Exploring Enhanced Recovery After Surgery (ERAS) Guidelines in Pakistan

Hamza Ahmad

Division of Experimental Surgery

McGill University, Montreal

December 2023

A thesis submitted to McGill University in partial fulfillment of the requirements

for the degree of Master of Science

Table of Contents

Abstract

Introduction: An increasing shift towards non-communicable diseases and an existing high surgical burden of disease in low-middle-income countries (LMICs), such as Pakistan, has driven the need for implementing Enhanced Recovery After Surgery (ERAS), a safe and cost-effective surgical service aimed at improving patient recovery and reducing post-operative complications. Even though the potential benefits of implementing ERAS in LMICs could outweigh those in HICs, a successful long-term implementation of ERAS has yet to be completed across Pakistan. Initial experiences of healthcare professionals when implementing ERAS in HICs revealed that a long-term adaptation of ERAS required overcoming several barriers including resistance to change, the support of relevant stakeholders, information provision to patients, availability of allied healthcare professionals and pertinent staff members, aligning different ward cultures, and formation of multidisciplinary teams consisting of various healthcare professionals and management in support of ERAS. Nonetheless, despite these challenges, implementation of ERAS in HICs has progressed, mainly because qualitative data regarding the perceived barriers to the implementation of ERAS has been used to form a number of process-related implementation enablers. Thus, qualitative research aimed at understanding the perspective of those involved in the implementation of ERAS has been a key factor in the successful implementation of ERAS in HICs and a paucity of qualitative research aimed at gaining experiences of healthcare professionals' views regarding ERAS in the specific socio-economic environment of Pakistan could be a rationale for a lack of long-term engagement of ERAS. Therefore, the purpose of this study was to investigate the challenges and opportunities in implementing ERAS in Pakistan's healthcare system, focusing on the perspectives of healthcare professionals.

Methods: A mixed method study design was utilized to conduct this project. Chapter 4 consisted of a survey analysis with a previously validated and modified 29-question survey whilst Chapter 5 consisted of a qualitative descriptive study utilization semi-structured interview, initially pilot tested amongst the faculty in Pakistan. Upon receiving ethical approval from the McGill University Health Center (MUHC) in October 2020, the survey was disseminated to healthcare professionals practicing in Pakistan. Interviews were conducted by the first author at a public tertiary care hospital in Lahore, Pakistan. Quantitative data was analyzed using descriptive statistics and potential correlations between the implementation of ERAS and the participants' gender, employment setting, and surgical specialty were investigated. Whereas the qualitative data was analyzed using an ongoing inductive approach where each transcript was thematically analyzed conceptually similar codes were grouped into meaningful categories and themes.

Results: In Chapter 4, 49 participants responded to the survey, revealing that 85% were aware of ERAS guidelines, with 61% successfully implementing ERAS into practice. Notably, elements such as preoperative carbohydrate loading, prolonged preoperative fasting, mechanical bowel preparation, active patient warming, and early postoperative removal of Foley's catheter displayed considerable variability in implementation. Comparing ERAS implementation with employment setting, surgeons at private institutions demonstrated higher success. Overall, enhanced management support, improved patient compliance, interdisciplinary collaborations, and surgeon’s knowledge and acceptance of ERAS were identified as key areas needing improvement. Chapter 5 highlighted that while ERAS benefits were recognized from a patient and hospital perspective, all 11 participants identified a complex interplay of cultural, organizational, and personal factors impacting ERAS protocol implementation. Participants identified common themes, including the need for administrative oversight, the role of attending

surgeons in ERAS implementation, improving patient education, strengthening primary healthcare services, and addressing resource constraints that play a significant underlying role in the current implementation of ERAS in Pakistan.

Conclusion: In essence, this study provides valuable insights into the challenges and opportunities of implementing ERAS in Pakistan's healthcare system. It underscores the multifaceted dynamics influencing the adoption of ERAS by healthcare professionals, emphasizing the need for tailored strategies to navigate the unique socio-economic environment.

Acknowledgements

I extend my deepest gratitude to my mentors, Drs. Dan Deckelbaum and Antonia Arnaert, whose guidance has been invaluable. Their unwavering support not only nurtured my growth as a researcher but also provided unique opportunities to submit abstracts and scholarships. Their mentorship has extended beyond research and has supported me in pursuing my dream of attending medical school. I am immensely thankful for their unwavering support.

I am also appreciative of Drs. Dragomir, Wong, and Grushka, members of the research advisory committee, who generously dedicated their time to guide me through the preparation of my thesis. Their consistent availability to address my queries and provide unwavering support has been indispensable.

I would also like to thank Gabriela Sanchez, who has been very helpful throughout this thesis project. She consistently helped me coordinate my project in Canada and in Pakistan, provided immense resources to help arrange scholarships and funds for the project, and provided a constant support whenever I faced challenges and difficulties in pursuing my project.

Finally, I would like to thank my family and friends without whom I could not have accomplished this achievement.

Preface

This thesis is presented in a manuscript-based format. Chapter 4 and 5 have been accepted for publication.

Chapter 4: Survey analysis exploring the knowledge, implementation, and perception of Enhanced Recovery After Surgery amongst surgeons in Pakistan

Chapter 5: Qualitative descriptive study exploring the experiences of healthcare professionals at a public tertiary care institution in Pakistan when implementing ERAS.

Contribution of Authors

Along with Dr. Deckelbaum and Dr. Arnaert, I was responsible for the conception and development of the project.

I contributed to all data collection and analysis in this project with some assistance from Dr. Arnaert, Dr. Shehdio, and Dr. Pasha.

All writing and interpretations in this thesis are entirely my own with minor editorial revisions by Drs. Deckelbaum and Arnaert.

Chapter 1: Introduction to Enhanced Recovery After Surgery (ERAS)

Development of ERAS guidelines

Enhanced Recovery After Surgery (ERAS) represents a collection of evidence-based perioperative guidelines, originally conceptualized by Professor Henrik Kehlet, challenging conventional perioperative care practices. Traditional approaches, including prolonged fasting, restricted mobility, mechanical bowel preparation, routine drain usage, and delayed resumption of normal eating postoperatively, were questioned [1]. Despite the historical association with the term "fast track," these protocols primarily aim to underscore the quality rather than the speed of recovery [2].

The inaugural application of ERAS occurred in 1994 when Engelman and collaborators introduced a "fast-track recovery" plan at Baystate Medical Center and Hartford Hospital in the United States. Initial implementation involved a retrospective 1-year analysis of coronary artery bypass grafting patients compared to those undergoing the same procedure pre-protocol adoption [3]. The early ERAS protocols emphasized preoperative education, prompt extubation, accelerated rehabilitation, early discharge, a dedicated fast-track coordinator overseeing daily telephone communication and a postoperative examination at one week, routine one-month postoperative visits with a physician assistant or medical doctor, and standardized pharmaceutical administration preoperatively and postoperatively [3]. Post-implementation, notable improvements were observed, including a reduction in extubation time from 22.1 to 15.4 hours and peak weight gain from 2.8 to 1.6 kg in the fast-track group compared to the non-fast-track group [3]. Concurrently, there were significant reductions in intensive care unit duration (from 2.4 to 1.9 days) and postoperative length of stay (from 8.3 to 6.8 days) [3]. Building on this success, Badram and colleagues extended similar strategies to their colonic resection in eight

elderly high-risk patients with neoplastic disease [4]. The reduction of hospital stay to two days without experiencing nausea, vomiting, or ileus, along with the avoidance of postoperative fatigue and functional impairment, was noted [4]. Encouraged by the success of this "fast-track" program in a specific patient cohort, Professor Henrik Kehlet conducted a series of larger trials in the 1990s to evaluate its efficacy in a broader surgical context [5]. In a study involving sixteen patients undergoing elective sigmoid resection under the fast-track program, a significant decrease in median postoperative hospital stay was observed, accompanied by increased patient mobilization on the second and third postoperative days. Additionally, fatigue and pain scores remained low during the initial 8-9 days post-operation [6]. Subsequently, the fast-track approach officially transitioned into Enhanced Recovery After Surgery (ERAS) guidelines. In 2001, a collaborative effort produced a set of protocols aimed at optimizing recovery based on published evidence [2].

These ERAS protocols embrace a multimodal strategy to control postoperative pathophysiology and patient rehabilitation, emphasizing evidence-based perioperative guidelines [7]. Key principles include pre-operative counseling, preoperative nutrition, avoidance of perioperative fasting, carbohydrate loading up to 2 hours preoperatively, standardized anesthetic and analgesic regimens (including epidural and non-opioid analgesia), and early mobilization [7]. Over time, these protocols have evolved to encompass a holistic perspective, incorporating endocrine, metabolic, and rehabilitative aspects of recovery [2]. Consequently, traditional protocols have been supplanted by these evidence-based guidelines, gaining widespread adoption in surgical specialties globally, spanning colorectal, gastric, pancreatic, esophageal, bariatric, and non-gastrointestinal disciplines [8].

The establishment of the ERAS Society in 2010 marked a pivotal development, aiming to create an international network of regional and national expert centers promoting ERAS protocol utilization [9]. Since its inception, the ERAS Society has been instrumental in developing specialized guidelines tailored to various surgical subspecialties, ensuring the adaptability of ERAS guidelines for sustained implementation.

Chapter 2: Literature Review

Current Implementation of ERAS in HICs

Since the inception of ERAS), numerous global implementation programs have provided compelling evidence supporting its benefits. A multicenter randomized study, comparing open or laparoscopic surgery with or without ERAS, concluded that laparoscopic surgery performed within ERAS significantly reduced postoperative complications and expedited recovery [10]. Pedrazanni and colleagues conducted a comprehensive ERAS adaptation at their institution involving 200 patients, validating the feasibility and safety of ERAS in a diverse population undergoing laparoscopic colonic and rectal resection for various benign and malignant diseases [11]. In Canada, a large-scale implementation of ERAS protocols across the university healthcare network in Alberta demonstrated a significant reduction in hospital length of stay post-ERAS implementation, as revealed in a retrospective cohort study involving 2714 patients with similar comorbidity profiles [12]. Even after adjusting for various factors, the consistent reduction in length of stay persisted, with no significant impact on 30-day death/readmission rates or death/readmission/emergency department visit rates. Notably, patients with diabetes exhibited longer lengths of stay, emphasizing the importance of careful consideration regarding trial benefits versus direct translation into practice [12]. Despite these nuances, a previous multi-site

ERAS program implementation in Alberta estimated that every $1 invested in the ERAS protocol delivered a savings of $3.8, underlining the cost-effectiveness of the approach [13].

ERAS, initially prevalent in colorectal surgery, has witnessed successful implementation across diverse surgical disciplines globally. Cavallaro and Liliana (2019) implemented the ERAS pathway at Massachusetts General Hospital, resulting in significant improvements in postoperative outcomes [13]. In neurosurgical patients undergoing elective craniotomy, Liu and colleagues (2018) observed higher patient satisfaction in the ERAS group, evidenced by reduced postoperative nausea and shorter length of stay [15]. A year-long implementation of ERAS in a US cardiac surgery facility yielded significant reductions in postoperative length of stay, total intensive care unit hours, gastrointestinal complications, and mean opioid use, as evidenced by a comparison between pre-ERAS and post-ERAS patients in the cardiac group [16]. Similarly, an ERAS implementation in patients undergoing pancreatoduodenectomy, conducted by Takagi and colleagues, demonstrated a statistically significant reduction in hospital length of stay, lower postoperative complications, and improved quality of life [17]. Though total medical costs tended to be lower in the ERAS group, the difference did not reach statistical significance [17]. The implementation of ERAS is no longer confined to colorectal surgeries; its success and benefits are evident across diverse surgical disciplines and institutions globally.

Increasing interest for ERAS in LMICs and Pakistan

The growing interest in implementing ERAS in developing nations, such as Pakistan, reflects the potential advantages of a cost-effective and innovative protocol in settings with limited resources and a rising prevalence of communicable diseases [18]. A trial by Pirzada and colleagues (2017) emphasized ERAS benefits in reducing hospital length of stay during stoma reversals in Pakistan [19]. Similarly, Ghufran and colleagues (2020) implemented ERAS for

small bowel surgery in Pakistan, demonstrating a decrease in hospital length of stay without an increase in wound infections or mortality rates [20]. The global implementation of ERAS extends to other developing nations. Rossi and colleagues (2013) investigated ERAS protocols for colorectal surgery in Chile, reporting that the ERAS group with a two-day hospital length of stay had significantly lower operative time, overall morbidity, surgery-related complications, and readmission rates [24]. Similarly, Wang and colleagues (2022) implemented ERAS for elective craniotomy in China, revealing significant reductions in hospital length of stay, postoperative pain, overall pain duration, early removal of urinary catheter, and early oral solid food intake [25].

Several studies from India further contribute to the exploration of ERAS implementation in LMICs. Garg and colleagues (2020) conducted a retrospective study on ERAS protocols for Elective Lumbar Spine Fusion, showing a significantly shorter hospital length of stay in the post-ERAS group, with comparable rates of complications, readmissions, and reoperations [21]. Ashok and colleagues (2020) discussed the successful implementation of ERAS for esophageal cancer resection surgery in Mumbai, India, emphasizing the establishment of an interdisciplinary ERAS team for program adherence [22]. Additionally, Agarwal and Divatia (2019) explored the controversies and possibilities of ERAS implementation in specific settings and specialties, highlighting the importance of revisiting evidence-based recommendations, particularly with the active involvement of key stakeholders, including healthcare professionals and patients [23].

Healthcare professionals and ERAS

As such, comprehending healthcare professionals' perspectives and navigating the local socio-cultural milieu is pivotal to an effective implementation of ERAS as the primary resistance to ERAS often stems from healthcare professionals' hesitancy to deviate from conventional

protocols [26]. Overcoming these barriers necessitates a concerted team effort, as demonstrated by studies linking protocol compliance to enhanced post-operative outcomes [27, 28]. Research underscores a direct association between ERAS program outcomes and adherence to individual recommendations, with heightened compliance independently predicting a better prognosis [31]. Interventions aimed at improving compliance to ERAS, with a minimal implementation of 80% of the elements, yielded significantly improved patient outcomes, reduced hospital length of stay, enhanced functional recovery, and improved tolerance of oral food and mobilization [31]. Several studies in surgical subspecialties emphasize the critical importance of adhering to ERAS recommendations, revealing correlations between increased adherence and diminished hospital length of stay [32]. Cakir and colleagues (2013) additionally stressed the significance of sustained compliance, observing that shorter postoperative stays were associated with higher compliance, while cautioning against waning compliance over time [33]. Repetitive education on ERAS is emphasized to ensure and sustain compliance [33].

While High-Income Countries (HICs) overcame initial ERAS challenges through ongoing qualitative research, a comparable undertaking is LMICs like Pakistan. Despite multiple ERAS implementations in Pakistan, the absence of long-term adaptation indicates a necessity for qualitative research delving into healthcare professionals' current perspectives, the challenges inherent in the local healthcare environment, and the distinct hurdles of implementing guidelines crafted in HICs within a unique cultural setting.

Chapter 3: Rationale and Methods

Rationale

Currently, no such data highlighting the difficulties faced when implementing ERAS protocols from the perspective of the healthcare professionals, the administration, or even the patients exist in Pakistan. Therefore, the aim of this study was to bridge this gap, providing insights for successful long-term implementation of ERAS in Pakistan. Understanding the underlying specific socioeconomic, cultural, and structural barriers to ERAS in Pakistan will provide crucial data that can help develop robust plans to ensure a more appropriate implementation strategy of ERAS.

Methods

A mixed method study design was utilized to conduct this research. Chapter 4 consisted of a survey tool designed to understand the current knowledge, implementation, and perception of ERAS amongst surgeons in Pakistan. A 29-question survey based on a previously validated questionnaire was disseminated to surgeons across Pakistan through various social media platforms and surgical societies with the goal of understanding the overall prevalence and utilization of ERAS. Whereas, Chapter 5 utilized a qualitative descriptive study design to conduct individual semi-structured interviews at the public tertiary care center in Pakistan with the goal of highlighting the barriers and potential enablers to the implementation of ERAS. A semi-structured interview guide was developed and pilot tested amongst the faculty prior to conducting the interviews in Pakistan. Upon receiving ethical approval from the McGill University's Research Institutional Board (#A10-B77-20A) both studies were commenced in September 2020 and data collection was completed in November 2020. A detailed explanation of the methods used for the studies are provided within Chapter 4 and Chapter 5.

Chapter 4: Knowledge, Implementation, and Perception of Enhanced Recovery After Surgery Amongst Surgeons in Pakistan: A Survey Analysis

Knowledge, Implementation, And Perception of Enhanced Recovery After Surgery Amongst Surgeons in Pakistan; A Survey Analysis

Hamza Ahmad[1], Omaid Tanoli[1,2], Waqas Shehdio[3], Dan Deckelbaum[1], Tayyeb Pasha[3]

[1]McGill University Health Center, Center for Global Surgery, Montreal, Canada

[2]University of Toronto, Department of General Surgery, Toronto, Canada

[3]Allama Iqbal Medical College, Department of Cardiac Surgery, Lahore, Pakistan

Corresponding Author

Hamza Ahmad,

M.Sc. Experimental Surgery

M.D., C.M candidate 2025,

McGill University

Hamza.ahmad@mail.mcgill.ca

11405 Rue Frigon

Montreal, Qc,

H3M2R6

Conflict of Interest: No conflict has been declared by the authors.

Funding Sources: HA was supported a grant provided by the Fonds de Recherche du Québec – Santé (FRQS). No additional external funding was received for this study. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Abstract

Introduction: An increasing shift towards non-communicable diseases and an existing high surgical burden of disease in low-middle-income countries (LMICs), such as Pakistan, has driven the need for implementing Enhanced Recovery After Surgery (ERAS), a safe and cost-effective surgical service aimed at improving patient recovery and reducing post-operative complications. Despite countless benefits, there are few ERAS programs throughout Pakistan and sparse literature on healthcare professionals' views regarding ERAS. Without a deep understanding of healthcare professionals' perspectives on ERAS, underlying barriers and facilitators to a long-term ERAS implementation cannot be addressed and improved upon. Therefore, the purpose of this study is to better understand the knowledge, implementation, and perception of ERAS from the perspective of healthcare professionals across Pakistan.

Methods: Upon receiving ethical approval from the McGill University Health Center (MUHC), a previously validated questionnaire was modified and a 29-question survey was developed and disseminated to healthcare professionals practicing in Pakistan. Quantitative data was analyzed using descriptive statistics and potential correlations that exist between the implementation of ERAS and the participants' gender, employment setting, and surgical specialty were investigated using the chi-squared analysis with a p-value of 0.05 as the cutoff.

Results: A total of 49 participants responded to this survey of whom 34 (69%) worked at a tertiary care teaching hospital whereas 15 (31%) worked at a private hospital. Surprisingly, 42 (85%) participants expressed being aware of the ERAS guidelines with only 30 (61%) either strongly agreeing or agreeing to successfully implementing ERAS into practice. The largest discrepancies in implementation were seen when discussing specific elements of the ERAS

guidelines such as preoperative carbohydrate loading, practicing prolonged preoperative fasting, performing mechanical bowel preparation, performing active patient warming, and early postoperative removal of Foley's catheter. Surgeons employed at a private institution were more likely to discuss postoperative pain management and control, less likely to utilize prolonged fasting, more likely to perform regular body temperature monitoring, more likely to practice providing chewing gum to patients postoperatively, and more likely to perform early removal of the Foley's catheter.

Conclusion: An understanding of ERAS, the implementation of various elements, and a positive attitude toward its benefits definitely seem to be prevalent among healthcare professionals in Pakistan. However, key barriers and enablers specific to the underlying healthcare environment seem to be hindering the long-term successful implementation of ERAS across Pakistan. It is crucial for future studies to explore these barriers in further detail and involve the perspective of these key stakeholders to help enhance long-term ERAS adoption.

Introduction

Enhanced Recovery after Surgery (ERAS) is a set of evidence-based perioperative guidelines that aim to improve patient care and recovery [1]. ERAS was first proposed by Danish professor of surgery, Henrik Kehlet, who questioned traditional perioperative care practices such as prolonged fasting, mobility limitations, mechanical bowel preparation, routine use of drains, and slow return to eating postoperatively [2]. Initial implementation of ERAS has shown that it not only lowers recovery time and postoperative complications as expected, but it is also a cost-effective method for reducing hospital and patient expenses [3]. Consequently, traditional protocols have been challenged by these scientifically-based guidelines and implemented globally in various surgical specialties, including colorectal, gastric, pancreatic, esophageal, bariatric, and non-gastrointestinal sub-specialties [1].

Globally,4.8 billion people do not have access to surgical care, with approximately 95% of this population being in low-middle-income countries (LMICs) such as Pakistan [4,5]. Hence, interest in implementing ERAS in Pakistan has risen, and several randomized controlled trials (RCTs) evaluating the potential benefits of ERAS have taken place, but without any long-term implementation being adopted across the country [6-8]. Potential barriers, such as resistance to change, standardization affecting personalized patient care, the buy-in of relevant stakeholders, information provision to patients, resources, palatability of nutritional drinks, aligning different ward cultures, patients going to non-ERAS departments, spreading the program within the hospital, differences in health issues, and utilizing a segmental approach have been identified in high-income countries (HICs) [9]. However, through rigorous research, reflection, and efforts to

improve awareness regarding the long-term benefits of ERAS, challenges have been overcome, and several programs have successfully adopted ERAS in HICs [10-12].

A paucity of data regarding the knowledge, implementation, and most importantly, perception of healthcare professionals regarding ERAS in Pakistan could be a potential underlying barrier to long-term implementation. Therefore, the first step towards improving the standardization of ERAS in Pakistan is to determine the current familiarity and willingness of surgeons across Pakistan to apply the ERAS concepts in their individual practices. While barriers such as accessibility, availability, affordability, and acceptability of surgical care hinder improvements in LMICs, evidence suggests that interventions to improve surgical care in these settings can be cost-effective in the long term [13].

To that end, a survey was developed and disseminated to healthcare professionals across Pakistan to gain insight into their knowledge, implementation, and perception of ERAS. This context-specific information could provide insights into current practices and help identify key areas that could be used to establish and progress the necessary next steps toward improving the standardization of ERAS in Pakistan.

Materials & Methods

Participant recruitment

In January 2021, upon receiving ethical approval, a convenience sampling method was used to recruit participants who were available and willing to participate in the study by completing an online survey. A survey link using the secure REDCap tool was shared directly with the surgeons at various tertiary care institutions via email, obtained from various institutional administrations,

and through several social media groups of surgeons across Pakistan. Informed consent, which included information concerning the purpose of the study and participant approval to use the data for the purpose of publication was obtained from the participants, and they had the choice to leave a question unanswered if the surgeon wished to do so. Participants were also assured regarding data anonymity and confidentiality. The inclusion criteria were being a surgeon practicing in Pakistan, regardless of gender or employment setting.

Survey tool

A survey tool was developed to better understand the knowledge, implementation, and perception of healthcare professionals regarding ERAS. The 29-question survey was a modified questionnaire based on a previously utilized and validated survey for ERAS research (See Appendix) and pilot-tested amongst randomly selected faculty members in Pakistan [14]. The survey was broken down into three distinct sections for preoperative, intraoperative, and postoperative ERAS protocols. To ensure reliability, the survey utilized a Likert scale for the questions with the possibility of rating each item on a five-point scale from 0 (strongly disagree) to 5 (strongly agree). Only upon approval and finalization was the survey distributed to the participants.

Data analysis

After a one-month period of data collection and management using the REDCap system, the survey was closed. Descriptive and inferential statistics were generated using the data obtained from the survey. Individual surgeon demographics were dichotomized or categorized into multiple groups where appropriate. Chi-square tests of independence were performed to identify

possible associations between demographic information and the implementation and knowledge of ERAS. Differences between groups were only considered significant when the p-value was < 0.05.

Ethics approval

Ethical approval was obtained from the McGill University Health Centre (MUHC) Research Institutional Board before study commencement (approval number: A10-B77-20A, 20-10-002).

Results

A total of 49 responses were received from surgeons employed across the provinces of Punjab and Khyber Pakhtunkhwa. Out of the 49 respondents, male surgeons constituted a larger portion (n=31, 63%) compared to female surgeons (n=18, 37%). The majority of respondents (n=34, 69%) worked at tertiary care teaching hospitals, while the remaining worked at private hospitals (n=15, 31%). The city of Lahore accounted for the highest number of responses (n=38, 78%), followed by Peshawar (n=6, 12%) and Rawalpindi (n=5, 10%). General surgery was the predominant specialization among the respondents (n=22, 45%), with other specializations including cardiac surgery (n=10, 20%), orthopedic surgery (n=5, 10%), gynecology (n=4, 8%), otorhinolaryngology (n=3, 6%), urology (n=3, 6%), thoracic surgery (n=1, 2%), and pediatric surgery (n=1, 2%). The average work experience of the respondents was four years, ranging from a minimum of one year to a maximum of 15 years. Most respondents (n=33, 67%) had worked one to four years, while 14 (29%) had worked 5-10 years, and only two (4%) had worked for 11 years or more. Out of the 49 respondents, a majority (n=42, 86%) were aware of

the ERAS guidelines. However, when it came to successfully implementing ERAS into practice, only 30 (61%) either strongly agreed or agreed to have adopted ERAS into practice.

Disparities were observed among individual practices regarding certain elements of the ERAS guidelines. For example, only 6 (12%) of the participants agreed or strongly agreed to provide carbohydrate loading preoperatively. A significant proportion 30 (62%) of the respondents agreed or strongly agreed to practice prolonged preoperative fasting. In terms of mechanical bowel preparation, 24 (48%) of participants agreed or strongly agreed, 16 (32%) were neutral, and only 6 (12%) disagreed with the practice. Only 19 (38%) of the participants agreed or strongly agreed to always performing active patient warming, and 27 (54%) agreed or strongly agreed to early postoperative removal of Foley's catheter to promote early mobilization. Detailed participant responses regarding individual elements of the ERAS guidelines are provided in Table *1*.

ERAS Component	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unanswered
Preoperative counselling is always performed	26 (53.06%)	18 (36.73%)	4 (8.16%)	1 (2.04%)	-	-
Discharge planning is always performed	15 (30.61%)	30 (61.22%)	-	3 (6.12%)	-	1 (2.04%)
Postoperative pain management and control is always discussed	14 (28.57%)	21 (42.85%)	2 (4.08%)	7 (14.28%)	2 (4.08%)	3 (6.12%)

Cessation of smoking 4 weeks prior to the surgery is always discussed	3 (6.12%)	25 (51.02%)	10 (20.40%)	5 (10.20%)	3 (6.12%)	3 (6.12%)
Underlying co-morbidities, including diabetes, hypertension, and coronary artery disease, are controlled and assessed prior to surgery	21 (42.85%)	10 (20.40%)	6 (12.24%)	7 (14.28%)	-	5 (10.2%)
Patients are always provided with carbohydrate loading drinks preoperatively	-	6 (12.24%)	11 (22.44%)	20 (40.81%)	11 (22.44%)	1 (2.04%)
Preoperative fasting of solid and liquid food is commenced at midnight before surgery	17 (34.69%)	13 (26.53%)	1 (2.04%)	15 (30.61%)	2 (4.08%)	1 (2.04%)
Mechanical bowel preparation is Always performed preoperatively	6 (12.24%)	18 (36.73%)	16 (32.5%)	5 (10.20%)	1 (2.04%)	3 (6.12%)

Antibiotic prophylaxis is Always performed preoperatively	25 (51.02%)	18 (36.73%)	2 (4.08%)	1 (2.04%)	-	3 (6.12%)
Thromboprophylaxis is Always performed preoperatively	3 (6.12%)	21 (42.85%)	10 (20.40%)	12 (24.49%)	1 (2.04%)	2 (4.08%)
Regular body temperature monitoring is Always performed to avoid hypothermia	8 (16.32%)	28 (57.14%)	5 (10.20%)	7 (14.28%)	1 (2.04%)	1 (2.04%)
Active patient warming is Always performed	4 (8.16%)	15 (30.61%)	10 (20.40%)	18 (36.73%)	1 (2.04%)	1 (2.04%)
Multimodal opioid-avoiding analgesia is Always used for all patients along with regional anesthesia during surgery	5 (10.20%)	28 (57.14%)	10 (20.40%)	4 (8.16%)	-	2 (4.08%)
Customized and tailored analgesia is Always	4 (8.16%)	26 (53.06%)	13 (26.53%)	4 (8.16%)	-	2 (4.08%)

considered to enable the earliest possible transition to oral medications						
Chewing Gum is Always encouraged 3x/day for 5 minutes until patient is tolerating food	3 (6.12%)	16 (32.65%)	14 (28.57%)	12 (24.49%)	4 (8.16%)	-
Given the patient is awake, alert, and able to swallow, early oral liquid and solid intakes is Always started within 4-6 hours postoperatively	8 (16.32%)	15 (30.61%)	7 (14.28%)	13 (26.53%)	4 (8.16%)	2 (4.08%)
Postoperative intrathecal opiates are used for pain management	1 (2.04%)	10 (20.40%)	9 (18.36%)	24 (48.98%)	2 (4.08%)	3 (6.12)
Foley's Catheter is Always removed in less than 48 hours postoperatively	12 (24.49%)	15 (30.61%)	11 (22.44%)	7 (14.28%)	2 (4.08%)	2 (4.08%)

Patients are recommended to start walking to prioritize early mobilization on post-operative Day 0	10 (20.40%)	20 (40.81%0	4 (8.16%)	11 (22.44%)	4 (8.16%)	-
Patients are recommended to start walking to prioritize early mobilization on post-operative Day 1	17 (34.69%)	26 (53.06%)	3 (6.12%)	3 (6.12%)	-	-

Table 1: Responses to whether surgeons are always implementing individual ERAS elements

When examining the association between a surgeon's knowledge of ERAS and the successful implementation of ERAS using the chi-squared statistical analysis method, no significant correlations were found. However, when comparing individual ERAS elements with the surgeons' employment settings, with 15 (31%) surgeons appointed at private institutions and 34 (69%) appointed at public tertiary care teaching hospitals, several distinct associations emerged. Surgeons employed at private institutions were more likely than those at public tertiary care teaching hospitals to discuss postoperative pain management and control, less likely to utilize prolonged fasting, more likely to practice regular body temperature monitoring, more likely to provide chewing gum to patients postoperatively for bowel movement, and more likely to perform early removal of the Foley's catheter. Conversely, participants at tertiary care hospitals were more likely to perform preoperative active patient warming compared to participants at private institutions. Interestingly, participants employed at private institutions believed they were more successful at implementing ERAS compared to participants at tertiary care teaching

hospitals. No significant associations were observed when comparing the gender, surgical specialty, or age of the surgeons to the implementation of various ERAS elements. These findings are further detailed in Table *2*, which highlights the utilization of ERAS guidelines which were significantly different in private institutions when compared to the public tertiary care institutions.

ERAS Elements	**Private Institution (%)**	**Tertiary Care Hospital (%)**	**p-value**
Discuss postoperative pain management and control	15 (100%)	20 (65%)	0.01
Utilize prolonged fasting	1 (6%)	29 (88%)	0.01
Practice regular body temperature monitoring	14 (93%)	22 (65%)	0.001
Provide chewing gum postoperatively for bowel movement	11 (73%)	8 (24%)	0.01
Perform early removal of Foley's catheter	13 (87%)	14 (44%)	0.02

Believe in the successful implementation of ERAS	13 (87%)	17 (50%)	0.02
Discuss postoperative pain management and control	15 (100%)	20 (65%)	0.01

Table 2: Associations between ERAS elements and employment setting of surgeons

Finally, participants were asked to highlight key areas of focus that would help enhance the implementation of ERAS at their institution. These key areas of focus included enhanced management support, improved patient compliance, interdisciplinary collaborations, and surgeons' knowledge and acceptance of ERAS. When questioned if ERAS should be implemented across Pakistan, only 10 (20%) participants agreed or strongly agreed whereas 20 (41%) were neutral, 17 (35%) disagreed or strongly disagreed, and two (4%) opted to not answer. Table *3* provides a summary of the responses.

Barrier to the implementation of ERAS	**Frequency**
Enhanced management support	4 (8%)
Improved patient compliance	12 (24%)
Interdisciplinary Collaborations	16 (33%)
Surgeon's knowledge and acceptance of ERAS	15 (31%)
Missing Response	2 (4%)

Table 3: Participant responses for perceived barriers to the implementation of ERAS

Discussion

This study is the first that surveyed surgeons in Pakistan regarding their knowledge, implementation, and perception of ERAS guidelines. According to the results of this study, a vast majority of surgeons (86%) were aware of the ERAS guidelines and astonishingly 49% of the participants in the study agreed or strongly agreed to successfully implement ERAS into their practice. However, despite an impressive number of participants already implementing ERAS, several key areas of improvement were identified by the participants. One of the main areas of focus that could help improve the implementation of ERAS at their respective institutions was the surgeon's knowledge and acceptance of ERAS. This finding is not surprising, as research conducted in HICs regarding healthcare professionals' attitudes towards ERAS highlighted that the most common reason for resistance to ERAS tended to be the reluctance of healthcare professionals to accept ERAS and abandon traditionally taught protocols. [15] Similarly, participants also expressed that enhanced support from the management, improved patient compliance, and interdisciplinary collaborations could further aid the implementation of ERAS. It is important to note that these key areas of improvement identified by the participants encompass institutional and structural components, thus requiring the involvement of key stakeholders and policymakers to improve the awareness, acceptance, and implementation of ERAS across Pakistan.

Interestingly, specific elements of ERAS such as providing preoperative carbohydrate loading, practicing prolonged preoperative fasting, regularly performing mechanical bowel preparation, active preoperative patient warming, and early postoperative removal of Foley's catheter tended

to be the practices that were least adhered to. This finding not only highlighted that certain elements were harder to standardize but also shed light on the importance of addressing compliance to all the components of ERAS because minimum compliance of 80% to the ERAS protocol is associated with lower postoperative complications, shorter postoperative hospital stays, and improved patient satisfaction [16,17]. A policy that can be adapted to address healthcare professionals' compliance with the different elements of ERAS is the use of an audit system, which can be imperative for achieving optimal patient outcomes [18].

When comparing the implementation of certain ERAS elements with the employment setting of the participants, interesting associations were observed, highlighting potential organizational barriers to the implementation of ERAS. Participants from private institutions were more successful at adhering to specific elements of the ERAS guidelines and believed to be more successful at implementing ERAS than participants at tertiary care teaching hospitals. Surprisingly, these findings are not in coherence with previous research which concluded that diagnostic accuracy and adherence to medical management standards were worse amongst the private sector care providers in Pakistan [19]. However, when taking into consideration that surgeons prefer to be employed at hospitals, which in turn focus on revenue generation through innovation and improved patient satisfaction, it is conceivable that there is an improved focus on implementing and standardizing ERAS protocols in the private sector.

Interestingly, enhancing management support does not seem to be a concern according to healthcare professionals when implementing ERAS. Instead, a concern is placed on patient compliance and a lack of interdisciplinary collaboration. Even though these barriers have also been identified in HICs, an emphasis on the lack of patient compliance has not been placed. This

is an interesting phenomenon and one that requires further exploration through research. Without a patient buy-in into ERAS, interventions aimed at improving compliance might not be effective. Hence, it can be important before going forward to conceptualize and develop stronger educational programs to help patients understand the importance of ERAS and take an active role in its implementation.

Alongside highlighting the implementation of specific ERAS protocols, this study has provided a brief insight into the perceived barriers faced by healthcare professionals when implementing ERAS. However, a deeper understanding of these institutional, structural, and cultural barriers is still needed to better conceptualize and target policy that can help overcome such barriers. Qualitative studies in HICs aimed at better understanding the perspectives of healthcare professionals, executive leadership at the hospital, and patients helped develop a number of process-related implementation enablers, which ultimately led to the successful long-term implementation and standardization of ERAS across healthcare institutions [20]. Therefore, moving forward, studies should ideally focus on understanding the specific needs of healthcare professionals, executive leadership, management, and even patients when exploring a long-term implementation of ERAS in Pakistan.

Limitations

The inherent limitation of this study is that it was a survey study and is subject to biases such as nonresponse, selection (those to respond are more likely to have an interest and adopt), and information bias. Furthermore, a survey analysis is limited to the amount of information that can be gathered and only highlights some of the more superficial challenges faced by healthcare professionals. However, efforts were made to minimize the limitations of the study by

approaching a large diverse participant pool with the inclusion of personnel from a myriad of working environments and developing a survey based on previously validated questionnaires for ERAS research. Nonetheless, a sample size of 49 and the majority of responses being mainly from the province of Punjab could impact the generalizability of the results obtained in this study. It is possible that healthcare professionals in other provinces and in different employment settings might have very different adaptations of ERAS.

Conclusions

The findings of this study suggest that a majority of surgeons are aware of the ERAS guidelines, and an impressive 49% of those surgeons are actually able to implement ERAS into their practice in Pakistan, which is just beginning to adopt ERAS. However, despite this initial start, several foci of improvement identified by the participants such as surgeons' knowledge and acceptance of ERAS, interdisciplinary collaborations, improved patient education, and enhanced support from the management could further help implement ERAS in Pakistan. Currently, it can be inferred from the data of this study that these elements are hindering the implementation of ERAS and acting as barriers that can only be addressed if the administrative leadership, surgical leadership, and sociopolitical interests all align. Furthermore, implementing certain ERAS elements was more difficult than others; surgeons employed at private institutions were believed to be more successful in implementing ERAS compared to those in public tertiary care teaching hospitals. However, these differences were only limited to ERAS elements that are limited by financial abundance, whereas the key ERAS elements are being implemented at private and public institutions equally, highlighting the fact that resource availability is not a major barrier to the implementation of ERAS. Overall, it was clear that further research is still required to

understand and address several institutional, structural, and cultural barriers to long-term ERAS implementation in Pakistan, especially because only a minority of surgeons agreed to have ERAS standardized across Pakistan. Understanding the reasoning and perspective behind this contradiction between implementation and willingness to standardize, and a lack of patient perspective towards ERAS can be potential topics for future studies.

References

1. Pędziwiatr M, Mavrikis J, Witowski J, Adamos A, Major P, Nowakowski M, Budzyński A: Current status of enhanced recovery after surgery (ERAS) protocol in gastrointestinal surgery. Med Oncol. 2018, 35:95. 10.1007/s12032-018-1153-0
2. Ljungqvist O, Hubner M: Enhanced recovery after surgery-ERAS-principles, practice and feasibility in the elderly. Aging Clin Exp Res. 2018, 30:249-52. 10.1007/s40520-018-0905-1
3. Pędziwiatr M, Pisarska M, Kisielewski M, et al.: Is ERAS in laparoscopic surgery for colorectal cancer changing risk factors for delayed recovery?. Med Oncol. 2016, 33:25. 10.1007/s12032-016-0738-8
4. Alkire BC, Raykar NP, Shrime MG, et al.: Global access to surgical care: a modelling study. Lancet Glob Health. 2015, 3:e316-23. 10.1016/S2214-109X(15)70115-4
5. Weiser TG, Regenbogen SE, Thompson KD, Haynes AB, Lipsitz SR, Berry WR, Gawande AA : An estimation of the global volume of surgery: a modelling strategy based on available data. Lancet. 2008, 372:139-44. 10.1016/S0140-6736(08)60878-8
6. Soomro FH, Razzaq A, Qaisar R, Ansar M, Kazmi T: Enhanced recovery after surgery: are benefits demonstrated in international studies replicable in Pakistan?. Cureus. 2021, 13:e19624. 10.7759/cureus.19624
7. Akhtar MS, Khan N, Qayyum A, Khan SZ: Cost difference of enhanced recovery after surgery pathway vs. conventional care In elective laparoscopic cholecystectomy. J Ayub Med Coll Abbottabad. 2020, 32:470-5.
8. Pirzada MT, Naseer F, Haider R, Haider J, Ahmed MJ, Alam SN, Siddique SS: Enhanced recovery after surgery (ERAS) protocol in stoma reversals. J Pak Med Assoc. 2017, 67:1674-8.
9. Herbert G, Sutton E, Burden S, Lewis S, Thomas S, Ness A, Atkinson C: Healthcare professionals' views of the enhanced recovery after surgery programme: a qualitative investigation. BMC Health Serv Res. 2017, 17:617. 10.1186/s12913-017-2547-y
10. Nelson G, Kiyang LN, Crumley ET, et al.: Implementation of enhanced recovery after surgery (ERAS) across a provincial healthcare system: the ERAS Alberta colorectal surgery experience. World J Surg. 2016, 40:1092-103. 10.1007/s00268-016-3472-7
11. Gramlich LM, Sheppard CE, Wasylak T, Gilmour LE, Ljungqvist O, Basualdo-Hammond C, Nelson G: Implementation of enhanced recovery after surgery: a strategy to transform surgical care across a health system. Implement Sci. 2017, 12:67. 10.1186/s13012-017-0597-5
12. Li Z, Zhao Q, Bai B, Ji G, Liu Y: Enhanced recovery after surgery programs for laparoscopic abdominal surgery: a systematic review and meta-analysis. World J Surg. 2018, 42:3463-73. 10.1007/s00268-018-4656-0
13. Ologunde R, Maruthappu M, Shanmugarajah K, Shalhoub J: Surgical care in low and middle-income countries: burden and barriers. Int J Surg. 2014, 12:858-63. 10.1016/j.ijsu.2014.07.009
14. Hughes M, Coolsen MM, Aahlin EK, et al.: Attitudes of patients and care providers to enhanced recovery after surgery programs after major abdominal surgery. J Surg Res. 2015, 193:102-10. 10.1016/j.jss.2014.06.032
15. Pedrazzani C, Conti C, Mantovani G, et al.: Laparoscopic colorectal surgery and enhanced recovery after surgery (ERAS) program: experience with 200 cases from a single Italian center. Medicine (Baltimore). 2018, 97:e12137. 10.1097/MD.0000000000012137

16. Shen Y, Lv F, Min S, et al.: Impact of enhanced recovery after surgery protocol compliance on patients' outcome in benign hysterectomy and establishment of a predictive nomogram model. BMC Anesthesiol. 2021, 21:289. 10.1186/s12871-021-01509-0
17. Feng J, Li K, Xu R, Feng H, Han Q, Ye H, Li F: Association between compliance with enhanced recovery after surgery (ERAS) protocols and postoperative outcome in patients with primary liver cancer undergoing hepatic resection. J Cancer Res Clin Oncol. 2022, 148:3047-59. 10.1007/s00432-021-03891-1
18. Li L, Jin J, Min S, Liu D, Liu L: Compliance with the enhanced recovery after surgery protocol and prognosis after colorectal cancer surgery: a prospective cohort study. Oncotarget. 2017, 8:53531-41. 10.18632/oncotarget.18602
19. Shaikh BT: Private sector in health care delivery: a reality and a challenge in Pakistan. J Ayub Med Coll Abbottabad. 2015, 27:496-8.
20. Gotlib Conn L, McKenzie M, Pearsall EA, McLeod RS: Successful implementation of an enhanced recovery after surgery programme for elective colorectal surgery: a process evaluation of champions' experiences. Implement Sci. 2015, 10:99. 10.1186/s13012-015-0289-y

Bridging Manuscripts

The preceding chapter delved into exploring the present comprehension, execution, and outlook of healthcare professionals regarding ERAS across Pakistan. It shed light on the implementation of various ERAS elements, underscoring the significance of adherence and compliance to these components. Additionally, the chapter aimed to collect data concerning potential relationships between ERAS implementation and specific sociodemographic factors, offering a preliminary grasp of some encountered barriers. However, the exploration in the previous chapter did not delve deeper into comprehending the nuanced challenges and barriers inherent in ERAS implementation in Pakistan. As such, the subsequent chapter aimed to highlight the healthcare professionals' perspectives when implementing ERAS at a public tertiary care center. The goal was to attain a more comprehensive understanding of the social, cultural, and structural barriers or facilitators that may exist.

Chapter 5: ENHANCED RECOVERY AFTER SURGERY IN PAKISTAN: AN INITIAL ASSESSMENT AND FUTURE DIRECTIONS

Full title: **ENHANCED RECOVERY AFTER SURGERY IN PAKISTAN: AN INITIAL ASSESSMENT AND FUTURE DIRECTIONS**

Short title: **ENHANCED RECOVERY AFTER SURGERY IN PAKISTAN**

Hamza Ahmad[1], Antonia Arnaert[1], Waqas Shedio[3], Omaid Tanoli[1,2],

Dan Deckelbaum[1], Tayyab Pasha[3]

S

[1]McGill University Health Center, Center for Global Surgery, Montreal, Canada

[2]University of Toronto, Department of General Surgery, Toronto, Canada

[3]Allama Iqbal Medical College, Department of Cardiac Surgery, Lahore, Pakistan

Corresponding Author

Hamza Ahmad, M.Sc. Experimental Surgery Candidate,

McGill University M.D., C.M Candidate 2025

Hamza.ahmad@mail.mcgill.ca

11405 Rue Frigon

Montreal, Qc,

H3M2R6

Abstract

Enhanced Recovery After Surgery, a novel and cost-effective perioperative surgical intervention, has been demonstrated to reduce patients' hospital length of stay, provide a higher turnover of available resources and decrease the postoperative expenses for both patients and hospitals. Even though the potential benefits of implementing ERAS in LMICs could outweigh those in HICs, a successful long-term implementation of ERAS has yet to be completed across Pakistan. Thus, the purpose of this study was to gain insights and identify potential opportunities to ERAS implementation in the context of the local socio-environmental setting. A qualitative descriptive study design consisting of individual semi-structured interviews was utilized to explore the experiences of 11 surgical residents when implementing ERAS guidelines at one of the public tertiary care hospitals in Lahore, Pakistan. Acknowledging the benefits of ERAS, participants faced several challenges when implementing ERAS in their respective wards. Several key opportunities to successful implementation including enhanced team work and collaboration amongst medical teams, improved patient education and compliance towards ERAS, strengthening of peripheral healthcare services, and targeted resource allocation were identified by the participants. Even though several challenges identified by the participants were similar to those highlighted in HICs, unique barriers specific to the healthcare structure and culture of Pakistan also emerged. Further research exploring and highlighting these specific challenges is needed to overcome these core barriers and promote a shift towards a standardized healthcare system focused on improving patient outcomes.

Key Words: global surgery, enhanced recovery after surgery, qualitative descriptive study, global health and medicine.

Introduction

The Enhanced Recovery After Surgery (ERAS) protocol is a set of evidence-based multimodal guidelines aimed at standardizing perioperative management, decreasing post-operative complications, and accelerating patient recovery [1]. Implementation and standardization of ERAS in high-income countries (HICs) has led to a reduced patients' hospital length of stay, a higher turnover of available resources and a decrease in the postoperative expenses for both patients and hospitals [2]. In fact, long-term implementation of ERAS at several health care centers in different surgical subspecialties across North America has demonstrated positive return on investment regardless of the initial cost of implementing the program [3]. Given the growing global burden of non-communicable diseases and the lack of resources in low- and middle-income countries (LMICs) such as Pakistan, the benefits of ERAS are expected to be even greater than those observed in HICs [4].

As such, ERAS has gained interest in Pakistan and several small-scaled randomized control trials (RCTs) demonstrating the benefits of implementing ERAS have been completed. However, despite the local emerging evidence in support of ERAS and the data available from HICs regarding an effective approach to the implementation of ERAS, acceptance and a wide scale integration of ERAS has not been successful in Pakistan [5,6,7]. Initial experiences of healthcare professionals when implementing ERAS in HICs revealed that a long-term adaptation of ERAS required overcoming several barriers including resistance to change, the support of relevant stakeholders, information provision to patients, availability of allied healthcare professionals and pertinent staff members, aligning different ward cultures, and formation of multidisciplinary teams consisting of various healthcare professionals and management in support of ERAS [8]. Nonetheless, despite these challenges, implementation of ERAS in HICs has progressed, mainly

because qualitative data regarding the perceived barriers to the implementation of ERAS has been used to form a number of process-related implementation enablers such as the elected champions' belief in the value of the program, the fit and cohesion of champions and their teams locally and provincially, a bottom-up approach to stakeholder engagement targeting organizational relationship-building, receptivity and support of division leaders, and the normalization of ERAS as everyday practice [9]. Moreover, appointment of dedicated 'champions' has not only made the transition possible but also ensured an effective long-term implementation [10]. Thus, qualitative research aimed at understanding the perspective of those involved in the implementation of ERAS has been a key factor in the successful implementation of ERAS in HICs. Even though RCTs across Pakistan are demonstrating the benefits of ERAS itself a paucity of qualitative research aimed at gaining experiences of healthcare professionals' views regarding ERAS in the specific socio-economic environment of Pakistan could be a rationale for a lack of long-term engagement of ERAS [11]. Therefore, to better understand the potential underlying barriers hindering and opportunities a long-term adaptation of ERAS, this qualitative descriptive study sought out to gain experiences of surgical residents when implementing ERAS at a public tertiary care hospital in Lahore, Pakistan.

Methods

Sample and Recruitment

The study was commenced in September 2020 and data collection was completed in November 2020. In September 2020, surgical residents and attending surgeons at the tertiary care hospital were introduced to the study, either at grand rounds or using a faculty wide email sent by the head of Cardiac surgery acting as a site coordinator. Participants were advised to privately contact the first and third author to set-up a follow-up call, this was on a voluntary basis. If a

participant showed potential interest, the first author elaborated the study purpose and explained the project. The recruitment of the potential participants was done progressively over the month, and by October 2020 all 11 participants had enrolled. Due to the ongoing constraints of Covid-19, lack of attending surgeon availability, and difficulty in accessing administrative staff, a purposive sample of surgical residents was recruited for the study.

Data Collection

Individual interviews were conducted at the hospital during working hours as per participant preference. The interviews lasted between 45 and 60 minutes, took place in closed private rooms, and were conducted by the first author. To avoid any communication errors, the first author being a native from Pakistan conducted the interviews in Urdu. Each interview was audio-recorded, and at the start of each interview participant signed a consent form and completed a socio-demographic questionnaire. A semi-structured interview guide with a series of questions to be explored with the participant was used. Sample questions included: *What are your current perioperative surgical protocols? Are you aware of enhanced recovery after surgery protocols? Do you use enhanced recovery after surgery protocols in your practice? If you do, are they always being implemented? If not, why do you think ERAS guidelines are not being adapted?* The interview guide was pilot-tested and validated with the local study coordinator to ensure alignment between the study aim and the interview questions with further refinements being made after the first few interviews [12].

Data Analysis

The process of data analysis was ongoing and based on an inductive approach [13]. To ensure trustworthiness each transcript was thematically analyzed and supplemented using field notes, journaled by the first author during the time spent in the project setting; documenting feelings,

insights, and possible preconceived notions and biases. Transcripts were coded on a line-by-line basis and captions were assigned to recurring concepts. Conceptually similar codes were grouped into meaningful categories and themes. Descriptive statements supported by participant quotes were subsequently formed. To ensure credibility, the first, second, and third authors performed an iterative analysis until a consensus regarding the concepts was achieved. Conducting mock interviews prior to the data collection further enhanced trustworthiness whilst an audit trail to keep track of decisions made during the analysis ensured confirmability.

Setting

The healthcare system of the tertiary care hospital was much like the rest of Pakistan, adopted from the United Kingdom. Different surgical specialties consisted of several 'wards' analogous to surgical units in the North American healthcare system. The number of wards dedicated to a surgical specialty depended on the patient load seeking that respective surgical specialty. Each ward employed several attending surgeons who oversaw the training of a set number of residents. Each surgical ward also had one attending surgeon who was designated as the head of the department (HOD). Overall, standard operating procedures (SOPs) were adapted by the HOD based on the World Health Organization (WHO) and disseminated to the entire staff. Ultimately, the HOD and the attending surgeons oversaw the wards with little input from the administrative body, similar to other public tertiary care centers in Pakistan.

Ethical Considerations

Ethical approval was received from the McGill University's Research Institutional Board (#A10-B77-20A). Participant informed consent verbal and written was obtained prior to the initiation of the interviews.

Results

A total of 11 participants enrolled in the study, of which 8 were male and 3 were female. Participants had an average age of 28 years, with a range of 25 to 32 years. Out of the 11 participants, 3 participants were affiliated with Cardiac Surgery, 1 participant was affiliated with Orthopedic surgery, and 6 participants were affiliated with General Surgery. The average years of practice for participants was 4 and the average number of surgeries performed/assisted was 14 in a month. All participants were fluent in Urdu and partially fluent in English. All participants had completed their medical education in Pakistan with 4 having attended workshops on ERAS. Only 1 participant had attended workshops on ERAS outside of Pakistan during an away rotation in the United States of America. Table 1 provides a detailed sociodemographic summary of all the participants.

Table 1: Detailed sociodemographic of participants.

#	Gender	Age (years)	Surgical Specialty	Post-Graduate Training Year/Status	ERAS Knowledge	Attended ERAS workshops	Implement ERAS on wards
1	M	29	Cardiac/General	PGY – 4	Yes	No	Partially
2	M	27	Cardiac/General	PGY – 1	Yes	Yes	Partially
3	M	30	Cardiac/General	PGY – 5	Yes	No	Partially
4	M	25	General	PGY – 1	Yes	No	Partially
5	F	28	General	PGY – 5	Yes	Yes	Partially
6	M	26	General	PGY – 1	Yes	Yes	Partially
7	M	32	General	Junior Surgeon	Yes	No	Partially

8	M	30	Orthopedic	PGY – 5	Yes	No	Partially
9	F	25	General	PGY – 1	Yes	No	Partially
10	M	30	Cardiac	PGY – 5	Yes	No	Partially
11	F	30	General	Chief Resident	Yes	Yes	Partially

Although ERAS benefits were understood from a patient and hospital perspective, all participants indicated that a complex interplay of cultural, organizational and personal factors impacted implementation of ERAS protocols on the respective wards. Highlighted in the first theme, *A Need for Administrative Oversight*, participants realized that support of ERAS not only by the surgical residents, but also with department leads and hospital leadership would be paramount to successful implementation. This was reinforced in the second theme, *Attending Surgeons' Role in ERAS Implementation*, where participants recognized and credited certain attending surgeons who were advocating for and making strides towards implementing ERAS. Detailed in the third theme, *Improving Patient Education*, even if certain ERAS guidelines were adapted and encouraged by motivated and interested attending surgeons, more robust patient education programs were necessary for stronger implementation. Moreover, expressed in the fourth theme, *Strengthening Primary Healthcare Services*, participant understood that a gradual shift towards improving primary healthcare services was pertinent to tackle misconceptions, empower and educate patients, and help improve compliance towards ERAS and other protocols without over burdening the tertiary care centers. Finally, emphasized in the fifth theme, *A Resource Pressured System*, participants identified key non-surgical areas including involving

allied healthcare workers and an increased availability of tangible resources that could further improve the implementation of ERAS guidelines.

Need for Administrative Input

Regardless of the leadership displayed by the attending surgeons, all participants (P1 – P11) highlighted the opportunities for growth within the healthcare culture. Due to the inherent hierarchy involved in healthcare, the attending surgeons led with a strong sense of necessary ownership. According to the participants, having an administrative committee led by senior clinical leadership overlooking the conceptualization and implementation of protocols would provide an opportunity for improved standardization of care between wards. Furthermore, establishing such a committee would not only help with ERAS but also provide a more uniform standardization of care even for non-ERAS protocols amongst the different wards. While attending presence in any healthcare system is variable, developing a team approach and responsible committees would ensure patient safety and efficiency in patient centric models. For participant P10, a continuous oversight and input from the administration would also ensure a long-term implementation of any given protocols; *"With checks and balances, adherence to guidelines and protocols will become routine".* Moreover, according to the participants, involvement of the administration would provide channels for communication between different wards that would ultimately improve interdisciplinary collaboration, which is a crucial aspect for the implementation of ERAS. Participant P3 stated, *"ERAS can be successfully implemented when all teams work together, which can be done with increased coordination".* Participant P6 agreed, *"The challenge can be overcome with coherence between surgeons and other specialists. While the attending surgeon is enthusiastic about ERAS implementation, agreement from other specialties is essential, because they have their own established practices".* Hence,

standardization of these practices across the various specialties would overall provide a greater coherence and ease for the implementation of ERAS. Participant P8 even expressed the need for standardizing performance audits as a potential solution to further align protocols, *"We conduct quality assessments, implement quality improvement committees, and have morbidity and mortality rounds. Although guidelines exist for this purpose, we lack the necessary meetings and infrastructure to implement them effectively, especially if an attending surgeon is expected to do this alone".*

Attending Surgeons' Role in ERAS Implementation

Interestingly, certain attending surgeons were willing to take the lead for the implementation of ERAS guidelines on their respective wards despite a lack of administrative input. For participants P5 and P11, a clear interest was expressed by their attending surgeons towards not only the implementation of ERAS guidelines but also towards teaching the protocols to the residents, which improved adherence to the protocols to a greater extent. According to the participant P5 and P11 this was due to a conscious effort. Participant P5 stated, "*It is a conscious implementation of our professor*. Participant P11 agreed, "*He [professor] tries his best and teaches us as much as possible".* Not only were the efforts of the professor impacting the short-term implementation of ERAS under his supervision, but it was also instilling a change in the attitudes and practices of the residents, creating a long-term impact. Participant P11 added, *"The idea was instilled by the professor. Now as a senior resident when I see a new resident neglect ERAS, I provide them with feedback".* However, despite the encouragement and extensive knowledge regarding ERAS, participants P5 and P11 expressed facing challenges when implementing certain ERAS guidelines. Participant P11 expressed, *"this should be done [avoid*

prolonged preoperative fasting], and we know that this is very important for the patient, but we are not always able to practice this out of necessity".

Improving Patient Education

According to the participants (P1 – P11), educating patients on ERAS would greatly support the successful implementation of ERAS, surpassing the effectiveness of any other measure. By providing patients with a better understanding of the post-operative reasons behind specific dietary recommendations such as NPO, clear liquids, and transitioning to a full diet, compliance could be enhanced. Participant P8 expressed*, "Patients sometimes find it confusing to differentiate between liquids and solids. They may raise questions about items like porridge and custard, consuming them within the designated 2-hour window, which can make things challenging. Instead of simply presenting guidelines, we should take the time to explain them clearly."* Providing patients with pictorial education on the different guidelines was one of the ways the participants were tackling this challenge. Participant P2 mentioned, *"But it is definitely patient education that can help. What we have been trying to do is we provide the patient a pictorial booklet when they are admitted and discharged. We explain regarding their surgery, their medications, their exercise, their diet and even their shower and habits".* Adding information regarding the ERAS guidelines to such pictorial information booklets could further inform patients about the different elements of ERAS guidelines and improve compliance. Overall, not only did the participants reiterate the importance of educating their patients, they also emphasized pertinent and key areas to focus on. Participant P4 emphasized, *"education of the patient is key. It has to be done properly not like the google education where they can learn anything about their symptoms. Patient education in the sense that they have to be taught about what is being asked of them and why is that being asked".* When discussing another important

element of ERAS, which is the recommendation to minimize the use of opioids for post-operative pain management, participants expressed similar practices. Participants (P1 – P11) acknowledged that opioids are frequently used as the primary choice because they tend to make managing patient complaints easier. To enhance patient education, participants P2, P3, P6, P8 and P9 suggested that educational programs should include family members accompanying the patients because culturally attendants accompanying the patients play a critical role in decision making. Participant P9 mentioned, *"Education of the attendant and counselling of the attendants is equally important".* By focusing on patient education and involving family members, we can strive to create a more supportive and informed healthcare environment, where patients have a clear understanding of the ERAS process and their role in it. Through effective communication and tailored educational initiatives, we can empower patients and their families to actively participate in their own care, leading to improved outcomes and greater satisfaction with the healthcare experience.

Strengthening Primary Healthcare Services

Besides promoting shared decision making and patient empowerment through improved communication at the hospital, participants (P1 – P11) all agreed that strengthening the healthcare infrastructure outside the hospital was a key to reinforcing basic principles and improving patient compliance and adherence to ERAS. According to participant P2 currently an ample amount of time and resources were spent addressing misconceptions regarding surgery held by the patients. Participant P2 stated, *"We have patients who come from smaller hospital and are referred to us but they have been informed that after the surgery do not eat for the next 3 days. But we tell the patient that you can eat even 1 day after the surgery. The patient becomes confused, stay stuck on their previous misconception and it becomes hard to overcome that".*

Participant P2 further explained that this could be improved if guidelines were standardized amongst the hospitals in the larger metropolitans and the peripheral community hospitals, *"Yes, it is a big issue, and larger hospital follow most of the guidelines including the WHO guidelines but the smaller hospitals do not follow these guidelines and there are no commonalities".* Therefore, participants took it upon themselves and counsel the patients at various steps of the hospital admission to improve compliance. Participant P6 explained, *"That is why we do so much counselling. We do the counselling at admission and then at preop and then again right before surgery to help increase compliance".* Improving primary healthcare in the communities would help improve not only access to healthcare but also provide an effective measure to improve patient compliance and tackle misconceptions without having to over burden the tertiary care centers. Participant P6 added, *"I feel like the compliance after the hospital should be tackled. The compliance after the patient is discharged is very low. We have patient come directly to the surgeons and the hospital for everything. Maybe if we make the general practitioners more available to the public for free for our population that cannot afford to come to the hospital every time, maybe then we can have the GP involved who can then help improve the compliance after the hospital."* Participant P7 shared similar concerns adding that working in a standardized system of healthcare connected with the community hospitals will help reduce the burden at the tertiary care centers and provide more time to individual patients, which would further help with compliance overall, *"If we have a strong GP system placed in this country and we focus on patients outside of the hospital as well, then we can definitely tackle this within the hospital too and reinforce these ideas in the hospital and in the periphery equally for all patients".*

Resource Pressured System

Regardless of the culture present, it was understood by the participants (P1 – P11) that certain elements of the ERAS guidelines were not implementable due to the resource limitations. When discussing elements of the ERAS guidelines focused on food, participants P1 explained, *"the hospital does not have the resources to provide everyone with catered food and meal plans. The food itself in the hospital is from a charitable organization working with the government".* Even though the food provided to the patients was not ideal for recovering from a surgery, it was the only option the patients had. Participant P2 added, *"We will tell them that they [recovering patients] should not consume a high fatty food but a lot of our patients are from backgrounds that include far areas and low-income backgrounds, and they simply cannot afford to get tailored healthier options".* For participant P3, justifying resources for specific elements of ERAS was not a major focus point because of other more important concerns such as sanitation of the operation theatre. Participant P3 remarked*, "drinks for carbohydrate loading are a concern for later. Only now do we have operation theatres that are up to standards. We have been using water that comes from a regular water tank placed on the top of the building that is not very sanitary".* For participant P3, P7, and P8, even more general and important elements of ERAS such as early mobilization were not easily implementable due to a lack of allied healthcare professionals. Participant P3 explained, "The biggest issue is also that we do not have physiotherapists. It is usually us [surgical residents] that would ask the patient to get up perform physiotherapy". Participant P7 added, *"If we have a larger staff and a lower patient load, and have a well-trained and educated nursing staff, then we can reinforce these things and monitor them over time".* Nurses were considered an integral part of the team when implementing ERAS and a lack of qualified and educated nurses presented with further challenges; *"You see it comes*

down all the way to the nurses. Even they are part of the ERAS. They must be educated on these as well. You cannot just implement ERAS through surgeons or anesthesiologists. You must implement it through the entire team" (P8). Given the patient load encountered, physically it was not feasible for the participants to overlook every patient. Participant P7 added, *"All the load comes directly to the teaching hospitals. Our surgical emergency ward has an outflow of 4000 patients in 24-hours, which is much larger than anywhere else".* For participant P11 another important factor inhibiting the implementation of ERAS was the inability to track and visualize the benefits of any implemented protocols due to a lack of record-keeping and computerized systems. Participant P11 stated*, "the reason why we are not good at implementing evidence-based practice right now is because we do not have a good record keeping option. There is no long-term data available for us to say that yes, our practice needs to improve".*

Discussions

To our knowledge, this qualitative descriptive study is the first to highlight the perspectives of surgical trainees regarding the opportunities to implementation of ERAS guidelines in Pakistan. Like the results of research conducted in HICs, participants identified areas that could improve the likelihood of implementing ERAS such as the application of standardized treatment plans, more robust healthcare teams including multidisciplinary communication and collaboration for patient centered care, improved tracking mechanisms for quality assurance and improvement strategies, stronger patient education programs geared to an inclusive nature for the patient to be a part of their care plan decision-making, improving support from department heads and hospital leadership, and finally, financial support to implement the above. [14 – 16] However, the findings of this study also revealed unique aspects of the healthcare milieu of Pakistan. These aspects of the healthcare system were highlighted through three distinct points that warrant

further discussion: 1) establishing interest from the executive leadership and administration, 2) stronger patient education programs and robust primary healthcare delivery, and 3) improved integration of allied healthcare professionals, especially nurse practitioners in ERAS.

Several participants in this study emphasized open communication, improved multidisciplinary collaboration, the implementation of quality assurance and improvement projects to foster an environment conducive to the successful implementation and sustainability of ERAS programs. Coordinating these elements requires effective executive leadership, which can help create and lead programs that initially focus on the isolated implementation of ERAS at selective wards, followed by a wider implementation across the entire hospital, essentially facilitating multilevel leadership alignment [17]. Moreover, it is essential to establish champions and generate interest among key stakeholders who can assume leadership positions to conceptualize and implement strategies for the advancement of ERAS [18]. However, according to participants this preliminary interest and buy-in of executive leadership and administration needed further solidification at the local institution. For many participants, this added interest in promoting ERAS would not only benefit the advancement of the ERAS guidelines but instead also provide coordination and coherence between wards on the current established protocols. With improved coherence and coordination, conceptualizing a mechanism to make ERAS possible will ultimately become easier as leadership of different wards will be more aware of the protocols to follow and utilize this enhanced communication to promote other projects. Nonetheless, it is equally important to acknowledge that getting the executive leadership and administration involved in new projects can be difficult to achieve, especially in a local context of limited resources and financial burdens. As the financial burden increases, even attending surgeons prefer treating patients in the private sector, leaving behind the trainees in the public sector

unsupervised and the care process dependent upon on the residents and trainees entirely [19]. It is important to acknowledge that these challenges are not unique to Pakistan or other LMICs. Similar difficulties were encountered during the initial implementation of ERAS programs in high-income countries (HICs), with several programs continuing to struggle. However, unlike HICs, LMICs have an underlying healthcare milieu that makes implementing changes, especially ERAS, more challenging.

Nevertheless, as identified by the participants, several motivated attending surgeons were taking the lead in advocating for ERAS and implementing it on their respective wards. However, a lack of patient education and comprehension of medical practices along with a lacking primary healthcare service structure in Pakistan, created difficulties when implementing standardized healthcare protocols such as ERAS. Again, this was not unique to Pakistan, as implementation programs in HICs identified that patients are not aware of the ERAS guidelines and without a formal education on the protocols, patients rarely follow the guidelines [20]. However, in Pakistan an underlying disconnects between the surgeons and the patients, prevalence of misconceptions about surgical procedures, and a lack of standardization of care between institutions made it even more difficult to convince patients to follow the ERAS guidelines. Improved educational programs that aim to empower patients and promote shared decision making were needed according to the participants. Efforts were being made by the surgical residents and the various departments at educating each and every patient using unique methods. Prior research conducted on this topic in Pakistan elucidates that sharing information with the patient helps improve anxiety and creates a strong patient-physician relationship that could overcome misconceptions. Communication that is warm, normalizes patient fears, and integrates patients' interpersonal and financial considerations can mitigate anxiety and reduce barriers to

accessing care in Pakistan's public healthcare facilities [21]. However, it was not feasible for the participants to provide catered education to each and every patient under an immense work load. Strengthening primary care services in peripheral areas across Pakistan emerged as a potential solution. The absence of healthcare services in these areas meant that patients had to travel to metropolitan tertiary care centers for surgical services. This geographical disparity, coupled with varying healthcare services between metropolitan and peripheral regions, left patients confused and hesitant to trust surgeons at tertiary care centers. This issue reflects broader health policies at the national level, where a communication gap exists between federal, provincial, and district levels during policy formulation and health planning [22]. As a result, public sector healthcare facilities in peripheral areas of Pakistan are underutilized, highlighting the need to strengthen primary healthcare services in these regions. However, addressing this issue will require gradual, long-term changes in healthcare policies. Nonetheless, conducting research to shed light on this issue can serve as an important initial step.

Lastly, it is important to highlight the role allied health care professionals, especially registered nurses play towards enforcing ERAS. Practically not only do registered nurses spend the most time in contact with the patients but they also spend the most time on the floor observing all aspects of healthcare. Studies exploring the impacts of nurses on the implementation of ERAS highlighted a decline in the compliance towards ERAS practices in the absence of a nurse coordinator because the nurse coordinators are involved in several aspects of patient care such as reducing the consequences of surgical stress, soliciting other actors according to the needs of the patient, anticipating the organization of care and discharge of the patient by staying in touch with a network of liberal nurses, detecting alerts that justify readmission, stimulate patient mobility, and promote recovery of patient autonomy [23]. Hence,

it is not a surprise that nurses are often viewed as the face of ERAS [24]. To the contrary, participants in our study expressed being in-charge of all the tasks that a registered nurse, a dietician, or a physiotherapist would traditionally perform. This meant that participants were tasked with not only performing their surgical duties but also overseeing these elements of the healthcare provision for all the patients at the surgical wards, which as they expressed was not feasible in the long-term. Having a nurse coordinator and a nursing staff actively involved in the implementation and integration of ERAS can improve the long-term sustainability of ERAS [25]. However, in Pakistan and other LMICs nurses are not actively involved in establishing or enforcing compliance towards ERAS. Instead, issues such as shortages of nurse educators, a lack of nursing-educated based research, and absence of supportive and productive educational and clinical learning environments results in a lack of highly trained nursing staff in Pakistan [26]. Therefore, a focus towards integrating allied healthcare professionals in the implementation of ERAS by providing them with educational programs and recognizing their concerns could be an important step forward.

Limitations

This study has some limitations. Although, the experiences of surgical trainees highlighted key opportunities to the implementation of ERAS in Pakistan and provided a deeper understanding of the challenges faced by the healthcare system, the study failed to capture the perspectives of attending physicians, the interdisciplinary healthcare team, and the patients. Without understanding the perspective of the entire healthcare team, it would be difficult to conceptualize solutions that help improve the implementation of ERAS and also ensure the necessary compliance to help yield a successful long-term implementation. Moreover, the use of volunteers in this study may be a source of selection bias towards trainees knowledgeable on ERAS. Future

studies should focus on addressing the perspectives of the entire healthcare team and the relevant stakeholders such as the administration of the tertiary care hospital.

Conclusion

In conclusion, a comprehensive strategy supporting team building, education, administrative support, standardized protocols, improved teamwork, effective communication, and allocation of adequate resources, will strongly facilitate ERAS implementation in Pakistan with the known patient and institutional benefits including improved surgical outcomes, enhanced patient satisfaction, and reduced healthcare costs. Addressing these barriers will require a collaborative effort from not only the surgeons but also from the administrative team, allied healthcare professionals, and the patients as well.

References

1. Pędziwiatr M, Mavrikis J, Witowski J, et al. Current status of enhanced recovery after surgery (ERAS) protocol in gastrointestinal surgery. Med Oncol. 2018;35(6):95. Published 2018 May 9. doi:10.1007/s12032-018-1153-0
2. Joliat GR, Ljungqvist O, Wasylak T, Peters O, Demartines N. Beyond surgery: clinical and economic impact of Enhanced Recovery After Surgery programs. BMC Health Serv Res. 2018;18(1):1008. Published 2018 Dec 29. doi:10.1186/s12913-018-3824-0
3. Shrime MG, Bickler SW, Alkire BC, Mock C. Global burden of surgical disease: an estimation from the provider perspective. Lancet Glob Health. 2015;3 Suppl 2:S8-S9. doi:10.1016/S2214-109X(14)70384-5
4. Alkire BC, Raykar NP, Shrime MG, et al. Global access to surgical care: a modelling study. Lancet Glob Health. 2015;3(6):e316-e323. doi:10.1016/S2214-109X(15)70115-4
5. Soomro FH, Razzaq A, Qaisar R, Ansar M, Kazmi T. Enhanced Recovery After Surgery: Are Benefits Demonstrated in International Studies Replicable in Pakistan?. Cureus. 2021;13(11):e19624. Published 2021 Nov 16. doi:10.7759/cureus.19624
6. Akhtar MS, Khan N, Qayyum A, Khan SZ. Cost difference of enhanced recovery after surgery pathway vs. Conventional care In Elective Laparoscopic Cholecystectomy. J Ayub Med Coll Abbottabad. 2020;32(4):470-475.
7. Pirzada MT, Naseer F, Haider R, et al. Enhanced recovery after surgery (ERAS) protocol in stoma reversals. J Pak Med Assoc. 2017;67(11):1674-1678.
8. Gramlich LM, Sheppard CE, Wasylak T, et al. Implementation of Enhanced Recovery After Surgery: a strategy to transform surgical care across a health system. Implement Sci. 2017;12(1):67. Published 2017 May 19. doi:10.1186/s13012-017-0597-5
9. Gotlib Conn L, McKenzie M, Pearsall EA, McLeod RS. Successful implementation of an enhanced recovery after surgery programme for elective colorectal surgery: a process evaluation of champions' experiences. Implement Sci. 2015;10:99. Published 2015 Jul 17. doi:10.1186/s13012-015-0289-y
10. Paton F, Chambers D, Wilson P, et al. Effectiveness and implementation of enhanced recovery after surgery programmes: a rapid evidence synthesis. BMJ Open. 2014;4(7):e005015. Published 2014 Jul 22. doi:10.1136/bmjopen-2014-005015
11. Herbert G, Sutton E, Burden S, et al. Healthcare professionals' views of the enhanced recovery after surgery programme: a qualitative investigation. BMC Health Serv Res. 2017;17(1):617. Published 2017 Aug 31. doi:10.1186/s12913-017-2547-y
12. Yeong ML, Ismail R, Ismail NH, et al. Interview protocol refinement: Fine-tuning qualitative research interview questions for multi-racial populations in Malaysia. The Qualitative Report. 2018; 23(11): 2700-2713.
13. Elo S, Kyngäs H. The qualitative content analysis process. Journal of Advanced Nursing. 2008; 62(1): 17-115. PMid:18352969 https://doi.org/10.1111/j.1365-2648.2007.04569.x
14. Pearsall EA, Meghji Z, Pitzul KB, et al. A qualitative study to understand the barriers and enablers in implementing an enhanced recovery after surgery program. Ann Surg. 2015;261(1):92-96. doi:10.1097/SLA.0000000000000604
15. Wang D, Liu Z, Zhou J, et al. Barriers to implementation of enhanced recovery after surgery (ERAS) by a multidisciplinary team in China: a multicentre qualitative study. BMJ Open. 2022;12(3):e053687. Published 2022 Mar 14. doi:10.1136/bmjopen-2021-053687

16. Herbert G, Sutton E, Burden S, et al. Healthcare professionals' views of the enhanced recovery after surgery programme: a qualitative investigation. BMC Health Serv Res. 2017;17(1):617. Published 2017 Aug 31. doi:10.1186/s12913-017-2547-y
17. Liu, V. X., Rosas, E., Hwang, J. C., Cain, E., Foss-Durant, A., Clopp, M., Huang, M., Mustille, A., Reyes, V. M., Paulson, S. S., Caughey, M., & Parodi, S. (2017). The Kaiser Permanente Northern California Enhanced Recovery After Surgery Program: Design, Development, and Implementation. The Permanente journal, 21, 17-003. https://doi.org/10.7812/TPP/17-003
18. Patil, S., Cornett, E. M., Jesunathadas, J., Belani, K., Fox, C. J., Kaye, A. D., Lambert, L. A., & Urman, R. D. (2019). Implementing enhanced recovery pathways to improve surgical outcomes. Journal of anaesthesiology, clinical pharmacology, 35(Suppl 1), S24–S28. https://doi.org/10.4103/joacp.JOACP_36_18
19. Mir AM, Shaikh MS, Rashida G, Mankani N. To serve or to leave: a question faced by public sector healthcare providers in Pakistan. Health Res Policy Syst. 2015;13 Suppl 1(Suppl 1):58. Published 2015 Nov 25. doi:10.1186/s12961-015-0045-4
20. Gillis, C., Gill, M., Marlett, N., MacKean, G., GermAnn, K., Gilmour, L., Nelson, G., Wasylak, T., Nguyen, S., Araujo, E., Zelinsky, S., & Gramlich, L. (2017). Patients as partners in Enhanced Recovery After Surgery: A qualitative patient-led study. BMJ open, 7(6), e017002. https://doi.org/10.1136/bmjopen-2017-017002
21. Kazi AK, Rowther AA, Atif N, et al. Intersections between patient-provider communication and antenatal anxiety in a public healthcare setting in Pakistan. PLoS One. 2021;16(2):e0244671. Published 2021 Feb 5. doi:10.1371/journal.pone.0244671
22. Kurji Z, Premani ZS, Mithani Y. Analysis Of The Health Care System Of Pakistan: Lessons Learnt And Way Forward. J Ayub Med Coll Abbottabad. 2016;28(3):601-604.
23. Crosson JA. Enhanced Recovery After Surgery-The Importance of the Perianesthesia Nurse on Program Success. J Perianesth Nurs. 2018;33(4):366-374. doi:10.1016/j.jopan.2016.09.010
24. Pignot G. Role of the nurse in the implementation of enhanced recovery after surgery. Prog Urol. 2019;29(15):904-907. doi:10.1016/j.purol.2019.08.269
25. Gramlich L, Nelson G, Nelson A, Lagendyk L, Gilmour LE, Wasylak T. Moving enhanced recovery after surgery from implementation to sustainability across a health system: a qualitative assessment of leadership perspectives. BMC Health Serv Res. 2020;20(1):361. Published 2020 Apr 26. doi:10.1186/s12913-020-05227-0
26. Rasheed SP, Younas A, Sundus A. Self-awareness in nursing: A scoping review. J Clin Nurs. 2019;28(5-6):762-774. doi:10.1111/jocn.14708

Chapter 5: Overall Discussion

Linking survey and interview findings

To our knowledge this master's project was the first to successfully explore the implementation of ERAS guidelines in Pakistan with an emphasis on understanding the perspectives of the healthcare professionals. By utilizing a mixed method study which involved a survey analysis to understand the broader implementation, knowledge, and perception of ERAS in Pakistan in conjunction with a qualitative descriptive study to understand the nuanced challenges and limitations from the perspective of the healthcare professionals when implementing ERAS, this study highlighted several key areas of improvement needed before a long-term implementation of ERAS could be successful.

Firstly, both papers highlighted that despite a lack of successful implementation of ERAS across Pakistan, healthcare professionals understood the importance of ERAS and its associated patient benefits. Findings from Chapter 4 indicated that 86% of the surveyed surgeons were aware of ERAS guidelines, which was similar to the findings of Chapter 5 where all 11 participants expressed being knowledgeable regarding the ERAS guidelines. However, despite understanding the importance of ERAS participants in both studies expressed difficulties when implementing ERAS into their practice. According to the findings of Chapter 4, only 60% of those surgeons who were knowledgeable about ERAS were able to implement ERAS into their practice. Similarly, participants in Chapter 5 expressed a lack of consistent implementation of ERAS on several surgical units at the tertiary care hospital. This lack of implementation of ERAS was attributed to several key factors in both Chapter 4 and Chapter 5, however, the main hurdle that was identified in both studies was a lack of buy-in from the executive leadership and administration. Without support from the executive leadership and administration, participants

found it difficult to implement ERAS guidelines that were consistent between surgical units and the attending surgeons. These findings are not unique to Pakistan or LMICs in general, as research conducted in HICs has highlighted a similar challenge when implementing ERAS where getting executive leadership and administration on board can be difficult. However, with continuous advocacy and the creation of programs that initially focus on the isolated implementation of ERAS at selective wards, followed by a wider implementation across the entire hospital, multilevel leadership alignment has been facilitated with several long-term adaptations of ERAS across several HICs [34]. Expressed in both Chapter 4 and Chapter 5, another key barrier to the implementation of ERAS tended to be a lack of interdisciplinary collaboration between surgeons. The qualitative paper underscored the need for more robust healthcare teams and multidisciplinary communication and collaboration to promote patient-centered care. The survey paper aligned with this by indicating that enhanced support from management and improved interdisciplinary collaboration can aid ERAS implementation. This emphasized the significance of teamwork and collaboration across the healthcare system to implement ERAS successfully. As expressed by participants in Chapter 5, even if surgeons took it upon themselves to implementing ERAS at their respective wards, a lack of administrative oversight made standardization very difficult between surgeons and further burdened the workload of surgeons, which lead to a decreased compliance and adherence to the guidelines. This can especially be problematic when an already increased financial burden causes attending surgeons to prefer treating patients in the private sector, leaving behind the trainees in the public sector unsupervised and the care process dependent upon on the residents and trainees entirely [35].

Surprisingly, a barrier discussed in both Chapter 4 and Chapter 5 was a lack of patient education and compliance towards the ERAS guidelines. The qualitative paper noted the prevalence of misconceptions about surgical procedures and a lack of standardization of care, made it difficult to convince patients to follow ERAS guidelines. The survey paper identified patient compliance as a significant concern, specifically a lack of patient buy-in into ERAS. These findings are unique to Pakistan as research conducted in HICs has not highlighted patient education as a major hurdle in the implementation of ERAS. However, it was also interesting to note that several participants expressed in Chapter 5 that this lack of education and awareness regarding surgical procedures as a whole could stem from a lack of education provided to the patient by the surgeons combined with misinformation obtained by patients from their local healthcare providers in the peripheries. Hence, it was clear that stronger educational programs are needed to help patients understand the importance of ERAS and actively participate in their care. These concerns highlight the presence of a barrier that is localized to Pakistan and requires robust educational programs not only for the healthcare professionals regarding ERAS but also for patients to improve compliance.

When discussing resources, the role of nursing staff and allied healthcare professionals, especially in implementing and enforcing ERAS, was a common thread. The qualitative paper mentioned the importance of integrating nurse practitioners into ERAS, whereas the survey paper emphasized the role of nurse coordinators and nursing staff in sustaining ERAS. Both papers suggested that a lack of highly trained nursing staff and a shortage of nurse educators can be a significant barrier in Pakistan and implementing training and educational curriculums to involve allied healthcare professionals is an absolute necessity. As highlighted in the qualitative paper, not having allied healthcare professionals increased the burden on the surgeons and

created an environment that promoted reduced adherence and intentional disregard of certain ERAS guidelines. This represents a critical area for improvement, given that nurses are frequently perceived as the frontline representatives of ERAS [36]. Moreover, the engagement of a nurse coordinator and nursing staff in the active implementation and assimilation of ERAS holds the potential to enhance the long-term sustainability of ERAS initiatives [37]. However, in Pakistan and other LMICs, nurses are not actively participating in establishing or ensuring compliance with ERAS protocols. Instead, challenges such as shortages of nurse educators, a paucity of nursing-focused research, and the absence of supportive and conducive educational and clinical learning environments contribute to a shortage of highly trained nursing staff in Pakistan [38]. Moreover, in Chapter 4, participants from private institutions in Pakistan tended to have better adherence to ERAS protocols compared to public tertiary care teaching hospitals, demonstrating limits posed by resource constraints.

Overall, the findings from both Chapter 4 and Chapter 5 highlight a need for a patient-centered approach towards the implementation of ERAS. The qualitative paper emphasized the importance of patient education programs geared toward inclusivity and shared decision making, which could enhance the trust of patients towards the surgeons and ultimately improve their compliance towards the ERAS guidelines. Similarly, a patient centered approach would also help surgeons and the healthcare professionals prioritize improved patient outcomes, which in-turn would improve patient buy-in and compliance.

Study Limitations

Both Chapter 4 and Chapter 5 have several unique inherent limitations. Since Chapter 4 was a survey analysis and was subject to several biases including nonresponse, selection, and information bias. Furthermore, the data gathered by the survey analysis only provided a superficial view of the healthcare professionals' knowledge of ERAS and the challenges faced

when implementing ERAS into practice. Some of these limitations were minimized though an effort to recruit a large and diverse participant pool with the inclusion of personnel from a myriad of working environments. Nonetheless, a sample size of 49 with majority responses from the province of Punjab may have impacted the generalizability of the results obtained in this study. It is possible that healthcare professionals in other provinces and in different employment settings might have very different adaptations of ERAS. For Chapter 5, although the experiences of surgical trainees highlighted key opportunities to the implementation of ERAS in Pakistan and provided a deeper understanding of the challenges faced by the healthcare system, the study failed to capture the perspectives of attending physicians, the interdisciplinary healthcare team, and the patients. Without understanding the perspective of the entire healthcare team, it would be difficult to conceptualize solutions that help improve the implementation of ERAS and also ensure the necessary compliance to help yield a successful long-term implementation. Moreover, the use of volunteers in this study may be a source of selection bias towards trainees knowledgeable on ERAS.

Chapter 6: Final Conclusions

In conclusion, these two papers provide complementary insights into the challenges and opportunities for implementing ERAS guidelines in Pakistan. They underscore the importance of a multi-faceted approach that involves healthcare professionals, patients, administrative support, and interdisciplinary collaboration. Bridging the findings of these two studies highlights the need for a comprehensive and patient-centered strategy that addresses knowledge dissemination, collaboration, patient education, and institutional support to successfully implement ERAS in Pakistan's healthcare system. Furthermore, it emphasizes the importance of ongoing research and policy development to optimize ERAS development and implementation whilst taking into account the specific socio-cultural context of a healthcare system in which ERAS is to be implemented.

References

1. Ljungqvist O. ERAS--enhanced recovery after surgery: moving evidence-based perioperative care to practice. JPEN J Parenter Enteral Nutr. 2014;38(5):559-566. doi:10.1177/0148607114523451
2. Ljungqvist O, Scott M, Fearon KC. Enhanced Recovery After Surgery: A Review. JAMA Surg. 2017;152(3):292-298. doi:10.1001/jamasurg.2016.4952
3. Engelman RM, Rousou JA, Flack JE 3rd, et al. Fast-track recovery of the coronary bypass patient. Ann Thorac Surg. 1994;58(6):1742-1746. doi:10.1016/0003-4975(94)91674-8
4. Bardram L, Funch-Jensen P, Jensen P, Crawford ME, Kehlet H. Recovery after laparoscopic colonic surgery with epidural analgesia, and early oral nutrition and mobilisation. Lancet. 1995;345(8952):763-764. doi:10.1016/s0140-6736(95)90643-6
5. Kehlet H. Multimodal approach to control postoperative pathophysiology and rehabilitation. Br J Anaesth. 1997;78(5):606-617. doi:10.1093/bja/78.5.606
6. Kehlet H, Mogensen T. Hospital stay of 2 days after open sigmoidectomy with a multimodal rehabilitation programme. Br J Surg. 1999;86(2):227-230. doi:10.1046/j.1365-2168.1999.01023.x
7. Melnyk M, Casey RG, Black P, Koupparis AJ. Enhanced recovery after surgery (ERAS) protocols: Time to change practice?. Can Urol Assoc J. 2011;5(5):342-348. doi:10.5489/cuaj.11002
8. Pędziwiatr M, Mavrikis J, Witowski J, et al. Current status of enhanced recovery after surgery (ERAS) protocol in gastrointestinal surgery. Med Oncol. 2018;35(6):95. Published 2018 May 9. doi:10.1007/s12032-018-1153-0

9. Ljungqvist O. Enhanced recovery after surgery and the ERAS® society. Journal of Pancreatology. 2019;2(3):65-68. doi:10.1097/jp9.0000000000000025
10. Vlug MS, Wind J, Hollmann MW, et al. Laparoscopy in combination with fast track multimodal management is the best perioperative strategy in patients undergoing colonic surgery: a randomized clinical trial (LAFA-study). Ann Surg. 2011;254(6):868-875. doi:10.1097/SLA.0b013e31821fd1ce
11. Pedrazzani C, Conti C, Mantovani G, et al. Laparoscopic colorectal surgery and Enhanced Recovery After Surgery (ERAS) program: Experience with 200 cases from a single Italian center. Medicine (Baltimore). 2018;97(35):e12137. doi:10.1097/MD.0000000000012137
12. AlBalawi Z, Gramlich L, Nelson G, Senior P, Youngson E, McAlister FA. The Impact of the Implementation of the Enhanced Recovery After Surgery (ERAS®) Program in an Entire Health System: A Natural Experiment in Alberta, Canada. World J Surg. 2018;42(9):2691-2700. doi:10.1007/s00268-018-4559-0
13. Thanh NX, Chuck AW, Wasylak T, et al. An economic evaluation of the Enhanced Recovery After Surgery (ERAS) multisite implementation program for colorectal surgery in Alberta. Can J Surg. 2016;59(6):415-421. doi:10.1503/cjs.006716
14. Cavallaro P, Bordeianou L. Implementation of an ERAS Pathway in Colorectal Surgery. Clin Colon Rectal Surg. 2019;32(2):102-108. doi:10.1055/s-0038-1676474
15. Liu B, Liu S, Wang Y, et al. Enhanced Recovery After Intraspinal Tumor Surgery: A Single-Institutional Randomized Controlled Study. World Neurosurg. 2020;136:e542-e552. doi:10.1016/j.wneu.2020.01.067

16. Williams JB, McConnell G, Allender JE, et al. One-year results from the first US-based enhanced recovery after cardiac surgery (ERAS Cardiac) program. J Thorac Cardiovasc Surg. 2019;157(5):1881-1888. doi:10.1016/j.jtcvs.2018.10.164
17. Takagi K, Yoshida R, Yagi T, et al. Effect of an enhanced recovery after surgery protocol in patients undergoing pancreaticoduodenectomy: A randomized controlled trial. Clin Nutr. 2019;38(1):174-181. doi:10.1016/j.clnu.2018.01.002
18. McQueen K, Oodit R, Derbew M, Banguti P, Ljungqvist O. Enhanced Recovery After Surgery for Low- and Middle-Income Countries. World J Surg. 2018;42(4):950-952. doi:10.1007/s00268-018-4481-5
19. Pirzada MT, Naseer F, Haider R, et al. Enhanced recovery after surgery (ERAS) protocol in stoma reversals. J Pak Med Assoc. 2017;67(11):1674-1678.
20. Ghufran S, Janjua AA, Chaudary SM, Munawwar F, Hassan M, Changazi SH. Outcome of Enhanced Recovery After Surgery Protocols in Patients Undergoing Small Bowel Surgery. Cureus. 2020;12(10):e11073. Published 2020 Oct 21. doi:10.7759/cureus.11073
21. Garg B, Mehta N, Bansal T, Shekhar S, Khanna P, Baidya DK. Design and Implementation of an Enhanced Recovery After Surgery Protocol in Elective Lumbar Spine Fusion by Posterior Approach: A Retrospective, Comparative Study. Spine (Phila Pa 1976). 2021;46(12):E679-E687. doi:10.1097/BRS.0000000000003869
22. Ashok A, Niyogi D, Ranganathan P, et al. The enhanced recovery after surgery (ERAS) protocol to promote recovery following esophageal cancer resection [published correction appears in Surg Today. 2020 Mar 25;:]. Surg Today. 2020;50(4):323-334. doi:10.1007/s00595-020-01956-1

23. Agarwal V, Divatia JV. Enhanced recovery after surgery in liver resection: current concepts and controversies. Korean J Anesthesiol. 2019;72(2):119-129. doi:10.4097/kja.d.19.00010
24. Rossi G, Vaccarezza H, Vaccaro CA, et al. Two-day hospital stay after laparoscopic colorectal surgery under an enhanced recovery after surgery (ERAS) pathway. World J Surg. 2013;37(10):2483-2489. doi:10.1007/s00268-013-2155-x
25. Wang D, Liu Z, Zhou J, et al. Barriers to implementation of enhanced recovery after surgery (ERAS) by a multidisciplinary team in China: a multicentre qualitative study. BMJ Open. 2022;12(3):e053687. Published 2022 Mar 14. doi:10.1136/bmjopen-2021-053687
26. Pearsall EA, Meghji Z, Pitzul KB, et al. A qualitative study to understand the barriers and enablers in implementing an enhanced recovery after surgery program. Ann Surg. 2015;261(1):92-96. doi:10.1097/SLA.0000000000000604
27. Kahokehr A, Sammour T, Zargar-Shoshtari K, Thompson L, Hill AG. Implementation of ERAS and how to overcome the barriers. Int J Surg. 2009;7(1):16-19. doi:10.1016/j.ijsu.2008.11.004
28. Pędziwiatr M, Pisarska M, Major P, et al. Laparoscopic colorectal cancer surgery combined with enhanced recovery after surgery protocol (ERAS) reduces the negative impact of sarcopenia on short-term outcomes. Eur J Surg Oncol. 2016;42(6):779-787. doi:10.1016/j.ejso.2016.03.037
29. Gotlib Conn L, McKenzie M, Pearsall EA, McLeod RS. Successful implementation of an enhanced recovery after surgery programme for elective colorectal surgery: a process

evaluation of champions' experiences. Implement Sci. 2015;10:99. Published 2015 Jul 17. doi:10.1186/s13012-015-0289-y

30. Paton F, Chambers D, Wilson P, et al. Effectiveness and implementation of enhanced recovery after surgery programmes: a rapid evidence synthesis. BMJ Open. 2014;4(7):e005015. Published 2014 Jul 22. doi:10.1136/bmjopen-2014-005015
31. Pisarska M, Małczak P, Major P, Wysocki M, Budzyński A, Pędziwiatr M. Enhanced recovery after surgery protocol in oesophageal cancer surgery: Systematic review and meta-analysis. PLoS One. 2017;12(3):e0174382. Published 2017 Mar 28. doi:10.1371/journal.pone.0174382
32. Hammond JS, Humphries S, Simson N, et al. Adherence to enhanced recovery after surgery protocols across a high-volume gastrointestinal surgical service. Dig Surg. 2014;31(2):117-122. doi:10.1159/000362097
33. Cakir H, van Stijn MF, Lopes Cardozo AM, et al. Adherence to Enhanced Recovery After Surgery and length of stay after colonic resection. Colorectal Dis. 2013;15(8):1019-1025. doi:10.1111/codi.12200
34. Liu, V. X., Rosas, E., Hwang, J. C., Cain, E., Foss-Durant, A., Clopp, M., Huang, M., Mustille, A., Reyes, V. M., Paulson, S. S., Caughey, M., & Parodi, S. (2017). The Kaiser Permanente Northern California Enhanced Recovery After Surgery Program: Design, Development, and Implementation. The Permanente journal, 21, 17-003. https://doi.org/10.7812/TPP/17-003
35. Mir AM, Shaikh MS, Rashida G, Mankani N. To serve or to leave: a question faced by public sector healthcare providers in Pakistan. Health Res Policy Syst. 2015;13 Suppl 1(Suppl 1):58. Published 2015 Nov 25. doi:10.1186/s12961-015-0045-4

36. Pignot G. Role of the nurse in the implementation of enhanced recovery after surgery. Prog Urol. 2019;29(15):904-907. doi:10.1016/j.purol.2019.08.269

37. Gramlich L, Nelson G, Nelson A, Lagendyk L, Gilmour LE, Wasylak T. Moving enhanced recovery after surgery from implementation to sustainability across a health system: a qualitative assessment of leadership perspectives. BMC Health Serv Res. 2020;20(1):361. Published 2020 Apr 26. doi:10.1186/s12913-020-05227-0

38. Rasheed SP, Younas A, Sundus A. Self-awareness in nursing: A scoping review. J Clin Nurs. 2019;28(5-6):762-774. doi:10.1111/jocn.14708