



GI Surgeries: How costly are they and what can we do to improve clinical and economic outcomes?

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Understanding why we do what we do might seem like an unusual question for surgeons to ask themselves. As a sub-specialty surgeon at a prestigious academic healthcare center, I could imagine several answers. I was trained by the best to provide patient care this way. I study all the literature and abide by it. My high-ranking health system has protocols in place for me.

In truth, however, how patients are managed from the time of the diagnosis of a surgically-managed problem through their operation and recovery is extremely variable. Additionally, most of the care received is based on tradition, meaning, the way surgeons have always delivered care or managed a particular problem. Perioperative medicine, in many ways, is a new field with less scientific proof than one might think.

When I was recruited to Duke Surgery (Duke University Medical Center, Durham, North Carolina), I had similar outcomes to the surgical team I joined. My anastomotic leak rates, infection rates, and hospital length of stay data were comparable to all of the surgeons in the two big private practice hospitals I was leaving, as well as, to the faculty I was joining. I had no external pressure to change my patient management. However, upon joining the Duke faculty, I chose to teach the medical students and residents about postoperative care of the colorectal surgery patient. I took this opportunity to create a literature library of the different care elements of the postoperative period. Immediately, I realized that most of how I practiced was dogma. Many care elements for the colorectal surgery patient, while proven scientifically, were not in my practice or in the practice of most of my peers. During this personal and professional search, I began seeing my patients' journey through diagnosis, preoperative preparation, their operations, and recovery as an integrated and important process of evaluation and optimization.

How costly are gastrointestinal (GI) surgeries? While I am a surgeon and not an economist or healthcare politician, my background is likely not important as there is no one who can tell you what an operation really costs in the United States (US). There are versions of this question that can be answered by certain people. How much does a certain operation cost the hospital to perform? How much will a surgeon bill a third party payor? How much does the patient portion of an operation cost? These fractions or partial costs are discernible, but for me to determine, from diagnosis to recovery, how much an operation costs is impossible.

So, while I cannot answer this specific question, I may be the best person to answer, "How can we make GI surgery as cost effective as possible?" Because this is the focus of my work, everyday. This is my "WHY." Working to change perioperative medicine, to make how I care for patients the evidence-based, best care I can provide is my WHY. To ask about the cost of GI surgery is to ask about my WHAT and my HOW. Which, in the Simon Sinek Golden Circle,¹ are the outer layers to the real purpose of our work. By focusing on providing the best patient experience through surgery, we provide the best patient outcomes.



The cost of GI surgery is essentially two components. One is nearly fixed, or at least comparatively fixed. Operations happen in hospitals and with similar techniques and equipment from hospital to hospital. The other component is the cost of what happens. If the patient does well and leaves the hospital and recovers as best as expected, the cost of the operation is the best guess cost of the first component, the cost of doing the operation. If the patient has any other outcome, be it no transportation on the day of discharge or a major complication requiring intensive evaluation and care, then the second component, the unpredictable cost of more care than anticipated, is added.

Any complication after an operation increases the cost of that operation by a factor of at least 2. If diagnostics are required to determine the management of a postoperative complication, the length of stay in the hospital can be 5-fold those of uncomplicated operations. Most importantly, complications have been shown to prolong recovery and shorten life.^{2,3} A patient who suffers a complication after surgery, even as simple as a wound infection, is at risk of a shortened life.

The top five most expensive conditions treated in US hospitals, according to a Centers for Medicare & Medicaid Services (CMS) review and an Agency for Healthcare Research and Quality (AHRQ) publication, were septicemia; osteoarthritis; complications of a device, implant, or graft; newborn services; and acute myocardial infarction.⁴ Three of these five can be a complication from surgery; two of these are known, reported complications from GI surgery.

Now, you can argue about robotics or expensive joints, but for the sake of this discussion, we will focus on a straightforward GI operation. Something done in every hospital with in-patient capacity. These are great examples of operations after which patient recovery impacts the cost of surgery.

While there are many regulations and metrics in place to improve the delivery of services, we lack the ability to define and enforce evidence-based care. Interestingly, it takes seventeen years on average to implement new evidence-based care into routine medical practice.⁵ One such example is the use of evidence-based perioperative care elements in a care paradigm from the time of diagnosis, through surgery, and recovery. A group in Europe has coined the phrase, Enhanced Recovery After Surgery (ERAS) to describe their perioperative care elements.⁶ The effort in the United Kingdom (UK) has included a rigorous aspect of fluid management, as well as, pain and nausea prevention. These components of care, typically managed by the anesthesia members of the surgery team, have been adopted by several US centers interested in perioperative medicine as well. This cooperative effort has resulted in care teams, including nurses, nurse anesthetists, anesthesiologists, and surgeons, to implement care elements.

The details of enhanced recovery programs are best understood with an explanation of what is now referred to as “traditional care,” or the common care plan of a GI surgery patient.

Traditional care of the GI surgery patient:

- 2 L bowel preparation and clear liquid diet for 2 days preoperatively
- 7 L crystalloid infusion during a 4-hour operation
- nasogastric tube to keep the stomach empty
- urinary tube to keep the bladder empty and measure urine made



- abdominal cavity drains
- postoperative starvation until resumption of bowel function
- bedrest for 24-48 hours after surgery
- no foods 2-day preop and 4-6 days postop = 6-8 days starvation during stress

When the physiologic stresses are considered, there are elements of care around the time of surgery that have been studied. Specifically, trying to minimize this physiologic stress response results in better outcomes from operations. In combination, these “Enhanced Recovery” elements have been studied to reduce insulin resistance, related infections, and perioperative complications (Fig 1).⁶

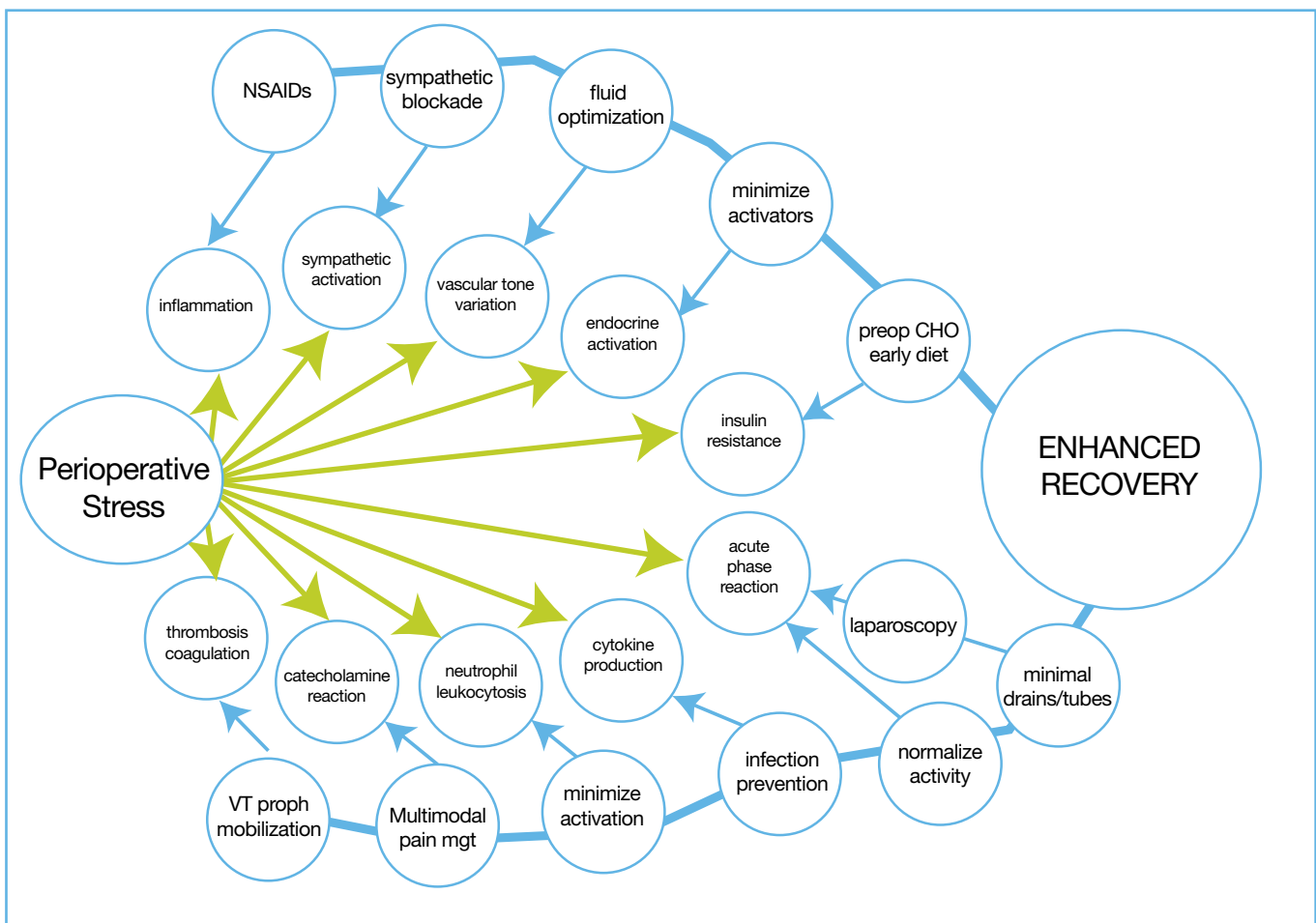


Fig 1. Enhanced recovery elements to minimize the perioperative physiologic stress response.⁶

NSAIDs=nonsteroidal anti-inflammatory drugs, CHO=carbohydrate, VT proph mobilization=venous thromboembolism prophylaxis mobilization, mgt=management



Evidence-based perioperative care (EBPOC) utilizing enhanced recovery protocols improves surgical outcomes and the patient experience. It involves the examination of current practices; implementation of every perioperative evidence-based medicine (EBM) care point; and a multimodal, multidisciplinary, patient-focused approach. Benefits of enhanced recovery include improved outcomes, improved efficiency, decreased variability, and increased value (ie, outcomes/cost). At Duke University Medical Center, our enhanced recovery elements focus on the patient’s journey through surgery (Fig 2).

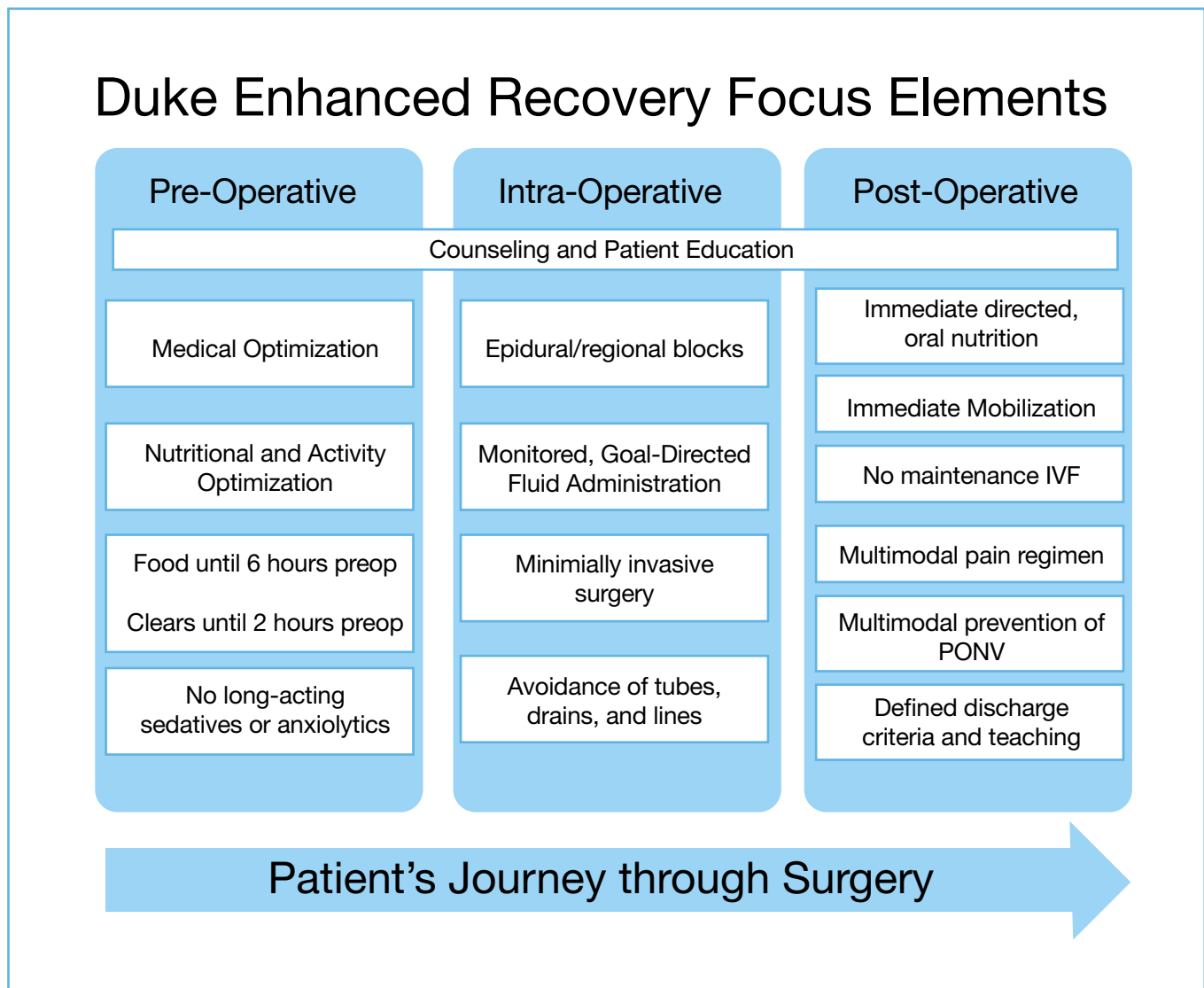


Fig 2. Duke Enhanced Recovery focus elements.
 IVF=intravenous fluids, PONV=postoperative nausea and vomiting



Why do I relate improving GI surgery outcomes to the cost of GI surgery? While surgery was only about 22% of 2012 CMS payments, this percentage of nearly 20% of the US gross national product (GNP) came to \$105 billion.⁷ So, operations do cost a lot. Metrics, comparisons, and restrictions may contain some variation of cost, but the impact of decreasing complications has a much greater impact on the overall cost of operations. We've seen this in our small study at Duke (Fig 3),⁸ and the same has been reported on a greater scale through studies at the US Department of Veterans Affairs (VA) and in Europe using ERAS protocols.

	SSI	UTI	Sepsis	LOS	Readmission
Pre-ERAS	24.3%	24.2%	8.1%	8.2	20.2%
ERAS	6.7%	9.4%	0.5%	5.9	9.8%

Fig 3. Decreased GI surgery complications with ERAS protocols.⁸

ERAS=Enhanced Recovery After Surgery protocols, SSI=surgical site infection, UTI=urinary tract infection, LOS=length of hospital stay, average in days (median was 7 to 4). Readmission=all cause readmission within 30 days of index operation

By studying those patients who do best and by implementing the science we have already done, we can create a perioperative protocol to decrease complications from all types of surgeries. GI surgery, specifically colorectal surgery, was the first specialty of abdominal surgery in which these practices were created and implemented, but currently all types of operations are being impacted by this application.

The most important aspect of improving perioperative medicine, however, seems to be the application of principle, not details. Importantly, evidence-based perioperative medicine is not just protocolized or mandated. The tenet of enhanced recovery protocols is to provide best care for the patient at each step of his or her journey through surgery - not to just treat everyone the same. This begs the application of nutrition science toward the on-going work of enhanced recovery.

Merging the science of improved perioperative outcomes from perioperative nutrition evaluation and oral nutritional supplements (ONS) with the improved outcomes from perioperative care strategies (such as enhanced recovery) yield amazing results. These two paths have crossed during the discussion of preoperative nutrition, preoperative carbohydrate loading, and postoperative ONS, though the application of true nutrition science to the surgical patient in enhanced recovery is limited. This is interesting, given that the premise of the first few studies in Scandinavia around enhanced recovery were specifically interested in insulin resistance and the effect of such on infection rates and recovery.



Taking what we have learned about perioperative care from enhanced recovery efforts and team protocols and combining this with what we know about perioperative stress and nutrition is a perfect combination to optimize surgical outcomes. With such optimization, we will be decreasing complications and, thereby, costs of GI surgery, if not all types of operations. Focusing on WHY we are interested in the surgical patients, be it as a surgeon, an anesthesiologist, a nutritionist, or a nutrition scientist, we can apply a HOW to our desired outcomes and product (Fig 4).¹

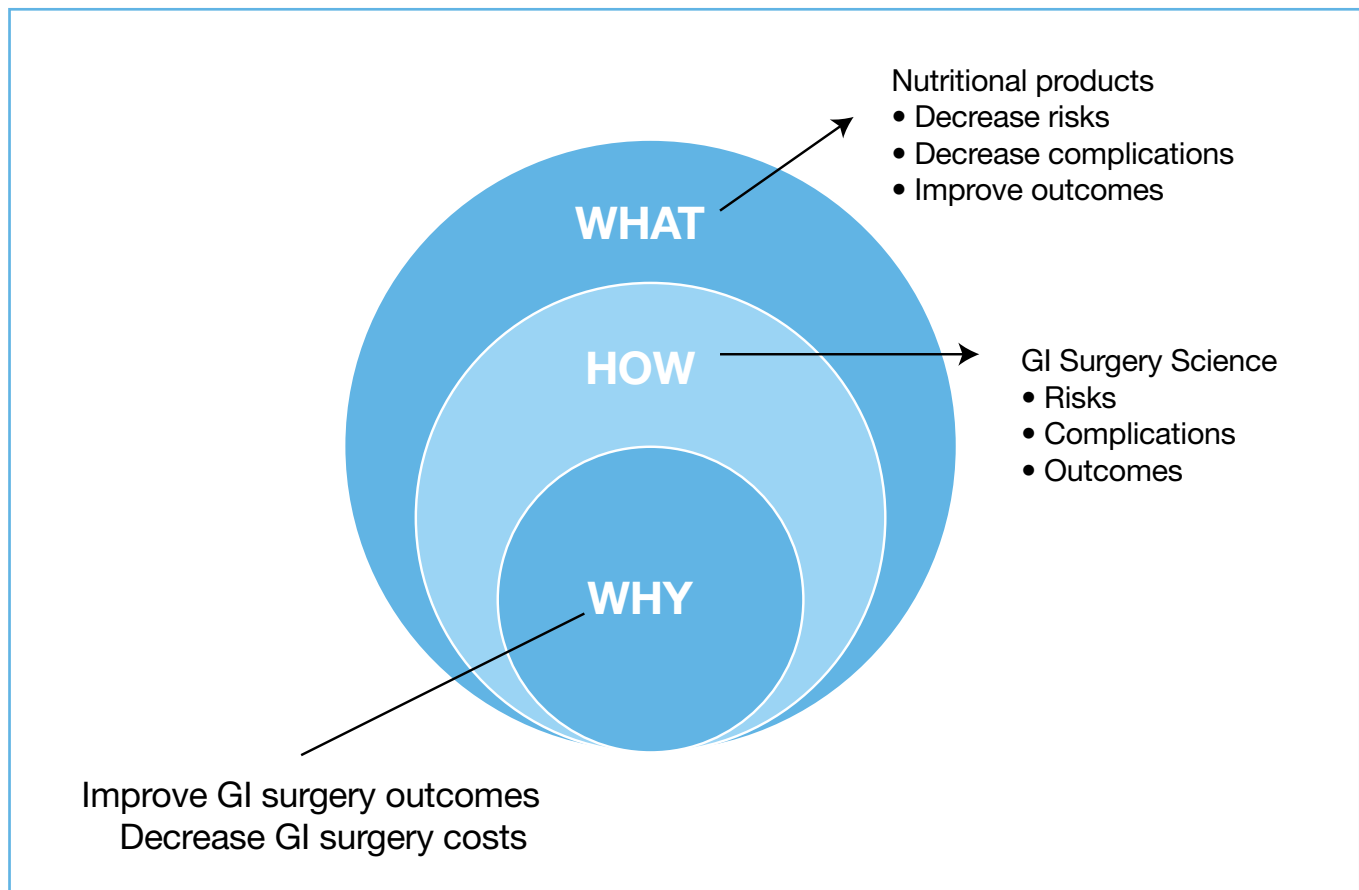


Fig 4. Applying the Golden Circle concept to improve outcomes in GI surgery.¹

Source: The Golden Circle. 2015 Simon Sinek, Inc. Available at <https://gumroad.com/d/8eaa76472308a1d96a944affc97e1898>. Accessed November 23, 2015.

The creation of alliances, a Venn diagram of each of our “WHYs” may then be the best focus of a forum such as this research conference. Understanding each other’s goals, in terms of the bigger picture, the reason why we do what we do, will improve outcomes, decrease costs, and benefit the science and the industry of perioperative nutrition. This is the perfect picture to open the 115th Abbott Nutrition Research Conference on “Nutritional Innovations to Improve Outcomes in Gastrointestinal Surgery.”



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