Clinics in Surgery

Research Article
Published: 10 Feb, 2022

Enhanced Recovery after Laparoscopic Hysterectomy: A Real World Experience Adopting Eras in a Tertiary Gynecology Unit

Chatterjee U[1], Qian H[2], Chua S[1,3,4,5], Gibbs E[6], Anpalagan A[1,4] and Kapurubandara S[1,4,7]*

[1]Department of Obstetrics and Gynecology, Westmead Hospital, Sydney, New South Wales, Australia

[2]Western Sydney Local Health District, Australia

[3]W2IRED, Westmead Women's Institute of Research and Data Collaboration, Australia

[4]Sydney West Area Pelvic Surgery, Australia

[5]Western Sydney University, Australia

[6]NHMRC CTC University of Sydney, Australia

[7]University of Sydney, Australia

Abstract

Objective: To compare LOS and adverse outcomes between ERAS and conventional surgical models of care in gynecological patients at a single tertiary unit.

Design: A three-year retrospective study was performed comparing the ERAS and conventional models on all patients undergoing Laparoscopic Hysterectomy (LH).

Materials and Methods: Data was collected from the patients' medical records. Data collected included baseline demographics, preoperative education, type and duration of surgery, postoperative analgesia, aperients and antiemetics used, use of postoperative drains, duration of indwelling catheter, LOS, and complications and readmissions within two weeks of discharge.

Results: Sixty four patients in the ERAS cohort and 179 patients in the conventional cohort were analyzed. There were noticeable differences in patient demographics including median age (55 *vs.* 46 ($p<0.001$)), BMI, and country of birth (64% *vs.* 36% born in Australia ($p=0.001$)). Median LOS in the ERAS cohort was 2 h shorter (54 h *vs.* 56 h ($p=0.009$) and was associated with significant decrease in cumulative analgesia use. Country of birth, age, and malignant histopathology were all independent risk factors for increased LOS. There was no significant difference in readmission rates or complications between both cohorts.

Conclusion: The use of ERAS protocol in gynecological patients was associated with a decrease in LOS and significant reduction in postoperative analgesia and no difference in readmission rates or complications. This study demonstrates widespread dissemination of ERAS principles despite implementation to only a select group of patients, highlighting a pragmatic approach to ERAS adoption.

Keywords: Hysterectomy; Laparoscopy; Perioperative care; Early recovery; Complications

Introduction

Current literature shows Enhanced Recovery after Surgery (ERAS) protocols maintain the body's normal physiology, minimize the stress insults of surgery, facilitate early discharge, and have low complication rates [1-4]. ERAS protocols also allow efficient turnover of patients using limited resources, resulting in significant economic benefit [5]. As per the ERAS® Society recommendations, this model involves preoperative education and optimization of patient comorbidities, effective perioperative anesthesia, postoperative analgesia, and early mobilization [6]. This process is in contrast with the 'conventional' model of care which has no standard pre- or postoperative protocol and is often at the discretion of the surgeon [3,7].

Despite the proven success in colorectal and gynecological oncology surgery, uptake of the ERAS model into mainstream gynecological practice has been slow [3,4]. International studies

OPEN ACCESS

Correspondence:
Ushmi Chatterjee, Department of Obstetrics and Gynecology, Westmead Hospital, Corner of Darcy and Hawkesbury Roads, Westmead NSW, 2145, Australia, Tel: +61-8890-5555; E-mail: Ushmi.chatterjee@health.nsw.gov.au

Received Date: *18 Nov 2021*
Accepted Date: *17 Jan 2022*
Published Date: *10 Feb 2022*

Citation:
Chatterjee U, Qian H, Chua S, Gibbs E, Anpalagan A, Kapurubandara S. Enhanced Recovery after Laparoscopic Hysterectomy: A Real World Experience Adopting Eras in a Tertiary Gynecology Unit. Clin Surg. 2022; 7: 3414.

have shown clear reductions in Length of Stay (LOS) following total abdominal hysterectomy using ERAS programs in gynecological oncology patients compared with conventional care [8,9]. Since 2010, an ERAS protocol (Figure 1) has been implemented in this tertiary center and applied to all patients who undergo surgery within the gynecological oncology unit run by four surgeons who are all gynecological oncologists. A study of this protocol's effectiveness in 2012 demonstrated shorter LOS with acceptably low complication and readmission rates [3]. At the same tertiary center, conventional model of care continues to be used for all cases performed by the remaining gynecology department, divided amongst twelve surgeons who perform majority of the benign gynecology cases. Anecdotal evidence suggested a difference in peri- and post-operative care between the ERAS and conventional models, hence the premise for this study.

The primary outcome of this study was to determine whether there was a difference in LOS in patients undergoing LH in the ERAS model compared to conventional model of care. Secondary outcomes included comparison of complications and readmission rates between both cohorts.

Materials and Methods

A retrospective cohort study was performed of patients who underwent Laparoscopic Hysterectomy (LH) between January 2013 to January 2016 as identified by activity based funding coding list. All patients who had LH with, or without concurrent adnexal surgery were included in this study. The center involved in this study is a 900-bed public referral hospital in Western Sydney, and provides services for approximately 180 hysterectomies for oncological indications and 80 hysterectomies for benign indications annually. Ethics approval was granted by the Western Sydney Local Health District Human Research Ethics Committee (SAC2015/10/6.4 (4468) QA).

All patients who had surgery by the gynecological oncologists had ERAS model of care as routine care within the gynecological oncology unit (Figure 1). All patients who had surgery by the gynecological surgeons had conventional model of care. Patients with confounders such as additional surgical procedures (e.g. lymphadenectomy, bowel resection, or extensive debulking), radical hysterectomy, and patients with Stage III or IV malignant disease, cervical cancer and disseminated ovarian pathology were excluded from the study.

Patients of both cohorts were seen in pre-admission clinic prior to surgery, which included an assessment and consultation with the preadmission nurse, anesthetist and a medical officer where clinically indicated.

As per the ERAS protocol, additional preoperative education was provided to the ERAS cohort during the preadmission visit by the gynecological oncology Clinical Nurse Consultant (CNC). There was no specific script used, however the same key components were covered with each patient (including expectations, predicted LOS, postoperative instructions and aftercare). Patients of both cohorts were counseled and consented for their procedures by the treating surgeon using both verbal and written tools; however no standardized proforma was used.

Data on patient demographics was collected from the patients' medical records. Duration of fasting was calculated from the documented time of last oral fluid or solid intake to commencement of surgery. As per protocol in this institution, onset of fasting is specified by preadmission protocols.

Comparison was made between patients who underwent LH on the ERAS protocol versus those who received conventional care, as per the primary operating team. The study was powered to detect a difference of 6 h in LOS, with a standard deviation of 12 h, which was considered clinically and economically significant to the patients and the department. Each cohort required 60 patients to achieve an adequate power of 80% with a two-sided 0.05 alpha.

Baseline and postoperative demographics were compared using simple statistical tests. For continuous variables, a Shapiro-Wilks test was performed to identify whether the continuous variables had a parametric distribution or not (skewed). If the variables were skewed,

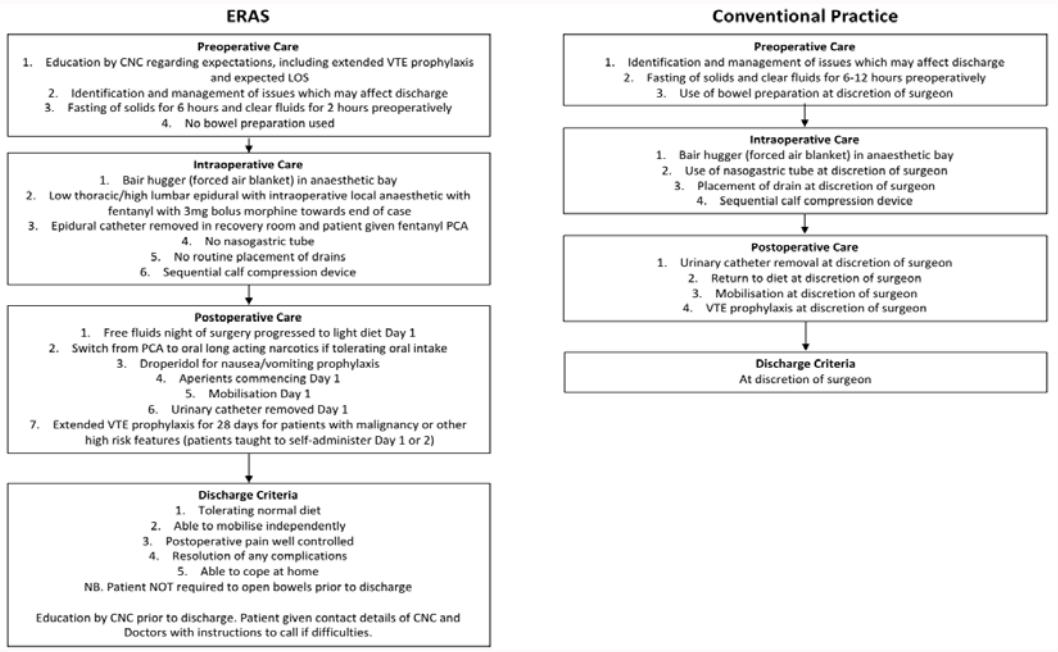

Figure 1: ERAS perioperative protocol versus conventional practice in this tertiary gynecology unit.

Table 1: Baseline Demographics.

Characteristic	Level	Conventional (N=179)	ERAS (N=64)	P-value
Age (Years)	Median (IQR)	46 (43,51)	55 (46,65)	<0.001
BMI Category	Missing or NA	16 (9%)	6 (9%)	0.2
	<18.9	1 (1%)	0	
	19-24.9	40 (22%)	11 (17%)	
	25-29.9	50 (28%)	16 (25%)	
	>30	72 (40%)	31 (48%)	
Country of Birth	Australia	64 (36%)	41 (64%)	0.001
	Other	115 (64%)	25 (36%)	
Hypertension	Yes	35 (20%)	22 (34%)	0.016
Diabetes- Diet controlled	Yes		2 (3%)	0.018
Diabetes- Hypoglycemic Agent	Yes	16 (9%)	10 (16%)	0.137
Ischemic heart disease	Yes	5 (3%)	2 (3%)	0.892
Previous Cancer	Yes	9 (5%)	10 (16%)	0.007
Other Comorbidities	Yes	114 (64%)	49 (77%)	0.06
ASA Grading	Missing or NA	2 (1%)	0	0.006
	1	52 (29%)	12 (19%)	
	2	108 (60%)	36 (56%)	
	3	17 (9%)	16 (25%)	
Smoking Status	Missing or NA	6 (3%)	3 (5%)	0.347
	Yes	35 (20%)	9 (14%)	
Benign or Malignant Pathology	Benign	178 (99%)	36 (56%)	<0.001
	Malignant	1 (1%)	28 (44%)	
Number of Comorbidities	Median (IQR)	1 (0,3)	2 (2,3)	<0.001

Table 2: Postoperative Outcomes.

Characteristic	Level	Conventional (N=179)	ERAS (N=64)	P-value
Length of Stay(Hours)	Median (IQR)	56 (52,76)	54 (36,58.25)	0.009
Length of surgery	Median (IQR)	145 (120,172)	115 (90,150)	<0.001
		(N=142)		
Total Number of Ports	Median (IQR)	5 (5,5)	4 (4,4)	<0.001
		(N=163)	(N=57)	
Estimated blood loss (ml)	Median (IQR)	200 (100,300)	100 (50,200)	0.003
		(N=142)		
Planned blood transfusion (units)	Missing or NA	2	0	
	0	173 (97%)	64 (100%)	0.14
	1	2 (1%)		
	2	4 (2%)		
Unplanned blood transfusion (units)	0	177 (99%)	64 (100%)	0.4
	1	1 (1%)		
	3	1 (1%)		
Change in Hemoglobin (g/L)	Median (IQR)	16 (10,24)	21 (14,29)	0.006
		(N=146)	(N=58)	
Presence of nasogastric tube	Yes	1 (1%)	0	0.549
		(N=146)	(N=58)	
Presence of postoperative drain	Yes	114 (64%)	1 (2%)	<0.001
Time to removal of indwelling catheter	Median (IQR)	20.5 (17,23)	19 (16,22)	0.033
		(N=177)	(N=63)	

Total dose of paracetamol (mg)	Median (IQR)	8 (7,11)	8 (5,9)	0.012
		(N=177)		
Total dose of oxycodone (mg)	Median (IQR)	30 (13,50)	25 (10,40)	0.16
		(N=150)	(N=41)	
Total dose of morphine (mg)	Median (IQR)	10 (7.5,10)	10 (10,10)	0.564
		(N=20)	(N=15)	
Total dose of fentanyl (mcg)	Median (IQR)	630 (445,1190)	500 (265,880)	0.004
		(N=177)	(N=60)	
Time to return to full diet postoperatively	Median (IQR)	22 (19,26)	21 (19.5,25)	0.492
		(N=169)	(N=62)	
Time to mobilization postoperatively	Median (IQR)	23.5 (21,26)	23 (20,27)	0.932
		(N=162)		
Readmission within 30 days	Yes	8 (4%)	3 (5%)	0.943

Table 3: Elements of ERAS.

Characteristic	Level	Conventional (N=179)	ERAS (N=64)	P-value
Pre-operative education	Missing or NA	0	3 (5%)	<0.001
	Yes	0	53 (83%)	
Preoperative bowel prep	Missing or NA	6 (3%)	0	0.42
	Yes	102 (57%)	34 (53%)	
	No	71 (40%)	30 (47%)	
Preoperative fasting of solids	Median (IQR)	13 (10.5,19)	14 (11.5,16.5)	0.756
		(N=178)	(N=63)	
Preoperative fasting of liquids	Median (IQR)	10 (7.5,11.5)	9.5 (6,14.5)	0.787
Epidural block	Yes	1 (1%)	2 (3%)	
	No	178 (99%)	62 (97%)	0.111
Spinal anaesthesia	Yes	1 (1%)	1 (2%)	
	No	178 (99%)	63 (98%)	0.446
TAP block	Yes	2 (1%)	0	
	No	177 (99%)	64 (100%)	0.396
Patient controlled analgesia	Yes	86 (48%)	30 (47%)	
	No	93 (52%)	34 (53%)	0.872

they were represented as medians (IQR) and a difference between the two cohorts was analyzed using a Mann-U-Whitney test. If the variable was not skewed they were represented as means (95% CI) and analyzed using a t-test. For categorical variables, differences were tested using a chi-squared test and for ordinal data, differences were tested using a Mann-U-Whitney test. No adjustment was made for multiple testing.

Post-hoc linear regression analysis was performed to identify any factors associated with LOS in these cohorts, independent of ERAS and its components. This was to identify independent risk factors for increased LOS. The outcome, LOS, was log transformed due to its non-parametric nature. Both univariate and multivariate analysis were performed. All statistical analysis was performed in SAS 9.4.

Results

Demographics

There were significant differences in the baseline characteristics between the two cohorts for age, country of birth, diet-controlled diabetes mellitus, and hypertension, number of comorbidities, ASA grade and previous cancer (Table 1). As expected, the ERAS cohort had significantly higher rates of preoperative education and rates of malignancy.

A total of 64 patients were included in the ERAS cohort, with a median age of 55 (IQR 46-65) and median BMI of 30 (IQR 26-38.5) (Table 1). The majority were born in Australia (64%). Almost all (97%) underwent LH with adnexal surgery (unilateral or bilateral salpingo-oophorectomy). Forty four percent (28/64) of patients had malignant pathology (one case of ovarian cancer and 27 cases of endometrial cancer) and 83% of patients received preoperative education by a single gynecological oncology CNC.

A total of 179 patients were included in the conventional cohort, with a median age of 46 (IQR 43-51) and median BMI of 29 (IQR 24.3-34) (Table 1). The majority were born outside of Australia (64%). Sixty percent underwent LH with adnexal surgery. Only one patient had malignant pathology and patients did not routinely receive additional preoperative education with a CNC.

Outcomes

Median LOS in the ERAS cohort was statistically significantly shorter than the conventional cohort (54 h vs. 56 h (p=0.009)) (Table

2). Statistically significant differences were seen between the ERAS and conventional cohort including shorter length of surgery, reduced use of postoperative drains, reduced number of laparoscopic ports used, and reduced cumulative use of analgesia (Paracetamol and Fentanyl) in the ERAS cohort. Overall there were no differences in complication or readmission rates between the two cohorts (Table 2).

There was no significant difference between preoperative fasting of solids (13 h vs. 14 h (p=0.756)) and fluids (10 h vs. 9.5 h (p=0.787) in conventional and ERAS cohorts respectively (Table 3). Use of regional and patient controlled analgesia was similar in both cohorts (Table 3).

Specific information on the use of any preoperative bowel preparation used (mechanical bowel preparation, suppositories or enemas) was not captured. The preoperative checklist included multiple data points (including preoperative antibiotics, shaving and bowel preparation) within the same column, and therefore specific data on bowel preparation could not be extrapolated retrospectively. The ERAS protocol did not recommend bowel preparation; therefore these were usually avoided in this cohort.

A post hoc linear regression was additionally performed to identify the independent factors that affected LOS, regardless of what model of care a patient received. Variables included were country of birth, malignant histopathology, age, IHD, diabetes, number of comorbidities, smoking status, hypertension, BMI, and history of previous cancers. It was found that country of birth (non-Australian born, p=0.034), age (per year, p=0.006) and malignant histopathology (p=0.004) were all independent risk factors for increased LOS.

Discussion

There is a growing body of literature supporting the use of ERAS in improving surgical outcomes [1,3,4,10]. In this study, there was a statistically significant two hour reduction in LOS in the ERAS cohort. Opportunities for a larger clinical difference may be explained by the differences between the cohorts, variable compliance with all ERAS® Society guidelines, and protocol creep. The current LOS is comparable with majority of the units across the country for all types of hysterectomy as per government statistics [11]. A length of stay of 54 h however does fall short of international published reports for LOS post LH [12]. The department is therefore currently working towards achieving the goal of same-day hysterectomy in appropriate patients.

Baseline differences

The two cohorts in this study had significantly different baseline demographics (Table 1). The ERAS cohort had inherent factors (older, higher BMI, underlying malignancy) that could be expected to predict longer LOS, thus reducing the difference between the two cohorts.

During the study period the gynecological oncology department had four surgeons who operated on all ERAS patients, whereas the conventional cohorts of patients were divided amongst twelve gynecological surgeons. Given the nature of a teaching hospital, trainee participation was expected across both cohorts, but degree of involvement was not captured. Heterogeneity in surgical caseloads and experience therefore likely influenced operative outcomes between the two cohorts [13].

Protocol creep

This study provided a clear example of protocol creep, demonstrating the limitations of ERAS in practice. There was evidence of shift in surgeon awareness and preference for ERAS principles such as routine use of aperients, early mobilization and avoidance of surgical drains in line with the protocol creep documented in literature [14,15]. This natural evolution of perioperative care has been alluded to in a recent study, where spontaneous diffusion of evidence-based ERAS principles was observed between two departments during the same study period [16]. It can be postulated that the gradual adoption of ERAS principles in the conventional cohort has contributed to diminishing the difference in LOS that would have been seen otherwise and is reflective of a real world scenario. Patients in both cohorts received postoperative care during the same time frame on the same ward and postoperative care was initiated by the nursing staff under the direction of the treating team. While all patients admitted under the gynecological oncology surgeons (ERAS cohort) had standardized care in accordance with the ERAS protocol, the patients admitted under the gynecological surgeons (conventional cohort) had individualized postoperative care at the discretion of the respective surgeon (Figure 1). This was due to the lack of an official postoperative protocol.

Protocol creep was also observed in the use of perioperative anesthesia, with no difference seen between regional anesthetic and patient controlled analgesia use between ERAS and conventional cohorts. Overlap of anesthetic staff between gynecological oncology and general gynecology operating lists during the same period of time may have contributed to a similar approach to anesthesia across both cohorts. However, there is a statistically significant reduction in the use of postoperative analgesia (both paracetamol and fentanyl) in the ERAS cohort. This is clinically significant as this finding can be an indirect marker of postoperative pain and may support the theory that ERAS model of care is associated with reduced postoperative pain.

Compliance with ERAS principles

The variable compliance with ERAS principles may also influence LOS [17]. The ERAS model used in this institution since 2010 differs from the recommendations published by the ERAS® Society [5,7]. Compliance was difficult to assess in the current study due to advances in ERAS protocols since its implementation. Based on the recommendations of the ERAS® Society, there may be room for improvement with compliance of interventions, such as minimal preoperative fasting and use of carbohydrate loading. These interventions prevent loss of insulin sensitivity and an increased catabolic state, which can negatively affect patients' recovery [18]. Likewise, a paucity of robust evidence on the use of carbohydrate loading preoperatively to reduce LOS has prompted this institution to commence a randomized trial to further evaluate its effectiveness [19,20]. Prolonged length of fasting in the ERAS cohort was likely due to inconsistent advice from administrative staff outside of the multidisciplinary team, despite well-defined ERAS fasting protocol [21]. Unexpectedly this study highlighted the inconsistencies between the ERAS protocol and actual clinical practice, which now has the scope to be rectified.

Strengths

In this study ERAS was shown to be a safe alternative to traditional surgical practice with decreased postoperative analgesia requirement without an increase in complications or readmission rates. There was a statistically significant difference in LOS between ERAS and conventional practice. The study demonstrated that

ERAS implementation does not require en masse adoption, with individual components naturally diffusing into real world practice. Piecemeal uptake of ERAS principles must be improved in the future to develop an established standard of perioperative care across the entire gynecological surgical unit; however it has been observed that the select implementation of ERAS within this department has not impaired perioperative outcomes.

Limitations

A limitation of this study was its retrospective nature which meant that there were instances where specifics of treatment were not available (e.g. use of bowel preparation) and readmissions to other hospitals or complications after two weeks were not available. Upon commencement of this study, significant differences were anticipated between the ERAS and conventional cohorts, which were apparent anecdotally. However findings of the study highlighted the lack of significant differences between the two cohorts due to suboptimal adherence with ERAS protocol and diffusion of ERAS principles into the conventional cohort during the same study period. Indeed a limitation of all available literature is the lack of standardization in ERAS protocols used. Heterogeneity in ERAS protocols and piecemeal uptake of interventions, makes it difficult to extrapolate and compare data between units [17,21,22]. While the strength of evidence supporting each recommendation is known, it is not yet established the weight that compliance with each intervention bears on markers of patients' return to functional baseline [2,17].

Conclusion

In conclusion ERAS is a safe and effective alternative to conventional surgical practice. This study demonstrated a statistically significant reduction in postoperative analgesia and LOS with no additional increase in postoperative complications. Going forward, there is scope for testing individual ERAS principles and markers for clinically-relevant outcomes in a randomized controlled setting. This study demonstrates widespread dissemination of ERAS principles within a gynecological unit despite initial implementation in only a select group of patients. This reflects a real world example of protocol creep and demonstrates a pragmatic approach to ERAS adoption.

Acknowledgement

The authors would like to acknowledge the invaluable work of A/Prof Alison Brand in the study design, planning and manuscript preparation, and most importantly for initiating ERAS in our department. The authors also acknowledge the contribution of Annie Stenlake and Dr Lucy Bates.

References

1. Carter J, Szabo R, Sim WW, Pather S, Philp S, Nattress K, et al. Fast track surgery: A clinical audit. Aust N Z J Obstet Gynaecol. 2010;50(2):159-63.
2. Myriokefalitaki E, Smith M, Ahmed AS. Implementation of Enhanced Recovery After Surgery (ERAS) in gynecological oncology. Arch Gynecol Obstet. 2016;294(1):137-43.
3. Sidhu V, Lancaster L, Elliott D, Brand AH. Implementation and audit of 'Fast-Tract Surgery' in gynecological oncology surgery. Aust N Z J Obstet Gynaecol. 2012;52(4):371-6.
4. Wodlin NB, Nilsson L. The development of fast-track principles in gynecological surgery. Acta Obstet Gynecol Scand. 2013;92(1):17-27.
5. Rhou Y, Pather S, Loadsman JA, Campbell N, Philp S, Carte J. Direct hospital costs of total laparoscopic hysterectomy compared with fast track open hysterectomy at a tertiary hospital: A retrospective case-controlled study. Aust N Z J Obstet Gynaecol. 2015;55(6):584-7.
6. Nelson G, Altman AD, Nick A, Meyer LA, Ramirez PT, Achtari C, et al. Guidelines for postoperative care in gynecologic/oncology surgery: Enhanced Recovery after Surgery (ERAS®) Society recommendations -- Part II. Gynecol Oncol. 2016;140(2):323-32.
7. Modesitt SC, Sarosiek BM, Trowbridge ER, Redick DL, Shah PM, Thiele RH, et al. Enhanced recovery implementation in major gynecologic surgeries: Effect of care standardization. Obstet Gynecol. 2016;128(3):457-66.
8. Chase DM, Lopez S, Nguyen C, Pugmire GA, Monk BJ. A clinical pathway for postoperative management and early discharge: Does it work in gynecologic oncology? Am J Obstet Gynecol. 2008;199(5):541.e1-7.
9. Muller C, Kehlet H, Friland SG, Schouenborg LO, Lund C, Ottesen B. Fast track hysterectomy. Eur J Obstet Gynecol Reprod Biol. 2001;98(1):18-22.
10. Dickson EL, Stockwell E, Geller MA, Vogel RI, Mullany SA, Ghebre R, et al. Enhanced recovery program and length of stay after laparotomy on a gynecologic oncology service. A randomized controlled trial. Obstet Gynecol. 2017;129(2):355-62.
11. Canberra: Australian Institute of Health and Welfare; 2018.
12. Korsholm M, Mogensen O, Jeppesen MM, Lysdal VK, Traen K, Jensen PT. Systematic review of same-day discharge after minimally invasive hysterectomy. Int J Gynaecol Obstet. 2017;136(2):128-37.
13. Moawad G, Tyan P, Corpodean F, Robinson J. Ethical considerations arising from surgeon caseload volume in benign gynecologic surgery. J Minim Invasive Gynecol. 2018;25(5):749-51.
14. Boland GW, Duszak R, Kalra M. Protocol design and optimization. J Am Coll Radiol. 2014;11(5):440-1.
15. Sachs PB, Hunt K, Mansoubi F, Borgstede J. CT and MR protocol standardization across a large health system: Providing a consistent radiologist, patient and referring provider experience. J Digit Imaging. 2017;30(1):11-6.
16. de Groot J, van Es LE, Maessen J. Diffusion of enhanced recovery principles in gynecologic oncology surgery: Is active implementation still necessary? Gynecol Oncol. 2014;134(3):570-5.
17. Lindemann K, Kok P, Stockler M, Jaaback K, Brand A. Enhanced recovery after surgery for advanced ovarian cancer: A systematic review of interventions trialed. Int J Gynecol Cancer. 2017;27(6):1274-82.
18. Carli F. Physiologic considerations of Enhanced Recovery after Surgery (ERAS) programs: Implications of the stress response. Can J Anaesth. 2015;62(2):110-9.
19. Hausel J, Nygren J, Thorell A, Lagerkranser M, Ljungqvist O. Randomized clinical trial of the effects of oral preoperative carbohydrates on postoperative nausea and vomiting after laparoscopic cholecystectomy. Br J Surg. 2005;92(4):415-21.
20. Smith MD, McCall J, Plank L, Herbison GP, Soop M, Nygren J. Preoperative carbohydrate treatment for enhancing recovery after elective surgery. Cochrane Database Syst Rev. 2014;8:CD009161.
21. Lindemann K, Kok P, Stockler M, Sykes P, Brand A. Enhanced recovery after surgery for suspected ovarian malignancy: A survey of perioperative practice among gynecologic oncologists in Australia and New Zealand to inform a clinical trial. Int J Gynecol Cancer. 2017;27(5):1046-50.
22. Altman AD, Nelson GS, Society of Gynecologic Oncology of Canada Annual General Meeting, Continuing Professional Development, and Communities of Practice Education Committees. The Canadian gynecologic oncology perioperative management survey: Baseline practice prior to implementation of Enhanced Recovery after Surgery (ERAS) Society guidelines. J Obstet Gynaecol Can. 2016;38(12):1105-9.