Barth & Jenson, 2006).

Table 1. BMI Classification

BMI	Category	Risk for Co Morbid Conditions
<18.5	Underweight	Low
18.5-24.9	Normal	Average
25-29.9	Overweight	Mildly Increased
30-34.9	Obesity, Class I	Moderate
35-39.9	Obesity, Class II	Severe
40-49.9	Extremely Obese	Very Severe
50 or Greater	Super Obesity	Very Severe

According to the National Health and Nutrition Examination Survey (NHANES) conducted in 2005-2006, 32.7 percent of adults in the United states are overweight (BMI  $\geq$  25-29), 35.1 percent adults are obese ( BMI  $\geq$  30-35), and 6.2 percent of adults are morbidly obese (BMI  $\geq$  40) (CDC, 2011).

Thus, millions of people are obese in the United States. Solutions to the obesity epidemic vary from traditional diet and exercise to bariatric surgery.

### **Bariatric Surgery**

The first bariatric surgical procedure, the jejunoileal bypass (JIB), was developed in the early 1950's by Dr. Richard Varco at the University of Minnesota. However, due to several post surgical complications, this procedure was essentially discontinued in 1979. Because of its lower

complication rate, the gastric bypass became the treatment of choice for the morbidly obese in the early 1980's (Zundel, Maalouf, Szomstein, Caceres, & Caushaj, 2008).

Bariatric surgery is the most successful, long-term therapy for the treatment of morbid obesity (Avidor, Still, Brunner, Buchwald & Buchwald, 2007). The obesity epidemic in the United States has led to an increase in the number of people who seek and meet the criteria for bariatric surgery (Tsuda & Jones, 2008). Qualifications for bariatric surgery include a BMI of thirty- five with co-morbid conditions, or a BMI of forty or greater with or without co-morbid conditions.

Bariatric procedures are classified into three categories described in Table 2.

Table 2. Categories of bariatric surgery

Restrictive:	Malabsorptive/Restrictive:	Malabsorptive :
Adjustable Gastric Band : A hollow silicone band is placed around the top portion of the stomach. Tubing is connected to the band and port for adjustments. Inflation of the band (adjustment) is done by accessing the port which is placed just beneath the skin.	Roux-En Y Gastric Bypass (RYGB):The stomach is divided by four rows of staples. Amount of intestine bypassed varies from 75-150 cm.	Biliopancreatic Diversion/Duodenal Switch (BPD/DS): Greater curvature of the stomach is removed. A common channel is created just before the small intestine enters into the colon or large intestine. The common channel is the only portion where complete digestion and absorption of food takes place. It is 75 cm in length.
Vertical Banded Gastroplasty(VBG): Stomach is divided into two sections. These sections are linked by a narrow passage called the stoma. The small pouch makes the patient feel full. The constriction of the stoma slows down stomach emptying which gives the patients a sense of satiety.		

Sleeve Gastrectomy: The greater curvature of the stomach is removed. Weight loss is attained by restricting the amount of food/calories. Intestines are not bypassed.		
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Although these procedures are widely accepted and used, potential complications exist for the patient who undergoes any type of surgical procedure. Each type of bariatric procedure is associated with a unique set of complications. The most common bariatric surgery complications are described in the table below as related in conversations with the bariatric team at the University of Minnesota (Buchwald, Leslie, Kellogg, & Ikramuddin, personal communication, 2001-2009).

Table 3. Common Surgical Complications of Bariatric Surgery

Procedure	Complication
Adjustable Gastric Band	Erosion of band and/or port, Band becomes too tight causing concentric dilation of esophagus.
VBG	Erosion of band, obstruction (beazor), recurrent emesis.
RYGB	Anastomic leak, stricture, dumping, anemia, vomiting, food intolerance, malnutrition, vitamin deficiencies, cholelithiasis, internal hernia, ventral hernia, bowel obstruction, osteoporosis.
BPD/DS	Anastomic leak, malnutrition, vitamin deficiencies, osteoporosis, cholelithiasis, ventral hernia, bowel obstruction, chronic diarrhea, liver failure.

In addition to the procedure-specific post-surgical complications of bariatric surgery, other complications may occur such as nutritional deficits. Post- surgical bariatric patients' nutritional needs vary depending on the type of surgery performed. The nutritional needs of the patient are related to the degree of restriction and malabsorption, as well as the specific area of the intestinal tract that was altered or bypassed. In general, the absorption of individual nutrients

occurs along the small intestine (Elliot, 2006). The greater the amount of small intestine that is bypassed for weight loss, the greater the risk for nutritional deficiencies. Patients who choose the RYGB or BPD/DS are at risk for developing fat soluble vitamins (A, D, E & K), vitamin B12, folic acid, and calcium deficiencies, as well as iron deficiency anemia (Miller & Smith 2006).

Iron is absorbed in the duodenum, the majority of which is bypassed in patients undergoing the BPD/DS or RYGB procedures. The most common factor contributing to vitamin B12 and thiamine deficiencies are chronic vomiting episodes and altered anatomy as a result of bariatric surgery. Lately, there has been more interest on the part of bariatric providers in monitoring patients for vitamin B12 and thiamine deficiencies because these deficiencies can result in permanent nerve and brain damage known as Wernicke-Korsakoff syndrome (Goldenberg & Sherry 2008).

Furtado (2008), reported that nutritional deficiencies have been identified in patients who underwent restrictive bariatric procedures such as the VBG and the Adjustable Gastric Band. Since no intestinal segments are bypassed in restrictive procedures in theory, nutritional deficiencies would not be expected. Therefore, even those patients who undergo restrictive procedures need to be monitored for nutritional deficiencies.

Klok & Drent (2006) have studied neuro-hormonal mechanisms involving leptin and ghrelin that appear to play a vital role in the regulation of appetite, food intake and body weight. Research continues in an effort to understand the complex system which regulates body weight.

Ghrelin levels are decreased in fasting obese subjects and rise with induced weight loss. Leptin levels rise with adiposity, as ghrelin levels tend to fall suggesting that both are involved with long term weight regulation. Further, ghrelin is not normally suppressed in obese subjects post-prandially, but is lower in patients who have had the RYGB operation. However, Huda

et.al. (2006) have shown that ghrelin levels have not been consistently lowered in patients who have had other bypass surgical procedures. The difference may be due to surgical techniques.

### **Significance of the Project**

According to the American Society for Metabolic and Bariatric Surgery (ASMBS), the frequency of follow up “depends on the bariatric procedure performed, and the severity of co-morbidities that existed prior to surgery” (Melchanick; et. al., 2008 p. S125).

A Consensus Conference of the American Society of Bariatric Surgery was convened in 2004 in which a statement was prepared to update the 1991 NIH Consensus Statement on “Gastrointestinal Surgery for Severe Obesity.” The statement recommended that the bariatric patient minimally have three follow-up visits with the bariatric surgical team during the first post operative year (Buchwald, 2005). The frequency of follow up visits varies with the type of procedure, and how well the patient is doing. For those patients who had the VBG, annual assessment is often adequate. Regular follow up visits will be necessary for those who had the Laparoscopic Adjustable Band. Primary care physicians should continue to provide the patient’s medical care while working closely with the bariatric team (McMahohn, et.al. 2006).

Bariatric surgeons follow- up with their patients to monitor nutritional deficiencies, weight loss or gain, and resolution of co-morbidities. At the University of Minnesota, many patients are failing routine follow- up for a variety of reasons. Based on patient phone interviews, and quarterly questionnaires, reasons for not following up are: (a) the patients have achieved their goal weight, and do not feel that they need any further follow- up, (b) embarrassment that they have gained some or all of their pre-surgical weight back, and (c) lost income and, therefore, lack of health insurance coverage. These patients usually follow- up with their primary care provider or the emergency department when they are having problems post-operatively. In

“What Happens to Patients Who Do Not Follow-Up after Bariatric Surgery?” (Harper, Madam, Ternovits, & Tishansky, 2007), the authors suggest that the patient feels, from a surgical and life-style perspective, that he/she is doing well and believes that follow-up is unnecessary. Further, the patient whose progress is not what they expected, may be reluctant to return for follow-up because of a feeling of failure. Finally the patient may be dissatisfied with the results of surgery, and /or the surgeon and staff.

In 2008, the follow -up rate at the University of Minnesota was 72.0 % at three months, 48.7 % at 6 months, 39.4 % at one year, and 1.6 % at two years post bariatric surgery. The lack of follow up is a major concern for bariatric surgery providers due to the lack of ability to assess the patient long- term, monitor lab results, and monitor patient outcomes (Harper, Madam, Terovitd, & Tichansky, 2007).

Patients look to their primary care providers (PCP) for their post surgical bariatric care. This phenomenon has changed the role and involvement of the PCP when caring for bariatric patients, making it essential that providers have a more thorough understanding of bariatric surgery (Leslie, Kellogg, & Ikramuddin, 2007), Consequently, the PCP is an integral part of the bariatric team (Presuti, Gorman, & Swain, 2004). As more patients undergo bariatric surgery for management of their morbid obesity, the need for bariatric follow- up has also increased. Wherever the post surgical bariatric patient chooses to follow- up, he or she will require life-long specialty care.

There are no published guidelines, and meager information is available to help guide the care that PCPs gives to the post surgical bariatric patient. As more patients undergo bariatric surgery, and turn to their PCPs for care, PCPs will be required to have an understanding of bariatric surgery (Leslie, et., al. 2007). Providers advocate, promote, and protect the health of

their patients. This project is motivated by the values of Catholic Social Justice (2009) in protecting the rights of patients. The development of a reference guide for primary care physicians emphasizes the importance of protecting patients' health and safety, as well as the fundamental rights of human dignity and the right to health care.

### **Purpose of Systems Change Project**

The purpose of this system change project (SCP) is to develop a reference guide to improve the PCP's ability to care for the post surgical bariatric patient. The first phase of the project used a survey to gauge the knowledge level of PCPs who are physicians or nurse practitioners in the state of Minnesota about their knowledge of bariatric surgery and post-procedure management. The responses from these providers regarding their perceptions of what they need to know about bariatric surgery, how to care for post surgical bariatric patients, and the best way to receive that information, was analyzed. The results of the analysis are integrated into a reference guide. The guide will ensure that providers of care for post bariatric surgery patients have the knowledge needed to provide high quality care when the patients are not seen by a bariatric specialist.

Project objectives include:

1. Development of a reference tool for PCPs including:
  - Description of the difference between procedures.
  - Description of the potential complications of each procedure.
  - Appropriate laboratory tests for each procedure.
  - A nutritional guide for each procedure.
  - Information about when to refer to the bariatric team.

- Engaged caring for effective follow up.
2. Assessment of knowledge of PCPs regarding the post-operative care of the bariatric patient in the primary care setting to include:
    - a) Assess the knowledge of PCP about different bariatric procedures.
    - b) Assess the knowledge of PCPs pertaining to complications of bariatric surgery.
    - c) Assess the knowledge of PCPS regarding nutritional requirements of bariatric surgery.

### **Theoretical Framework**

Watson's *philosophy of interpersonal caring* incorporates the mind-body-spirit connection between life, work, and the world in which we live. Her philosophy was developed from her own values, beliefs, and perceptions about life, health, and healing (Kelley & Johnson, 2002). Watson's framework is based on the preservation of human dignity, wholeness, and integrity which is characterized by an authentic presence and choice. "Jean Watson's framework suggests the energetic nature of consciousness, and the caring consciousness emanates a quality of energy that potentiates healing" (Quinn, 2003, p. A68)

Professional nursing's individuality is personified by caring. This is paramount in today's challenging health care environment where humanistic values are constantly questioned due to nursing's work load and responsibilities. The caring attribute leads many to the profession of nursing. Sustaining this attribute in daily practice is indispensable, bringing meaning and gratification to the profession (Cara, 2009).

As a health care provider, I assess the patient's physical, emotional, spiritual, and psychosocial needs. A holistic relationship is superior when caring for complex people. Rarely is a health issue purely physiological

The term *caring* is prominent within nursing education, health care legislation and many codes of ethics. The International Code of Ethics for Nurses (ICN) has “four fundamental responsibilities: to promote health, prevent illness, restore health, and alleviate suffering” (ICN Brochure, 2005). The role of the Advanced Practice Nurse (APN) specializing in bariatrics involves upholding these four fundamental responsibilities. The creation of a reference guide is a way to educate health care providers with evidence-based information so that post surgical bariatric patients will continue to receive excellent care. The *Code of Ethics for Nurses* (ANA, 2001) and Watson’s theory grounds the systems change project in the discipline of nursing as caring is the foundation of nursing.

Providers advocate, promote, and protect the health of their patients. This SCP is motivated by the values of Catholic Social Justice (Kalb, 2009) in which one of the principles is to guarantee the rights of patients to proper care. The development of this reference guide for primary care physicians emphasizes the importance of protecting patients’ health and safety, as well as the fundamental rights of human dignity and the right to health care.

### **Ethical principles**

As more people are deciding to undergo bariatric surgery, providers must uphold the ethical principles of beneficence and non-maleficence. According to Beauchamp and Childress (1994 p.189), the principle of beneficence is defined “as a moral obligation to act for the benefit of others”, and non-maleficence is defined as “to prevent harm”. The responsibility of health care providers is to provide the best care possible.

### **Literature Review**

References relating to follow- up care of the post surgical bariatric patient by PCPs were found under the general topics of bariatric surgery, primary care physicians, primary care, health

care, behavior, patient compliance and the post operative period, in CINHALL, Pub Med, and The Cochrane Library data bases. The existing literature usually relates to specific procedures and related medical issues as opposed to the details of care of the bariatric patient by the PCP. This gap in published work creates an opportunity to develop a reference guide for primary care providers caring for the post surgical bariatric patient. The results of this literature search are presented in Table 3.

Table 4. Table of References. Primary Care/Bariatric Surgery

Author	Doolen & Miller (2005).
•Design and discipline	Case Study/Nursing
•Participant/intervention	
• Measures-instruments.	
•Results	
• Conclusions	Emphasizes the importance of long-term monitoring of nutritional, psychosocial issues that are essential for health maintenance within primary care for the post surgical bariatric patient.

<p><b>Author</b></p> <ul style="list-style-type: none"> <li>•Design and discipline</li> <li>•Participant/intervention</li> <li>• Measures-instruments.</li> <li>•Results</li> <li>• Conclusions</li> </ul>	<p>McMahon et., al. (2006).</p> <p>Surgery</p> <p>Comprehensive and collaborative care is necessary for favorable outcomes after bariatric surgery. The primary care provider should assume the overall medical care of the patient while working in close partnership with the bariatric team</p>
<p><b>Author</b></p> <ul style="list-style-type: none"> <li>•Design and discipline</li> <li>•Participant/intervention</li> <li>• Measures-instruments.</li> <li>•Results</li> <li>• Conclusions</li> </ul>	<p>Buynak (2005).</p> <p>Medicine</p> <p>Primary care physicians are becoming more involved with bariatric surgery. As bariatric surgical procedures increase, the PCP will become more involved with managing their post-operative care.</p>

<p><b>Author</b></p> <ul style="list-style-type: none"> <li>•Design and discipline</li> <li>•Participant/intervention</li> <li>• Measures-instruments.</li> <li>•Results</li> <li>• Conclusions</li> </ul>	<p>Presutti et.,al. (2004).</p> <p>Medicine</p> <p>The primary care physician needs to be educated on the bariatric procedures, complications, willing to provide lifelong monitoring and follow up care</p>
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<p><b>Author</b></p> <ul style="list-style-type: none"> <li>•Design and discipline</li> <li>•Participant/intervention</li> <li>• Measures-instruments.</li> <li>•Results</li> <li>• Conclusions</li> </ul>	<p>Lara et., al. (2005).</p> <p>Surgery</p> <p>To determine if distance traveled plays a part in follow –up compliance in post-gastric-bypass patients.</p> <p>150 participants. All patients were followed for one year. 115 patients lived &lt;50 miles, 21 patients 50-100 miles, and 14 patients lived &gt; 100 miles. Attrition started to be apparent at 3 mos post –operatively. For those patients that lived &gt;100 miles at one year were the most non-compliant.</p> <p>Utilizing the patient’s primary care physician for less crucial follow up appointments may improve compliance</p>
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<p><b>Author</b></p> <ul style="list-style-type: none"> <li>•Design and discipline</li> <li>•Participant/intervention</li> <li>• Measures-instruments.</li> <li>•Results</li> <li>• Conclusions</li> </ul>	<p>Leslie, et., al (2007).</p> <p>Surgery.</p> <p>It is essential that the internist have a strong understanding of the bariatric procedures in order to be prepared and treat possible complications.</p>
<p><b>Author</b></p> <ul style="list-style-type: none"> <li>•Design and discipline</li> <li>•Participant/intervention</li> <li>• Measures-instruments.</li> <li>•Results</li> <li>• Conclusions</li> </ul>	<p>Van Sickle, (2007)</p> <p>Surgery</p> <p>The goal of this chapter is to familiarize the PCP with a specific subgroup of bariatric surgery patients: adolescents, pregnancy and the elderly.</p>

Primary care providers today are faced with an increasingly overweight and obese patient population. After many attempts at weight loss via diet, exercise, and the use of medications, many obese patients fail to reach or approach their ideal body weight. A number of these obese patients are choosing bariatric surgery for weight loss and resolution of co-morbid conditions. Therefore, primary care providers can anticipate managing an increasing number of patients who have had bariatric surgery (Doolen & Miller, 2005).

The increase rates of bariatric surgeries over the past several years reflects the rapidly increasing number of obese individuals in today's society. More than 140,000 bariatric surgeries

were done in 2005 (Wheeler, et.al., 2008). Because more patients are undergoing bariatric surgery for management of their obesity, all clinicians (surgeon and non-surgeons) need to have some awareness regarding bariatric surgical procedures (Leslie et.al. 2007). The PCP should be comfortable identifying an appropriate surgical candidate, familiar with current bariatric procedures including its risks and benefits, in order to provide life- long follow up care for these patients. The aspects of care management requiring knowledge include nutritional program specifics, monitoring and treatment of potential vitamin deficiencies, effects of weight loss on medical co-morbid conditions, and short and long term surgical complications. When patients understand and take responsibility for following- up with their bariatric surgeon per the guidelines of the surgical practice, potentially serious medical and surgical complications are identified earlier. “Long term success of bariatric surgery relies on patients’ ability to make sustained lifestyle changes” (McMahon, et. al. 2006 S34 ).

“Inadequate post-operative follow up care is a contributing factor to the development of complications after bariatric surgery. The consequences of missed appointments can lead to the late diagnosis of complications, loss of a support network, and lack of reinforcement to follow the medical regimen” (Lara, et.al., 2005 p.20).

The ASMBS requires hospitals where bariatric surgeries are performed to be credentialed as a center of excellence. In order to maintain that status, the ASMBS states that minimally fifty percent of patients who undergo restrictive procedures, and seventy- five percent of patients who undergo the malabsorptive procedure should be followed closely for five consecutive years (Lara; et. al., 2005). Involving the PCP has been proposed for post- operative follow- up care may improve compliance (Lara; et. al., 2005).

Most patients value the importance of continuity of care, and therefore want a relationship with one physician as their PCP. The PCP relationship is central for the delivery of high quality health care. The PCP knows their patients and works with the patient in partnership (Berry et. al., 2008). Primary care physicians are in a better position to identify psychosocial problems, such as depression, which can be common after bariatric surgery (Presutii, et. al. 2004) Other complications include the increase in transference of addictions from eating to spending, gambling, alcohol, sexual promiscuity, marital discord leading to separation or divorce, and eating disorders such as bulimia (Harper, et.al. 2006).

In 2007, Avidor, et.al. surveyed 478 physicians from six specialties regarding bariatric surgery. Results show that bariatricians, endocrinologists and family practitioners have more knowledge regarding specific bariatric procedures than other medical specialties. Fifty nine percent of the respondents were interested in receiving educational material on caring for the post surgical bariatric patient. Physicians who care for the morbidly obese patient should be knowledgeable regarding present clinical guidelines for patient management, including bariatric surgery.

### **Project Design**

#### Methodology

A quantitative research design was used in this project. Data was collected through the use of a survey sent to Family Practice and Internal Medicine Physicians; Adult, Geriatric, Family Practice, Acute Care, Psychiatric and Women's Health Nurse Practitioners in the State of Minnesota. The names were obtained from the Minnesota Board of Medicine, and the Minnesota Board of Nursing. The focus of the survey was post surgical care of bariatric patients. The survey

consisted of four questions; using a Likert-type scale, three general information questions and one question to capture demographic information. One question asked in what form the reference guide should be available, i.e. paper or electronic. Another question asked if there were any other information that the health care provider thought would be beneficial for them in their practice regarding bariatric surgery. (Appendix B).

### **Resources & Budget**

Table 5: Project Budget

Item	Cost	Justification
Nurse Researcher \$50.00/HR x 20 hours	\$1000.00	Writing Reference Guide
Statistician	In Kind	
Survey Monkey	\$150.00	
Reference Guide	\$751.87	Printing for 300 copies
Total	\$3051.87	

The nurse researcher collaborated with Stanley Williams Ph.D. statistician within the bariatric division at the University of Minnesota, in coordinating the data collection and analysis advised by Henry Buchwald M.D., Ph.D.

The cost of time was the researcher's personal time. The time is calculated as if the researcher was hired as an independent contractor as an Adult Nurse Practitioner.

### **Return on Investment**

The objective is to give the PCP guidance in caring for the post surgical bariatric patient. The outcome objective is measured in the change in the patient's condition due to application of prescriptive data obtained from using the reference guide.

The return on investment of this SCP can be illustrated by the following case scenarios based upon real life experiences that occurred with this researcher.

#### *Case scenario 1:*

A patient who was six years status post duodenal switch had not been seen by the bariatric team in four years, and had not taken her fat soluble ADEK vitamins for one and a half years. The duodenal switch is a malabsorptive procedure in which the patient is susceptible to severe nutritional and vitamin deficiency especially of the fat soluble vitamins A, D, E and K (ADEK). Due to the extreme of amount of nutrient malabsorption caused by this procedure, it is absolutely essential that these patients take these vitamins three times a day for life. This patient started losing her eyesight, more specifically developed night time blindness. She followed up with her PCP who then referred her to an ophthalmologist. Her diagnosis was a severe vitamin A deficiency that required intensive vitamin A replacement, in addition to several follow up visits with the ophthalmologist. After successful treatment of her vitamin A deficiency and consequent restoration of her vision, her ophthalmologist instructed her to return to follow up with her bariatric surgical team.

In this example the total cost to the patient and insurance company was \$6,538. Not included was patient's own costs: a) sick time from work, b) gas, c) parking, and d) loss of productivity of self or employer. Had this patient seen her bariatric surgeon yearly, she would

have saved her insurance company \$6,161.00 that year. Furthermore, had her PCP followed the reference guide proposed in this project, an additional \$3,051.87 could have been saved, increasing the savings by her insurance company by \$3,486.13. The benefit of eyesight is priceless.

Case Scenario 2:

Another example is that of a patient who is a 35 year old female who is 4 years status post duodenal switch. This patient has not been seen by the bariatric team in two years. In the mean time, the patient had a left breast cyst removed by a plastic surgeon and, as a consequence of narcotic use post procedure, became addicted to prescription opioids. On several occasions the patient called the bariatric triage nurse complaining of fatigue, abdominal pain, nausea and requesting pain medication. The patient was informed by the triage nurse that an office visit was necessary to evaluate her symptoms. Instead of making an appointment, patient went to the E.R three times and was admitted to the hospital on all three occasions. After the first hospitalization the patient was discharged home on total parental nutrition (TPN). At this point the patient's PCP refused to continue to care for her as her needs exceeded his scope of practice. Subsequently, this patient came to the clinic for an office visit with the Nurse Practitioner and requested pain medications until the patient could be admitted to a drug rehabilitation program. During the clinic visit, patient complained of extreme fatigue, no interest in eating, lower extremity edema, and continual pain in left breast from left breast cystectomy. During this visit, labs were drawn and the patient was found to be severely anemic and in need of either a blood transfusion or iron infusion and possible endoscopy or colonoscopy to assess for GI bleeding. The patient was subsequently hospitalized for five days.

In this example, the total cost of all three hospitalizations was \$60,472. The total cost for total parental nutrition for sixty days was \$25,000. Post hospitalization care had a cost breakdown care of weekly home health nurse visits for sixty days was \$1,350.00 while the infusion line was in place. Other costs incurred but not described were labs while on TPN, emergency office visits, and possible infection of infusion line. The estimated cost of this example was \$100,000.00.

Again, as in the previous example, had this patient's PCP been aware of impending crisis he/she would have been able to intervene sooner. The PCP could have benefitted from the use of the reference guide and contacted the bariatric surgeon at an earlier stage to assist in

The reference guide is a resource to PCPs who provide continuous comprehensive care to the post surgical bariatric patient. The guide increases the efficiency of the PCP, keeps monies within the PCP's network, therefore increasing financial productivity for the PCP and his/her institution. By following these guidelines, PCPs will keep health care costs down, which in turn benefits the patient, the insurance company, tax payers, and hospitals. As the patient loses weight, there is a decrease in morbidity, mortality, depression, and anxiety related to their obesity. Thus, there are fewer co-pays for prescription medications, and medical follow up visits. The cost-reduction benefits both the patient and the health care industry. The reference guide is applicable to other specialties: a) internal medicine, b) pediatrics, c) obstetrics and gynecology, and d) orthopedics.

### **Ethical Considerations**

The study commenced after the approval of the Institutional Review Board from St. Catherine University. After receiving written approval, a letter stating the purpose of the study

the survey was sent to the participants electronically via survey monkey. To maintain confidentiality, only the project leader had names of the PCP's who were sent the survey. No other members of the team had access to participants' names who received the survey. No information was kept after the project was completed.

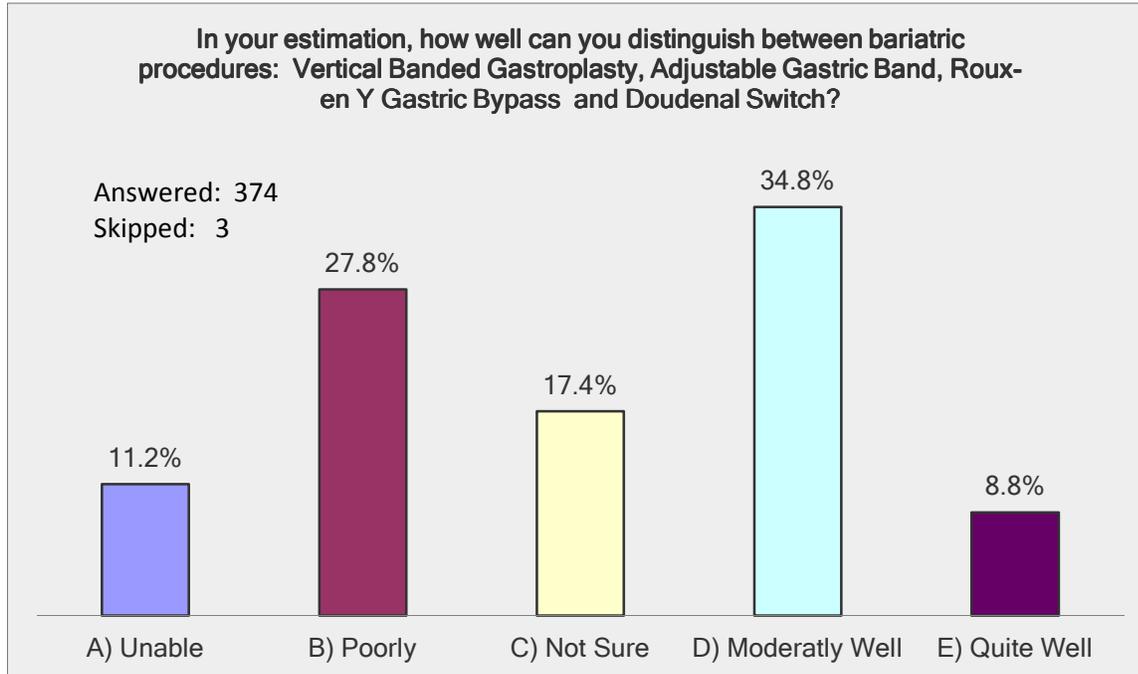
Full support was provided by my site mentor, and the Division of Bariatric Surgery at the University of Minnesota.

### Data Analysis

A total of 5,120 questionnaires were sent out. Three hundred and seventy-seven providers responded giving a 7.3% response rate. Of the 377 respondents, 54.6% were MDs, 1.4 % were DOs, and 44% were Nurse Practitioners. The largest specialty group was Family Practice (46 %) followed by Internal Medicine (13.6 %), Gerontology (4%), Hospitalist (3.7%), OB/GYN (3.7 %), and E.R (3.1 %). Sixty four percent of respondents indicated that they had referred patients for bariatric surgery.

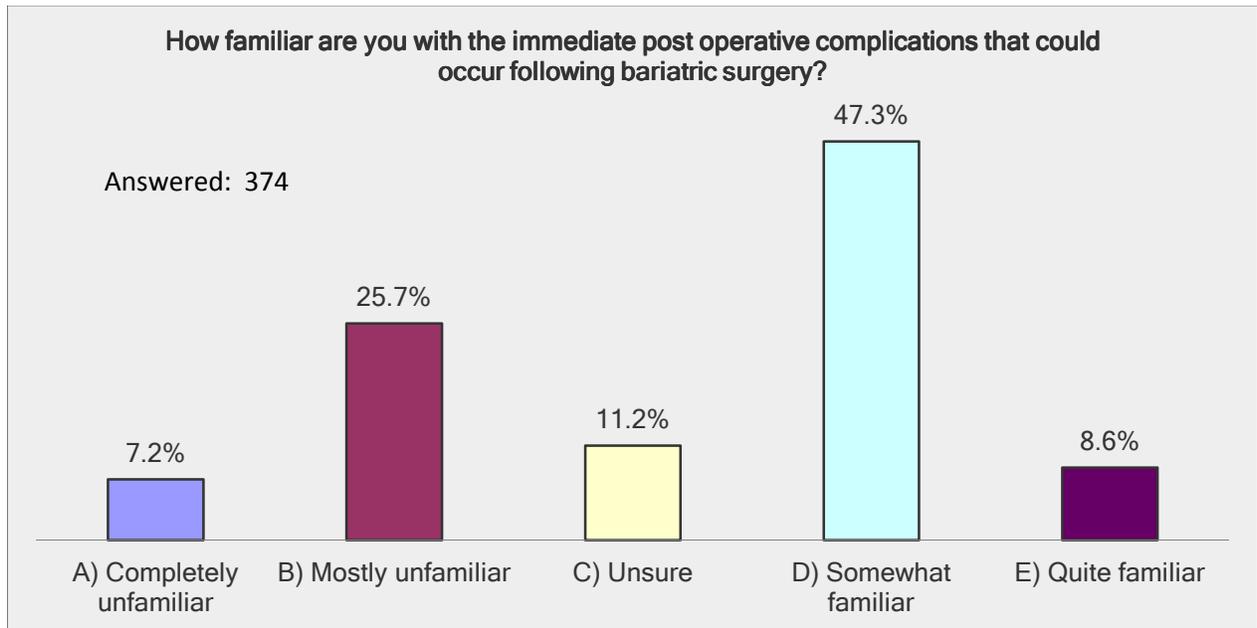
Responses to the questions are depicted in the figures that follow

Figure 1: Question 1.



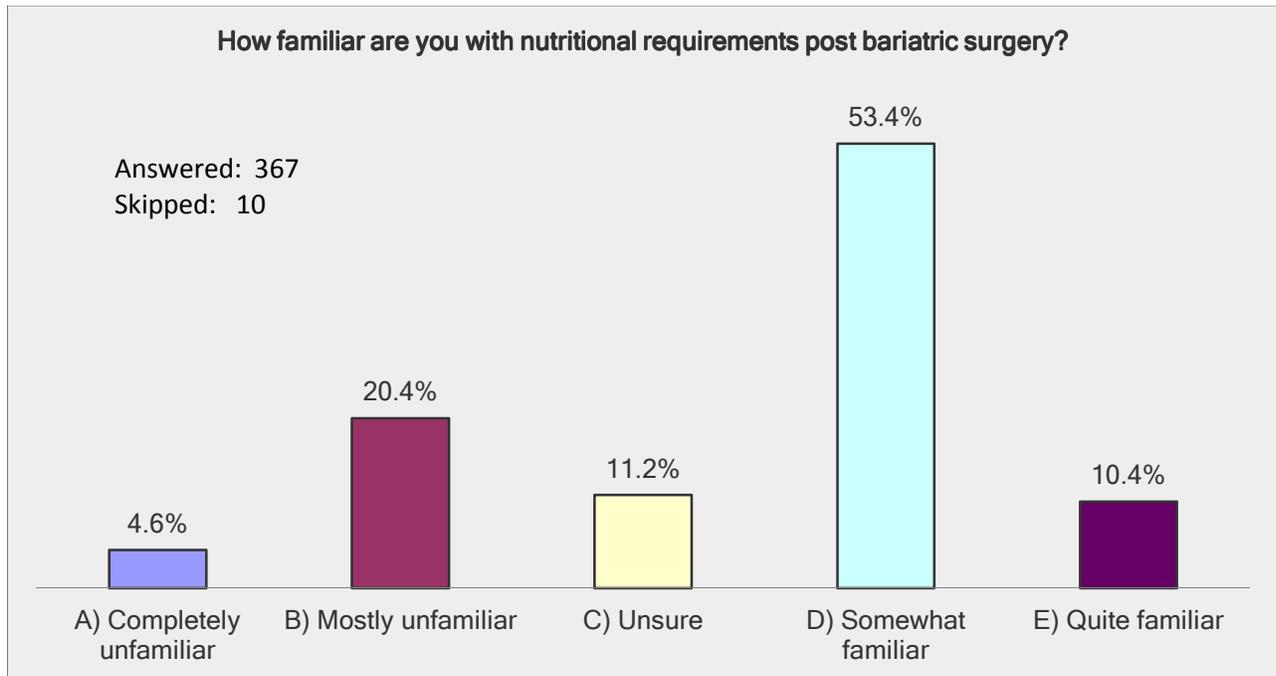
Forty - three and six tenth percent were able to distinguish moderately well and quite well between bariatric surgical procedures: (Vertical Banded Gastroplasty, Adjustable Gastric Band, Roux-En Y Gastric bypass, and Duodenal Switch). This suggests that 56.4 % of respondents cannot distinguish between the different bariatric surgical procedures. The reference guide would provide that information for them.

Figure 2: Question 2.



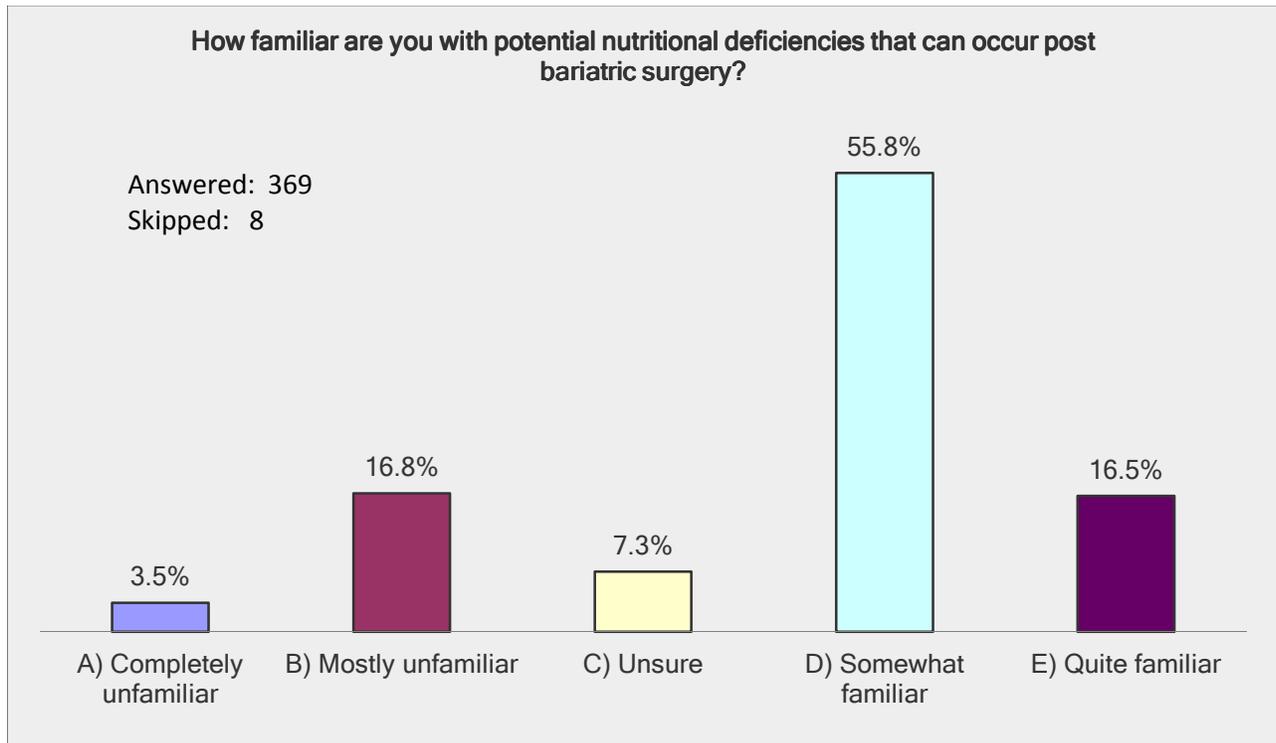
Fifty-five and nine tenths percent are either somewhat or quite familiar with the immediate post bariatric surgery complications. Accordingly, 44.1% are not familiar with the immediate post operative complications of bariatric surgery. When the patient has post operative complications and cannot be seen by the bariatric team, the patient will inevitably call their PCP for help. The reference guide will have information on how manage complications.

Figure 3: Question 3.



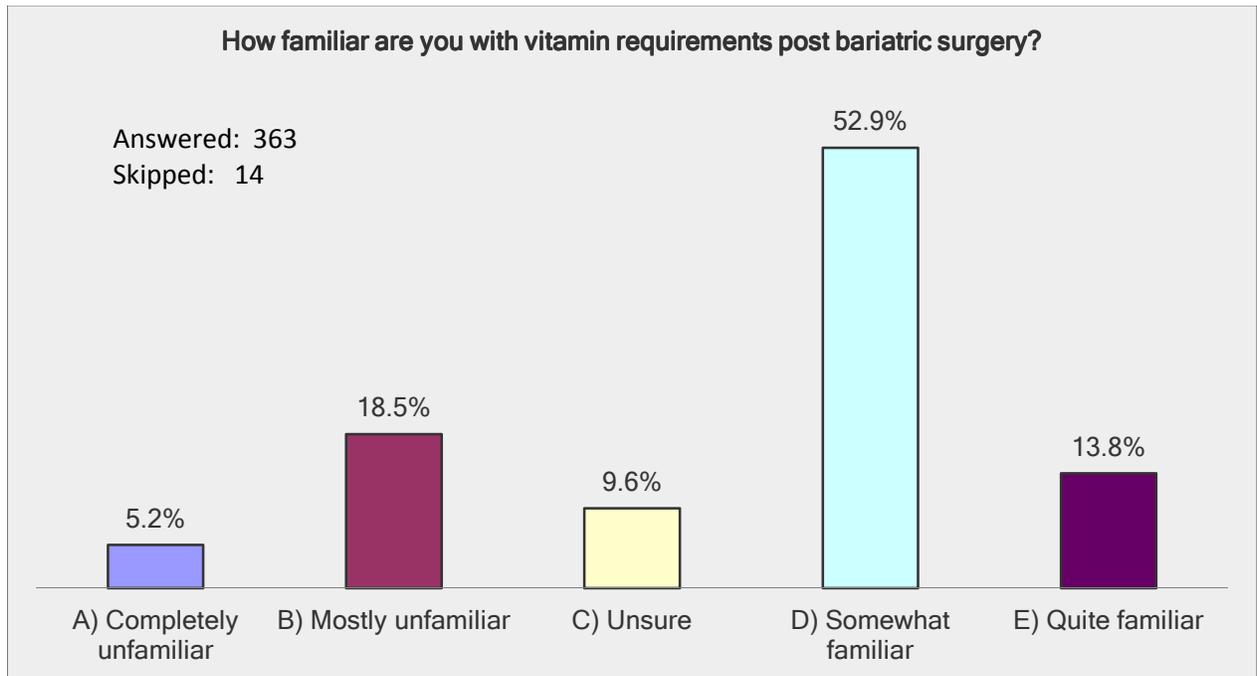
Fifty-three and four tenths percent responded that they are somewhat or quite familiar with the nutritional requirements post bariatric surgery patients. However, only 10.4% responded that they feel quite familiar with the nutritional requirements post bariatric surgery. If post surgical bariatric patients are being managed by their PCP, the PCP must understand the nutritional requirements of each procedure so that they can appropriately counsel the patient. The reference guide will give appropriate nutritional guidance for each surgical procedure.

Figure 4: Question 4.



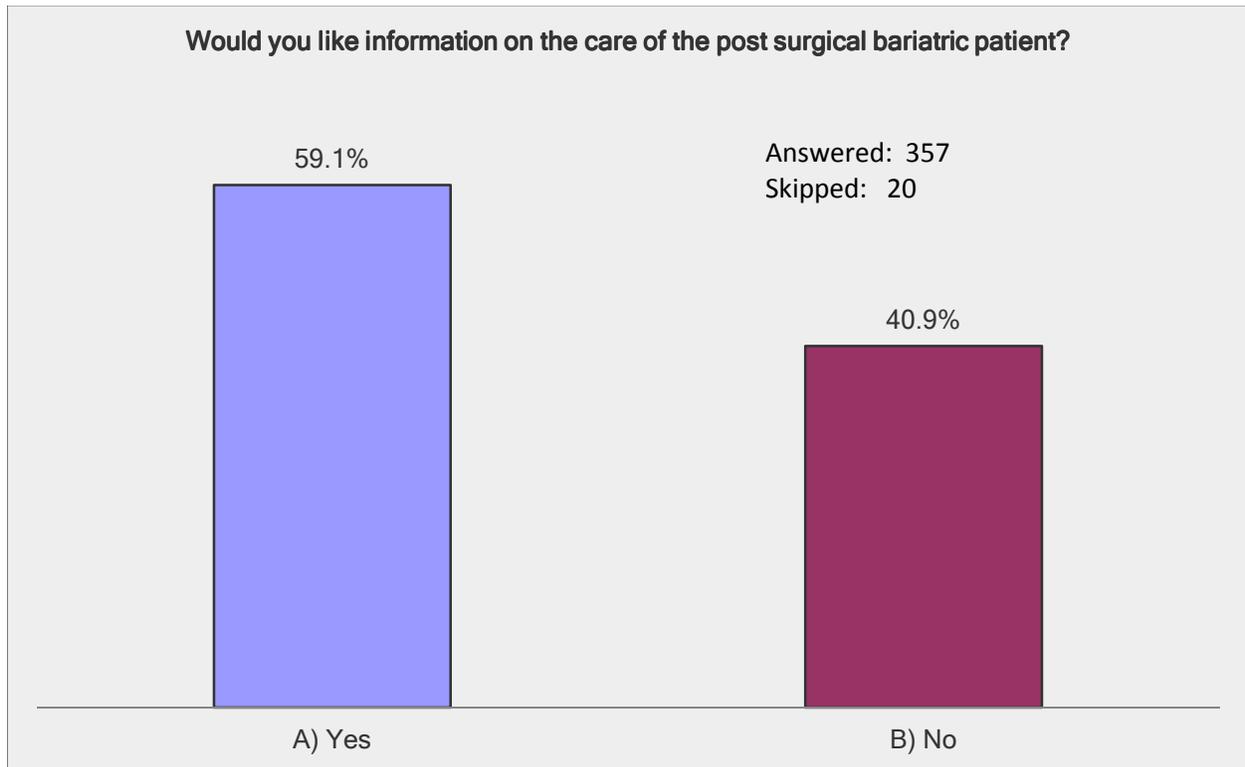
Fifty-five and eight tenths percent are somewhat familiar with the nutritional deficiencies that can occur, and 16.5% are quite familiar with the nutritional deficiencies. While the majority of respondents indicate that they have familiarity with the nutritional deficiencies related to bariatric procedures, nearly 30% of respondents are unfamiliar with the types of nutritional deficiencies that occur. This lack of familiarity can lead to poor outcomes for the patient. For example, it is important for the PCP to understand the amount of protein the patient must consume per day. The reference guide instructs that a post duodenal switch patient requires 80-100 grams of protein per day, whereas a post RNYGB patient needs only 50-60 grams/day.

Figure 5: Question 5.



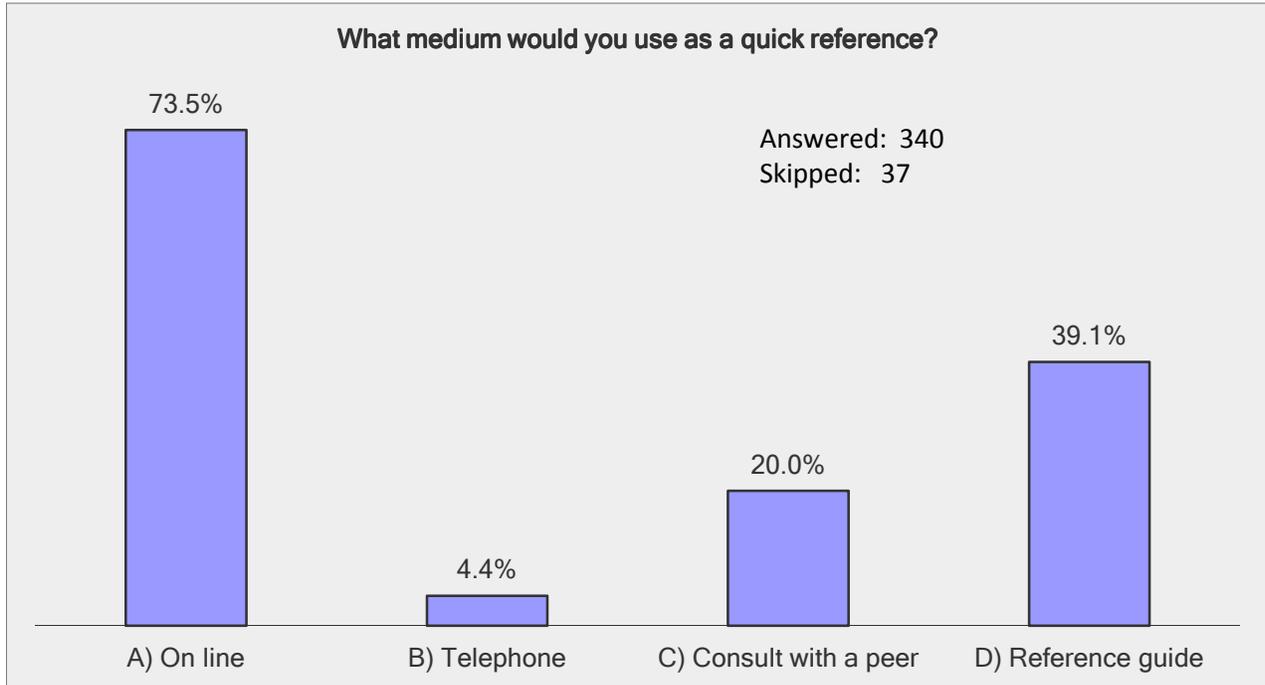
Thirteen and eight tenths percent are quite familiar with the vitamin requirements post bariatric surgery. A post duodenal switch patient risks severe vitamin deficiency especially with their fat soluble vitamins A,D,E & K (ADEK). They must take additional ADEK vitamins three times/day for the rest of their lives to prevent vitamin deficiency. Recent literature suggests that, like the Roux-en Y gastric bypass patients, they too should take vitamin B 12 supplementation (American Society of Metabolic and Bariatric Surgery, n.d. 2011). The RNYGB patients need to have vitamin B 12 supplementation daily, as well as a multivitamin twice a day. The reference guide directs the PCP as to what vitamin regimen the patient should be following based upon the type of bariatric surgery performed.

Figure 6: Question 7



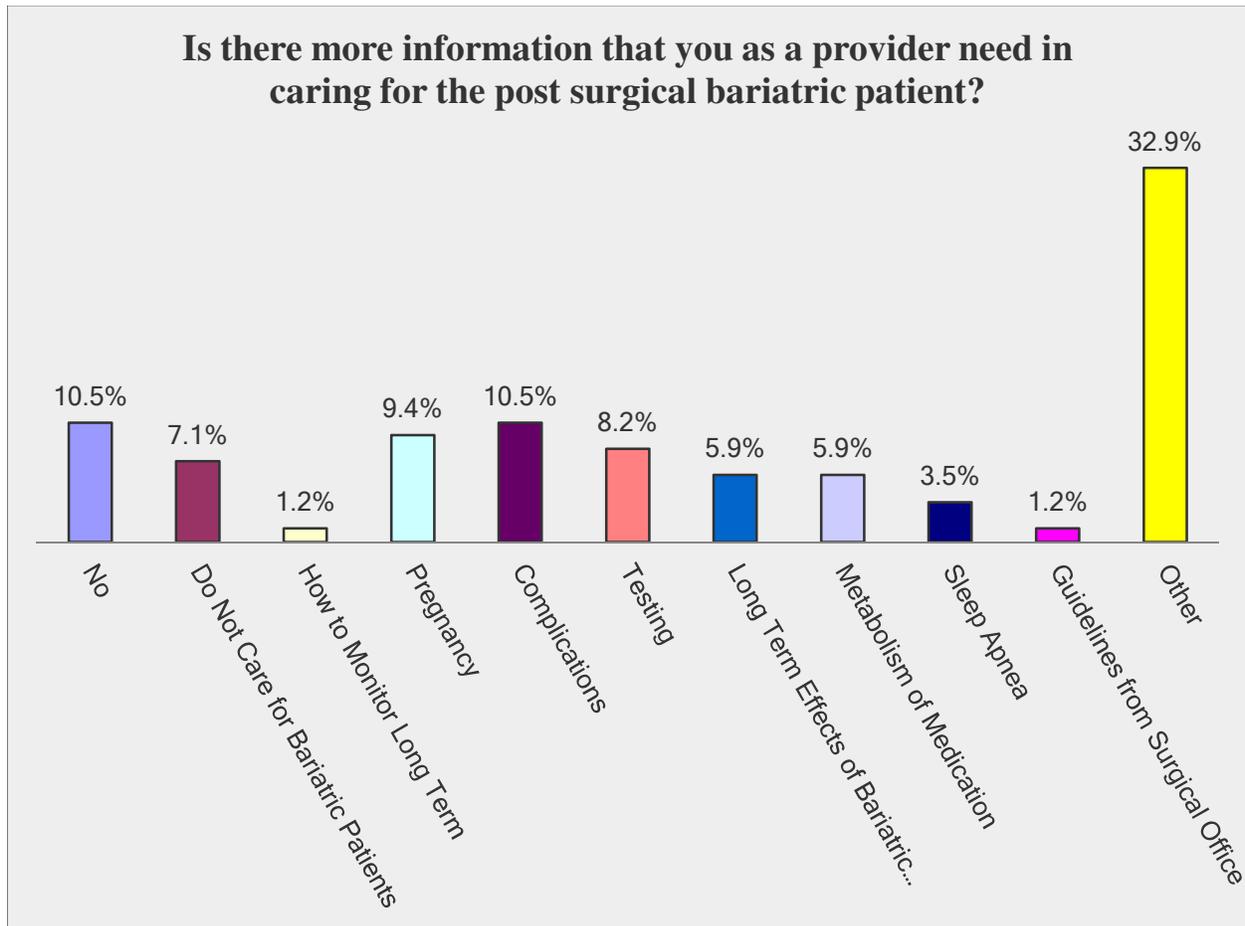
A total of two hundred and eleven respondents (59%) indicated that more information would be helpful. The reference guide can be made available on line.

Figure 7: Question 8.



Although 73.5% go on line as a quick reference, having my reference guide in printed form assures access regardless of location. For convenience, the reference guide can be made available on line.

Figure 8. Question 11



The question “Is there more information that you as a provider need in caring for the post surgical bariatric patient?” was answered by eighty-five respondents. The themes that emerged are categorized in Figure 9. The content analysis is verification that primary care providers want information on how to care for the post surgical bariatric patient.

### Evaluation

The objectives were met by the creation of my reference guide. The survey was a tool to assess the knowledge base of PCPs regarding post operative care of the bariatric patient

including complications and nutritional requirements. In addition the survey functioned as a mechanism that allowed the researcher to determine the need for a reference guide

### Discussion

Fifty-five percent of PCPs responded that they felt somewhat familiar with potential nutritional deficiencies that can occur post-bariatric surgery, and 53% felt somewhat familiar with the nutritional requirements of post bariatric surgery. The percentage of PCPs that felt they were somewhat familiar with immediate post-operative complications that could occur was 47.3% . However, only 34.8% of respondents could distinguish between the different procedures. This raises the question of whether the respondents understand what nutritional deficiencies occur with each procedure, or assume that the same deficiencies happen with every procedure. These results indicate that educating health care professionals on the care of the post surgical bariatric patient is essential, and that there is the need for a reference guide.

The Chi-squared analysis (118.93, df) suggests that the PCPs' stated ability to distinguish among bariatric procedures is strongly ( $p=0.0001$ ) associated with their estimated knowledge of the nutritional requirements post bariatric surgery.

Of the three -hundred and seventy- seven providers who responded, it is possible that those physicians and nurse practitioners who felt more familiar with bariatric procedures are those that have been in practice for 10-15 years or less. This may be because obesity has become more of a recent significant health issue; and the treatment of obesity including bariatric surgery is now being taught in medical and nursing schools.

The immediate post-operative period can lead to dehydration and possible electrolyte imbalance due to inadequate fluid intake or hyperemesis. Of concern is potential thiamine deficiency due to hyperemesis which can result in permanent neurologic and brain damage known

as Wernicke-Korsakoff syndrome. If the bariatric patient is unable to be seen by the bariatric team, the patient will call his/her PCP or go to the emergency room (ER) for treatment. It is important for the PCP and the ER physicians to know that when treating dehydration and/or hyperemesis what vitamins should be added to the IV fluids.

Pregnancy after bariatric surgery is a unique subspecialty within bariatrics and obstetrics. The PCP will need to know how much vitamin A his/her patient who had a duodenal switch is taking as too much vitamin A during pregnancy can cause birth defects. A woman who had a lap band may need to have some of the fluid removed prior to delivery. All PCPs and Obstetricians must know for any woman who goes into pre-term labor, with no uterine contractions seen on the fetal monitor, an internal hernia must be ruled out. At this point the bariatric surgeon will need to be consulted.

When the researcher sent the survey out, one response received was: "I am an E.R. physician. This does not pertain to me." The researcher found this to be an interesting response because the E.R. is where bariatric patients with abdominal pain, dehydration, and/ or intractable nausea and vomiting are sent when they are unable to be seen in clinic.

### **Limitations**

Several limitations are present in this project. The time of year that the survey was sent was during the holiday season when many providers may have been on vacation. Another limitation of the project was the number of surveys being deleted by potential respondents due to their perception that the survey was spam. In addition, the sample is representative of only one geographic area- the state of Minnesota. A limitation lies in the nature of self-assessment on knowledge. Some respondents may have overestimated the extent of their knowledge. They do not know what they do not know. A small number of respondents may also have underestimated

the extent of their knowledge. One reviewer acknowledge that regrettably, negative biases concerning obesity and/ or obese persons, exist among primary care professionals, which may explain one reason for low response rate. It is not possible to estimate the impact of such biases on the data collected.

### Conclusion

Having a reference guide available is extremely important for PCPs because, unfortunately, patients have been misdiagnosed; or suffered delayed treatment due to the lack of knowledge regarding post surgical bariatric care (personal observation). This SCP will increase the PCP's knowledge about bariatric surgery, and how to care for this population safely. If the patient can afford to follow- up with a medical provider, it will be with their PCP as most patients value the importance of continuity of care. The PCP in this relationship is central to the delivery of high quality health care.

### Recommendations

This project should be replicated not using survey monkey, but utilizing the academic research staff from place of employment. In addition, since there are many subspecialties within Internal Medicine, ideally it would be helpful to identify those PCPs who only practice primary care. Test for implicit bias.

There are multiple avenues of dissemination of the results of this SCP. This would include nursing and medical schools, physician assistant programs, professional organizations, nursing and medical journals.

The reference guide is valuable for insurance companies as a means to educate the staff in having a better understanding of the surgical procedures, nutrition, and the necessity for follow -up. In addition, the reference guide can be translated into other languages and be used on an international basis. It is a small window into the complex, intricate world of bariatric surgery.

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## Appendix A

**My name is Donna Schneider, RN, CNP a doctoral student in nursing at St. Catherine University.**

**I invite you to participate in a research project in developing a clinical reference guide that Physicians and Nurse Practitioners should find helpful in giving the special care their post-surgical bariatric patients require. I will use the results of this survey to design the reference guide as part of my doctoral dissertation.**

**Participation in this research project is strictly voluntary. The data collected will be kept confidential, will not identify you as a participant, and will be presented only as grouped data for all participants. You have the option not to not respond to any questions that you choose, and there are no known risks or benefits to you if you choose to participate. Participation or nonparticipation will not influence your current or future relationship with St. Catherine University. Submission of the completed survey questionnaire, which should take approximate 3 to 5 minutes to complete, will be interpreted as your informed consent to participate.**

**If you have any questions or concerns about completing the questionnaire or your participation in the research study, please contact me at 612-384-6909 or [dschneiderdp@gmail.com](mailto:dschneiderdp@gmail.com). My faculty advisor Dr. Valinda Pearson at 651-690-7733 or [vipearson@stkate.edu](mailto:vipearson@stkate.edu) can answer questions regarding this research. If you have other questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you may also contact John Schmitt, PhD, Chair at St. Catherine University Institutional Review Board, at (651) 690-7739.**

**I hope that you will decide to participate in this study. If you wish to participate, you can click on the following link that will take you directly to the short survey.**

**Thanking you, for your help with my research,**

**Kind Regards,**

**Donna Schneider, R.N., C.N.P**

## Appendix B

**QUESTIONNAIRE**

7. In your estimation, how well can you distinguish between bariatric procedures: Vertical Banded Gastroplasty, Adjustable Gastric Band, Roux-en Y Gastric Bypass, and Duodenal Switch?
- A) Unable
  - B) Poorly
  - C) Not Sure
  - D) Moderately Well
  - E) Quite Well
2. How familiar are you with the immediate post operative complications that could occur following bariatric surgery?
- A) Completely unfamiliar
  - B) Mostly unfamiliar
  - C) Unsure
  - D) Somewhat familiar
  - E) Quite familiar
3. How familiar are you with nutritional requirements post bariatric surgery?
- A) Completely unfamiliar
  - B) Mostly unfamiliar
  - C) Unsure
  - D) Somewhat familiar
  - E) Quite familiar
4. How familiar are you with potential nutritional deficiencies that can occur post bariatric surgery?
- A) Completely unfamiliar

- B) Mostly unfamiliar
- C) Unsure
- D) Somewhat familiar
- E) Quite familiar

5. How familiar are you with vitamin requirements post bariatric surgery?

- A) Completely unfamiliar
- B) Mostly unfamiliar
- C) Unsure
- D) Somewhat familiar
- E) Quite familiar

6. Do you refer patients for Bariatric surgery? Yes\_\_\_No\_\_\_

9. Would you like information on the care of the post surgical bariatric patient?  
Yes\_\_\_No\_\_\_

10. What medium would you use as a quick reference:

On line\_\_\_

Telephone\_\_\_

Consult with a peer\_\_\_

Reference guide\_\_\_\_\_

Other\_\_\_\_\_

11. Is there information that you as a provider need in caring for the post surgical bariatric patient.

12. Demographics:

Years of experience:

0-5 years

5-10 years

10-15 years

15-20 years

20-25 years

more than 25 years

13. Your Degree:

A) M.D.

B) D.O

C) N.P.

14. Your Specialty

Acute Care

Cardiology

Dermatology

Emergency

ENT

Family Practice

GI

Gerontology

Hematology/Oncology

Hospitalist

Immunology

Infectious disease

Internal Medicine

Neurology

Ophthalmology

Palliative Care

PM&R

Pulmonary

Psychiatric

OB/GYN

Orthopedics

Rheumatology

Surgery

Urology

15. What organization are you affiliated with?

Allina

Boynton

CentraCare

HCMC

Health East

Health Partners

Fairview

MeritCare

Mayo

North Memorial Health Care

United Health Care

V.A.

Winona Health

Prefer not to answer