Nutritional innovations to improve outcomes in gastrointestinal surgery

Dr Gary Fanjiang, Abbott Nutrition Divisional Vice President of Asia Pacific Research and Development, welcomed eight distinguished faculty and participants to the 115th Abbott Nutrition Research Conference on Nutritional Innovations to Improve Outcomes in Gastrointestinal (GI) Surgery. Organized by Abbott Nutrition Research and Development, the meeting took place November 1 and 2, 2015, at the New York Academy of Sciences in New York, NY.

What does GI surgery really cost?

In purely economic terms, GI surgery accounts for a substantial portion of hospital inpatient expense, which itself accounts for about a third of the estimated $1.331 trillion paid for healthcare in the United States in 2011.1 In human terms, patients experience a variety of physiologic and psychological stresses during the perioperative period that can slow recovery and increase the likelihood of costly complications. Malnutrition has consistently been associated with poor surgical outcomes, including impaired wound healing, pneumonia, higher infection rates, longer hospital stays, and mortality—all of which increase costs to the healthcare system as a whole as well as to individual patients and families.2

There is increasing consensus that nutrition support is a key factor in the management of physiologic stress and risks for complications following GI surgery. Newer approaches to perioperative nutrition therapy clearly demonstrate significant outcome improvements and cost savings. But entrenched practices that restrict and/or delay perioperative nutrition persist and are slowing the adoption of evidence-based practices.

Faculty and participants at this year’s conference discussed these issues in depth with the following objectives:

• Explore the link between perioperative malnutrition and GI surgery complications;
• Review the current evidence base for perioperative nutrition interventions and best practices for improving GI surgical outcomes and reducing costs; and
• Identify opportunities for innovation to improve both the clinical and economic outcomes for GI surgical patients.

Discussion around the value of nutritional innovations in GI surgery flowed into break sessions. Participants agreed with faculty that additional health economics and outcomes research (HEOR) is critical to making the case in today’s quality- and cost-conscious healthcare environment. From left to right: Dr Clifford Ko, Dr Nagendra Rangavajla, Dr Refaat Hegazi, Dr Jamie Partridge, Dr Hakim Bouzamondo.

115th Abbott Nutrition Research Conference

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Highlights

• The causes of malnutrition in GI surgical patients are multifactorial and involve altered nutrient processing, inadequate intake, malabsorption, and/or excess nutrient loss, depending on the surgery and the patient.

• Contrary to the common belief that people with obesity are “over-nourished,” obesity is also being recognized as a risk factor for several nutrient deficiencies, including lower levels of antioxidants and certain fat-soluble vitamins.

• Malnutrition in surgical patients is associated with a higher risk for perioperative and postoperative morbidity, mortality, and other costly consequences including increased length of stay and more frequent readmissions.

• New paradigms for evidence-based, patient-focused perioperative care (known generally as ‘enhanced recovery’ or ‘fast-track’ surgical protocols) are being championed to improve outcomes and the patient experience. Optimization of perioperative nutrition is a key element in these protocols.

• Barriers to change persist and better communication is needed – among scientists, researchers and clinicians, among interdisciplinary healthcare teams, and among clinicians and their patients – to accelerate the adoption of evidence-based care and best practices in GI perioperative nutrition.
From traditional to evidence-based perioperative nutrition: a personal journey

In her keynote remarks, Julie K. Marosky Thacker, MD, a colorectal surgeon and Medical Director for Evidence-Based Perioperative Care and the Duke Enhanced Recovery Program in Durham, North Carolina, described the moment she began her journey from traditional to evidence-based perioperative nutrition care.

“Early in my surgical teaching career I was asked a simple question: why do surgical patients have a nasogastric tube? This was followed by: how do you manage it?”, explained Dr Thacker. “Something about that prompted me to begin examining every single aspect of our care, looking for the reasons we had been doing certain things for so long, routinely and without question. I took this opportunity to create a literature library of the different care elements of the postoperative period. I realized we focused a great deal on ‘what’ we do and ‘how’ we do it. And that the answer to the ‘why’ of traditional perioperative care – which basically results in putting patients through six or seven days without any nutrition during the perioperative period – has more to do with dogma, and our fears about feeding patients, than with the evidence. The evidence is telling us we should be doing a lot of things differently. Why? To improve patient outcomes and reduce costs.”

New paradigms for evidence-based, patient-focused perioperative care, known generally as ‘enhanced recovery’ or ‘fast-track’ surgical protocols, are being championed to improve outcomes and the patient experience by decreasing perioperative stress and the body’s reaction to surgery (Fig 1). “Essential to enhanced recovery is the identification of all perioperative factors that cause physiologic stress, and the mitigation of those factors to the best of our ability based on the evidence,” said Dr Thacker. Optimization of perioperative nutrition is a key element of these protocols, as are patient counseling and education, standardized analgesic and anesthetic regimens, and early mobilization (Fig 2).

At Duke University Medical Center, research conducted by Dr Thacker and her team at the Evidence-Based Perioperative Care Lab has demonstrated significant outcome improvements over three years since implementation of an enhanced recovery protocol, including major reductions in surgical site and urinary tract infections, sepsis, length of stay, and readmission rates, while controlling hospital costs.3

Fig 1. Perioperative stress: the body’s reaction to surgery.

Pre-Operative

Counseling and Patient Education

- Medical Optimization
- Nutritional and Activity Optimization
- Food until 6 hrs preop
- Clears until 2 hrs preop
- No long-acting sedatives or anxiolytics

Intra-Operative

- Epidural/regional blocks
- Monitored, Goal-Directed Fluid Administration
- Minimally invasive surgery
- Avoidance of tubes, drains, and lines

Post-Operative

- Immediate, directed, oral nutrition
- Immediate Mobilization
- No maintenance IVF
- Multimodal pain regimen
- Defined discharge criteria and teaching

Patient’s Journey through Surgery

IVF=intravenous fluids, PONV=postsurgical nausea and vomiting.

Figure 2. Duke Enhanced Recovery Program.
Causes and consequences of malnutrition in GI surgical patients

The causes of malnutrition in GI surgical patients are multifactorial and – depending on the procedure and the patient – may involve altered nutrient processing, inadequate intake, malabsorption, and/or excess nutrient loss, any of which will have consequences for healing and recovery.4,5

Causes of malnutrition in surgical patients4

<table>
<thead>
<tr>
<th>Altered nutrient processing</th>
<th>• Increased or altered metabolic demands, as with infection, surgery, or burns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate intake</td>
<td>• Poor diet • Poor appetite • Problems chewing, swallowing • Depression</td>
</tr>
<tr>
<td>Malabsorption</td>
<td>• Pathologic conditions in gut, intestine, pancreas, or liver</td>
</tr>
<tr>
<td>Excess loss</td>
<td>• Vomiting • Diarrhea • Fistulæ</td>
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Consequences of malnutrition in surgical patients5

• Higher risk for perioperative and postoperative morbidity and mortality
• Increase of protein and energy requirements, causing or worsening nutritional status
• Immune system dysfunction
• Sepsis/overgrowth of bacteria in the GI tract
• Pneumonia
• Poor wound healing/Wound dehiscence/Pressure ulcers
• Impaired QoL and fatigue

QoL = quality of life

For instance, patients undergoing upper GI surgeries are likely to be nutritionally compromised for many reasons and require careful preoperative nutrition assessment. “The simple matter of swallowing food that most people take for granted becomes painful and difficult,” said Krishnan Srim, MD, former Fellowship Program Director, Surgical Critical Care at Stroger Hospital of Cook County, Chicago, Illinois. Strictures of tumors of the esophagus cause progressive decrease in food intake. Tumors of the stomach likewise cause decreased intake due to early satiety and obstruction to the outlet leading to the duodenum.

In patients with severe acute pancreatitis who require surgery, the systemic inflammatory process creates a highly catabolic state. Treatment of acute pancreatitis by means of limiting oral nutrition in order to achieve pancreatic rest may further contribute to malnutrition in these patients. In patients undergoing surgery for periampullary and pancreatic malignancies, the metabolic effects of cancer frequently lead to significant malnutrition.

Dr Sabrena Noria explained why it is important for clinicians to challenge assumptions they may have about their patients’ perioperative nutritional status.

“It is important for clinicians to challenge assumptions they may have about their patients’ perioperative nutritional status,” said Sabrena Noria, MD, PhD, Assistant Professor of Surgery at The Ohio State University, Wexner Medical Center, Columbus, Ohio. For example, although commonly considered a state of “over-nutrition”, obesity is increasingly recognized as a risk factor for several nutrient deficiencies, including lower levels of antioxidants and certain fat-soluble vitamins. Studies of extremely obese adults undergoing metabolic/bariatric surgery have identified a wider array of pre-existing nutritional deficiencies prior to surgery than previously thought. Postoperatively, anatomical rearrangement can result in malabsorption of key vitamins and minerals.

Preoperative malnutrition predicts postoperative morbidity, mortality, and increased costs

“The fact that preoperative malnutrition is common in GI surgery patients mandates that we employ strategies to mitigate, diagnose, and treat these nutritional deficiencies throughout the perioperative period,” said Kenneth K.W. Lee, MD, Professor of Surgery at the University of Pittsburgh School of Medicine, Pennsylvania. He cited one recent study in which investigators reviewed 143 consecutive patients undergoing pancreatic resection due to malignancy and found a high incidence of moderate and severe malnutrition.2 “Most importantly,” said Dr Lee, “they found that preoperative malnutrition was a predictor of postoperative morbidity and mortality after pancreatic surgery.”
In fact, researchers investigating the influence of nutritional status on complications after major intra-abdominal surgery found that on admission, 44% of the 100 patients in the study were malnourished according to the Subjective Global Assessment, and 61% were malnourished according to the Nutritional Risk Index. Higher complication and death rates were found in the malnourished groups (Fig 3).

Fig 3. Effect of malnutrition on surgical outcome.

“All of this is important because while disease processes may or may not be mutable, the issue of malnutrition can be addressed,” said Clifford Y. Ko, MD, Professor of Surgery at UCLA, Los Angeles, California.

Dr Clifford Ko emphasized that “while disease processes may or may not be mutable, the issue of malnutrition can be addressed.”

Dr Maria Isabel Correia encouraged implementation of simple and effective methods to screen and assess patients for malnutrition on hospital admission.

Why nutrition matters: perioperative stress and insulin resistance

“The nutrition care of GI patients needs to begin in the preoperative period,” said Dr Sriram. He added that the evidence clearly shows that providing balanced scientific enteral formulas as oral nutritional supplements for 7-10 days prior to any major upper GI tract surgery decreases wound complications, length of stay, duration on ventilator, and anastomotic leaks; and is highly cost-effective. For optimal wound healing and recovery, enteral nutrition should be initiated as soon as possible after surgery, provided no major contraindications exist. “Enteral nutrition should be looked at beyond its nutrient content,” said Dr Sriram. “Its effects on altering the stress response and immune functions are even more important.”

Indeed, no matter the procedure, all patients experience a similar organic response triggered by the stress of the operation. A defining feature of this metabolic response is insulin resistance, which occurs in parallel with multiple other metabolic effects including decreased muscle glucose oxidation, increased muscle catabolism leading to negative nitrogen balance, and is further associated with decreased muscle mass and thus reduced muscle strength.

The degree of insulin resistance experienced has been shown to be directly proportional to the magnitude of the surgical insult and is also related to the development of postoperative complications,” explained Maria Isabel Correia, MD, PhD, Professor of Surgery at Universidade Federal de Minas Gerais in Belo Horizonte, Minas Gerais (Brazil). Reduced muscle mass and strength impair respiratory function causing increased risk of pulmonary complications such as pneumonia. Insulin resistance is also a risk factor for hyperglycemia, which has been shown to be associated with higher rates of surgical site infections.

Improving outcomes: carbohydrate loading and nutritional supplementation

Preoperative carbohydrate loading and nutritional supplementation have both been investigated as a means to minimize insulin resistance and improve clinical outcomes. Carbohydrate loading has been shown to reduce insulin resistance and hyperglycemia, reduce preoperative discomfort (i.e., thirst, hunger, anxiety), decrease postoperative nausea, vomiting, and pain, and preserve muscle mass. The health benefits of nutritional supplementation, including oral nutritional supplements and enteral and parenteral nutrition, have been shown to have significant clinical and economic benefits across patient groups and in different settings.
Practical approaches to screening and assessment

“Metabolic and nutritional conditioning should be the rule for surgical patients, yet disease-related malnutrition still goes unrecognized and undertreated,” said Dr Correia. “To change that you need simple and effective methods to screen and assess patients for malnutrition on admission, along with a healthcare team and institutional culture that value nutrition care.”

As an example, Dr Correia described the Nutrition Care Pathway proposed by the feedM.E. (Malnutrition Awareness & Education) Global Study Group. It is simple and can be tailored to different healthcare settings. The Pathway begins with nutrition screening based on the two basic questions from the Malnutrition Screening Tool (MST): Has your food intake decreased? Have you lost weight recently? Answers are combined with a quick clinical judgment about whether the patient’s illness or injury carries risk for malnutrition (Fig 4). The pathway then includes recommendations to ‘intervene’ promptly when needed, and to ‘supervene’ or follow-up routinely with adjustment and reinforcement of nutrition care plans.

Toward more patient-centered care: understanding the patient experience

Dr Ko pointed out that after a routine colorectal operation most patients lose approximately 15 pounds of weight. There is little information in the peer-reviewed published literature, however, on patient dietary intake and food-related symptoms after colorectal surgery, especially in the period after hospital discharge. “But social media gives us a lot of insight into how patients experience food tolerances, dietary progression, and intestinal/ostomy issues after hospital discharge. What we see is that it is usually more difficult for patients to adjust than the ‘best case scenario’ the surgical team has prepared them for.” He added, “If we are going to deliver truly patient-centered care, there needs to be much better communication among all the individuals who interact with a patient before and after surgery. The dietitian needs to have a voice in the conversation and so does the patient.”

Special considerations in emergency GI surgeries

While the safety and efficacy of early postoperative enteral nutrition in the elective GI surgery population and the general critically-ill population have been well established, it is important to explore what this evidence may mean for emergency GI surgery patients – those who are among the sickest and who have more complications and die more frequently than elective patients. Several basic principles based on the current evidence were suggested by Alexander Sauper, MD, Chair of the Division of Surgical Critical Care at Stroger Hospital of Cook County, Chicago, Illinois.

“There is a limited amount of data regarding the use of early enteral nutrition in the emergency GI surgery population,” Dr Sauper explained. Nonetheless, several studies found that in both traumatic and non-traumatic conditions leading to emergency GI surgery, early enteral nutrition did not lead to an increase in surgical complications.

Dr Sauper highlighted several key principles that should govern the approach to nutrition support for emergency GI surgery patients, despite how varied this population is.

“Enteral nutrition should always be the default choice, while being mindful of the difference between true contraindications and barriers to initiating enteral nutrition,” said Dr Sauper. “Many of the traditional barriers to feeding the gut are based on dogma rather than data. Hopefully, over time, practice will reflect a simpler evidence-based philosophy based on understanding that ‘if the guts works, use it – but don’t abuse it!’

An important feature of feedM.E.’s proposed Nutrition Care Pathway is the emphasis it places on determining nutritional status on discharge and on follow-up, with continuing attention to meeting nutrition needs and challenges. Poor nutritional status on discharge has been shown to predict hospital readmission within 30 days.
Perioperative immunonutrition: does one size fit all?

Over the past twenty years, numerous articles have been published in the field of immune-modulating formulas, also called “immunonutrition,” administered in the perioperative setting. Hailed for various beneficial effects, these formulas are typically high protein enteral formulations or oral supplements with high levels of “pharmaconutrients.” The most common of these are arginine, omega-3-fatty acids, glutamine, ribonucleic acids, selenium, and other antioxidants.

“As more studies have been done in this area, however, the cloudier the case for immunonutrition has become, especially in the preoperative setting,” said David Evans, MD, Assistant Professor of Surgery at The Ohio State University, Wexner Medical Center, Columbus, Ohio. Despite limited evidence, quality improvement efforts based on the use of preoperative immunonutrition oral supplements are slowly proliferating in the United States. The precise immunonutrient profile, timing, dose, and duration are all issues that need to be resolved before immunonutrition can be optimally prescribed to diverse clinical populations.

“In the future, immunonutrition may be tailored to target specific mechanistic derangements observed in specific clinical populations,” Dr Evans said. “Modulation of immune dysfunction is tricky business, and no successful pharmaceutical therapies have emerged from over a hundred human drug trials in this arena. Therefore, we must be cautious and not look to immunonutrition as a panacea. It does not appear to be a ‘one size fits all’ solution.”

Realigning around a common cause: improving patient outcomes

In his closing remarks, Hakim Bouzamondo, MD, Divisional Vice President, Scientific and Medical Affairs for Abbott Nutrition, returned to a recurring theme of the conference.

“Throughout this conference we have been challenged to redefine the ‘why’ of perioperative nutrition – to define it less by fear and worry about feeding the gut and more by a desire to improve patient outcomes based on the evidence,” said Dr Bouzamondo. “We’ve also heard how much more work needs to be done to translate this knowledge into clinical practice and what some of the barriers are.”

Among the barriers are lack of awareness and also the fact that change on this order of magnitude takes time and requires extensive staff education and training, as well as individual and institutional commitment.

More communication and collaboration – among scientists, researchers, industry and clinicians, among interdisciplinary healthcare teams, and among clinicians and their patients – will also be needed to accelerate the adoption of evidence-based care and best practices in perioperative nutrition to improve outcomes in GI surgery.

Dr David Evans described the strengths and weaknesses of the evidence for perioperative immunonutrition, concluding that, while there may be potential for more targeted therapies in the future, “currently we should be cautious and not look to immunonutrition as a panacea.”

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Videos of the presentations and proceedings from the 115th Abbott Nutrition Research Conference on Nutritional Innovations to Improve Outcomes in Gastrointestinal Surgery.

This site features the highest quality educational materials, along with new resources for our partners who specialize in research and development.
Faculty at the 115th Abbott Nutrition Research Conference: Nutritional Innovations to Improve Outcomes in Gastrointestinal Surgery

Keynote
Julie K. Marosky Thacker, MD, FACS, FASCRS
GI Surgeries: How costly are they and what can we do to improve clinical and economic outcomes?

Session 1:
GI Surgery Procedures, Complications and Nutritional Implications

Sabrena F. Noria, MD, PhD
Metabolic/Bariatric Surgery

Krishnan Sriram, MD, FRCSC, FACS, FCCM
Upper Gastrointestinal Surgery

Kenneth K.W. Lee, MD, FACS
Pancreatic Surgery

Clifford Y. Ko, MD, FACS, FASCRS
Colectomy

Session 2:
Scientific Update on Perioperative Nutrition

Maria Isabel Correia, MD, PhD
Preoperative Carbohydrate Loading and Nutritional Supplementation: A Scientific Update

Alexander Sauper, MD, FACS
Nutritional Management of Emergency GI Surgeries

David Evans, MD, FACS
Perioperative Immunonutrition: Does One Size Fit All?
References