Editorial

Adding value in healthcare: understanding the whole denominator

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"Enhanced recovery pathways" (ERPs), often termed "enhanced recovery after surgery" (ERAS) protocols, are evidence-based, multimodal care pathways developed to facilitate patient recovery and minimize complications. This approach to patient care is not a new concept in cardiothoracic surgery. In 1994, Engelman *et al.* first reported a reduction in intensive care unit stay and hospital length of stay in patients undergoing coronary artery bypass with the application of an 8-item ERP (1). Shortly after, early reports of ERPs for lung resection began to emerge with encouraging results (2). There is now strong evidence that improvement in patient outcomes and cost-savings can be achieved with the use of ERPs in colorectal surgery (3,4). However, consensus guidelines for the use of ERPs in non-cardiac thoracic surgery have yet to be developed.

Recently, a systematic review of ERPs in elective lung resection concluded that the overall evidence supporting any benefit remains weak (5). With postoperative morbidity rates of 10–40% following lung resection (6,7), the establishment of an ERP that reduces complications, shortens hospital length of stay, and minimizes healthcare costs would be a game changer.

In September's issue of *Annals of Thoracic Surgery*, Paci *et al.* examined the economic impact of an ERP for lung resection in the Canadian healthcare system (8). In this study, 58 historical control "conventional care" patients and 75 patients who followed an ERP were compared for clinical outcomes and overall cost-savings. The authors performed a rigorous economic analysis, including evaluation of institutional, healthcare system, and societal costs. They found that a multidisciplinary ERP was associated with improved hospital length of stay, reduced postoperative complications, and lower societal costs. Societal costs were calculated using questionnaires and included utilization of outpatient resources, productivity losses, out-of-pocket expenses, and caregiver burden.

Limitations of this study include those inherent to its historical cohort design, including a high risk for selection bias. In addition, over 50% of the patients who underwent lung resection during the study period were excluded from the analysis, potentially skewing the results. Furthermore, it is unclear if the findings are applicable to other thoracic surgery practices or healthcare systems outside of Canada. For example, less than 1/3 of patients underwent a minimally-invasive resection, everyone received an epidural catheter, and patients had exceptional pulmonary function tests compared to most undergoing lung resection in the US.

Despite these weaknesses, in an increasingly cost-conscious healthcare environment, Paci *et al.* provide a timely and important addition to the literature. In the business world, return-on-investment refers to the productivity of an investment and is defined as net income generated divided by the cost of the investment. However, this formula does not necessarily apply in medicine, where the quality of care provided and patient outcomes hold significance. Return-on-investment is perhaps more properly termed value when applied to the business of healthcare. The value of an investment in healthcare equals the improvement in quality of care or outcomes divided by overall cost of that investment. In this context, the denominator must not only account for the direct medical costs, but also indirect costs to the healthcare system, and to society as a whole. Paci *et al.* examined all of these and reported a mean societal savings of greater than $4,000 per patient with the use of

ERPs in elective lung resection.

Complicating the matter, to determine the true value of an ERP, the institutional investment to implement it must also be factored into the denominator. Protocols and measurable goals must be determined, ERPs integrated into clinical practice, pre-determined metrics tracked, and appropriate adjustments made over time using a continuous auditing process (9). This stepwise implementation requires a substantial investment in financial and human resources. While the cost to the institution will vary by health system, the cost of additional training, clinical supplies, and human capital required to incorporate ERPs must be projected and tracked.

Clearly there are many moving pieces when determining the value of integrating ERPs into clinical practice for patients undergoing lung resection. Despite the US spending more per capita on healthcare than any other country, the outcomes are not significantly better than other developed nations (10). This suggests that there is room to increase value in healthcare, both in the US and around the world. To do this, both the numerator (improved quality of care and outcomes) and denominator (overall cost) must be fully understood and examined from all angles. At this point, we are yet to definitively establish if quality or outcomes are improved with the use of ERPs in thoracic surgery. Despite this, Paci *et al.* should be congratulated on a paper that brings us one step closer by showing, for the first time, that ERPs may result in societal cost-savings when used in patients undergoing lung resections.

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Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

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