19. Enhanced Recovery Programs: Making the Business Case

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The various components and patient benefits of enhanced recovery after surgery protocols are more extensively discussed elsewhere in this publication. The focus of this discussion is on the institutional benefits related to adoption of a strong Enhanced Recovery Programs (ERP). The two major sources of institutional benefit are related to reductions in resource consumption and potentially avoidable complications. The net result of these benefits is improved quality of care and lower cost of care. There is often concern regarding the complexity and cost of adoption but in reality the principal components of care should be readily available and actually less expensive compared to standard care. The slow adoption of ERP strategies confirms the difficulties in transforming traditional approaches in health care systems, even in the face of simple, evidence based processes of care which benefit both patients and providers. This chapter focuses on colorectal surgery as an example, but the principles are applicable to other procedures.

ERP Impact on Length of Stay

Most Western healthcare systems are facing significant pressures to control the growth of health care expenses, especially in the surgical population. Because most colorectal pathology has a predictable incidence and prevalence of disease burden within a population, the only option to control costs at the provider level is to redesign the process, reduce variability of care, and decrease the rate of truly preventable complications. ERPs have been adopted broadly since the 2000s and the consistent benefit across all health care systems has been a reduction in

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the duration of hospital stay which is the principal driver of institutional productivity gains and cost savings [1–5]. At a basic level, reducing the length of stay allows a greater number of patients to be managed within the constraints of fixed resources such as number of hospital beds and nursing care at the inpatient unit level. This benefit has been consistently demonstrated across all studies and accrues to both open and laparoscopic approaches [6]. Therefore, the data consistently demonstrate and confirm a reduction in length of stay by 2–5 days depending on the original process of care and the adoption of laparoscopic techniques.

Adoption of Laparoscopic Colectomy

The widespread adoption of laparoscopic colon resection was delayed because of concerns regarding the adequacy of oncologic resection; however, robust prospective randomized studies confirmed equipoise with the open technique [7, 8]. These studies also confirmed a reduced length of stay compared to open colectomy in the absence of a structured enhanced recovery program. However, it should be recognized that increasing the case mix in favor of laparoscopic resection is an important component of providing system benefits even within an ERP [6, 9–13]. The data is clear that laparoscopic surgery is a key enabler to safely and consistently reduce the length of stay and other outcomes within a healthcare system [9, 13]. At the system level, Archibald et al. showed that a 10 % shift towards laparoscopic colectomy, in addition to adoption of an ERP protocol, was an important component of reducing length of stay. Similarly, Bosio et al. showed in a case matched study that this combination of laparoscopy and ERP resulted in a 5 days reduction in length of stay [13]. Yet there remains large geographic variability in uptake of laparoscopic colectomy for colon cancer in the USA, from 0 to 67 % [14]. Given the breadth of data and the increased training opportunities for advanced laparoscopic techniques, the data support a broader adoption of laparoscopic colectomy whenever possible.

Specific Components

It is difficult to tease out the relative benefits of laparoscopic colectomy versus ERP components; however, the evidence does suggest a reduction in specific complications related to simple components of care. Cakir et al. assessed multiple ERP components and determined

that laparoscopic surgery, removal of nasogastric tube before extubation, mobilization within 24 h after surgery, starting nonsteroidal anti-inflammatory drugs at day 1 and removal of thoracic epidural analgesia at day 2 were independent predictors of LOS [15].

Avoidance of postoperative ileus is a very important component of reducing a cause for unnecessary delay in discharge and a significant source of increased cost of care [16]. The two major approaches to reducing the rate of ileus are prophylaxis with alvimopan and narcotic sparing multimodality analgesia. Although alvimopan is not routinely mentioned as part of ERP protocols, there is a preponderance of data to suggest that use of this agent is associated with a reduction in both ileus rates and length of stay [17–19]. However, it should be understood that each team should assess the care plan used because the relative benefit of extended use (other than preoperative prophylaxis for intraoperative narcotic exposure) of alvimopan is dependent on the amount of narcotic used subsequently as ileus risk appears to be dose dependent [20–22].

The next major component of ERP is effective multimodal analgesia because it not only reduces ileus risk, but allows for early ambulation which conveys its own particular advantages. The various components vary by institution; however, commonly invoked strategies included epidural analgesia, transversus abdominis plane (TAP) blocks, nonsteroidal anti-inflammatory agents, gabepentin, and acetaminophen [23–27]. In laparoscopic colectomy it is not clear that epidural analgesia is an important adjunct and avoidance of the approach avoids one more additional procedure and its associated cost [28, 29]. Therefore, the literature suggest that inexpensive, oral analgesia combined with surgeon delivered TAP blocks provides for a very efficient means of perioperative analgesia. For open colectomy, there is more data to support the role of epidural analgesia within a structured ERP [30–33].

Surgical site infection (SSI) is another common complication associated with colectomy and results in patient morbidity, mortality, increased cost of care and prolonged length of stay. Once again laparoscopic colectomy appears to be associated with a relative reduction in SSI compared to open colectomy [34–36]. A major issue in the ERAS Society guidelines is the recommendation that mechanical bowel preparation be avoided, at least for open colon surgery [37]. This recommendation is based on systematic reviews finding no decrease in SSI rate with the use of mechanical bowel preparation versus no preparation, but a major limitation is that the bowel preparation groups did not include the use of oral antibiotics [37]. This gap has been exposed by studies which document higher SSI rates after abandoning the oral antibiotic/mechanical

preparation strategy and lower rates after its reintroduction [38–41]. While the need for oral antibiotics is clear, whether oral antibiotics need a mechanical preparation in order to be effective has not been studied [42]. The issue of appropriate intravenous prophylactic antibiotics has been well studied and the appropriate options are evidence based [43]. These data support the role of inexpensive strategies to effectively reduce the risk of SSI following colectomy and surgeons should give strong consideration to adding these measures to their ERAS protocol.

Cost Benefits of ERP

The data associated with ERP clearly demonstrate many potential sources of cost containment with adoption of these inexpensive strategies. In fact, other than the often cumbersome process of adoption of ERP protocols, the individual components are relatively inexpensive and readily available even in cost constrained environments [44–48]. Sammour et al. identified an adoption cost of NZ$ 102,000 for an ERP protocol which produced and excellent rate of return of NZ$ 6900 per patient [49]. Delaney et al. demonstrated similar benefits and highlighted a variety of sources of cost reduction related to shortened length of stay, lower complication rates, and lower utilization of laboratory, imaging and pharmaceutical resources [11]. These cost benefits can be considered within the construct of a warranty process which allows providers to assess the financial risks associated with internal processes of care and the population managed [49, 50].

Summary

The data associated with ERP protocols, particularly when combined with laparoscopic techniques, has consistently demonstrated efficient cost reduction while producing superior clinical outcomes. The time has arrived for senior surgeon leadership and hospital administrative leadership to demand implementation of a “bundle” of inexpensive highly effective processes of care. Each team should then regularly assess and evaluate further opportunities guided by actual experience to resolve the remaining clinical issues which can be modified. These assessments should include both clinical and financial analyses, as well as the potential cost of risk mitigation. This practical approach to operational management will allow maximal innovation which should produce higher quality and lower cost of care for colorectal surgical patients.

Take Home Messages

Key take home messages based upon this review include:

- Introduction of an ERP will almost assuredly safely reduce the length of hospital stay by avoiding components of the care plan which negatively impact recovery.
- The addition of a significant volume of minimally invasive colorectal resection will be necessary for a system to see significant improvement even with the introduction on an ERP.
- Prophylaxis for postoperative ileus is an important adjunct because this factor disproportionately accounts for many unnecessary days of care within a colectomy population.
- A multimodal, narcotic minimized analgesic program is highly effective in managing postoperative pain while avoiding opioid related adverse events.
- The standardization of care and adoption of effective, inexpensive care components will yield a significant cost of care for the provider within ERP.

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