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Agreements on perceived use of principles for Enhanced Recovery After Surgery between patients and nursing staff in a Gynecological ward

by

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Abstract

Agreements on perceived use of principles for Enhanced Recovery After Surgery between patients and nursing staff in a gynecological ward

By Evelina Wickenbergh, BMSci, Lena Nilsson, MD, PhD, Marie Bladh, statistician, Ph D, Preben Kjölhede, MD, PhD, Ninnie Borendal Wodlin, MD, PhD

Objectives

The aim of the study was to evaluate the agreements between patients and nursing staff in perceived use of the principles of Enhanced Recovery After Surgery (ERAS) in a gynecological ward, both prior to and following an educational session on ERAS guidelines for the nursing staff.

Study design

This was a prospective observational study conducted in the in-patient gynecological section of the Department of Obstetrics and Gynecology at the University hospital of Linköping during spring 2017. The study groups comprised women scheduled for elective in-patient gynecological surgery due to benign or malignant diseases and the nursing staff at the gynecological ward. The study was performed in three parts with two structured questionnaire interviews of patients and nursing staff, and an intermediate educational session for the nursing staff regarding ERAS principles, conducted between the parts of the interview. Seventy-two patients were included in Interview part 1 and 68 patients in Interview part 2. The results are shown as the degree of inter-rater agreement and reliability of the responses between patients and nursing staff in numbers and percentages, along with the difference (Δ) in agreement between the interview parts, and its corresponding 95% confidence interval (CI). In addition, Cohen's kappa was used to validate the findings.

Results

Inter-rater agreement in answers to the interview questions was high even before the educational session. The observed agreement was $\geq 70\%$ in 34 out of 42 questions in Interview part 1, and in 38 out of 42 questions in Interview part 2. Thirty of the 42 items (71%) had positive Δ agreement (%) whereas 12 of the 42 (29%) had negative Δ agreement (%).

Conclusions

This study showed high inter-rater agreement in perceived adherence to ERAS principles between patients and nursing staff in a gynecological ward. This was further improved by an educational session for the staff concerning ERAS guidelines. This might indicate the importance of repeated educational sessions to maintain high compliance with ERAS principles.

Keywords: Enhanced Recovery After Surgery (ERAS), gynecological surgery, educational session, inter-rater agreements

Abbreviations: CI, confidence interval; ERAS, enhanced recovery after surgery

Introduction

The multimodal concept of Enhanced Recovery After Surgery (ERAS) was introduced to improve postoperative recovery, and has proven beneficial both for the patient and the health care system. ERAS principles have been well described and include specifically pre-, intra-, and postoperative guidelines, intended to ensure realistic preoperative expectations and to optimize the patient physically as well as psychologically throughout the perioperative period [1-4].

Basically, ERAS is intended to minimize surgical stress, thereby reducing the physiological response. This strategy has been proven to reduce postoperative complications, enhance patient's well-being, shorten recovery time and decrease mortality [5-8].

Even though benefits of using ERAS principles have been well described, compliance with ERAS protocols varies greatly in clinical practice [9,10]. Implementation of ERAS programs requires the collaboration of all members of the perioperative team, including the patient, to be successful [1]. Studies have pointed out that the lowest adherence to ERAS principles postoperatively occurs in the ward. This issue concerns especially delayed stop of intravenous fluid, start of oral nutrition, ambulation, and weight control [9,10]. Thus, the nursing staff is crucial to adoption, dissemination and maintenance of an ERAS program [11-13]. The ERAS approach has been used at the Department of Obstetrics and Gynecology of Linköping University Hospital, Sweden for more than a decade, but no quality audit has been carried out in regard to compliance.

The primary aim of this study was to evaluate the agreements between patients and the nursing staff on how well they perceived that ERAS principles were applied in the gynecological ward. The secondary aim was to assess the impact of an educational session for

the nursing staff about ERAS guidelines on the agreements between patients and the staff in perceived use of principles of ERAS.

Material and methods

A prospective observational study was conducted in the in-patient gynecological section of the Department of Obstetrics and Gynecology at the University Hospital of Linköping.

Women, aged 18 years or older, who were scheduled for elective in-patient gynecological surgery during the spring of 2017, were eligible for the study. Proficiency in Swedish was required to qualify for participation in the study. Exclusion criteria were severe psychiatric and/or mental disorders, or physical disability that would be anticipated to obstruct early ambulation postoperatively. All eligible women were informed verbally about the study by the first author (EW) and those who agreed to participate gave verbal informed consent. The study group also included the nursing staff at the ward.

The study was conducted in three parts with two structured questionnaire interviews of patients and nursing staff, and an intermediate educational session for the nursing staff conducted between the interview parts. Interview part 1 was carried out between January 30th and March 10th 2017 and Interview part 2 between April 10th and May 15th 2017.

Organization of the gynecological ward and the nursing staff

The Department of Obstetrics and Gynecology is a primary and tertiary referral hospital for benign and malignant gynecological diseases. The gynecological ward has room for 17 in-hospital patients. Two nurses and two assistant nurses, divided into two teams, are on duty during each shift of the day. One nurse and one assistant nurse always care for the same patients during their shift and preferably during the patients' whole stay in hospital.

Interview parts

The questionnaire was designed with structured items about content of ERAS and used during the interviews, with the same questions for both patient and nursing staff responsible for patient. It addressed 44 issues, 42 joint and two for nursing staff only, covering various elements of the ERAS program (Table 1). The answers were fixed options: Yes (Y), No (N)

and Unknown (U). The first author (EW) performed all interviews with the patients and nursing staff. The questions were asked (and when necessary explained by the interviewer) on three occasions in the ward; at the preoperative visit, postoperatively on the day of surgery, and on the day after surgery (postoperative day 1). The number of postoperative days was restricted to postoperative day 1 only, since the number of participants remaining in the hospital fell sharply after this day.

The interviewer wrote the respondent's answer on the form. The interviews with the patient and nursing staff were conducted on separate occasions in random order. All interviewees were blinded to the responses of the others. The patients were interviewed in private and the nursing staff was interviewed in the ward office. In the staff, the nurse was interviewed first-hand and if she was unsure about the answer, the assistant nurse was interviewed, so the answer "Unknown" from the personnel was applied only when neither of these two could give an answer. Some questions during postoperative day 1 were excluded for some patients if the items were not applicable. For instance, not all patients received a urinary catheter during surgery, thus they could not "still have a urinary catheter" postoperatively, and not all patients stayed in the ward to be mobilized after lunch.

Educational part

The aim of the educational part was to teach and remind nurses and assistant nurses at the ward about ERAS guidelines in regard to surgical pathophysiology and how to apply the principles in everyday practice. A one-hour educational lecture was given for all the nursing staff in the ward by the first author (EW) on weekdays within a two-week period, a total of 10 hours education. To improve patient information and promote their motivation, special emphasis was placed on the importance of patient communication and explanation regarding ERAS principles.

Statistics

The inter-rater agreement and reliability of responses between the patient and the personnel was primarily quantified by the observed agreement and the differences (Δ) in percentage agreement between the two periods. A positive Δ agreement expresses an improved inter-rater agreement in Interview part 2. The results are presented as the observed agreement at each interview in numbers and percentages, along with the Δ agreement and its corresponding 95% confidence interval (CI). In addition to the observed agreement, Cohen's kappa was used to validate the findings using observed agreement and Δ agreement. The kappa value ranges from -1 to 1, where 0 indicates the agreement that can be expected by chance alone. The calculations were conducted online (GraphPad Software, San Diego CA 92108), [14], using 3x3 contingency tables. As for the Δ agreement, Cohen's kappa value was presented as a point estimate along with the corresponding 95% confidence interval.

In some questions, the kappa value was zero or could not be calculated, even though the observed agreement was high (questions no. 3-5 in Interview part 2, and questions no. 8 and 19 in Interview part 1 and Interview part 2). Instead, a binomial test was used to compare these specific questions in Interview part 1 and Interview part 2, to determine whether the observed agreement was higher than the agreement suspected by chance [15].

Some questions were constructed to be responded to by the personnel only. For these questions non-parametric tests (χ^2 for trends ($df = 2$), Pearson χ^2 ($df = 1$)) or Fisher's exact test were used to evaluate the comparison between groups. The level of significance was set at 5%.

The study was approved by the Regional Ethics Board of Linköping University (Dnr 2017/162-31).

Results

The flowchart of the study population is presented in Figure 1. Seventy-two patients with a median age of 58 years (range 24-87 years) were included in Interview part 1; 30 patients (42%) had surgery due to benign diseases and 42 (58%) for malignant diseases. Sixty-eight patients were included in Interview part 2. The median age in this group was 60 years (range 23-89 years); 18 (26%) had surgery for benign diseases and 50 (74%) for malign diseases.

The cross tables of responses to the items in Table 1 are shown in Table S1 for Interview part 1 and in Table S2 for Interview part 2. Overall, the inter-rater agreements in answers to the interview questions were high even before the educational episode (Table 2). The observed agreement was $\geq 70\%$ in 34 and 38 questions out of the 42 joint issues in Interview parts 1 and 2, respectively, with the lowest being 55 % in Interview part 1 and 54% in Interview part 2. Thirty of the 42 items (71%) had positive Δ agreement (%) whereas 12 of the 42 (29%) had negative Δ agreement (%). In particular, the agreement improved $\geq 10\%$ in the items concerning preoperative nutrition evaluation, eating and drinking postoperatively, and use of mode of analgesia intra- and post-operatively. In contrast, the agreements on drinking two glasses of sweet drink two hours prior to the operation and referral to a welfare officer were lower by 10% or more after the educational session.

The Cohen's kappa analysis showed statistically significant differences on the same questions as using the Δ agreement, Figure 2, i.e. confirming the findings found using the Δ agreement. Table 3 shows the comparison of the personnel's responses in Interview parts 1 and 2 concerning questions only applicable to them. Following the educational episode, there was a significant improvement concerning the accomplishment of the action asked for in question 23.

Table 4 shows the binomial tests for questions with inconclusive kappa, even though the observed agreements were high.

Discussion

This study showed high inter-rater agreements between patients and nursing staff in a gynecological ward concerning perceived use of ERAS principles. An educational session for the personnel further improved the inter-rater agreements.

A strength of this study was that a single interviewer strictly adhering to inclusion and exclusion criteria conducted all interviews and no new personnel were included after the educational episode. This might minimize risk for selection bias. Blinding of the study groups' responses to each other and the limited timeline of the study, 14 weeks for data collection and with 10 one-hour educational sessions in between time for interview parts, were other strengths. This ensured that all interviewed personnel had recently taken part in the ERAS education prior to the second interview and the interviewer had kept the method of asking and explaining the questions in mind. A limitation might be that we did not study the sustained effect of the education.

Both Cohen's kappa and percentage agreement have statistical limitations. The observed agreement does not take agreement by chance into consideration, and kappa makes assumptions about rater independence and is susceptible to certain contingency table imbalances. This statistical phenomenon, paradox of Cohen's kappa, means that the kappa value will be altered when there is a substantial imbalance in the contingency table marginal totals, either vertically or horizontally. This means that in some cases, where there is a very high observed agreement at the same time as several marginal totals equal 0, kappa cannot be correctly calculated. The combination of kappa and percentage agreement has therefore been recommended to assess inter-rater agreement [15,16].

Overall, inter-rater agreements were high in the first interview, indicating that the principles of ERAS were reasonably well adopted in the nursing group. The inter-rater agreements

generally improved after the educational sessions. Since some inter-rater agreements did not increase, it is uncertain to what extent the personnel actually changed their working habits and informed the patients more thoroughly about the importance of the ERAS elements. However, it showed that close monitoring of the guidelines improved agreements about perceived use of ERAS principles, which could be interpreted as better ERAS compliance.

Studies regarding adoption of ERAS in clinical settings concentrate on improving the nursing staff's compliance with ERAS guidelines as a means to improve postoperative outcomes [17,18]. In the present study, the opinions of both patients and nursing staff were essential in describing the perceived use of ERAS principles, as indicators of compliance. Bakker et al. [9], reported in colonic surgery that adherence to the ERAS protocol, described as the percentage of patients in whom the item was implemented successfully, decreased from 73 %, to 63 % between 2006 and 2010. Interventions in the form of educational sessions and stricter guideline control applied in 2011 resulted in an increased guideline adherence to 82% in 2013. They also concluded that benefits associated with using ERAS diminished when adherence declined, further emphasizing the value of continuous personnel education. Since ERAS guidelines had already been implemented in our gynecology ward prior to our study, the goal of our study was initially quite similar to that of Bakker et al. [9]. One important difference was that our study focused on improvement in patient-personnel inter-rater agreements, rather than addressing each item as “compliant” or “not compliant”, and did not compare this relationship with postoperative outcomes. Another difference was that Bakker et al. [9] implemented strict compliance control and case managers to ensure quality when compliance declined. In our study, no additional intervention was made after the educational session. This ensured that the results would probably be based on the educational sessions and not on external factors, such as use of checklists. Implementing a checklist during the

educational session would potentially have altered the personnel's actions throughout Interview part 2, and was therefore intentionally avoided.

Nelson et al. [10] evaluated patient outcomes after implementing ERAS principles in colorectal surgery. They found that the overall adherence to making care principles part of the ERAS concept increased from 39% to 60%, when comparing pre- and post-ERAS patients.

As in the study by Bakker et al. [9], Nelson et al. focused on ERAS guideline item compliance and postoperative outcome, and not patient-personnel communication. In both of these studies [9,10], ERAS compliance was evaluated based on information provided by personnel on whether or not each ERAS item was "compliant" or "not compliant". No patient interviews were conducted in regard to ERAS compliance.

In ERAS programs, the patient should be encouraged to take an active part in her own care, and the nurse should work with the patient to address important issues as well as recovery expectations [12]. A qualitative study, focusing on patient information about following ERAS principles concluded that it was crucial for patients to receive information about why certain actions should be carried out. Furthermore, information must follow the patient throughout the entire care period [19]. Unfortunately, data on patients' experiences of ERAS programs is very limited [20].

Our study focused on the agreements between patient's and personnel's perceptions of use of ERAS guidelines. This is to our knowledge the first published study to describe this issue in a gynecological ward. Although methodological differences exist, the main similarity between the studies previously referred to and ours is the demonstration of increased compliance following personnel education. In our study, this increase also seemed to be reflected in patient's perceptions, suggesting that information about ERAS was provided, as intended, by the personnel to the patient. In addition, we can conclude that the studies referred to mainly

comprised colorectal surgery and that we could not find corresponding studies in gynecological surgery to make comparisons with.

Conclusions

We found high agreements in perceived adherence to ERAS principles between patients and nursing staff in a gynecological department where the approach of ERAS had been implemented. This was further improved by an educational session on ERAS guidelines for the nursing staff. This might indicate the importance of repeated education to maintain high compliance.

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Legends of Figures and Tables

Figure 1. Flowcharts of the study population in Interview part 1 and Interview part 2.

Figure 2. Interview questions and corresponding Cohen's kappa with 95% confidence interval at Interview part 1 and Interview part 2.

Table 1. Interview questions and occasion of questioning.

Table 2. Agreements between the patients and personnel's responses, comparing Interview part 1 and Interview part 2.

Table 3 Comparison of the personnel's responses to questions only applicable to them.

Table 4. Binomial test for questions with inconclusive kappa.

Table S1 (supplementary). Cross tables of responses to the items in Table 1 for Interview part 1.

Table S2 (supplementary). Cross tables of responses to the items in Table 1 for Interview part 2.

Table 1. Interview questions and timing

Question no.	Timing and question	Question no.	Timing and question
	Preoperative visit at the ward		Postoperative day 1 continued
1	The patient has received information by mail concerning planned surgery and ERAS concept	24	The patient 's weight is measured
2	The patient has received information from a physiotherapist	25	The patient still has an indwelling urinary catheter
3	There has been a nutritional evaluation of the patient		<i>Pain management and medication</i>
4	The patient has received education and counseling concerning ERAS, and is well informed about the surgical procedure	26	Received epidural analgesia?
5	There has been a preoperative evaluation by the anesthesiologist	27	Received patient-controlled analgesics intravenously?
6	The patient has received instructions about how to use thrombosis prophylactic injections	28	Received paracetamol?
	Day of surgery	29	Received diclofenac?
7	The patient received thrombosis prophylaxis the evening before surgery	30	Received oxycodone?
8	The patient ate freely until midnight the night before	31	Received other analgesic?
9	The patient drank about 2 glasses of a sweet drink 2 hours prior to the procedure	32	The patient received thrombosis prophylaxis the evening before
10	The patient 's weight was measured		<i>Nutrition</i>
11	Received general anesthesia during surgery	33	The patient is receiving intravenous fluids
12	Received spinal anesthesia during surgery	34	The patient is drinking > 2000 ml
13	Received spinal morphine during surgery		<i>Mobilization</i>
14	Received epidural anesthesia during surgery	35	The patient has received information from a physiotherapist
15	Received local anesthesia during surgery	36	The patient has been mobilized for 2 x 2 hours before lunch
16	There is a risk-classification assessment of the patient in the perioperative journal and noted on the expedition board in the ward office	37	The patient has been mobilized for 2 x 2 hours after lunch
17	The patient has an indwelling urinary catheter	38	The patient has received help with walking
18	The patient can eat freely		<i>Criteria for discharge met?</i>
19	The patient is receiving intravenous fluids	39	The patient tolerates a normal diet
20	The patient is drinking > 1000 ml	40	The patient passes gases and/or feces
21	The patient has been able to sit up (at least once)	41	The patient's pain is well handled with per oral analgesics
22	The patient has been mobilized for 2 hours or more	42	The nurse has discussed discharge with the patient
	Postoperative day 1	43	The doctor has discussed discharge with the patient
23	There is a risk-classification assessment of the patient noted on the expedition board in the ward office	44	The patient has a referral letter and/or an established contact with a welfare officer

Table 2. Agreements between the patients' and personnel's responses, comparing Interview part 1 and Interview part 2.

	Interview part 1		Interview part 2		
Question no.	Number of patients	Agreement no. (%)	Number of patients	Agreement no. (%)	Δ Agreement % (95% CI)
Preoperative visit to the ward					
1	72	68 (94)	68	63 (93)	-1 (-8.23-10.07)
2	72	43 (60)	68	43 (62)	2 (-13.88-17.67)
3	72	56 (78)	68	68 (100)	22 (12.37-32.85)
4	72	69 (96)	68	68 (100)	4 (-1.97-11.32)
5	72	72 (100)	68	67 (99)	-1 (-4.14-7.11)
6	72	65 (90)	68	62 (93)	3 (-6.99-12.93)
Day of surgery					
Prior to surgery					
7	72	54 (75)	68	52 (76)	1 (-13.23-15.03)
8	72	70 (97)	68	65 (96)	-1 (-6.41-8.91)
9	72	65 (90)	68	51 (75)	-15 (-27.49- -2.38)
10	72	62 (86)	68	58 (85)	-1 (-10.85-13.05)
During surgery					
11	72	54 (75)	68	68 (100)	25 (14.91-36.09)
12	72	55 (76)	68	65 (96)	20 (8.67-31.34)
13	72	49 (68)	68	65 (96)	28 (15.73-39.76)
14	72	55 (76)	68	66 (97)	21 (9.95-32.23)
15	72	40 (56)	68	37 (54)	-2 (-14.12-18.00)
After surgery					
16	72	-	68	-	-
17	72	72 (100)	68	67 (99)	-1 (-4.14-7.11)
18	72	45 (63)	68	60 (88)	25 (10.82-37.90)
19	72	69 (96)	68	67 (99)	3 (-3.66-10.37)
20	72	46 (64)	68	52 (76)	12 (-3.21-26.38)
21	72	45 (63)	68	55 (81)	18 (3.07-31.80)
22	72	55 (77)	68	48 (71)	-6 (-20.27- -8.44)

Table 2 continued. Agreements between the patients' and personnel's responses, comparing Interview part 1 and Interview part 2.

Interview part 1			Interview part 2		
Question no.	Number of patients	Agreement no. (%)	Number of patients	Agreement no. (%)	Δ Agreement (%) (95% CI)
Postoperative day 1					
23	62	-	65	-	-
24	62	55 (89)	65	63 (97)	8 (-1.32-18.40)
25	54	51 (94)	59	56 (95)	1 (-7.80-11.21)
Pain management and medication					
26	62	57 (92)	65	64 (98)	6 (-4.66-11.65)
27	62	53 (85)	65	62 (95)	10 (-0.70-21.37)
28	62	57 (92)	65	63 (97)	5 (-3.71-14.70)
29	62	48 (77)	65	49 (75)	-2 (-12.85-16.60)
30	62	49 (79)	65	50 (77)	-2 (-12.47-16.23)
31	62	56 (90)	65	61 (94)	4 (-6.07-14.60)
32	62	55 (89)	65	64 (98)	9 (0.08-19.29)
Nutrition					
33	62	47 (76)	65	48 (74)	-2(-13.02-16.78)
34	62	44 (71)	65	61 (94)	23 (9.97-35.79)
Mobilization					
35	62	52 (84)	65	50 (77)	-7 (-6.98-20.56)
36	62	53 (85)	65	60 (92)	7 (-4.43-18.79)
37	48	41 (85)	47	43 (91)	6 (-7.76-19.74)
38	62	40 (65)	65	56 (86)	21 (6.06-34.99)
Criteria for discharge					
39	62	53 (85)	65	63 (97)	12 (1.91-23.12)
40	62	34 (55)	65	45 (69)	14 (-2.81-29.81)
41	62	54 (87)	65	59 (91)	4 (-7.31-15.62)
42	62	57 (92)	65	64 (98)	6 (-2.2915.58)
43	62	55 (89)	65	64 (98)	9 (0.08-19.29)
44	62	45 (73)	65	36 (55)	-18 (-33.31- -1.29)

Table 3. Comparison of the personnel's responses to questions only applicable to them.

Question no.	Number of patients	Interview part 1 (%)			Number of patients	Interview part 2 (%)			<i>P</i>
		Y	N	U		Y	N	U	
Day of surgery									
16	72	51 (71)	16 (22)	5 (7)	68	54 (79)	14 (21)	0	0.08*
Postoperative day 1									
23	62	38 (61)	24 (39)	0	65	52 (80)	13 (20)	0	0.02#

Y= yes, N = no, U = unknown

* Chi² for trends (df = 2). # Pearson Chi² (df = 1).

Table 4. Binomial test for questions with inconclusive kappa.

		Interview part 1				Interview part 2				
Q	N	Observed agreement no.	Expected agreement no.	Assumed <i>p</i> -value	Observed <i>p</i> -value	N	Observed agreement no.	Expected agreement no.	Assumed <i>p</i> -value	Observed <i>p</i> -value
Preoperative visit to the ward										
3	72	56	36	0.50	0.78	68	68	34	0.50	1.00
4	72	69	36	0.50	0.96	68	68	34	0.50	1.00
5	72	72	36	0.50	1.00	68	67	34	0.50	0.99
Day of surgery										
8	72	70	36	0.50	0.97	68	65	34	0.50	0.96
19	72	69	36	0.50	0.96	68	67	34	0.50	0.99

Q = question number, N = number of patients.

Figure 1.

Figure 2. Interview questions and corresponding Cohen's kappa with 95% confidence interval at Interview part 1 and Interview part 2. Only the joint questions and those questions where Cohen's kappa could be calculated on both occasions are shown.