

# National survey of Korean hepatobiliary-pancreatic surgeons on attitudes about the enhanced recovery after surgery protocol

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**Backgrounds/Aims:** The purpose of this study was to investigate attitudes regarding the Enhanced Recovery After Surgery (ERAS) protocol of hepato-biliary-pancreatic (HBP) surgeons in Korea and the extent to which they use the protocol for perioperative management. **Methods:** An online survey was conducted among members of the Korean Association of Hepato-Biliary-Pancreatic Surgery (KAHBPS) for eight weeks beginning on August 2019. The questionnaire, which was written in Korean, was based on the latest ERAS guidelines. Total responses were collected from 127 surgeons. **Results:** Of the 127 total respondents, the largest proportion (44.9%) were working in Seoul. In terms of established in-hospital clinical pathways (CP), 19.7% of the participating surgeons had and followed a CP in pancreaticoduodenectomy (PD) and 21.3% in hepatectomy. Regarding the ERAS protocol for each surgery, four items (18.2%) regarding PD and seven items (35.0%) related to hepatectomy were followed by more than 50% of respondents. **Conclusions:** ERAS guidelines are one of the consensuses for better recovery in perioperative management of patients undergoing major surgeries and encompass the overall process of patient recovery including patient education, pain control, physiologic balance, and perioperative nutrition. A novel project is needed to successfully implement an evidence-based enhanced recovery strategy. ([Ann Hepatobiliary Pancreat Surg 2020;24:477-483](#))

**Key Words:** ERAS; HBP; Pancreaticoduodenectomy; Hepatectomy

## INTRODUCTION

In the 2000s, there have been many advances in surgical techniques and pre- and post-operative management in various abdominal surgeries. Based on these advances, a group of European academic surgeons<sup>1,2</sup> developed an enhanced recovery pathway, and the Enhanced Recovery After Surgery (ERAS) study group was launched in London in 2001. ERAS is a multimodal pathway developed to improve recovery after major surgery, and a guideline for colorectal resection was proposed in 2005. Since then, the protocol has been extended to other spe-

cialties including urologic, thoracic, vascular and orthopedic surgery. More recently, it has included pancreaticoduodenectomy (PD) in 2012<sup>3</sup> and liver surgery in 2016.<sup>4</sup>

The purpose of the ERAS guidelines is to provide evidence-based, standardized processes for minimizing surgical stress and restoring normal physiological conditions after surgery. The goal is to provide faster functional recovery and significant reduction in postoperative complications, early return to daily life, short hospital stay, and cost effectiveness. It not only refers to the “fast track” of recovery, but also includes the overall multidisciplinary approach to patient recovery including patient education,

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pain control, physiologic balance, and nutrition.

Based on evidence, ERAS guidelines have been implemented in many countries and centers, demonstrating their benefits, and they have been revised as necessary according to a specific audit system.<sup>5,6</sup> Until recently, implementation and verification of ERAS guidelines were primarily conducted for colorectal surgery; related research is being carried out in complex and difficult hepato-biliary-pancreas (HBP) surgeries.<sup>7-10</sup> Postoperative recovery from HBP surgery has historically been known to have a high incidence of complications including perioperative hemorrhage, infection, poor pain control, and prolonged intensive care and hospital stays. However, with recent developments in surgical techniques and patient monitoring and management, postoperative complications are decreasing, and it is reasonable to implement ERAS guidelines.

The purpose of this study was to investigate the recognition and extent of application of ERAS guidelines by Korean surgeons who actively perform hepatobiliary and pancreatic surgery.

## MATERIALS AND METHODS

### Survey and data collection

This study was approved by Institutional Review Board of Samsung Medical Center (approval number: 2020-03-133). An online survey was conducted among members of the Korean Association of Hepato-Biliary-Pancreatic Surgery (KAHBPS) for eight weeks from August 2019. The questionnaire, which was written in Korean, was based on the latest ERAS guidelines.<sup>4,11</sup> It had six common questions of respondent age, size of hospital, number of operations, existence of in-hospital clinical pathways (CP), and an individual question related to each PD and hepatectomy. Each question addressed compliance and surgeon preference regarding the ERAS guidelines. Each personal device (computer or mobile) could be used only once for the survey, and duplicate replies were not valid. Total responses were collected from 127 surgeons, which included replies from 113 surgeons performing PD and 107 surgeons performing hepatectomy.

## RESULTS

Among the 127 total respondents, 57 (44.9%) were working in Seoul, followed by Gyeongsang-do (18.1%), Gyeonggi-do (17.3%), Chungcheong-do (11.0%), Jeolla-do (6.3%), and Gangwon-do (2.4%). Most of the surgeons were working in medium- to large-sized hospitals with more than 500 beds (93.7%) (Table 1). Among the respondents, 66.1% were from a hospital performing more than two PDs per month ( $\geq 26$  cases per year), and 78% were from a hospital performing more than two hepatectomies per month ( $\geq 26$  cases per year). In terms of established in-hospital CP, surgeons who had and followed a

**Table 1.** Responses to common questions of the survey from members of Korean Association of Hepato-Biliary-Pancreatic Surgery (n=127)

Common question	No. (%)
Regional distribution of respondents	
Seoul	57 (44.9)
Gyeonggi-do	22 (17.3)
Chungcheong-do	14 (11.0)
Jeolla-do	8 (6.3)
Gyeongsang-do	23 (18.1)
Gangwon-do	3 (2.4)
Size of a center of respondent	
< 500 beds	8 (6.3)
501-1000 beds	70 (55.1)
> 1000 beds	49 (38.6)
No. of pancreaticoduodenectomy performed per year by a center	
< 25 cases	43 (33.9)
26-50 cases	43 (33.9)
51-100 cases	15 (11.8)
> 100 cases	26 (20.4)
No. of liver surgery performed per year by a center	
< 25 cases	28 (22.0)
26-50 cases	31 (24.4)
51-100 cases	31 (24.4)
> 100 cases	37 (29.2)
In-hospital clinical pathway of pancreaticoduodenectomy	
Having, and following clinical pathway	25 (19.7)
Having, but not following clinical pathway	43 (33.8)
Not having clinical pathway	58 (45.7)
Unknown	1 (0.8)
In-hospital clinical pathway of hepatectomy	
Having, and following clinical pathway	27 (21.3)
Having, but not following clinical pathway	45 (35.4)
Not having clinical pathway	54 (42.5)
Unknown	1 (0.8)

CP represented 19.7% in PD and 21.3% in hepatectomy. Most respondents did not have a CP protocol, and if they did, they performed postoperative management based on personal preferences rather than a CP.

In the responses about individual surgery, 113 of 127 respondents were performing PD, 107 hepatectomy, and

97 both surgeries. Table 2 shows the respondent responses to implementation and preference for the ERAS protocol for each surgery. More than 50% of the respondents reported that they would perform postoperative management according to the ERAS protocol in only four items of PD and seven items of hepatectomy, Considering that four

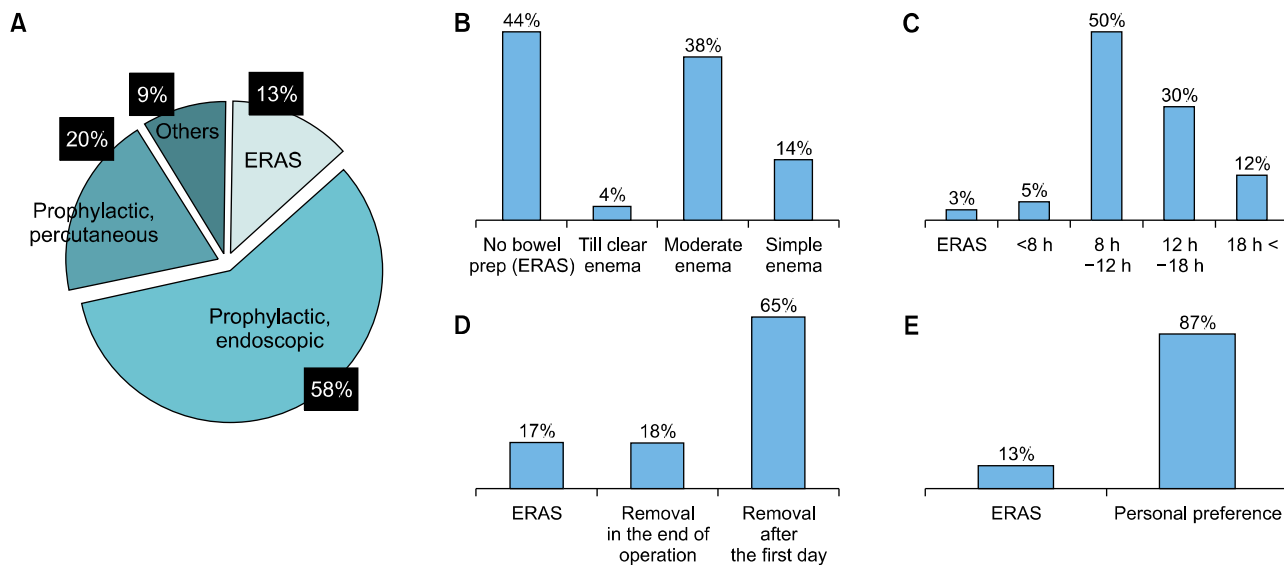
**Table 2.** Numbers and percentages of Korean hepato-biliary-pancreatic surgeons following recommendations of enhanced recovery after surgery (ERAS) items in pancreaticoduodenectomy and hepatectomy

Item	No. (%)
<b>Pancreaticoduodenectomy (n=113)</b>	
Preoperative counselling	19 (16.8)
Perioperative biliary drainage	15 (13.3)
Preoperative smoking and alcohol consumption	25 (22.1)
Preoperative nutrition	41 (36.3)
Perioperative oral immunonutrition	6 (5.3)
Oral bowel preparation	50 (44.2)
Preoperative fasting	13 (11.5)
Preanaesthetic medication	51 (45.1)
Anti-thrombotic prophylaxis	3 (2.7)
Antimicrobial prophylaxis and skin preparation	106 (93.8)
Epidural analgesia	13 (11.5)
Wound catheters and transversus abdominis plane block	17 (15.0)
Preventing postoperative nausea and vomiting	25 (22.1)
Avoiding hypothermia	87 (77.0)
Postoperative glycemic control	24 (21.2)
Nasogastric intubation	20 (17.7)
Fluid balance	8 (7.1)
Perianastomotic drain	15 (13.3)
Somatostatin analogues	36 (31.9)
Urinary drainage	96 (85.0)
Stimulation of bowel movement	4 (3.5)
Early and scheduled mobilization	60 (53.1)
<b>Hepatectomy (n=107)</b>	
Preoperative counselling	17 (15.9)
Preoperative nutrition	13 (12.1)
Perioperative oral immunonutrition	No specific recommendation
Preoperative fasting	6 (5.6)
Oral bowel preparation	71 (66.4)
Preanesthetic medication	44 (41.1)
Anti-thrombotic prophylaxis	10 (9.3)
Perioperative steroids administration	No specific recommendation
Antimicrobial prophylaxis and skin preparation	22 (20.6)
Minimally invasive approach	27 (25.2)
Nasogastric intubation	46 (43.0)
Prophylactic abdominal drainage	No specific recommendation
Preventing intraoperative hypothermia	81 (75.7)
Postoperative nutrition and early oral intake	29 (27.1)
Preventing delayed gastric emptying	9 (8.4)
Stimulation of bowel movement	No specific recommendation
Early mobilization	52 (48.6)
Analgesia	8 (7.5)
Preventing postoperative nausea and vomiting	37 (34.6)
Fluid management	87 (81.3)

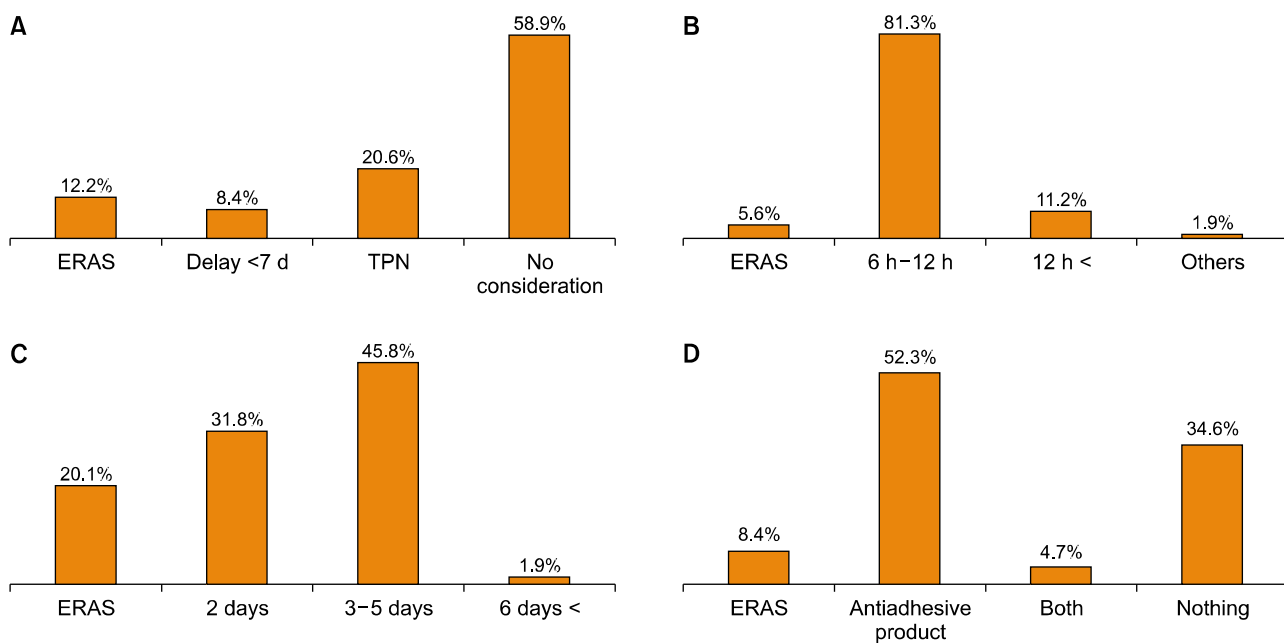
items in hepatectomy, perioperative oral immunonutrition, perioperative steroids administration, prophylactic abdominal drainage, and stimulation of bowel movement, do not have specific recommendations, three items were accepted by more than 50% of respondents.

Details of personal preferences for several ERAS items are shown in Figures. Regarding PD, the ERAS protocol

does not recommend routine biliary drainage in patients with serum bilirubin concentration <250 μmol/L, but most respondents (87%) were performing prophylactic biliary drainage before surgery (Fig. 1A). Although ERAS protocol recommends intake of clear fluids up to two hours and intake of solids up to six hours before anesthesia, most surgeons still tend to prefer preoperative fast-



**Fig. 1.** Personal preferences following enhanced recovery after surgery (ERAS) guideline of pancreaticoduodenectomy. (A) Preoperative biliary drainage, (B) preoperative oral bowel preparation, (C) preoperative fasting, (D) nasogastric intubation, and (E) perianastomotic drain.



**Fig. 2.** Personal preferences following enhanced recovery after surgery (ERAS) guideline of liver surgery. (A) Preoperative nutrition, (B) preoperative fasting, (C) antimicrobial prophylaxis, and (D) prevention of delayed gastric emptying.

ing for more than eight hours (Fig. 1C). In terms of perianastomotic drains, personal preferences of surgeons were the most important determinant regardless of specific criteria (Fig. 1E). In hepatectomy, there were more surgeons who did not consider preoperative nutrition (Fig. 2A), and the responses for preoperative fasting were like those of PD (Fig. 2B). To prevent delayed gastric emptying after left-sided hepatectomy, more surgeons preferred to use a commercial anti-adhesive agent rather than covering omental flap recommended by ERAS protocol (Fig. 2D).

## DISCUSSION

Although surgeries of the HBP area are complicated and life-threatening, advances in surgical techniques and perioperative management have led to performance of these surgeries with acceptable morbidity and mortality.<sup>12-17</sup> Considering these advances, this survey was conducted to determine the contribution of ERAS guidelines, a major change in perioperative management, to actual clinical practice in Korea, and to determine future improvements. Survey results demonstrated that the ERAS guidelines were less actively accepted in Korean HBP surgeons than expected, and that traditional practice based on experience was still trusted more than evidence-based guidelines.

The researchers identified four reasons that are likely to hinder implementation of the ERAS guidelines in Korean HBP clinical practice. First, there is a misunderstanding of the guidelines' purpose. Previous studies on ERAS protocols have emphasized that implementation of these new protocols can yield earlier recovery and subsequent decrease in length of hospital stay.<sup>7,9,18-22</sup> These repetitive results have been misleading as if the ERAS protocol was dedicated to rapid recovery. However, an ERAS protocol is an evidence-based guideline containing the overall process of patient recovery including patient education, pain control, physiologic balance, and perioperative nutrition. The protocol has been reported to be associated with enhanced recovery of patients and a lower probability of morbidity; however, it is necessary to understand that early return to normal life is not the primary purpose but the beneficial result of enhanced recovery.

The second reason why ERAS protocol is not properly implemented is that some of their items are complicated

and obscure. The PD and hepatectomy guidelines used in this survey included 28 and 23 items, respectively. Some of these items are easily accessible, but others require close cooperation with various departments, such as anesthesiology, and yet others are confusing because they fail to provide specific recommendations. For example, items such as perioperative oral immunonutrition or anti-thrombotic prophylaxis in PD have significant limitations for application in actual clinical situations, and there are items that confuse readers rather than providing clear recommendations, with ambiguous expressions such as "steroids may be used" in hepatectomy. This complexity and ambiguity pose one of the biggest obstacles to implementing these new protocols in HBP surgery with a wide variety of perioperative courses.

The third and fourth reasons why ERAS protocols are not properly implemented are that the recommendations have large discrepancies with traditional management and the fear caused by big changes. ERAS guidelines for PD and hepatectomy recommend that preoperative mechanical bowel preparation has no proven benefit, preoperative fasting does not need to exceed six hours for solids and two hours for liquids, and early removal of perianastomotic drains after 72 hours in PD may be advisable in patients at low risk (i.e., amylase content in drain <5000 U/L) for developing a pancreatic fistula. These recommendations have already been proven repeatedly in previous studies,<sup>23-26</sup> and most surgeons know the advantages of performing them. However, through the survey administered in the current study, the researchers identified that a large percentage of surgeons maintain traditional methods, and it is very difficult to change traditional experience-based practice to novel, evidence-based management, even if the evidence is obvious.

Although this survey has a limitation that 127 respondents do not represent all Korean HBP surgeons, participant responses may be credible given that there are approximately 260 active participants in the Korean HBP society.

ERAS protocols may not be an absolute guide for patient management. However, they are one of the consensuses for better recovery in perioperative management of patients undergoing these major surgeries. The protocols encompass the overall process of patient recovery including patient education, pain control, physiologic bal-

ance, and perioperative nutrition. The high-level evidences have already been demonstrated and are also in progress. Therefore, a novel project is needed to successfully implement an evidence-based enhanced recovery strategy that encompasses preoperative counseling, perioperative modulation of physiologic balance, and postoperative early restoration of normal nutritional status.

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## CONFLICT OF INTEREST

All the authors declare that they have no conflict of interest.

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