

Enhanced recovery after surgery (ERAS): Are anaesthesiologists prepared for the paradigm shift in perioperative care? A prospective cross-sectional survey in India

INTRODUCTION

The concept of enhanced recovery after surgery (ERAS) was introduced in the mid-90s by Kehlet *et al.*^[1] The comprehensive nature of the ERAS protocol was intended to encompass the patient's entire journey throughout the perioperative period by combining different modalities and treatments through an evidence-based approach.

A recent meta-analysis showed that implementation of the ERAS protocol led to a reduction in postoperative recovery time, duration of stay, and reduction in complications by 30%–50%.^[2]

In India, a study showed a 35% decrease in hospital stays without any increased readmissions or complications after inclusion of ERAS pathways.^[3] Similar results for laparoscopic assisted gastrostomies have been seen in another study.^[4]

Recently, ERAS society has suggested recommendations for optimum anaesthesia care for the patients undergoing gastrointestinal (GI) surgery.^[5] However, despite all the clinical and other patient-centred benefits of ERAS, its implementation has been hugely neglected worldwide, as well as in India.^[6,7]

We, therefore, conducted a survey among the anaesthesiologists practising in India to examine the existing state of knowledge and obstacles to the introduction of ERAS protocols in perioperative surgical care.

METHODS

After Institutional Ethics Committee approval, this online survey was conducted amongst Indian anaesthesiologists prospectively from September 2020 to January 2021. The questionnaire was developed after extensive research for various elements of the

ERAS protocol, along with the review of published guidelines on ERAS website. The questionnaire had 28 questions [Appendix A] and was divided into three sections. Section one dealt with the consent of the participants. The second section consisted of questions investigating the demographics of anaesthesiologists and their awareness of ERAS protocols in general. The third section consisted of questions framed to know the current practice of anaesthesiologists in India and the extent of implementation of the various elements of ERAS protocol for major GI surgeries in the perioperative period.

The validity and reliability of the questionnaire were evaluated as per responses from the experts. The questionnaire was transformed into an online version using google forms and a link to the online questionnaire was shared amongst the anaesthesiologists. Percentages and frequencies were used for the descriptive analysis of the data.

RESULTS

Of the 856 anaesthesiologists contacted, we received 273 completed forms which qualified for the final analysis [Appendix B]. Majority of the respondents (72.4%) were from teaching hospitals and more than one third (35.5%) of the respondents had more than ten years of experience. Characteristics of the respondents are shown in [Table 1].

Of the 273 participant anaesthesiologists, 244 (89.4%) were aware of the concept of ERAS. The perioperative care protocols were decided by anaesthesiologists as per 126 (46.2%) responses [Figure 1a]. Maximum awareness of ERAS guidelines was for colorectal and GI surgeries. More than half of the anaesthesiologists 157 (57.5%) had primary contact with the patients for the pre-anaesthetic check-up before admission when the surgical plan was decided. One hundred and thirty-two (48.4%) of the participants believed that the anaesthesiologist's involvement in postoperative patient care was mostly limited to discharge from the intensive care unit or post anaesthesia care unit, 45 (16.5%) thought it was limited to the day of surgery and as per 67 (24.5%) anaesthesiologists, it was until hospital discharge. Multimodal rehabilitation (84.2%) and reduced hospital stays (71.1%) were the most commonly perceived benefits from ERAS implementation [Figure 1b].

Intraoperative elements of ERAS like Total intravenous propofol-based anaesthesia (17.9%), neuromuscular

Table 1: Characteristics of the respondents (n=273)

Characteristics	No. of Respondents (%)
Current Place of Practice	136 (49.8%)/15 (5.5%)/68 (24.9%)/38 (13.9%)/16 (5.9%)
Govt. teaching hospital/Govt. non-teaching hospital/Private teaching hospital/Private non-teaching hospital/Freelancing	
Working experience as anaesthesiologist	98 (35.9%)/78 (28.6%)/97 (35.5%)
Trainee/Resident (<5 years' experience)/Junior consultant (5-10 years' experience)/Senior consultant (>10 years' experience)	
Average number of major gastrointestinal surgeries performed	40 (14.7%)/71 (26%)/152 (55.7%)
<50 cases in a year/50 to 100 cases in a year/more than 100 cases in a year	
Govt – Government	

Table 2: Enhanced recovery after surgery (ERAS) protocol implementation in major gastrointestinal surgeries (n=273)

Elements of ERAS protocol	No. of Respondents (%)
Elements of ERAS protocol implemented in the preadmission period	153 (56%)/168 (61.5%)/97 (35.5%)/138 (50.5%)/46 (16.8%)
Pre Admission counselling/Preadmission risk stratification/Prehabilitation/Preoperative nutritional screening and care in pre-anaesthetic check-up/None of the above	
Use of Multimodal prophylaxis for postoperative nausea and vomiting based on Apfel score	198 (72.5%)/75 (27.5%)
Yes/No	
Preoperative fasting protocol in your institute	159 (58.2%)/102 (37.4%)/9 (3.3%)/3 (1.1%)
2 h for clear fluids, 6 h for solids/Nil Per Oral' since midnight/Nil Per Oral' since lunch or dinner/Other	
Preoperative oral complex carbohydrates (CHOs) (in non-diabetic and nonobese patients) 2-3 h before induction of anaesthesia	49 (17.9%)/224 (82.1%)
Yes/No	
Technique of general anaesthesia included in anaesthesia protocol	49 (17.9%)/158 (57.9%)/66 (24.2%)
Total intravenous anaesthesia with propofol/Inhalational agents based/Not definite	
Routine neuromuscular function monitoring	43 (15.8%)/230 (84.2%)
Yes/No	
Titration of inspired fractional concentration of oxygen to maintain normal arterial oxygen levels and saturation	199 (72.9%)/74 (27.1%)
Yes/No	
Use of modalities to maintain intraoperative normothermia	240 (87.9%)/33 (12.1%)
Yes/No	
Routine use of nasogastric tube	233 (85.3%)/40 (14.7%)
Yes/No	
Intravenous drug of choice for analgesia	179 (65.6%)/82 (30%)/12 (4.4%)
Opioid analgesics/Non-opioid intravenous analgesics/Adjuvant drugs	
Goal-directed fluid management	220 (80.6%)/53 (19.4%)
Yes/No	
Main surgical approach	128 (46.9%)/145 (53.1%)
Laparoscopic/Open surgery	
Depth of anaesthesia monitoring	155 (56.8%)/30 (11%)/88 (32.2%)
End tidal concentration of anaesthetics	
[End tidal Minimum Alveolar Concentration (End tidal MAC)]/Bispectral Index (BIS Index)/Do not monitor routinely	
Preferred type of intravenous crystalloid	21 (7.7%)/252 (92.3%)
0.9% Saline/Balanced crystalloids	
Use of tight control of hyperglycaemia using Insulin in the postoperative period	113 (41.4%)/160 (58.6%)
Yes/No	
Method of regional analgesia for postoperative analgesia	222 (81.3%)/30 (11%)/19 (7%)/96 (35.2%)/24 (8.8%)/24 (8.8%)
Epidural analgesia/Intravenous analgesia with lidocaine infusion/Continuous wound infusion (CWI) of local anaesthetic/Abdominal trunk blocks/Intrathecal morphine/None of the above	

function monitoring (15.8%) and avoidance of nasogastric drainage (14.7%) were routinely practised by less than 20% of the anaesthesiologists. The implementation of various elements of ERAS protocol in the perioperative period in major GI surgeries was variable [Table 2].

Early mobilisation (78.4%), use of epidural analgesia (59.3%), early feeding (52.4%) and use of opioid-sparing strategies postoperatively (48.4%) were some of the most employed strategies to speed up postoperative GI function recovery. Use of opioid antagonists, laxatives and gum chewing were

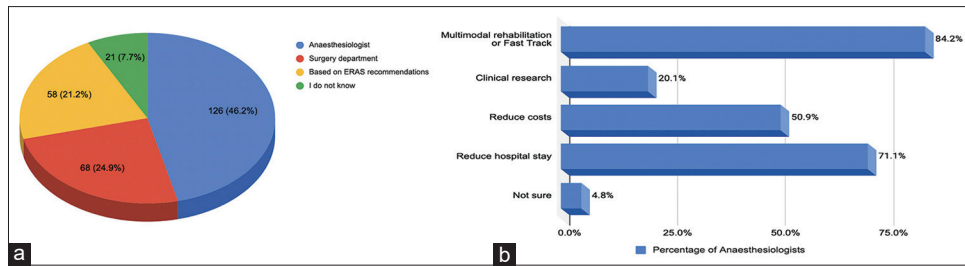


Figure 1: (a) Department/Body deciding perioperative care protocols. (b) Benefits of implementation of ERAS protocol according to anaesthesiologists

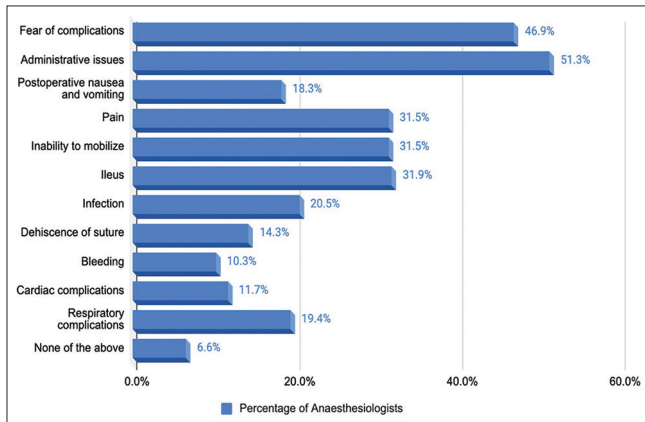


Figure 2: Main hindrances faced by anaesthesiologists in fast-track programs which have prevented the full implementation of the protocol

reported by 2 (0.7%), 35 (12.8%) and 33 (12.1%) anaesthesiologists. The most common hindrances faced by anaesthesiologists in the fast-track programs were fear of complications (46.9%) and administrative issues (51.3%) [Figure 2].

DISCUSSION

This is the first survey among anaesthesiologists about the awareness and implementation of the ERAS protocol in India. As per this survey, most of the anaesthesiologists (89.4%) in India were aware of the concept of ERAS.

Despite awareness among most anaesthesiologists and the proven benefits of ERAS protocol, we found that there was a huge variation in the pattern of clinical practice followed in the perioperative period in our Indian setups. Among the ERAS protocols, pre-admission counselling and risk stratification, preoperative nutritional screening and care, multimodal prophylaxis for postoperative nausea and vomiting (PONV), titration of the inspired fractional concentration of oxygen, maintenance of intraoperative normothermia, intraoperative monitoring of depth of anaesthesia, use of balanced

crystalloids, epidural anaesthesia, goal-directed intravenous fluid administration, initiation of early postoperative feeding and mobilisation were relatively well adopted by more than half of the anaesthesiologists in perioperative care.

However, other practices, such as the provision of preoperative carbohydrate-rich drink, total intravenous propofol based anaesthesia, routine monitoring of neuromuscular function, avoidance of nasogastric drainage, opioid-sparing analgesia in intraoperative period and tight perioperative control of hyperglycaemia were relatively less well-adopted.

Greco *et al.*^[8] conducted a survey among senior anaesthesiologists and reported that 76% of anaesthesiologists were familiar with the concept of ERAS in some way at least. A similar survey among surgeons and anaesthesiologists in Spain reported that 86.1 percent of respondents were familiar with ERAS pathways, which is similar to our survey results.^[9] A survey among Indian gastroenterology surgeons to assess their views on fast-track surgery received a very poor response, and four of 18 respondents of the survey had never heard about ERAS.^[10]

Greco *et al.*^[8] reported that prophylaxis for PONV and maintenance of intraoperative normothermia were the best-adhered components of ERAS. While other key postoperative ERAS elements like early nasogastric tube removal, early resumption of oral feeds and intravenous fluid therapy discontinuation were reportedly least adhered to.

In our study, preoperative fasting of 2 h for clear fluids and 6 h for solid meals was followed by most of the anaesthesiologists, which is in accordance with the ERAS protocol. But the fasting guidelines for heavy meals for more than 10 h (against more than 8 h as per ERAS guidelines) has been recently issued by the Indian Society of Anaesthesiologists for

the Indian population based on our distinct eating habits and culture. This should also be taken into consideration when applying the ERAS protocol to our Indian population.^[11] This highlights the need for a customised version of the ERAS protocol for the Indian population.

Preoperative oral consumption of complex carbohydrate, 2–3 h before induction of anaesthesia has been demonstrated to reduce the postoperative insulin resistance and to independently improve postoperative outcomes.^[12] Despite a strong recommendation in favour of this element of ERAS protocol, only 17.9% of the respondents reported to be following it. Ripollés-Melchor *et al.*^[9] reported the use of preoperative oral complex carbohydrates by 51.4% of the respondents in their survey. The poor implementation of this arm of ERAS can be related to the ubiquitous fear of aspiration in the mind of anaesthesiologists or the lack of awareness of its benefits or institutional policies in this regard.

Surprisingly, many (80.6 %) of our survey respondents reported implementation of goal-directed fluid therapy (GDFT) in major GI surgeries, though its true benefit remains controversial.^[13] Open surgery approach was reported by 53.1% of respondents despite the proven benefits of laparoscopic resection as already proven in the multi-centred study on perioperative strategy in colonic surgery comparing laparoscopy and/or fast track multimodal management with standard care (LFAFA trial).^[14] However, it has been observed that minimally invasive surgery practice in India is less regulated due to the lack of mentorship, resulting in more frequent complications than are reported.^[15,16] So, the operative technique that is least invasive and most beneficial for the patient should be the preferable approach.

Thus, our study highlights the variability in compliance with various elements of the ERAS protocol in India. Similar findings were shown in a retrospective study on the prevailing perioperative management practice for colorectal surgeries.^[7]

The main hindrances faced in the implementation of ERAS as per our survey respondents were fear of complications and administrative issues by most of the anaesthesiologists. The former factor might be attributed to the fact that most of the available literature is based on studies done in European and American institutions. Its clinical application

in the Indian scenario requires more clinical and research work in this direction. Besides this, patient-related factors, like illiteracy and inability to recognise early warning signs, staff-related factors, like lack of trained personnel in ERAS, practice-related issues like poor telecommunication facilities and coordination of multispecialities, besides infrastructure-related factors might be the cause of this fear in a country like India. Framing an evidence-based anaesthesia protocol, performing audits and training programs might help us in overcoming this fear. At the same time, extensive teamwork along with the efforts of increasing awareness among staff members of the hospital and demonstrating the cost benefits to the administration along with providing quality care to a greater number of patients in a given time frame may help in overcoming the administrative issues. Considering that our nation has a huge variation in the types of institutes delivering healthcare, a more personalised set of recommendations for various categories of health care facilities might improve implementation at various levels.^[17]

There were some limitations to our study. The response rate to the survey was 32%, which is relatively low and therefore, non-response bias cannot be excluded. It is possible that anaesthesiologists unaware of the concept chose not to respond to the survey. Secondly, the respondents might not be representative of all the regions and levels of healthcare in India. Thirdly, due to the extensive nature of the ERAS protocol, all the components of ERAS could not be incorporated in the online questionnaire as it would make the process of filling it too tedious. We tried to keep the questionnaire short and concise to maximise participation and included the components which were directly pertaining to and needed the involvement of the anaesthesiologist. However, ERAS is a multidisciplinary concept, and a coordinated effort is needed between various specialities to improve penetration of the ERAS protocol into our system.

CONCLUSION

To conclude, most anaesthesiologists were aware about the ERAS program but there exists a wide heterogeneity in their practice of perioperative patient care. We suggest more extensive research in the future on ERAS practice in India, involving the various specialities and including all the aspects of ERAS.

Acknowledgement

The authors would like to thank Mr. Jitendra and Dr Swagata for their incessant support and valuable inputs in this manuscript.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Submitted: 18-Feb-2021

Revised: 10-Mar-2021

Accepted: 27-Apr-2021

Published: 15-Sep-2021

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Access this article online	
Quick response code	Website: www.ijaweb.org
	DOI: 10.4103/ija.IJA_122_21

How to cite this article: Singh R, Gupta A, Gupta N, Kumar V. Enhanced recovery after surgery (ERAS): Are anaesthesiologists prepared for the paradigm shift in perioperative care? A prospective cross-sectional survey in India. *Indian J Anaesth* 2021;65:127-38.

APPENDIX A: QUESTIONNAIRE FOR THE SURVEY

Survey on 'Enhanced Recovery After Surgery'

ERAS protocols have brought about a revolutionary change in the perioperative care of the patient, redefining our roles as peri-operative physicians. That is, besides 'Anesthesia' and 'Analgesia', 'Early Recovery' of the patients too becomes our responsibility. ERAS Society issued a consensus statement for anaesthesia practice for gastrointestinal surgery in 2015. Many countries have developed strategies to increase the role of anaesthesiologists in perioperative medicine. Regardless of the name given to these clinical delivery models, all focus on ensuring a better clinical outcome for patients, better service, and greater efficiency.

But the key issue is "Are we prepared for it?" as Anesthesiologists.

According to your answers to the survey, we wish to understand the awareness of Enhanced Recovery After Surgery among Anesthesiologists and the extent of implementation in gastrointestinal surgeries in India.

Your participation will be highly appreciated and kept completely anonymous for all practical purposes.

***Required**

1. Email address *

2. By participating in this Survey, I give my consent for the data to be used for any future research purposes and/or any subsequent publications *

Mark only one oval.

Yes

No

General Awareness of ERAS protocols among Anaesthesiologists

3. Where have you been working? *

Mark only one oval.

Govt. teaching hospital

Govt. non-teaching hospital

Private teaching hospital

Private non-teaching hospital

Freelancing

4. Your working experience as Anaesthesiologist *

Mark only one oval.

Trainee/Resident (<5 yrs experience)

Junior consultant (5-10 yrs experience)

Senior consultant (>10yrs experience)

5. Are you aware of the concept of Enhanced Recovery After Surgery (ERAS)? *

Mark only one oval.

- Yes
 No

6. Peri-operative care protocols implemented in your institution are based on guidelines set by- *

Mark only one oval.

- Surgery department
 Anaesthesiologist
 Based on ERAS recommendations
 I do not know

7. The ERAS guidelines are available for which type of surgeries according to your knowledge? *

Tick all that apply.

- Colorectal surgery
 Gastrointestinal surgery
 Breast surgery
 Gynaecological surgery
 Bladder cystectomy
 Hepatic resection
 Head and neck surgery
 Bariatric surgery
 Thoracic surgery
 I do not know

8. What is the benefit of implementation of ERAS Protocol according to you? *

Tick all that apply.

- Multimodal rehabilitation or Fast Track
 Clinical research
 Reduce costs
 Reduce hospital stay
 Not sure

9. When do you do the 'primary' pre-anaesthetic workup of the patient? *

Mark only one oval.

- Before admission, when the surgical plan is decided
 At the time of admission for Operation
 Evening before Operation
 On the morning of Operation

10. What is the duration of your involvement as anaesthesiologist for postoperative care of the patient in your institute? *

Mark only one oval.

- Until hospital discharge
 Only the day of surgery
 Only until ICU/PACU discharge
 Not Definite

11. How frequently are gastrointestinal surgeries performed at your institute? *

Mark only one oval.

- Less than 50 cases in a year
 50 to 100 cases in a year
 More than 100 cases in a year

ERAS Implementation in major Gastrointestinal surgeries

12. Which elements of ERAS protocol for anaesthesia practice for major gastrointestinal surgery do you implement in your day to day practice in the preadmission period? *

Tick all that apply.

- Pre Admission counselling
 Preadmission risk stratification
 Prehabilitation
 Preoperative nutritional screening and care in pre-anaesthetic checkup
 None of the above

13. Do you use Multimodal prophylaxis for postoperative nausea and vomiting based on Apfel score? *

Mark only one oval.

- Yes
 No

14. What is the Preoperative fasting protocol in your institute? *

Mark only one oval.

- 2hrs for clear fluids, 6hrs for solids
 'Nil Per Oral' since midnight
 Nil Per Oral' since lunch/dinner
 Other

15. Do you allow preoperative oral complex carbohydrates (CHOs) (in non-diabetic and non-obese patients) 2-3 hours before induction of anaesthesia in your setup? *

Mark only one oval.

- Yes
 No

16. What type of general anaesthesia is usually included in the protocol in your hospital? *

Mark only one oval.

- Total intravenous anaesthesia with propofol
 Inhalational agents based
 Not definite

17. Do you routinely monitor neuromuscular function whenever Neuromuscular blocking agents are used? *

Mark only one oval.

- Yes
 No

18. Do you titrate inspired fractional concentration of oxygen to maintain normal arterial oxygen levels and saturation? *

Mark only one oval.

- Yes
 No

19. Do you use any modalities to maintain intraoperative normothermia? *

Mark only one oval.

- Yes
 No

20. Do you routinely use a nasogastric tube in major gastrointestinal surgeries? *

Mark only one oval.

- Yes
 No

21. What is your choice of intravenous drugs for analgesia? *

Mark only one oval.

- Opioid analgesics
- Non-opioid intravenous analgesics
- Adjuvant drugs

22. Do you perform goal-directed fluid management during surgery? *

Mark only one oval.

- Yes
- No

23. In your hospital, the surgical approach in patients included in major Gastrointestinal surgeries is mainly(>50%)? *

Mark only one oval.

- Laparoscopic surgery
- Open surgery

24. How do you monitor the depth of anaesthesia intraoperatively? *

Mark only one oval.

- End tidal concentration of MAC
- BIS index
- Do not monitor routinely

25. Which type of intravenous crystalloid is routinely preferred during the perioperative period? *

Mark only one oval.

- 0.9% Saline
- Balanced crystalloids

26. Do you routinely use tight control of hyperglycemia using Insulin in the postoperative period? *

Mark only one oval.

- Yes
- No

27. Which method of regional analgesia do you prefer most for postoperative pain control? *

Tick all that apply.

- Epidural Analgesia
- Intravenous Analgesia with lidocaine infusion
- Continuous wound infusion (CWI) of local anaesthetic
- Abdominal trunk blocks
- Intrathecal Morphine
- None of the above

28. Which postoperative strategies do you use to accelerate the recovery of gastrointestinal function? *

Tick all that apply.

- Thoracic epidural analgesia
- Opioid-sparing strategies/NSAIDs/COX-2
- Opioid antagonists (Alvimopam/Metiltrexone)
- Early Mobilisation
- Laxatives
- Gum-chewing
- Early feeding
- None of the above

29. Which of the following are the main hindrances in patients in fast track programs which have prevented the full implementation of the protocol in your institute? *

Tick all that apply.

- Fear of complications
- Administrative issues
- Postoperative nausea and vomiting
- Pain
- Inability to mobilise
- Ileus
- Infection
- Dehiscence of suture
- Bleeding
- Cardiac complications
- Respiratory complications
- None of the above

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APPENDIX B: FLOW DIAGRAM OF THE SURVEY STUDY PARTICIPANTS

