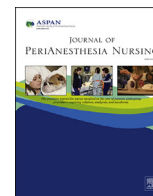




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Research

Patients' Experiences of Pain and Postoperative Nausea and Vomiting in the Early Postoperative Period After an Elective Knee Arthroplasty

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A B S T R A C T

Keywords:

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pain
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sex**Purpose:** The aim of this study is to explore patients' experience of pain and postoperative nausea and vomiting (PONV) in the early postoperative period after knee arthroplasties.**Design:** This is a retrospective cohort study with a quantitative approach. Data from patients registered in the Swedish Perioperative Registry were used. We used the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies.**Methods:** Data were collected from patients ($N = 439$) undergoing knee arthroplasties. The analysis was performed with descriptive and analytic statistics.**Findings:** The findings indicate that women experienced significantly higher levels of pain than men and suffered significantly more often from PONV. However, the relationship of postoperative pain and PONV was not significant. There was also no significance for the relationship among postoperative pain, PONV, and age.**Conclusions:** Care needs to be sensitive to differences in experiencing pain and PONV depending on sex or gender bias, with a goal of increasing the equality in care.

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Knee arthroplasty (KA) is a common surgical procedure and normally generates a high level of postoperative pain.^{1,2} Patients undergoing surgical procedures have described a great fear of experiencing postoperative pain^{3,4} as well as postoperative nausea and vomiting (PONV).⁵ Their fear is not unreasonable: despite improved methods for surgery and strategies for analgesia, pain and PONV still pose substantial problems in the early postoperative period.⁶ Previous research in various surgical areas^{6–9} reveal that women generally experience higher levels of postoperative pain than men, which needs attention in the endeavor to reach equality. Management of postoperative pain remains a challenging issue,¹ and patients' experience of pain and PONV in the early postoperative period after elective KAs warrants further studies, with a focus on sex-related differences, when the evidence is unclear regarding this topic.^{1,10}

Background

Osteoarthritis of the knee is a common problem and affects approximately one-third of people older than 65 years.¹¹ Osteoarthritis of the knee causes major suffering for the individual, including pain, reduced mobility, and decreased quality of life. Women are affected by this morbidity more often than men,^{11,12} and osteoarthritis of the knee also affects women and men in different ways. Women exhibit more advanced stages of osteoarthritis and report a higher level of pain and invalidity than men.¹¹ The differences between women and men depend on interacting issues, such as anatomic and hormonal factors. Patients at a more advanced stage of osteoarthritis, who experience pain or exhibit a low functional capacity, may be considered for surgical intervention.^{11,13} In Sweden during 2017, 13,492 KAs were performed on patients aged 20 to 85+ years. The average age at the time of the KA was 68.9 years, and the gender distribution was skewed, as more women underwent KA (56% women vs 44% men).¹⁴

In this study, the early postoperative period included patients staying in a postanesthesia care unit (PACU), which is a part of the

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intensive care unit in Sweden. Intensive care nurses (ICNs) cared for the patients and registered the patients' reports of their level of pain and the prevalence of PONV during their stay at the PACU. Before surgery, patients in one study³ had the opportunity to rank the problems that they feared most postoperatively, and postoperative pain was highest ranked, followed by PONV. There were no differences of these rankings depending on sex.³ Some factors influencing the level of postoperative pain experienced in general were revealed to be type of surgery, age, catastrophizing, depression, psychological vulnerability, existing pain before surgery, experimental pain sensitivity,⁶ and the sex of the patients, with women reporting more pain than men.⁶⁻⁹ Assessment and management of postoperative pain is not an easy task because the experience of pain is complex and subjective.¹⁵ Inadequate management of pain may lead to physical and psychological consequences, such as a higher risk for postoperative complications with an extended stay at hospital as a consequence.^{15,16} The opportunity for good management of postoperative pain increases throughout administration of spinal or epidural analgesia, usually with a combination of opioids and anesthetic.¹⁷

In a meta-analysis, Hu et al¹ compared strategies for management of pain after KA. The researchers found that local infiltration analgesia, which includes an intraoperative systemic administration of local anesthetic in the tissues for the surgical procedure, provides better management of postoperative pain than regional anesthesia techniques. However, patients who undergo KA often experience severe pain postoperatively. Management of postoperative pain is critical to a patient's rehabilitation after KA.^{1,2,18} The conclusions of one review¹⁰ indicated sex-related differences regarding the experience of pain after KA, with women suffering more pain than men, a factor that warrants further study.

PONV is a common experience among surgical patients at PACUs, and approximately 30% are affected. Although patients suffer from PONV for a limited time, the risks for complications, such as pneumonia and dehydration, are increased.¹⁹ PONV has also been found to extend the recovery after surgery.²⁰ Some factors that have been shown to affect the prevalence of PONV are age, health status before surgery, anxiety, body mass index (BMI), type of anesthesia and analgesia,²¹ type of surgery, length of surgery,^{21,22} and the sex of the patients.^{20,21} Studies^{20,22} have indicated significant differences between women and men regarding the prevalence of PONV. Women are overrepresented and have been reported to suffer two to three times more often from PONV than men, and women also report higher degrees of PONV. After a KA, the incidence of PONV has been revealed to be lower among patients who have received local infiltration analgesia. However, no significant differences in PONV between men and women were indicated.¹ The research regarding differences in PONV depending on sex after KAs is scarce and needs to be further investigated.

Our review of the literature shows that patients who undergo surgery mainly fear the experience of postoperative pain and PONV. In spite of improved methods to prevent and relieve these problems, postoperative pain and PONV are still commonly experienced at PACUs. Through adequate management of pain and PONV, an enhanced postoperative recovery may be possible. KA is a common type of surgery generating a high degree of postoperative pain, and the evidence is unclear regarding this topic. Therefore, patients' experience of pain and PONV in the early postoperative period after KAs needs to be further investigated, particularly to answer the question "Is there a difference depending on sex?"

Aim

The aim of this study was to explore patients' experience of pain and PONV in the early postoperative period after KAs.

Research Questions

- Are distribution of age, BMI, American Society of Anesthesiologists (ASA) classification, smoking, length of the surgery, type of anesthesia, type of analgesia, regional blockades, pain, and PONV associated with sex?
- Are there differences in the level of experienced postoperative pain and in the prevalence of PONV depending on sex?
- Is there a relationship between the experienced level of postoperative pain and the prevalence of PONV?
- Are there differences in the level of experienced postoperative pain and in the prevalence of PONV depending on age?

Methods

Design

This is a retrospective cohort study with a quantitative approach. We used the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cohort studies. Data from patients registered in the Swedish Perioperative Registry (SPOR) were used. The SPOR is a national quality register intended to develop quality of care.

Context

All hospitals ($N = 3$) performing elective KAs in a region in northern Sweden were included in this study. The three hospitals have similar procedures regarding the management of elective KA. According to statistics from the Swedish Knee Arthroplasty Registry,¹⁴ the differences between the hospitals regarding methods of anesthesia are negligible.

Sample

The present study includes data from all patients ($N = 439$) registered in the SPOR who fulfill the criteria of inclusion. These criteria of inclusion were patients 18 years and older who had undergone a primary elective KA at one of the three selected hospitals during 2018, with postoperative care at the PACU. The patients were informed of the study in connection with their surgery and accepted that data from their journals were registered in the SPOR and that data may be used for quality improvement and research.

Data Collection

The collection of data was performed through extraction of data from the SPOR. The data extracted from the SPOR included sex, age, type of surgery, type of anesthesia, type of analgesia, regional blockade, BMI, smoking, ASA classification, and length of the surgery. The outcome variables extracted included the level of pain experienced within 1 hour postoperatively after arrival at the PACU, highest level of pain experienced during the stay at the PACU, the level of pain experienced at discharge from the PACU, and the prevalence of PONV. The patients rated their experience of pain through the 11-point (0-10) Numerical Rating Scale (NRS). The prevalence of PONV during the stay at the PACU was rated with a nominal two-point scale, because of whether it occurred or not (yes/no).

Ethical Considerations

This study aims to increase the knowledge of patients' experience of pain and PONV after a KA. The local ethics board at Luleå

Table 1
Characteristics of Participants Differentiated by Sex

Characteristics	Women (n = 247)	Men (n = 192)	P	Total Sample (N = 439)
Sex, n (%)				
Women/men	247 (56.3)	192 (43.7)		439 (100)
Age (y)			.29*	
M (SD)	69.7 (8.9)	68.8 (8.7)		69.3 (8.8)
Minimum-maximum	44-88	41-89		41-89
Distribution by age group, n (%)			.94†	
40-69 y	117 (47.4)	92 (47.9)		209 (47.6)
70-89 y	130 (52.6)	100 (52.1)		230 (52.4)
BMI			.82*	
M (SD)	29.5 (4.7)	29.6 (4.4)		29.5 (4.5)
Minimum-maximum	17-42	18-48		17-48
Smoking, n (%)			.99†	
Yes	9 (3.7)	7 (3.7)		16 (3.7)
No	237 (96.3)	183 (96.3)		420 (96.3)
ASA classification, n (%)			.65†	
ASA class 1 and 2	196 (79.2)	149 (77.6)		345 (78.6)
ASA class 3 and 4	51 (20.8)	43 (22.4)		94 (21.4)
Length of surgery (h)			<.01*	
M (SD)	1.29 (0.4)	1.43 (0.5)		1.35 (0.4)
Minimum-maximum	0.7-2.8	0.8-3.4		0.4-3.3
General anesthesia, n (%)			<.01†	
Yes	116 (47.3)	62 (33.3)		178 (41.3)
No	129 (52.7)	124 (66.7)		253 (58.7)
Regional anesthesia, n (%)			.39†	
Yes	233 (95.1)	180 (96.8)		413 (95.8)
No	12 (4.9)	6 (3.2)		18 (4.2)

M, mean; BMI, body mass index; ASA, American Society of Anesthesiologists. Internal loss is less than 1%.

Presented as numbers (n) and proportions (%) for categorical variables and mean (M) and SD for numerical variables.

* t Tests were performed, and a P value of less than .05 was used to denote statistical significances. Significant values are marked in bold.

† χ^2 tests were performed, and a P value of less than .05 was used to denote statistical significances. Significant values are marked in bold.

University of Technology ethically reviewed and approved the study. The heads of the selected hospitals were contacted and gave their permission for the performance of the study. In connection with the surgery, patients received written information and gave permission for their journal data to be registered in the SPOR and that these data may be used for improvement and research. A person with authorized login extracted the data from the SPOR. Personal data, such as name and social security number, remained hidden and coded to protect the patients' privacy. The coded data were then stored in a locked space, and only the authors had access to these data.

Data Analysis

The analysis of the data was performed with support of a statistician. Descriptive statistics were performed in Microsoft Excel 2016, and categorical variables were presented as frequencies and proportions. The 11-point NRS (0 to 10) was dichotomized to a nominal two-point scale, acceptable pain (0 to 4), and unacceptable pain (5 to 10). The ASA classification scale was dichotomized to a nominal two-point scale (ASA 1 to 2 and ASA 3 to 4). To denote significances, statistical analysis was performed in OpenEpi (openepi.com). The analysis of the significances of nominal data was performed using Pearson χ^2 test, and Fisher exact test was used when the cells had expected counts of less than five. The analysis of the significances of numerical data was performed using t tests. A P value of less than .05 was used to denote statistical significances.

Findings

As shown in Table 1, data from a total of 439 patients were analyzed. The distribution related to sex was slightly skewed (women, 56.26% and men, 43.74%).

Table 1 shows that the sample in most respects was homogeneous with similar characteristics for women and men. The average

ages were relatively equal, and the average BMI figures were similar. Most of the sample (N = 439) were relatively healthy, classified as ASA 1 to 2 (78.59%), and no sex-related significance was indicated regarding ASA (P = .65). However, women had significantly shorter lengths of surgery on average than men (P < .001). Moreover, a significantly higher proportion of the women received general anesthesia during surgery, compared with the men (P = .0010). In the total sample, 95.82% received regional anesthesia in the form of spinal or epidural during surgery. There were no significant differences related to sex regarding the prevalence of regional anesthesia (P = .39).

Table 2 shows a more detailed specification of the type of anesthesia administered. Most of the sample received an intermittent spinal anesthesia without a catheter (92.58%).

Table 2
Specified Distribution Divided by Sex Regarding Type of General Anesthesia and Type of Regional Anesthesia, Presented as Numbers (n and N) and Proportions (%)

Characteristic	Women (n = 246)	Men (n = 186)	Total Sample (N = 431)
Type of general anesthesia, n (%)			
Inhalation anesthesia	9 (3.7)	4 (2.2)	13 (3.0)
Intravenous anesthesia	62 (25.3)	28 (15.0)	90 (20.9)
Anesthesia of mucosa (nasal inhalation of sedating drugs)	45 (18.3)	30 (16.1)	75 (17.4)
No anesthesia	129 (52.7)	124 (66.7)	253 (58.7)
Type of regional anesthesia, n (%)			
Spinal anesthesia, no catheter	226 (92.2)	173 (93.0)	399 (92.6)
Spinal anesthesia, no catheter + lumbar epidural anesthesia with catheter	2 (0.9)	5 (2.7)	7 (1.6)
Lumbar epidural anesthesia with catheter	0 (0.0)	1 (0.5)	1 (0.2)
Spinal anesthesia (unknown)	5 (2.0)	1 (0.5)	6 (1.4)
No regional anesthesia	12 (4.9)	6 (3.2)	18 (4.2)

Internal loss is less than 1%.

Table 3
Rated Level of Experience of Postoperative Pain and Prevalence of PONV Divided by Sex

Pain and PONV	Women (n = 247)	Men (n = 192)	P	Total Sample (N = 439)
Pain within 1 h			.06	
NRS 0 to 4, n (%)	245 (99.2)	191 (99.5)		436 (99.3)
NRS 5 to 10, n (%)	2 (0.8)	1 (0.5)		3 (0.7)
M (SD)	0.1 (0.7)	0.0 (0.4)		0.1 (0.6)
NRS minimum/maximum	0/6	0/5		0/6
Highest rated pain at PACU			.05	
NRS 0 to 4, n (%)	187 (76.3)	160 (84.2)		347 (79.8)
NRS 5 to 10, n (%)	58 (23.7)	30 (15.8)		88 (20.2)
M (SD)	1.8 (2.9)	1.3 (2.3)		1.6 (2.7)
NRS minimum/maximum	0/10	0/8		0/10
Pain at discharge from PACU			.11	
NRS 0 to 4, n (%)	240 (98.0)	188 (99.0)		428 (98.4)
NRS 5 to 10, n (%)	5 (2.0)	2 (1.0)		7 (1.6)
M (SD)	0.8 (1.4)	0.6 (1.2)		0.7 (1.3)
NRS minimum/maximum	0/6	0/7		0/7
Prevalence of PONV at PACU, n (%)			.03	
Yes	22 (8.9)	7 (3.7)		29 (6.7)
No	224 (91.2)	183 (96.3)		407 (93.3)

PONV, postoperative nausea and vomiting; NRS, Numerical Rating Scale; M, mean; PACU, postanesthesia care unit. Internal loss is less than 1%.

Presented as numbers (n) and proportions (%) for categorical variables, and mean (M) and SD for numerical variables. χ^2 tests were performed. A P value of less than .05 was used to denote statistical significance. Significant values are marked in bold.

As Table 3 shows, there were sex-related differences in the postoperative pain experienced and the prevalence of PONV. Women generally indicated a higher level of postoperative pain (NRS 5 to 10) during their stay at the PACU. The experience of pain within 1 hour postoperatively after arrival at the PACU differed proportionally, and women reported a higher level of pain than men did, which was nearly significant ($P = .06$). However, a significant difference depending on sex was shown between the two regarding the highest level of postoperative pain experienced during the stay at PACU, with a higher proportion of women reporting NRS 5 to 10 ($P = .05$). PONV occurred at a significantly higher level among women compared with men ($P = .03$).

Table 4 shows the relation between the highest level of postoperative pain experienced during the stay at PACU and the prevalence of PONV. No significant differences were detected within the total sample ($P = .95$), group of women ($P = .53$), or group of men ($P = .34$). However, the proportions indicated that within the group of women, the prevalence of PONV was higher among those who reported lower levels of pain, NRS 0 to 4 (NRS 0 to 4, 9.63% vs NRS 5 to 10, 6.90%). The reverse pattern was indicated within the group of men, where the prevalence of PONV was higher for those who reported higher levels of pain, NRS 5 to 10 (NRS 5 to 10, 6.67% vs NRS 0 to 4; 3.13%).

As Table 5 shows, no significant differences emerged regarding postoperative pain and PONV depending on age. The proportions indicated a somewhat higher level of postoperative pain in the younger group (40 to 69 years) at all three measures. Regarding PONV, although nonsignificant, the situation was reversed, and the older group (70 to 89 years) reported PONV to a greater extent (8.30%) than the younger group (4.83%).

Discussion

This study aimed to explore patients' experience of pain and PONV in the early postoperative period after an elective KA. The study is based on registered data, and all patients ($N = 439$) who had undergone KA at three hospitals in a northern region of Sweden during 2018 were included. From a societal perspective, it is essential to chart differences between women and men, with the future goal to reach better equality. The Swedish government's²³ goal for equal health reveals that individuals, regardless of sex or

gender, will receive equal care and be offered equal conditions for creating good health.

In our study, women were overrepresented, which is similar to the national statistic in the Swedish Knee Arthroplasty Register (women, 56%; men, 44%).¹⁴ Because women constitute most of those undergoing KAs and tend to experience more pain, the cause for these outcomes calls for reflection. In one study, two standardized patients (a woman and a man) with moderate arthritis of the knee were examined by a succession of 67 physicians who were asked to assess the need for KA for them.¹³ The patients were equal in characteristics, except for their sex, which was apparent to the physicians. Of the physicians, 67% recommended KA for the man, but barely 33% of them recommended KA for the woman. In our study, data regarding the patients' functional status are lacking. However, the literature shows that women exhibit a lower functional capacity and a more advanced level of osteoarthritis than men do at the time selected for surgery.^{11,12}

The present study indicates that the groups of women and men were relatively homogeneous with similar characteristics and similar pain management intraoperatively. However, the women reported a significantly higher score regarding the highest level of postoperative pain experienced during their stay at the PACU. This is consistent with previous research in other surgical areas.⁶⁻⁹

Table 4
Relation Between the Highest Level of Pain Experienced at the PACU and the Prevalence of PONV, Presented as Numbers (n) and Proportions (%)

Highest Level of Pain Experienced	PONV	No PONV	P
Total sample, N = 435 (%)			.95
NRS 0 to 4	23 (6.6)	324 (93.4)	
NRS 5 to 10	6 (6.8)	82 (93.2)	
Women, n = 245 (%)			.53
NRS 0 to 4	18 (9.6)	169 (90.4)	
NRS 5 to 10	4 (6.9)	54 (93.1)	
Men, n = 190 (%)			.34
NRS 0 to 4	5 (3.1)	155 (96.9)	
NRS 5 to 10	2 (6.7)	28 (93.3)	

PACU, postanesthesia care unit; PONV, postoperative nausea and vomiting; NRS, Numerical Rating Scale.

Internal loss is less than 1%.

Fisher exact tests were performed on the dichotomized nominal two-point scales. A P value of less than .05 was used to denote statistical significances.

Table 5
Experienced Levels of Pain Reported at the PACU and the Prevalence of PONV Distributed by Age Group

Pain and PONV	40 to 69 y Old (n = 209)	70 to 89 y Old (n = 230)	P
Pain within 1 h			.47
NRS 0 to 4, n (%)	207 (99.0)	229 (99.6)	
NRS 5 to 10, n (%)	2 (1.0)	1 (0.4)	
M (SD)	0.1 (0.6)	0.1 (0.5)	
NRS minimum/maximum	0/5	0/6	
Highest rated pain at PACU			.18
NRS 0 to 4, n (%)	160 (77.7)	187 (81.6)	
NRS 5 to 10, n (%)	46 (22.3)	42 (18.4)	
M (SD)	1.8 (2.8)	1.4 (2.5)	
NRS minimum/maximum	0/10	0/9	
Pain at discharge from PACU			.70
NRS 0 to 4, n (%)	202 (98.0)	226 (98.7)	
NRS 5 to 10, n (%)	4 (2.0)	3 (1.3)	
NRS 5 to 10, n (%)	0.7 (1.4)	0.7 (1.3)	
M (SD)	0/7	0/5	
NRS minimum/maximum			
Prevalence of PONV at PACU, n (%)			.15
Yes	10 (4.8)	19 (8.3)	
No	97 (95.2)	210 (91.7)	

PACU, postanesthesia care unit; PONV, postoperative nausea and vomiting; NRS, Numerical Rating Scale; M, mean.

Internal loss is less than 1%.

Presented as numbers (n) and proportions (%). χ^2 tests were performed. A P value of less than .05 was used to denote statistical significances.

Toomey²⁴ has described that the stereotyped conceptions of women and men in society may contribute to differences in the rating of pain related to sex. Study results propose that the stereotypical woman is allowed to show feelings and verbally express the experience of pain, whereas the stereotypical man is expected to be brave and unaffected and quietly endure even high levels of pain.^{24,25} Consequently, there is in society a preconceived gender bias, where we expect that women will be more sensitive, report more pain, and also be mentally less able to endure pain than men are.^{24,26} However, some studies indicate that women do have a lower physical tolerance for pain than men.^{6,8,24} Cepeda and Carr⁸ have investigated sex-related differences regarding ratings of pain related to morphine dosage after surgery performed under general anesthesia. The women rated higher levels of pain and required 30% more morphine compared with the men to reach a bearable level of pain.

Similar to our study, Pereira and Pogatzki-Zahn⁹ found sex-related differences regarding the experience of postoperative pain after different types of surgeries. They revealed that after orthopaedic surgery, women reported higher levels of pain and experienced pain for a longer period than men did. Our study is based on self-estimations of pain according to NRS, whereas the ICNs verbally asked the patients about their level of pain (0 to 10). However, there is considerable difficulty in rating pain in that there is no evidence for an adequate relationship between different persons when they rate their subjective pain. For example, number seven on an NRS may be perceived completely differently by one patient compared with the same numerical rating perceived by another patient.¹⁵ Pain is also perceived, assessed, and managed differently by staff, depending on the patients' sex, age, and ethnicity.^{15,26} Subsequently, the nurse who is responsible for patients after surgery needs to be aware of differences depending on personality and gender bias or sex to provide good nursing care. Effective management of pain is synonymous with the patients' experience of good quality in postoperative care. Allowing patients—regardless of sex, age, and ethnicity—to suffer

postoperative pain without an adequate plan for management is unethical.²⁷

Our study shows that patients experienced low levels of pain within 1 hour of arriving at the PACU. This is likely because of a high proportion of both the women and men receiving a blockade before their surgery. Both women and men rated substantially higher levels of pain regarding the highest level of postoperative pain experienced during the stay at the PACU, probably because of the blockade waning. More than half of the patients undergoing KA reported experiencing severe pain in the early postoperative period,²⁸ and similar to our study, the indications were that women experienced more pain after KA.²⁸ The risk for persistent long-term pain after KA is considered to be higher for women compared with men, indicating a link to the experience of severe pain before surgery, as well as in the early postoperative period.¹⁰ This indicates that the management of pain needs to be enhanced. According to Rudin et al,¹⁷ pain should be regarded as a vital sign and be treated immediately to increase the patients' well-being and decrease the risk of complications. One review²⁷ shows that the nurses' assessment and management of postoperative pain is often affected by their own personal experience of pain. This may lead to the nurses' underestimating the patients' pain levels, regardless of the patients' sex. To provide good nursing care, a deep understanding of pain is required, including knowledge of the expected levels of pain after specific surgeries. Moreover, an awareness of the subjectivity of the pain for each individual may generate an ability to manage pain without questioning the patient.

The present study reveals a significant difference between women and men regarding the prevalence of PONV. Women exhibited a significantly higher prevalence of PONV than men did. This is in accordance with earlier research demonstrating that women have a greater risk of suffering PONV.^{29,30} Increasing evidence shows that sex affects postoperative outcomes as an independent factor.²⁰ However, although women and men in our study had similar characteristics and had undergone the same type of surgery, men had a significantly lengthier surgery, and a somewhat higher proportion of the women received anesthesia. Research has indicated a strong relationship between PONV in the early postoperative period and general anesthesia.^{21,22} However, the risk decreases considerably if regional anesthesia such as blockades are used. The length and type of surgery also affects the risk for PONV. In our study, both women and men had similar proportions of high BMI, which has been shown to increase the risk for suffering PONV.²¹ An enhanced knowledge of PONV and associated risk factors may contribute to better awareness and prophylactic management of patients who run increased risk of suffering from PONV. This may contribute to the increased safety and well-being of patients in the early postoperative period.

Our study did not indicate any relationship between patients' experience of postoperative pain and the prevalence of PONV. Only a minor proportion of patients reported that they suffered from PONV; therefore, it is difficult to draw conclusions about its relationship with pain. This is in contrast to earlier studies revealing that patients who rated higher levels of pain within 5 hours after surgery also rated a greater prevalence of PONV.^{5,31–33} In our study, different age groups were compared (eg, 40 to 69 vs 70–89 years), and no significant differences emerged regarding the prevalence of PONV. Younger ages have been shown to be predictors of suffering PONV.²⁹ In the Apfel Risk Assessment Scale, which shows the risk of suffering PONV, one of the predicting factors for suffering PONV is age younger than 50 years.³⁰ Thus, the evidence regarding relations between patients' experiences of postoperative pain and the prevalence of PONV is still partially unclear, and more research is warranted.

Methodological Considerations

The present study is based on data from the SPOR, which includes characteristics and preoperative, intraoperative, and postoperative data from patients undergoing different types of surgeries. Using the SPOR register made it possible to collect and analyze a large amount of relevant data on a specific group of patients during a short period. The sampling was limited to include only data from those patients who had undergone a primary KA during 2018 to homogenize the group and use actual data. The internal loss was negligible, in total less than 2.5%. Taken together, the present study may have a good validity and generalizability, measuring relevant data from a specific group because the loss may not have affected the results significantly. Generalizability means that the results should be transferrable to other similar contexts.³⁴ Management of KAs probably differs in different countries, which would suggest that the results may not be widely transferrable. However, the context in our study regarding the management of anesthesia is well described, which means that the reader has the possibility of comparing the procedure in their own setting.

This study has limitations. One limitation is that the scales regarding pain and ASA classification were dichotomized into two-point scales. NRS 0 to 10 was dichotomized to 0 to 4 and 5 to 10, and ASA 1 to 4 was dichotomized to 1 to 2 and 3 to 4. Dichotomizing a scale may lead to a higher risk for misinterpretation of the results because of the fact that nuances may disappear. However, the dichotomizations in our study were performed to accommodate larger groups and to illustratively present the results as proportions. The scale reductions were performed with respect to the clinical view of an acceptable level of pain (NRS <4).^{35,36} However, some of the groups were small and unequal in size, which is a weakness and may cause certain results to be unreliable. The effect from the statistical tests may be insufficient to detect a true significance, type II error.³⁷ Thus, the significances that occurred in the present study are likely true, but some possible significant results may not have occurred.

Clinical implications

The ICNs who are responsible for patients postoperatively need to be aware of differences in the experience of pain and PONV depending on sex or gender bias in order to provide quality nursing care. The ICN should work preventively and support the goal to increase equality in care. Further research is warranted in order to chart gender- and sex-related differences in encountering and management during postoperative care. For instance, patients' experience of pain after KA should be charted in relation to administration of pain relief in order to clarify whether there are differences in the pain management between women and men.

Conclusions

Experiencing postoperative pain and PONV are issues that patients fear before their surgery. The present study indicated significant differences between women and men regarding the highest level of experienced pain and the prevalence of PONV during their stay at the PACU. This pattern occurred although the group of women compared with the group of men were relatively homogeneous regarding age, BMI, smoking, and ASA classification. Women in our study experienced a higher level of pain and had a higher prevalence of PONV than men did, which is similar to earlier research. However, no relationship emerged between the patients' experiences of postoperative pain and the prevalence of PONV. There was no apparent relation connecting postoperative pain, PONV, and age. Research has tried to explain why women

experience more pain after surgery compared with men, but the evidence is still unclear. Women are disadvantaged in research, perhaps depending on the complexity of their problems historically, which have been lower valued, or their concerns have been neglected for other reasons. From a societal perspective, it is essential to chart differences related to sex regarding patients' experience of their care, with the goal to address this and in the future to increase the equality of care.

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