GAVIN PUBLISHERS

Plastic Surgery and Modern Techniques

Ogu US, et al. Plast Surg Mod Tech 2: 130.

DOI: 10.29011/2577-1701.100030

Communication

Advancing Outcomes in Plastic Surgery with Immunonutrition and Standardized Pre-Operative Wellness Education

Uchechukwu Stanley Ogu*, Cori Rogers, Vinayak Gupta, Nancy Strange, William A Wooden

Division of Plastic Surgery, Department of Surgery, Indiana University, Indianapolis, USA

***Corresponding author:** Uchechukwu Stanley Ogu, Division of Plastic Surgery, Department of Surgery, Indiana University, Indianapolis, USA. Tel: +13172780394; Email: usogu@iu.edu

Citation: Ogu US, Rogers C, Gupta V, Strange N, Wooden WA (2017) Advancing Outcomes in Plastic Surgery with Immunonutrition and Standardized Pre-Operative Wellness Education. Plast Surg Mod Tech 2: 130. DOI: 10.29011/2577-1701.100030

Received Date: 26 August, 2017; **Accepted Date:** 22 September, 2017; **Published Date:** 28 September, 2017

Communication

Surgery is not without risks, as anywhere between 20-50% [1] of patients experience post-operative complications, including; prolonged Lengths of Stay (LOS) [2], increased morbidity and mortality [3], decreased quality of life [4] and infections - the most common complication [5]. In addition, 40% of patients experience a loss in function [6] and these post-operative complications cost an estimated $10 billion per year to the healthcare industry. As plastic surgeons, we have become keenly aware of the need for opportunity to improve outcomes and reduce cost to the patients and health care system at large. This endeavor is widely considered a multi-factorial process with prevention techniques centered around nutrition (preventing pre-operative malnutrition [7], decreasing post-operative insulin resistance [8], early post-operative feeds [8]), pre-operative conditioning or pre-habilitation, as well as established standards of post-operative care including encouraging incentive spirometry [9] and physical activity [10]. These interventions are aimed at creating an evidence-based model to aid post-operative recovery. They are based on our enhanced understanding of the pathophysiology of surgery and built upon a new protocol of Enhanced Recovery after Surgery (ERAS), with origins in European protocols from the 1990's. Major changes to already-existing protocols included emphasis on nutrition with fluid and carbohydrate loading without a prolonged fast in the pre-operative phase, and initiating early oral nutrition while encouraging mobilization in the early post-operative period. While ERAS had been shown to decrease morbidity and length of stay when compared to conventional peri-operative management at the time [11], it did not include new research on the role played by immunotherapy and exercise in decreasing complications.

Carbohydrate loading was added to the other ERAS elements in 2014, further expanding the program. Prior to adoption of ERAS protocols, it was routine to have patients fast 12 hours before a surgical procedure, due to a perceived risk of aspiration events, however a Cochrane review found no difference in aspiration events when comparing patients who fasted and patients who had liquids up to two hours before [12]. Therefore in 1999 the American Society of Anesthesiologists changed guidelines, recommending that patients can eat 6 hours prior to surgery as well as drink clear fluids 2 hours prior to surgery, except for patients with delayed gastric emptying [13].

This is beneficial not only for patient comfort and psychological health, but it has also been thoroughly documented that there is insulin resistance post-surgery resulting in hyperglycemia and creating an anabolic state that slows repair and recovery. Preexisting malnutrition in fact exacerbates this effect. It has also been previously suggested that immuno nutrition can be helpful with mitigating the anabolic state associated with surgical stress [14,15]. When comparing giving only carbohydrate drinks preoperatively and carbohydrate with glutamine and antioxidants, one study found lower levels of both glucose and insulin [16] in patients who received the latter [17]. When patients were given a more comprehensive nutrition supplement, IMPACT (nucleotides in RNA, arginine, and omega 3 fatty acids) for 5-7 days pre-operatively, reduced wound infections, abdominal abscesses, anastomotic leaks, pneumonias, and UTIs were observed [18].

Along with nutrition management, ERAS included early mobilization of patient's post-operatively, but new studies have suggested that mobilization pre-operatively or pre-habilitation can provide benefits to patients. Pre-habilitation has been associated with faster recovery and decreased pain and length of stay after surgical procedures [19]. In cardiovascular surgery, patients see a reduction in pulmonary complications (atelectasis, pneumonia), especially if pre-habilitation therapy includes maximal inspiratory muscle strength training [20]. In non-cardiac thoracic and abdominal surgery, cardiovascular exercise preoperatively has demonstrated improved functional status post-operatively [21]. Based on our National Surgical Quality Improvement Program (NSQIP)

data at Indiana University (IU) Health, 75% of the surgical patients treated at the IU Health Adult Academic Health Center had three or more major risk factors for major complications. In 2011, to address the need to improve outcomes, IU Health initiated efforts to improve pre-surgical wellness with a Pre-Operative Wellness program that expanded our standard pre-surgical assessment and intervention protocols. The core element involved prescription of an immuno nutrition drink, containing arginine, omega-3 fatty acids, and nucleotides, which have been shown to reduce infectious complications by 41% [4], as well as mortality and LOS of patients [6]. The patients were originally required to purchase the immuno nutrition drink, as no insurance program would cover the cost of a short-term oral nutrition drink. The results of the initial program were consistent with the evidence-based literature and showed significant improvement in wound healing, LOS and infection rates. Using the initial data, we obtained executive level support and an IU Health financial grant to refine a standard IU Health POWERR (Peri-Operative Wellness Enhanced Rapid Recovery) education process and a POWERR "Tool Kit", which included a 5 day supply of the immuno nutrition drink, incentive spirometer, chlorhexidine soap bath, mupirocin pre-treatment, incentive spirometry and a pedometer to encourage exercise. These were provided to the patients without charge along with Pre-Admission Testing (PAT) clinic education. Included in each kit was a patient education sheet itemizing the components of their pre-surgical regimen? Under each component, the sheets contained blank tables for the patients to track which scheduled doses or activities were performed to serve as a reminder as well as a method to track compliance. Compliance to the POWERR program was also monitored through a standard questionnaire completed during pre-operative nursing assessment on the day of surgery.

Our retrospective chart review was conducted on 6,834 elective adult surgical patients at two major university hospitals in the IU Health system, seen in PAT clinic in 2015 and 2016. The PAT clinic encouraged pre-operative exercise, smoking cessation, and provided patients with a pre-surgical education package containing the POWERR tool kit. Patients were queried about compliance with the POWERR tool kit components on the day of elective surgery during the nursing assessment. A review of Length of Stay (LOS), Surgical Site Infections (SSI), Catheter-Associated Urinary Tract Infections (CAUTI), Central Line-Associated Blood Stream Infections (CLABSI), Methicillin-Resistant Staphylococcus Aureus (MRSA), Vancomycin-Resistant Enterococcus (VRE) and Clostridium Difficile (CDIFF) infections among participating patients was done. Statistical analysis was conducted through Fisher's exact test with a two sided p-value <.05.The percentage of the patients receiving at least 1 component of the POWERR program is 91.1%. The patient overall compliance rate is 57% with 47.1% for immuno nutrition, 49.5% for IS, 52.8% for chlorhexidine bathing and 68% for Mupirocin. A global analysis of the data indicates a statistically significant decrease in the post-surgical complication rates for patients who were compliant with the pre-surgical components. The global harm event rate was reduced by 39% with POWERR compliance.

Plastic surgeons are faced routinely with reconstructive or cosmetic patients with underlying risk factors for surgical complications and surgery imparts major bodily stress. We should therefore ensure pre-operative patient optimization to achieve superior outcomes. At our institution, we have dramatically improved our outcomes with simple, direct immuno nutrition and wellness based (POWERR) program, which is easily reproducible with very tangible and durable outcomes. We have also been able to track patient compliance and relate this directly to these outcomes, noting that providing the tool kits to the patients at no cost further improves patient engagement and compliance. We conclude that all patients undergoing elective plastic surgery will benefit from immuno nutrition and pre-surgical education and that these interventions will significantly decrease their risk of post-operative complications, while providing major cost savings to the health system. As evidenced by our study, providing a pre-surgical wellness kit with the immuno nutrition, at no cost to the patient, will further improve the surgical outcomes and engagement with providers and patients.

References

1. O'Neill JP, Shaha AR (2011) Nutrition management of patients with malignancies of the head and neck. Surg Clin North Am 91: 631-639.
2. Bozzetti F, Braga M, Gianotti L, Gavazzi C, Mariani L (2001) Post-operative enteral versus parenteral nutrition in malnourished patients with gastrointestinal cancer: a randomised multicentre trial. Lancet 358: 1487-1492.
3. Correia MI, Waitzberg DL (2003) The impact of malnutrition on morbidity, mortality, length of hospital stay and costs evaluated through a multivariate model analysis. Clin Nutr 22: 235-239.
4. Culebras JM (2013) Malnutrition in the twenty-first century: an epidemic affecting surgical outcome. Surg Infect (Larchmt) 14: 237-243.
5. Drover JW, Dhaliwal R, Weitzel L, Wischmeyer PE, Ochoa JB, et al. (2011) Perioperative use of arginine-supplemented diets: a systematic review of the evidence. J Am Coll Surg 212: 385-399.
6. Christensen T, Kehlet H (1993) Postoperative fatigue. World J Surg 17: 220-225.
7. McClave SA, Kozar R, Martindale RG, Heyland DK, Braga M, et al. (2013) Summary points and consensus recommendations from the north american surgical nutrition summit. JPEN J Parenter Enteral Nutr 37: 99-105.
8. Ljungqvist O, Soop M, Hedström M (2007) Why metabolism matters in elective orthopaedic surgery: a review. ActaOrthop 78: 610-615.
9. Overend TJ, Anderson CM, Lucy SD, Bhatia C, Jonsson BI (2001) The effect of incentive spirometry on postoperative pulmonary complications: A systematic review. Chest 120: 971-978.

10. Carli F, Scheede-Bergdahl C (2015) Prehabilitation to enhance perioperative care. Anesthesiol Clin 33: 17-33.

11. Teeuwen PHE, Bleichrodt RP, Strik C, Groenewoud JJM, Brinkert W, et al. (2010) Enhanced Recovery After Surgery (ERAS) Versus Conventional Postoperative Care in Colorectal Surgery. J Gastrointest Surg 14: 88-95.

12. Brady M, Kinn S, Stuart P (2003) Preoperative fasting for adults to prevent perioperative complications. Cochrane Cochrane Database Syst Rev 4: CD004423.

13. [No authors listed] (1999) Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures: a report by the American Society of Anesthesiologist Task Force on Preoperative Fasting. Anesthesiology 90: 896-905.

14. Braga M, Gianotti L, Vignali A, Carlo VD (2002) Preoperative oral arginine and n-3 fatty acid supplementation improves the immunometabolic host response and outcome after colorectal resection for cancer. Surgery 132: 805-814.

15. Tepaske R, Velthuis H, Oudemans-van Straaten HM, Heisterkamp SH, van Deventer SJ, el al. (2001) Effect of preoperative oral immune-enhancing nutritional supplement on patients at highrisk of infection after cardiac surgery: a randomised placebo-controlled trial. Lancet 358: 696-701.

16. Awad S, Fearon KC, Macdonald IA, Lobo DN (2011) A randomized cross-over study of the metabolic and hormonal responses following two preoperative conditioning drinks. Nutrition 27: 938-942.

17. Roos D, Dijksman LM, Tijssen JG, Gouma DJ, Gerhards MF (2013) Systematic review of perioperative selective decontamination of the digestive tract in elective gastrointestinal surgery. Br J Surg 100: 1579-1588.

18. Waitzberg DL, Saito H, Plank LD, Jamieson GG, Jagannath P, et al. (2006) Postsurgical Infections are Reduced with Specialized Nutrition Support. World J Surg 30: 1592-1604.

19. Santa Mina D, Clarke H, Ritvo P, Leung YW, Matthew AG, et al. (2014) Effect of total-body prehabilitation on postoperative outcomes: a systematic review and meta-analysis. Physiotherapy 100: 196-207.

20. Hulzebos EH, Smit Y, Helders PP, van Meeteren NL (2012) Preoperative physical therapy for elective cardiac surgery patients. Cochrane database Syst Rev 11: CD010118.

21. O'Doherty AF, West M, Jack S, Grocott MP (2013) Preoperative aerobic exercise training in elective intra-cavity surgery: a systematic review. Br J Anaesth 110: 679-689.