

Enhanced Recovery After Surgery programs: Applying knowledge from the Covid-19 era to enhance rural surgery

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Abstract

Introduction

Enhanced Recovery After Surgery (ERAS) is a perioperative protocol proven to improve post-operative outcomes and reduce hospital length-of-stay. It has been implemented in both metropolitan and rural healthcare sites, with variable successful rates.

Objective

In this review, we explore the evolution of the ERAS protocol and the unique challenges to its implementation within rural and regional settings: with a particular focus on the seismic impacts of the COVID-19 pandemic. We aim to identify current pitfalls in ERAS compliance, and lessons that can be learned and applied to rural clinical practice.

Design

We conducted a systemized search of published literature regarding the impact of COVID-19 on ERAS pathways around the world in rural and metropolitan healthcare centres. Findings: Six observational studies and seven commentaries were included in this review.

Discussion

The Covid 19 pandemic influenced elements of ERAS program both positively and negatively on the health care globally. There was an exponential uptake of technology and remote platforms during pandemic as a way to reduce transmission of COVID-19.

Conclusion

The Covid-19 pandemic introduced an innovative approach to healthcare delivery. Novel approaches with inbuilt

technological solutions should be applied to ERAS pathways, improving their versatility and expanding their reach to a wider patient community.

Introduction

Enhanced Recovery After Surgery (ERAS) is an evidence-based management guideline for optimising post-operative patient outcomes and minimising hospital length of stay. In 1997, Kehlet first described a multimodal management pathway to address post-operative pathophysiology. His initial framework included techniques to reduce surgical stress and pain, post-operatively, with the primary goal to “fast-track” recovery and reduce length of admission. During the early 2000s, “Enhanced Recovery After Surgery” replaced “fast-track surgery” to describe overall improvement of patient physiology in the post-operative phase. This reflected a change in the primary goal of the protocol. Instead of reducing length of admission, the emphasis shifted towards improving physiological recovery and promoting all post-operative outcomes, including morbidity and mortality rates, surgical complication rates, and overall patient satisfaction. The evolution of ERAS has been underpinned by advances in the understanding of perioperative physiology, allowing for more holistic clinical practice. This process highlights the importance of multidisciplinary teamwork to optimise patients pre-operatively and “rehabilitate” patients post-operatively, with a focus on adequate pain relief, early mobilisation, and appropriate nutritional advice. Over the decades, ERAS protocols have continued to evolve and adapt, encompassing a wider range of surgical procedures, including emergency procedures. This has introduced new challenges for ERAS centres, with emergency patients representing a more heterogenous group demanding greater flexibility and personalisation in management regimes.

Successful implementation of ERAS protocols has been associated with improved surgical outcomes, shorter hospital stays and improved patient experiences. However, despite a growing pool of evidence for the ability to adapt ERAS to nearly all surgical procedures, the practical implementation of these protocolised pathways has faced challenges. Barriers include overcoming ingrained clinical practices and systemic

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issues of resourcing, staffing and geographical accessibility . The incorporation of ERAS guidelines in clinical practice has lagged behind their urban counterparts for diverse reasons . These challenges have been further exacerbated by the COVID-19 pandemic, which have strained hospital resources and drastically shifted the ratio of elective to emergency procedures. To date, no reviews have explored the impact on ERAS programs during Covid-19, and the consequences for rural healthcare systems.

There is a paucity of studies regarding ERAS programs in rural and remote healthcare settings. In this review, we focus on the implementation and of ERAS during the COVID-19 pandemic and consider how pandemic-induced changes may be of continued benefit to rural healthcare services.

Methodology

We searched Medline and Cochrane Library from inception through to January 2023 using the terms “enhance recovery after surgery” and “Covid-19”, as well as all synonyms. Using Covidence, studies were screened via title and abstract (by authors 1 and 2), and then subsequently via full text. Studies were included if they discussed the impacts of Covid-19 pandemic on ERAS implementation or outcomes – either in rural or metropolitan centres. Exclusion criteria included studies that were not complete, not published in English, involved paediatric surgeries, or did not discuss a defined ERAS pathway. Data was extracted into an excel spreadsheet and included the date and country of publication, the study design, and the main conclusions related to ERAS implementation or outcomes.

Results

There were forty-one studies identified via Medline and Cochrane Library of Clinical Trials, of which thirteen were included in this study. Twenty-one were excluded during title and abstract screening and a further seven were excluded during full text screening (Figure 1).

The thirteen eligible articles were of varying style. Only five were primary research studies (table 1) and the remaining eight were surveys, perspective pieces, letters-to-the-editor, or commentaries (table 2).

Of the primary studies, four studies compared a pre-Covid cohort to a mid-pandemic cohort of patients, and one study compared an at-home pre-habilitation program to a standard preoperative program. All five studies provided numerical comparisons for length of stay in hospital, two studies provided data regarding compliance with ERAS criteria, and

three studies commented on post operative complication rates (table 1).

Discussion

The Impact of Covid-19

The COVID-19 pandemic was a major disruption to routine healthcare delivery across the globe; however, studies on ERAS implementation during the COVID-19 pandemic are limited. There is variable evidence regarding the impact of the pandemic on compliance rates to ERAS criteria during the pandemic . Grieco et al discussed concerns that one of the ERAS criteria most affected by the lower nurse-to-patient ratio was early mobilisation. This may reflect staff being redeployed to work on Covid-specific wards, higher case load, and an overall decrease in the nurse-to-patient ratio. In addition, as part of Covid-safe measures, interactions between medical staff, family visitors and patients was restricted in hospital , whilst Allied health professional operated on restricted schedules. This undermined ERAS's multidisciplinary model of care, with reduced capacity for allied health care and, to some extent, limited involvement of family in the care. Furthermore, the cancellation and postponement of elective surgeries also impacted the pre-operative optimisation aspect of ERAS, with one study finding that management of anaemia was more often overlooked²⁸.

Patient outcomes were also impacted during the Covid pandemic, with worse post operative complication rates . This may in part be secondary to the reduced rate of laparoscopic procedures, as they were deemed unsafe due to aerosol generation risks. Instead, units performed colorectal resections using open approaches .

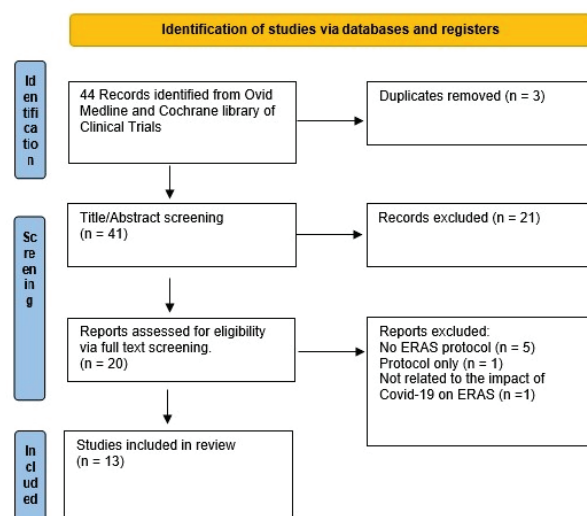


Figure 1. Screening studies for eligibility

Table 1. Primary Studies on the Impact of Covid-19 pandemic on ERAS

Study	Country	Study Design	Surgical Type	Elective vs Emergency	Study aim	Cohort size	Outcomes
Brown 2021 ¹⁴	United Kingdom	Case-control study	Caesarean section	Elective	"To determine if COVID-19 contributed to a reduction in length of stay (LOS)"	403	Length of stay: - Pre COVID: 2.86 days - During COVID: 2.24 days
Goodmaker 2021 ¹⁵	England	Cohort study	Colorectal	Elective & Emergency	To explore the "effect of the COVID-19 pandemic on colorectal ERAS pathway adherence and patient outcomes"	166	Length of stay: - Pre COVID: 7 days - During COVID: 7 days Compliance with ERAS: - Pre COVID: 58.6% - During COVID: 68.2%
Grieco 2022 ¹⁶	Italy	Multicentre, Cohort study	Colorectal	Elective	"How the COVID-19 pandemic changed application of the ERAS program to colorectal surgery"	1237	Length of stay - Pre COVID: 6.82 days - During COVID: 7.43 days Compliance with ERAS: - Pre COVID 65.6% - During COVID: 54.6% Post op complications: - Pre COVID group: 16.1% - During COVID group: 18.0%
López-Rodríguez-Arias 2021 ¹⁷	Germany	Randomised Control Trial	Onco-colorectal	Elective	"Assess the impact of prehabilitation on the body composition of patients undergoing colorectal surgery enrolled in a home-based prehabilitation program vs standard of care (enhanced recovery after surgery (ERAS) without prehabilitation) and its impact on postoperative outcomes in the home confinement context due to the COVID-19 pandemic."	20	Length of stay - Standard care group: 7.2 days - Home prehabilitation group: 4.8 days Post operative complications - Standard care group: 50% - Home prehabilitation group: 20%
Spinelli 2021 ¹⁸	Italy	Cohort study	Colorectal	Elective	"How the pandemic scenario impacted the quality of a long-established enhanced recovery protocol colorectal surgery program"	309	Length of stay: - Pre COVID: 6.2 days - During COVID: 4.3 days Post operative complications - Pre COVID: 24% - During COVID: 30%

Remarkably, the hospital length of stay for patients remained largely the same if not slightly shorter during the COVID pandemic . This allowed for a compensatory reduction to the systemic burden of care . One study from the United Kingdom purported that the reduced hospital admission time may be due to three main factors: the wishes of patients to be home instead of in hospital; the inability for family members to visit; and the stronger efforts by staff to facilitate earlier discharges to create bed space and to minimise in-patient Covid-19 transmission.

The Parallel between Rural Surgery and the Covid-19 era

Major factors inherent to ERAS are active patient involvement, multidisciplinary interaction, and flexibility to adopt a new pathway of practice. ERAS programs are possible in rural and regional hospitals but are inherently challenged by several factors. This includes geographical limitations, higher staffing turnover, fewer resources, a relatively smaller cohort of patients, lower patient education . Moreover, detrimental patient factors including co-morbidities and socioeconomic disadvantages are more

prevalent in the rural and regional setting. The lack of resourcing and limited staffing availability which burdened the Covid-19 era is a parallel to the challenges that characterise rural surgical practice. Thus, the lessons to be learnt from studying the Covid-19 era and its impact on ERAS can be extrapolated to rural practice.

Future Directions of ERAS

ERAS have helped set a new standard of surgical care, delivering both improved patient outcomes and health system benefits. Furthermore, with heightened post pandemic demand and shortages in healthcare workers, the health economic advantages of ERAS should be better utilised moving forward . The increased healthcare system demands seen during the COVID-19 pandemic and post-pandemic era demonstrate the necessity for more efficient and streamlined hospital admissions of surgical patients in order to relieve bed pressure and create greater capacity for patient care. Thus, finding ways in which to optimise the implementation of ERAS should be front of mind in both urban and rural healthcare centres.

Table 2. Commentaries regarding the impact of Covid-19 on ERAS pathways

Study	Country	Study Design	Surgical Type	Elective vs Emergency	Main conclusions
Borghi 2020 ¹⁹	Italy	Letter to the Editor	Colorectal	Elective & Emergency	Due to the complexity of implementing ERAS pathways, it be beneficial to centralise patients towards ERAS-experienced centres to help optimise patient flow, peri-operative and post-operative outcomes during a health crisis.
Gregory 2020 ²⁰	United States	Article	Cardiac	Elective & Emergency	Cardiac ERAS protocols have been proven to reduce ICU and hospital resource utilisation whilst improving outcomes. Constrained resources during the COVID pandemic have emphasised the importance of ERAS and the need for constant adaption, such as the use of electronic media for meetings and updates.
Liyanage 2020 ²¹	England	Letter to the Editor	N/A	N/A	ERAS can significantly improve efficacy of healthcare systems when surgeries restart post Covid-19
Nikolaos 2020 ²²	England	Letter to the Editor	Gynae-oncology	Elective	Strategies to prevent Covid-19 infection during admission should include pre-admission Covid-19 testing, and control of staff and visitor flow throughout the day. This can be worked into peri-operative programs such as ERAS
Sica 2020 ²³	Germany	Article	Onco-colorectal	Elective & Emergency	Implementation of ERAS protocols have not been significantly impacted by the pandemic, rather its implementation has led to decreased hospital length-of-stay during the pandemic.
Wainwright 2021 ²⁴	Switzerland	Perspective	Hip & Knee replacements	Elective	ERAS should incorporate the use of technologies

Restarting elective surgery after the height of the pandemic posed the challenges of long elective procedure waiting lists, unknown consequences of long-Covid disease, and high risk of pulmonary complications and increased mortality associated with perioperative Covid-19 infection . Consistent and careful implementation of the ERAS protocol with stipulated guidelines for preoperative testing should become mandatory in this new norm .

One of the most positive changes induced by the pandemic is the increased use of electronic platforms . To reduce transmission of the disease between healthcare workers and

patients, telehealth and telephone consults became a common practice. More effective utilisation of remote access to patients can be adopted to rural and remote settings in order to accommodate patients who live far from healthcare centres.

Furthermore, several healthcare sites and at-home rehabilitation programs were introduced to accommodate lockdowns mandates and ensure patients remained fit for surgery. The preliminary results of such programs were promising , suggesting room for incorporation of these programs into pre-operative ERAS protocols. At-home rehabilitation programs can also benefit from increasing use

of technology, such as phone applications and smartwatches for tracking activity — . Again, this incorporation into ERAS programs may prove beneficial for patients living in rural and remote environments, providing greater accessibility to the wider community.

Conclusion

By utilising more novel ideas that were founded during the COVID-pandemic, it may be possible to break through the rural specific barriers that have previously hindered adoption of ERAS programs to rural and regional centres. The pandemic saw a dramatic uptake in the utilisation of electronic platforms to promote remote access to healthcare services and these mechanisms should be further adapted and incorporated into the implementation rural ERAS programs. Furthermore, incorporation of at-home rehabilitation programs may allow for rural patients to still be optimised pre-operatively without the burden of long-distance travel whilst unwell. Ultimately, the Covid-19 pandemic has shed lights in to how ERAS be extrapolated in all healthcare settings and further demonstrated that rapid changes to a system is possible. Breaking rural-specific barriers, embracing relevant technologies, improving the communication and collaboration augurs well for sustainable ERAS programs to rural and regional centres

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