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Developing Strategies for Targeted Improvement of Perioperative Education for Post-Bariatric Surgery Body Contouring Patients

Hoyune E. Cho, MD, MS¹, Kristine A. Huynh, BS¹, Matthew A. Corriere, MD, MS², Kevin C. Chung, MD, MS¹, Paul S. Cederna, MD¹

¹Section of Plastic Surgery, Department of Surgery, Michigan Medicine, Ann Arbor, MI

²Section of Vascular Surgery, Department of Surgery, Michigan Medicine, Ann Arbor, MI

Abstract

Background—The quality of perioperative patient education impacts surgical outcomes, patient experiences, and resources needed to address patient concerns and unplanned visits. We examined patient inquiries and education materials to assess the quality of perioperative education and identify areas of targeted improvement for post-bariatric surgery body contouring procedures.

Methods—We examined 100 consecutive post-bariatric procedures at an academic center. Themes of patient-generated calls, emails, and electronic medical record portal messages during the perioperative period were identified via qualitative analysis. Understandability and actionability of perioperative educational resources were assessed using the Patient Education Materials Assessment Tool (PEMAT).

Results—Among 212 communications identified, 167 (79%) were postoperative. Common themes were concerns regarding the surgical site (38%), medications (10%), and activity restrictions (10%). 130 inquiries were resolved through patient re-education (57%) but 36 (16%) required in-person evaluation including 4 unplanned emergency department visits and 3 readmissions for surgical-site concerns. PEMAT scores for institutional materials were fair for understandability (69%) and actionability (60%). American Society of Plastic Surgeons materials were more understandable (84%) but less actionable (40%).

Conclusion—Patient queries can be leveraged as a source of qualitative data to identify gaps in perioperative education. High-yield topics, such as education regarding the surgical site and medications, can be targeted for quality improvement through better communication and potentially reduce the number of unnecessary visits. Using the PEMAT, we also identified how directly the education materials can be revised. Improving perioperative education can promote mutual understanding between patients and surgeons, better outcomes, and efficient resource utilization.

Keywords

quality improvement; electronic health records; body contouring; teaching materials; patient education; surgical outcome

The efficiency of health care delivery is a key component of improving value in the current U.S. health care system.^{1,2} Medical societies and policymakers have called for strategies that will increase quality and simultaneously reduce the volume and cost of care.^{2–5} Most surgical quality improvement initiatives focus on clinical outcomes with limited insight into process factors that are potentially important and influential.^{6,7} Because both outcomes and processes factor into quality,^{8,9} process improvement has potential to improve value.¹⁰ Attention to process measures can identify gaps in both patient and provider adherence to recommended practices, allowing insight into where opportunities for improvement exist.¹¹

Process measures have demonstrated impacts on both surgical outcomes and patient experiences.¹² If instructions are hard to understand, it will be difficult for patients to follow them correctly. These circumstances may generate additional encounters, financial costs, and administrative burdens by demanding precious time and energy from health care providers. Waste related to unnecessary (and potentially avoidable) encounters caused by gaps in patient preparation contribute to low-value care. It is estimated that 56% of emergency department (ED) visits are potentially avoidable, and that unnecessary uses of health care services cost approximately \$750–935 billion per year.^{13–16} Process improvements related to patient education and preparation prior to surgery represents a potentially high-yield opportunity to increase value through targeted interventions.

The purpose of this study was to assess the quality of perioperative patient education in plastic surgery by examining patients' perioperative communications for post-bariatric surgery body contouring procedures. In addition, we will evaluate the quality of patient education materials as both printed and online resources, which are often utilized to supplement in-person care.¹⁷ We will leverage patient queries as a source of rich qualitative data to identify the common issues and concerns for patients that lead to patients calling the office or visiting the ED during the perioperative period. Our study results will help identify the mismatch between education provided and the patients' understanding, which can be utilized as high-yield topics for targeted improvements in perioperative patient education to promote improved outcomes and efficient use of resources. We hypothesize that the most common reason for patients to call the office or visit the ED would stem from misunderstandings of normal wound healing process.

Patients and Methods

Study Cohort

We selected 100 consecutive cases of elective post-bariatric surgery body contouring procedures including abdominoplasty (Current Procedural Terminology code 15847 with or without 15830), panniculectomy (15830), brachioplasty (15836), thighplasty (15832), mastopexy (19316), and breast reduction (19318 with or without 19316) at a large tertiary academic center from July 1, 2018 to January 31, 2019. We excluded cases with lengths of stay >23 hours to ensure a homogenous case mix. When there were multiple procedure codes per patient on the same day, we regarded it as one patient-case to prevent overestimation of case count. This study was determined exempt by the Institutional

Review Board as secondary research without requirement for informed consent (IRBMED: HUM00165462).

Qualitative Data Collection and Analysis

Two investigators (H.E.C. and K.A.H.) abstracted medical records to identify patient-generated communications such as telephone calls, emails, and patient portal messages through the electronic medical records during the perioperative period. A series of communications between a patient and a provider was considered a single communication-encounter if they pertained to the same concern. For example, if a patient called about uncontrolled pain and had 3 phone calls with the provider regarding that single concern, we counted this as one communication-encounter. Each patient-generated communication-encounter was coded independently by two investigators using a deductive qualitative approach to identify emergent themes. Any discrepancies in coding were discussed to reach consensus iteratively. From each encounter, we abstracted the date of communication, type of inquiry (e.g. question (asking for direction), request (expressing need for a specific item), or report (mention of symptom or event without question or request)), subject of inquiry (e.g. surgical site erythema, scheduling, and medication refills), and encounter resolution (e.g. question answered, office visit scheduled, visit to the ED, and readmission). Of note, pain was classified as a symptom rather than a surgical site issue; we defined surgical site issues as limited to the appearance of the surgical site. When a patient called with more than one question or concern, for example, wound swelling and medication refill, we considered this as one communication-encounter but included both codes in our data to prevent overestimating the number of patient inquiries. Similarly, to accurately capture how each communication was managed, all responses were captured; thus, it was possible to have multiple resolutions associated with a single communication-encounter. For instance, if a patient reported surgical site erythema and drainage and the provider prescribed antibiotics (call to pharmacy) and advised patient to come to the ED for an evaluation, we coded this communication with codes “intervention-antibiotics” and “advised to ED.”

Additionally, we collected information on demographic characteristics, date of preoperative visit, date of surgery, and date of the postoperative follow-up visit. We defined the preoperative period as the time between the outpatient visit for the preoperative history and physical and surgery, and the postoperative period as the time between the hospital discharge and first scheduled postoperative follow-up appointment. If the first postoperative visit entailed drain removal by the nursing staff and did not include an encounter with the surgeon, we considered the next follow-up visit date as the end of perioperative period. Descriptive statistics are displayed as mean \pm standard deviation (SD) for continuous variables and count (%) for categorical variables.

Evaluating Patient Education Materials

We used the Patient Education Materials Assessment Tool (PEMAT) from the Agency for Healthcare Research and Quality (AHRQ) to assess the quality of patient education materials¹⁸ that are currently used at our institution and those available on the American Society of Plastic Surgeons (ASPS) website. With strong internal consistency, reliability, and construct validity, PEMAT evaluates the understandability (how well patients of diverse

backgrounds and levels of health literacy can process and explain key messages) and actionability (identifying what they can and need to do based on the presented information) of both print and audiovisual educational materials.^{19,20}

The PEMAT offers separate scoring algorithms for printed materials and audiovisual materials (Appendix 1), based on clarity of purpose, organization, and difficulty of content.²¹ For printed materials, there are 19 parameters to evaluate understandability (content, word choice and style, use of numbers, organization of material, layout and design, and use of visual aids) and 7 parameters to measure actionability (breaking down actions to explicit, manageable steps). Similarly, for audiovisual materials, there are 19 parameters on understandability and 4 parameters on actionability. An evaluator reviews the patient education material and assigns a score for each parameter; 1 if the requirement is satisfied, 0 if inadequate, or no-score if the parameter does not apply. For example, for the parameter “clear description of purpose” - a pamphlet on screening mammograms will receive a score of 1 if titled “what will happen during your mammogram,” 0 if titled “mammogram and you.” Then the sum of these scores are divided by total possible points separately for understandability and actionability, and multiplied by 100 to produce a percentage score. The parameters with no-scores do not contribute to the total number of possible points. Because each of the printed and audiovisual patient education material can have different total possible points, PEMAT is designed to produce a percentage score. Educational materials with higher percentage scores are considered to be more understandable and actionable. For our study, two investigators (H.E.C. and K.A.H) independently scored the patient education materials. Any discrepancies in scores were discussed to reach agreement.

Results

Patient and Procedural Characteristics

One hundred post-bariatric surgery body contouring patient-cases were included. Procedure categories included 43 breast reductions, 24 mastopexies, 22 abdominoplasties and panniculectomies, 4 brachioplasties, and 4 thighplasties. Three patient-cases involved more than one body contouring procedure during the same operative procedure. Most patients were women (N = 98), white/Caucasian (83), and non-Hispanic (96), with mean age of 47.3 ± 14.6 years. The mean distance from the patient’s home address to the medical center was 40.1 ± 51.9 miles. 3 patients traveled a distance of more than 900 miles and were excluded from the distance calculation but their perioperative communications were included in our thematic analysis (Table 1). The mean duration of preoperative period was 23.8 ± 21.2 days, versus 20.0 ± 17.0 days for postoperative period.

Thematic Analysis Results

We found that 212 communications were generated by 77 patients; the remaining 23 patients made no inquiries outside of their scheduled preoperative and postoperative visits. The overall mean number of communications generated per patient was 2.1 ± 2.1 , and 2.8 ± 2.1 among those who generated any communication. The total number of communications per patient ranged from 0 – 11. A majority of the communications (167, 79%) were initiated during the postoperative period. Brachioplasty (N = 2.8/patient) and breast reduction (N =

2.8/patient) were the procedures with the most inquiries (11 inquiries from 4 brachioplasties and 120 inquiries from 43 breast reductions) (Table 2). Nearly half of the communications (45.8%) were related to patients asking for clarification or direction; 37.7% were reports (e.g. 30ml of drain output) and 16.5% were specific requests (e.g. refill of pain medications).

Nearly half of communications (44.8%) involved multiple themes (e.g. one phone call asking about the surgical site and medications). The most common themes were concerns regarding the surgical site (37.6%), medications (10.1%), and postoperative activity restrictions (10.1%) (Table 3). Subthemes related to the surgical site queries included erythema (20.3%), dressings and site care (17.9%), drains (16.3%), edema (13.8%), and drainage (11.4%). Among medication-related inquiries, opioid pain medications were the most common subtheme (30.3%), followed by home medications (24.2%), over-the-counter medications (18.2%), and refill requests (12.1%). Among symptom-related communications, postoperative pain was the most common subtheme (19/24; 79.2%). Provider responses to pain complaints included offers for in-person evaluation (N = 6), prescription of additional opioid pain medications (3), and recommendation to try over-the-counter pain medications (2). Among 54 documented concerns during the preoperative period, the majority were questions about the surgical procedure (20/54, 37.0%) (Table 3).

More than half of all inquiries during the perioperative period (56.5%) were resolved with patient re-education. However, 36 (15.7%) communications resulted in scheduling of a previously unplanned outpatient visit for in-person evaluation and 7% required an additional treatment intervention, such as prescribing an antibiotic (N = 7) or an opioid analgesic (3). There were 6 patient-generated communications related to emergency services. For 2 instances, patients reported surgical site concerns (erythema and concerns with the sutures) and were advised to present to an ED for further evaluation but patient did not follow recommendations. In the other 4 communications, the patients presented to the ED for further evaluation: 1) one patient was seen in a local ED for surgical site erythema and received oral antibiotics; 2) one patient was diagnosed with a large hematoma requiring an operative washout; 3) one patient had cellulitis and fluid collection requiring intravenous antibiotic administration and drainage; and 4) one patient had leg pain which ultimately was diagnosed as an acute deep venous thrombosis requiring readmission (Tables 3, 4).

Quality of Patient Education Materials

Institutional patient educational materials were available in print for 4 out of 6 post-bariatric surgery body contouring procedures included in this study (abdominoplasty, panniculectomy, brachioplasty, and breast reduction). Only one educational video was available, for breast reduction. The ASPS website had printable materials for all 6 procedures and instructional videos for abdominoplasty, brachioplasty, breast reduction, and mastopexy. All 15 entities of educational materials were assessed for understandability and actionability using the PEMAT worksheet from AHRQ (Appendix 1).

Overall, the understandability scores were consistently higher than actionability scores across all 15 educational materials assessed. The printable materials from the ASPS website had equal or higher understandability scores (mean 83.9%) compared to those from our institution (mean 69.2%), but lower actionability scores (40.0% vs 60.0%). The institutional

audiovisual materials were more understandable than any of the institutional or ASPS printed materials, with a score of 91.7%. Regarding actionability, our institution's video on breast reduction had a higher score (66.7%) than the mean score (41.7%) of the videos on the ASPS website. In fact, the 3 videos on abdominoplasty, brachioplasty, and breast reduction had the poorest actionability scores (33.3%) among all education materials (Table 5, Appendix 2).

Discussion

In this study, we abstracted 100 consecutive cases of post bariatric surgery body contouring procedures to examine the quality of perioperative patient education by identifying the concerns patients most frequently inquired about. Consistent with our hypothesis, surgical site was the most common theme of patient-generated communications and most inquiries arose during what was deemed a normal wound healing process. Medications and postoperative activity restrictions were other common themes. These observations reveal the areas of mismatch between the education provided from the surgeons' perspective and the information received from the patients' perspective. It should be noted that information about all three of these topics was provided in the patient educational materials. Therefore, our study suggests that gaps in patient education are primarily related to how the information is presented and explained, rather than missing content. The understandability and actionability scores of the educational materials evaluated suggest that there is room for improvement, because documents with appropriate health literacy demands will typically score higher (70% - 90%) according to the AHRQ and the Centers for Disease Control and Prevention.^{19,21} Furthermore, our results demonstrate that despite the efforts by the American Medical Association and the National Institutes of Health to develop health education materials that patients can easily understand and act upon, the quality gap persists.^{20,22}

Previous studies evaluating the quality of patient educational materials have reported similar findings, with most materials assessed lacking readability, understandability, actionability, and clarity.²²⁻²⁶ For instance, Maciolek et al. found that online educational materials on transrectal ultrasound-guided prostate biopsy were too complex and difficult to follow.²⁵ Similarly, Tran et al. evaluated educational materials from the National Comprehensive Cancer Network and concluded that the materials were not suitable for the average adult population.²² Even studies that solely focused on readability measure reported that the materials were too verbose and contained too much confusing medical jargon.^{17,27,28} Our study evaluated patient educational materials in plastic surgery and identified similar gaps in the content and the process of delivering education to patients. These results support the need to revise these materials from a patient-facing perspective and suggest several topics that would be high yield to target specifically.

Several limitations of this study warrant specific mention. First, our PEMAT scores were generated by surgical trainees rather than patients, and therefore may be conservatively biased. That is to say, we may have overestimated the understandability and actionability of the educational materials. Nevertheless, our conclusions regarding the suboptimal quality of the educational materials remain valid as the PEMAT scores would have been lower

had a patient performed the assessment. Second, the PEMAT instrument is not designed to evaluate accuracy of medical information in the educational material.¹⁸ No issues related to accuracy were identified through this analysis, but medical accuracy was not an *a priori* goal. Additionally, we did not evaluate other sources of information that patients sought out independent of the educational materials provided. Lastly, our study cohort was based on cases performed at a large, academic tertiary medical center with a wide catchment area. Our findings therefore should be interpreted from this perspective and are not necessarily generalizable to other specialties or practice environments.

These limitations aside, this study which was designed to assess the quality of perioperative patient education has direct applicability to domains of health care quality defined by the Institute of Medicine, including effectiveness, patient-centeredness, safety, and efficiency.²⁹ Reduction in the number of telephone calls and unplanned ED visits will facilitate efficient and effective use of resources such as decreasing unnecessary and redundant use of clinical staff's time and energy. Moreover, improving the quality of patient education materials will improve patient understanding and adherence to perioperative care instructions, which will lead to better patient outcomes.³⁰ These results therefore provide examples of several opportunities to improve the value of care for patients, payers, and providers through low-risk, low-cost refinements of educational materials and processes.³¹ Future work will evaluate refined educational materials and related effects on communication and unplanned visits.

From examining patient-generated communications in the perioperative period for body contouring procedures, we identified wound healing, postoperative activity restrictions, and medication management as the high-yield topics of perioperative care to prioritize in targeted quality improvement efforts. Direct identification of the quality gap and addressing the mismatches in content and delivery of patient education will aid surgeons and policymakers as they optimize the efficient use of resources by increasing value and decreasing costs of surgical care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Patient Demographic Characteristics

	N (Total = 100)
Gender	
Female	98
Male	2
Race	
White	83
Blacks	10
Asian	3
American Indian or Alaskan Native	2
Other	2
Ethnicity	
Non-Hispanics	96
Unknown	4
	Mean (SD)
Age (years)	47.3 (14.6)
Distance Traveled* (miles)	40.1 (51.9)

* Excluded in calculation 3 patients with distances over 900 miles.

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Table 2.

Number of Communications Per Procedure Type

Procedure Type	Number of Patients	Number of Communications	Mean Number of Communications per Patient
Abdominoplasty/Panniculectomy	22	36	1.6
Brachioplasty	4	11	2.8
Thighplasty	4	8	2.0
Mastopexy	24	33	1.4
Breast Reduction	43	120	2.8
Abdominoplasty/Panniculectomy + Thighplasty	1	1	1.0
Abdominoplasty/Panniculectomy + Brachioplasty	1	1	1.0
Mastopexy + Breast Reduction	1	2	2.0

Table 3.

Encounter Subject Matter by Time Period

Subject	Preoperative Period	Postoperative Period	Total
	N (%)	N (%)	N (%)
Surgical Site			
Erythema	0 (0.0)	25 (9.2)	25 (7.6)
Dressing	1 (1.9)	21 (7.7)	22 (6.7)
Drain	0 (0.0)	20 (7.3)	20 (6.1)
Edema	0 (0.0)	17 (6.2)	17 (5.2)
Drainage	0 (0.0)	14 (5.1)	14 (4.3)
Sutures	0 (0.0)	8 (2.9)	8 (2.4)
Bleeding	0 (0.0)	7 (2.6)	7 (2.1)
Bruising	0 (0.0)	5 (1.8)	5 (1.5)
Wound Management	0 (0.0)	1 (0.4)	1 (0.3)
Unspecified	0 (0.0)	4 (1.5)	4 (1.2)
Medications			
Opioids	0 (0.0)	10 (3.7)	10 (3.1)
Home Meds	4 (7.4)	4 (1.5)	8 (2.4)
Over the Counter	2 (3.7)	4 (1.5)	6 (1.8)
Refills	0 (0.0)	4 (1.5)	4 (1.2)
Pharmacy	0 (0.0)	1 (0.4)	1 (0.3)
Unspecified	0 (0.0)	3 (1.1)	3 (0.9)
Antibiotics	0 (0.0)	1 (0.4)	1 (0.3)
Postoperative Activity Restrictions	4 (7.4)	29 (10.6)	33 (10.1)
Drain Output	0 (0.0)	31 (11.4)	31 (9.5)
Scheduling	6 (11.1)	22 (8.1)	28 (8.6)
Symptoms			
Pain	0 (0.0)	19 (7.0)	19 (5.8)
Dizziness	0 (0.0)	3 (1.1)	3 (0.9)
Nausea	0 (0.0)	1 (0.4)	1 (0.3)
Constipation	0 (0.0)	1 (0.4)	1 (0.3)
Procedure	20 (37.0)	2 (0.7)	22 (6.7)
Employment	6 (11.1)	10 (3.7)	16 (4.9)
Other Unrelated Medical Problems	5 (9.3)	5 (1.8)	10 (3.1)
Preoperative Clearance	5 (9.3)	0 (0.0)	5 (1.5)
Insurance	1 (1.9)	0 (0.0)	1 (0.3)
DVT/PE	0 (0.0)	1 (0.4)	1 (0.3)
Total	54 (100.0)	273 (100.0)	327 (100.0)

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Table 4.

Encounter Resolutions by Time Period

Subject	Preoperative Period	Postoperative Period	Total
	N (%)	N (%)	N (%)
Patient Re-Education			
Questions Answered	31 (68.9)	45 (24.3)	76 (33.0)
Patient Instructed	1 (2.2)	20 (10.8)	21 (9.1)
Patient Reassured	5 (11.1)	28 (15.1)	33 (14.3)
Outpatient Management			
Clinic Visit Offered	0 (0.0)	8 (4.3)	8 (3.5)
Clinic Visit Scheduled	0 (0.0)	36 (19.5)	36 (15.7)
Request Fulfilled	6 (13.3)	17 (9.2)	23 (10.0)
Emergency Services			
Advised to ED	0 (0.0)	2 (1.1)	2 (0.9)
Presented to ED	0 (0.0)	4 (2.2)	4 (1.7)
Readmission	0 (0.0)	3 (1.6)	3 (1.3)
Intervention			
Antibiotics	0 (0.0)	7 (3.8)	7 (3.0)
Opioids	0 (0.0)	3 (1.6)	3 (1.3)
Drain	0 (0.0)	2 (1.1)	2 (0.9)
Imaging	0 (0.0)	2 (1.1)	2 (0.9)
Steroids	0 (0.0)	2 (1.1)	2 (0.9)
Deferred to Other Services	1 (2.2)	3 (1.6)	4 (1.7)
None Recorded	1 (2.2)	3 (1.6)	4 (1.7)
Total	45 (100.0)	185 (100.0)	230 (100.0)

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Table 5.

PEMAT Scores for Printed and Audiovisual Patient Education Materials

	Understandability Score (%)	Actionability Score (%)
Printed Materials		
<i>Institutional</i>		
Abdominoplasty	61.5	60.0
Brachioplasty	76.9	60.0
Breast Reduction	69.2	60.0
Panniculectomy	69.2	60.0
<i>ASPS</i>		
Abdominoplasty	87.5	40.0
Brachioplasty	87.5	40.0
Breast Reduction	87.5	40.0
Mastopexy	87.5	40.0
Panniculectomy	76.9	40.0
Thighplasty	76.9	40.0
Audiovisual Materials		
<i>Institutional</i>		
Breast Reduction	91.7	66.7
<i>ASPS</i>		
Abdominoplasty	91.7	33.3
Brachioplasty	91.7	33.3
Breast Reduction	91.7	33.3
Mastopexy	91.7	66.7

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