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Predictive Clinical Factors of Pain-Related Quality of Recovery Following Elective Gastrointestinal and Hepato-Pancreato-Biliary Surgery: An Observational Study in Norway

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Purpose: This observational cohort study aimed to identify predictive factors associated with pain-related quality of recovery among patients undergoing elective gastrointestinal and hepato-pancreato-biliary surgery.

Patients and Methods: This study involved a secondary analysis of the data collected from five hospitals across all healthcare regions in Norway to validate the Norwegian version of the Quality of Recovery-15 (QoR-15NO). The sample consisted of 268 adult patients who underwent elective gastrointestinal and hepato-pancreato-biliary surgery between September 2021 and May 2022. Data were collected using QoR-15NO upon admission for surgery and on the first postoperative day, and surgery severity was classified using the Surgical Outcome Risk Tool. A linear mixed model and multivariate linear regression were used to investigate associations between postoperative scores and possible predictive clinically relevant factors.

Results: The results of this study showed that postoperative pain was significantly associated with age, gender, severity of surgery, and changes from pre- to postoperative status. Younger patients, compared to older patients (b=0.23, 95% CI: [0.03, 0.41]), female patients (b=−0.61, 95% CI: [−1.19, −0.04]), patients undergoing minor and intermediate surgeries compared to major surgeries (b=0.96, 95% CI: [0.00, 1.92]) all reported higher levels of postoperative pain. There was a significant decline in QoR post-surgery due to increased pain severity (b=−1.91, 95% CI: [−2.33, −1.50]; p <0.001). No clinically significant associations were found between ASA physical status, surgery duration, and pain-related QoR.

Conclusion: This study identified age, gender, and surgery severity as key predictors of postoperative pain. Younger and female patients and those undergoing minor surgeries are at higher risk for severe postoperative pain. Proactive approaches for minor surgeries and tailored pain management for younger patients and females might enhance recovery and postoperative pain outcomes. Thus, future research should focus on the long-term effects of individualized pain management and additional strategies for high-risk patient groups.

Keywords: gastrointestinal surgery, pain management, postoperative pain, recovery, quality of recovery, surgical outcomes

Introduction

Gastrointestinal (GI) and hepato-pancreato-biliary (HPB) elective surgeries are complex procedures performed to treat conditions affecting the GI system, liver, pancreas, and bile ducts.[1] These conditions include severe diseases such as inflammatory bowel diseases and cancer,[2] which can cause significant pain before surgery and become life-threatening due to complications. These complications often lead to higher mortality rates, extended ICU stays, and reduced quality of recovery (QoR).[1,3]

Recovery after surgery is influenced by various factors, including patient characteristics, type of operation, anesthesia, adverse events, duration of surgery, age, gender, the American Society of Anesthesiologists (ASA) physical status, and

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acute pain.[4–10] Pain is a fundamental component of the postoperative recovery.[9] Studies report that pain is prevalent among post-surgery patients, with more than 70% of surgical patients experiencing moderate to severe pain post-surgery, which affects their QoR.[11–13] A prospective observational study of patients undergoing elective prostatectomy found a strong correlation between postoperative pain severity - both at rest and with activity - and a decrease in patient's QoR in the immediate postoperative period.[14] Another study by Yoon et al reported a significant negative correlation between pain intensity and quality of postoperative recovery at 48 hours postoperatively, highlighting that increased postoperative pain reduces the likelihood of achieving a good or excellent recovery.[5]

Poorly managed postoperative pain is associated with adverse outcomes, including increased morbidity such as cardiovascular and pulmonary complications and cognitive dysfunction, delayed recovery, a higher risk of chronic pain, longer hospital stays, a reduced QoR, and overall quality of life.[5,6,15–22] Additionally, side effects of pain medications can further impact recovery, causing nausea, constipation, respiratory depression, and somnolence.[6,11] It has been acknowledged that improving perioperative pain management leads to shorter ICU stays, decreased opioid use, earlier discharge, and enhanced patient satisfaction.[23] Therefore, it is crucial to adequately assess and manage pain to enable essential activities like mobility and nutrition, thereby reducing complications.[5,6,15–17] However, it has been widely recognized that postoperative pain is often inadequately managed.[24–29]

Over the last decade, studies have identified significant challenges in pain management, including inadequate pain assessment, poor communication with patients, and a lack of individualized approaches due to standardized pain management protocols.[27,30,31] Pain is a personal and subjective experience influenced by biological, social, and psychological such as mood, fear, anxiety, and anticipation, which makes individualized pain management essential.[32,33] Individualized pain management strategies involve tailoring treatment to the patient`s specific needs, pain tolerance, and medical conditions. Recent studies indicate that these strategies enable healthcare providers to optimize clinical outcomes, reduce side effects, prevent the development of chronic pain, and enhance both recovery and patient satisfaction.[16,32,34] This approach minimizes the risks of under or overtreatment, lowers the likelihood of chronic pain, and improves QoR by addressing both the physical and psychological dimensions of pain.

Postoperative recovery involves an initial decline followed by a gradual return to pre-operative function. Measuring recovery has both prognostic and clinical significance, aiding in identifying predictors for increased postoperative pain and enhancing patient satisfaction during the perioperative period. Over the past few decades, there has been a growing focus on patients' perspectives in evaluating their own QoR post-surgery[29,35] using tools such as QoR −15.[7,36] However, limited research has been conducted in Norway on pain-related QoR among patients undergoing GI and HPB surgery.[37] Therefore, this study aims to examine the associations between selected predictive factors such as gender, age, ASA status,[38] postoperative changes, surgery duration and severity, and pain-related QoR in elective GI and HPB surgery patients in Norway.

Materials and Methods

This study is an analysis of secondary data from the validation study of the QoR-15, with detailed data collection methods of the original study provided in the published article.[37]

Study Design

The original study was designed as an observational cohort study, collecting data at two specific time points: before and after surgery.

Sample

The data was collected from five hospitals across all healthcare regions in Norway, including both university and local hospitals, reflective of patients recorded in the Norwegian Registry for GI Surgery (NORGAST), which annually retrieves data on postoperative complications for patients undergoing major GI- and HPB surgeries in Norway.[1,39] The study initially enrolled 324 patients. However, 56 patients who underwent surgery did not complete and return the postoperative questionnaire and were consequently excluded. The sample consisted of 268 patients scheduled for elective GI- and HPB surgeries between September 2021 and May 2022. Eligibility was assessed by study nurses at each hospital,

with inclusion criteria of patients to be 18 years or older and fluent in Norwegian. Exclusion criteria included cognitive impairment, severe mental illnesses, and patient refusal to participate. Due to the COVID-19 pandemic and reduced surgical capacity in Norwegian hospitals, a comprehensive overview of dropouts was unavailable for the inclusion period. Study nurses included all eligible patients on the days they were present despite varying schedules across hospitals, which indirectly minimized selection bias.[37]

Data Collection

Data were collected using the Norwegian version of the QoR-15 (QoR-15NO) questionnaire and the clinical information form developed by the researchers. Upon admission for surgery, eligible patients were provided with a consent form containing written information and instructions regarding the questionnaire. The QoR-15NO was administered by nurses on the first day after surgery, except for one hospital where 37 patients were in the intensive care unit on the first day and received the postoperative questionnaire on the second day after surgery.[37]

Data Collection Tools

QoR −15 Scale

QoR-15 scale is a 15-item questionnaire developed by Stark et al,[9] which has been proven to be a concise and effective tool for assessing the postoperative QoR in adult patients undergoing general anesthesia and surgery.[36] QoR-15 covers five health domains: pain, physical comfort, physical independence, psychological support, and emotional state, and reflects how the patients have been feeling in the last 24 hours. The scale, using an 11-point numeric rating scale, generates a total score ranging from 0 to 150, with recovery levels categorized as follows: excellent (136–150), good (122–135), moderate (90–121), and poor (0–89).[40] The Minimal Clinically Important Difference (MICD) for the total scale scores is determined to be 6.0 by Myles et al.[41]

The estimate of MICD for individual items indicates that a 0.44 points reduction in score would be clinically relevant. Given that the QoR-15 utilizes an 11-point numeric scale where only whole points can be recorded, a one-point reduction has been designated as the MICD for each item.

Clinical Information Form

Clinical information such as gender, age, ASA score, duration, and surgery severity were retrieved from each hospital's patient records. The surgery severity was classified using the Surgical Outcome Risk Tool (SORT), which categorizes procedures into four levels: SORT 1 (least severe) to SORT 4 (most extensive and complex).[42,43] Due to the limited number of patients in ASA IV (0.5%, one patient) and the category of minor severity of surgery (2%, five patients), these categories were combined for the analysis. As a result, ASA III and IV and minor and intermediate surgery severities are presented together in Tables 1–3.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics Version 27.0 software[44] and Stata MP 18 software.[45] This study aimed to include up to five covariates in the regression model, requiring a minimum sample size of 90 patients (10–15 per covariate). With a sample of 268 patients, this study was considered sufficiently powered. The continuous variables, age, and duration of surgery are presented with median and range, while the categorical variables, such as gender, ASA status, and surgery severity, are reported as numbers and frequencies (percentages). Age and duration of surgery are analyzed and presented in units of 10 years and 10 minutes, respectively. A linear mixed model was used to investigate associations between postoperative scores, both for individual items and the total scale score of the QoR-15NO questionnaire and preselected clinical factors. The dependent variable was the postoperative score (continuous variable), and the independent variables included the following clinical characteristics: gender, change in time, age, ASA, duration of surgery, and severity of surgery. Additionally, a multivariate linear regression analysis was performed to investigate the strength of association between the independent variables (gender, age, ASA, duration of surgery, and surgery severity) and the dependent variable, change scores (continuous variable) for individual items and the total scale

Table 1 Patient Characteristics (n = 268)

Male	137 (51%)
Age (years) Median (min, max)	68 (20, 94)
ASA score*	
I	14 (5%)
II	172 (64%)
III and IV	82 (31%)
Duration of surgery (minutes) Median (min, max)	138 (23, 432)
Severity of surgery (according to SORT)**	
Minor and intermediate (1 and 2)	39 (15%)
Major (3)	76 (28%)
Extramajor/complex (4)	153 (57%)

Notes: *ASA score: American Society of Anaesthesiologists Physical Status Classification System.[1] **SORT: Surgical Outcome Risk Tool[2].

score of the QoR-15NO. The change score was computed as the postoperative score subtracted from the pre-operative score, with a larger negative score indicating a greater reduction in QoR.

Sensitivity analysis was conducted due to the variation in the timing of postoperative QoR-15NO administration for 37 patients at one hospital who answered the QoR-15NO questionnaire on the second day after surgery. The MICD for individual items was calculated by assessing the percentage change from the total score based on the MICD set at 6 points.[41] A 6-point reduction of the total score of 150 points represents a 4% change. Then, for each item, a 4% reduction of 11 points would be 0.44. P-values < 0.05 were considered statistically significant and all tests were two-sided. All analyses were considered exploratory, so no corrections were made for multiple testing.

Ethical Considerations

The Regional Committees for Medical and Health Research Ethics in Norway assessed the ethical considerations for this study, which determined that formal ethical approval was not necessary (application number 263327). All patients provided written consent at the initial data collection, and the reuse of data for this study was approved by the Data Protection Officers at Innlandet Hospital Trust.

Results

Patient Characteristics

Table 1 summarizes patient characteristics. The study included 268 patients with a median age of 68 years (min = 20, max = 94), and 51% were male. The majority of the patients (95%) had an ASA level of two or more before surgery, more than half of the patients (57%) underwent extra major/complex surgeries, and 15% had minor or intermediate surgery. The median duration of surgery was 138 minutes (min = 23 minutes, max = 432 min) (Table 1). Pre- and postoperative mean scores for each question in the QoR-15NO questionnaire were presented in the supplementary Table 1.

Associations Between Possible Predictive Factors and Postoperative QoR

The results from a linear mixed model, adjusted for all available variables, are presented in Table 2. A statistically significant association was found between severe postoperative pain and changes in reported pain levels from pre- to postoperative status, as well as with age, gender, and surgery severity. The postoperative measurement indicates a negative association (b=−1.91, 95% CI: [−2.33, −1.50]; p = 0.001), with approximately a 2-point lower score than

Table 2 The Predictive Factors: Gender, Change Post-Surgery, Age, Duration and Severity of Surgery Associated with the Post-Operative Score and Total Scale Score of QoR-15NO*

Item	N	Gender			Change Post-Surgery, Time			Age			Duration of Surgery			Severity of Surgery SORT 3			Severity of Surgery SORT 4		
		Coefficient -b	[95% CI]	*P* - value	Coefficient - b	[95% CI]	*P* - value	Coefficient - b	[95% CI]	*P* - value	Coefficient -b	[95% CI]	*P* - value	Coefficient -b	[95% CI]	*P* - value	Coefficient -b	[95% CI]	*P* - value
1. Able to breathe easy	249	−0.20	[−0.57–0.14]	0.255	−0.90	[−1.20 - −0.63]	<0.001	0.02	[−0.11–0.13]	0.811	−0.01	[−0.04–0.00]	0.317	−0.50	[−1.10–0.10]	0.110	−0.73	[−1.39 – −0.09]	0.023
2. Been able to enjoy food	250	−0.76	[−1.31 - −0.19]	0.007	−2.10	[−2.89 - −1.26]	<0.001	0.22	[0.02–0.41]	0.02	−0.04	[−0.08–0.00]	0.068	−0.31	[−1.25–1.87]	0.702	−0.05	[−1.71–1.57]	0.940
3. Feeling rested	249	−1.37	[−2.31 - −0.43]	0.004	−2.08	[−2.89 - −1.28]	<0.001	0.17	[−0.14–0.49]	0.301	−0.02	[−0.07–0.05]	0.629	0.26	[−1.29–1.81]	0.745	−0.26	[−1.67–1.14]	0.705
4. Have had a good sleep	250	−0.50	[−1.03–0.02]	0.058	−1.77	[−2.17–1.37]	<0.001	0.23	[0.05–0.41]	0.013	−0.01	[−0.04–0.01]	0.462	−0.45	[−1.33–0.41]	0.305	−0.66	[−1.57–0.27]	0.164
5. Able to look after personal toilet and hygiene unaided	250	−0.36	[−0.76 - −0.02]	0.061	−1.88	[−2.24 - −1.49]	<0.001	0.02	[−0.10–0.15]	0.781	−0.03	[−0.06–0.00]	0.041	−0.10	[−0.76–0.55]	0.750	−0.81	[−1.49 – −0.12]	0.019
6. Able to communicate with family or friends	250	−0.25	[−0.52–0.01]	0.042	0.64	[−0.90 - −0.41]	<0.001	−0.00	[−0.09–0.07]	0.977	−0.00	[−0.03–0.01]	0.287	0.01	[−0.39–0.43]	0.922	−0.38	[−0.82–0.05]	0.082
7. Getting support from hospital doctors and nurses	234	0.09	[−0.35–0.57]	0.666	1.02	[−0.63–1.40]	<0.001	0.03	[−0.13–0.17]	0.722	−0.00	[−0.02–0.02]	0.925	0.01	[−0.74–0.79]	0.951	−0.25	[−1.06–0.55]	0.550
8. Able to return to work or usual home activities	237	−0.72	[−1.31 - −0.15]	0.012	−4.73	[−5.26 - −4.23]	0.002	0.31	[0.10–0.50]	0.002	−0.05	[−0.09 - −0.01]	0.002	0.09	[−0.87–1.03]	0.859	−0.01	[−1.00–0.97]	0.985
9. Feeling comfortable and in control	247	−0.70	[−1.20 - −0.23]	0.004	−1.94	[−2.30 - −1.55]	<0.001	0.20	[0.02–0.40]	0.019	−0.03	[−0.05–0.00]	0.118	−0.43	[−1.25–0.36]	0.275	−1.31	[−2.03 – −0.59]	<0.001
10. Having a feeling of general well-being	247	−1.07	[−1.62 – −0.53]	<0.001	−2.03	[−2.42 - −1.64]	<0.001	0.20	[0.02–0.40]	0.033	−0.02	[−0.07–0.01]	0.114	−0.21	[−1.10–0.65]	0.619	−0.83	[−1.16–0.09]	0.076
11. Moderate pain**	**240**	**−0.53**	**[−1.10–0.05]**	**0.072**	**−2.50**	**[−2.92 - −2.10]**	**<0.001**	**0.40**	**[0.20–0.59]**	**<0.001**	**0.01**	**[−0.02–0.05]**	**0.712**	**0.77**	[−0.16–1.71]	**0.103**	**0.10**	**[−0.86–1.10]**	**0.825**

(*Continued*)

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Table 2 (Continued).

Item	N	Gender			Change Post-Surgery, Time			Age			Duration of Surgery			Severity of Surgery SORT 3			Severity of Surgery SORT 4		
		Coefficient -b	[95% CI]	*P* - value	Coefficient - b	[95% CI]	*P* - value	Coefficient - b	[95% CI]	*P* - value	Coefficient -b	[95% CI]	*P* - value	Coefficient -b	[95% CI]	*P* - value	Coefficient -b	[95% CI]	*P* - value
12. Severe pain**	**241**	**−0.61**	**[−1.19 – −0.04]**	**0.037**	**−1.91**	**[−2.33 - −1.50]**	**<0.001**	**0.21**	**[0.03–0.41]**	**0.025**	**0.00**	**[−0.03–0.03]**	**0.966**	**0.96**	**[0.00–1.92]**	**0.047**	**0.60**	**[−0.40–1.61]**	**0.234**
13. Nausea or vomiting	240	−0.46	[−1.02–0.10]	0.117	−1.30	[−1.70 - −0.87]	<0.001	0.04	[−0.16–0.22]	0.714	0.01	[−0.05–0.02]	0.654	−0.34	[−1.27–0.59]	0.481	−0.16	[−1.17–0.82]	0.730
14. Feeling worried or anxious	243	−1.10	[−1.71 – −0.51]	<0.001	0.22	[−0.14–0.58]	0.252	0.06	[−0.15–0.25]	0.584	−0.01	[−0.05–0.01]	0.327	−0.69	[−1.68–0.29]	0.163	−0.71	[−1.74 – −0.34]	0.185
15. Feeling sad or depressed	241	−0.82	[−1.35 – −0.26]	0.003	−0.15	[−0.52–0.21]	0.385	0.02	[−0.14–0.22]	0.738	−0.02	[−0.06–0.01]	0.406	−0.02	[−0.93–0.85]	0.942	−0.34	[−1.30–0.58]	0.464
Total QOR-15 scale score	211	−10.12	[−15.00 – −5.22]	<0.00	−21.29	[−24.49 - −18.12]	<0.001	1.88	[0.21–3.55]	0.028	−0.27	[−0.62–0.05]	0.109	−1.27	[−9.31–6.78]	0.758	−7.29	[−15.81–1.20]	0.092

Notes: *ASA (American Society of Anaesthesiologists) scores are excluded due to their lack of significant findings in the analysis. **Bold font highlights key variables of interest in the analysis.

Table 3 The Predictive Factors; Gender, Age, Duration and Severity of Surgery Associated with Change Scores in Single Items and Total Scale Score of QoR-15NO Pre- and Post-Operative*

Item	N	Gender			Age			Duration of Surgery			Severity of Surgery, SORT		
		Coefficient - b	[95% CI]	P - value	Coefficient-b	[95% CI]	P - value	Coefficient -b	[95% CI]	P -value	Coefficient-b	[95% CI]	*P* - value
1. Able to breathe easy	249	−0.07	[−0.65–0.52]	0.826	0.13	[−0.07–0.32]	0.826	−0.02	[−0.06–0.02]	0.317	−0.53	[−1.01–0.05]	0.027
2. Been able to enjoy food	250	−0.70	[−1.54–0.10]	0.091	0.10	[−0.18–0.38]	0.485	−0.05	[−0.11–0.01]	0.094	−0.72	[−1.40–0.04]	0.035
3. Feeling rested	249	0.36	[−1.34–2.07]	0.680	0.16	[−0.41–0.74]	0.573	−0.04	[−0.16–0.08]	0.464	−0.77	[−2.18–0.63]	0.274
4. Have had a good sleep	250	0.50	[−0.30–1.32]	0.224	0.06	[−0.22–0.34]	0.661	−0.01	[−0.07–0.04]	0.646	−0.32	[1.00–0.35]	0.337
5. Able to look after personal toilet and hygiene unaided	250	−0.45	[−1.21–0.30]	0.235	−0.06	[−0.32–0.19]	0.619	−0.04	[−0.09–0.02]	0.159	−0.84	[−1.48−0.21]	0.008
6. Able to communicate with family or friends	250	−0.37	[−0.88–0.12]	0.135	0.03	[−0.14–0.19]	0.761	−0.02	[−0.05–0.02]	0.349	−0.31	[−0.74–0.09]	0.123
7. Getting support from hospital doctors and nurses	234	0.02	[−0.80–0.83]	0.969	0.11	[−0.16–0.39]	0.411	−0.00	[−0.06–0.06]	0.985	−0.18	[−0.85–0.48]	0.576
8. Able to return to work or usual home activities	237	−1.43	[−2.44-−0.41]	0.006	0.46	[0.12–0.79]	0.008	−0.03	[−0.10–0.04]	0.394	−0.88	[−1.70−0.05]	0.035
9. Feeling comfortable and in control	247	−1.10	[−1.85-−0.35]	0.004	0.14	[−0.11–0.40]	0.259	−0.01	[−0.07–0.04]	0.612	−0.87	[−1.49−0.24]	0.006
10. Having a feeling of general well-being	247	−0.65	[−1.43–0.12]	0.102	0.10	[−0.17–0.36]	0.469	0.00	[−0.05–0.06]	0.936	−1.11	[−1.75−0.47]	0.001
11. Moderate pain**	**240**	**−0.11**	[−0.**90–0.70**]	**0.794**	**0.05**	**[−0.22–0.32]**	**0.727**	**−0.01**	[−0.**07–0.04**]	**0.674**	**−1.15**	[−1.**79−0.48**]	**0.001**
12. Severe pain**	**241**	**−0.17**	[−1.**04–0.66**]	**0.674**	**0.24**	**[−0.05–0.52]**	**0.107**	**−0.03**	[−0.**09–0.03**]	**0.276**	**−0.64**	[−1.**32–0.05**]	**0.074**
13. Nausea or vomiting	240	−0.10	[−0.97–0.77]	0.819	−0.05	[−0.34–0.24]	0.709	−0.01	[−0.07−0.06]	0.858	−0.52	[−1.24–0.18]	0.141
14. Feeling worried or anxious	243	0.35	[−0.40–1.14]	0.359	−0.21	[−0.47–0.06]	0.122	0.02	[−0.04–0.07]	0.579	0.09	[−0.55−0.71]	0.788
15. Feeling sad or depressed	241	0.71	[−0.29–1.25]	0.232	−0.02	[−0.29–0.24]	0.852	−0.02	[−0.08–0.03]	0.382	0.02	[−0.62–0.64]	0.954
Total QOR-15 scale score	211	−2.32	[−13.10–8.48]	0.665	−4.29	[−7.89-−0.68]	0.021	0.20	[−0.62–1.02]	0.626	−17.11	[−26.33−7.90]	0.001

Notes: *ASA (American Society of Anaesthesiologists) scores are excluded due to their lack of significant findings in the analysis. **Bold font highlights key variables of interest in the analysis.

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preoperative, indicating more severe postoperative pain. Patients undergoing minor or intermediate surgeries (SORT 1 and 2) reported more severe pain compared to major surgery (SORT 3) (b= 0.96, 95% CI: [0.00, 1.92]; $p < 0.05$), with pain scores improving by approximately one point for SORT 3. Female patients reported slightly higher pain levels than males, with scores approximately 0.5 points lower (b= −0.61, 95% CI: [−1.19, −0.04]; $p < 0.05$). Age was also positively associated with severe postoperative pain (b= 0.23, 95% CI: [0.03, 0.41]; $p < 0.05$), with each 10-year increase in age, patients score approximately 0.2 points higher for severe postoperative pain indicating that younger patients report more severe pain than older patients. A significant association was found between moderate postoperative pain and change from pre– to postoperative status ($p = 0.001$). Postoperative measurement indicated a negative association (b= −2.5, 95% CI: [−2.92, −2.10]), with a 2.5-point lower score than preoperative, indicating more moderate postoperative pain. A similar association was observed between moderate postoperative pain and age (b= 0.4, 95% CI: [0.20, 0.59]; $p > 0.05$). Each increment of 10 years in age scores approximately 0.5 points higher in moderate pain, indicating that younger patients report more moderate postoperative pain than older patients (Table 2).

Associations Between Possible Predictive Factors and Change in QoR

In the multivariate linear regression analysis, adjusted for all variables, surgery severity was found to be the strongest prognostic factor for change in moderate postoperative pain (b= −1.15, 95% CI: [−1.79, −0.48]; $p = 0.001$). The pain score was reduced by about one point for each increase in the severity of surgery (SORT 3 and 4), indicating more moderate pain compared to less severe surgery (SORT 1 and 2). The association between gender and postoperative pain and the change of scores was very similar in males and females. For moderate pain, the females scored 0.1 points lower, and for severe postoperative pain, less than 0.2 points lower compared to males (b= −0.11, 95% CI: [−0.90, 0.70]; $p > 0.05$) and (b= −0.17, 95% CI: [−1.04, −0.66]; $p > 0.05$), respectively. Also, regarding age, the analysis did not reveal any statistically significant difference in change scores between younger (b= 0.24, 95% CI: [−0.05, −0.52]) and older patients (b= 0.05, 95% CI: [−0.22, 0.32]). Duration of surgery and ASA status were not found to be statistically significantly associated with postoperative pain or change score ($P > 0.05$) (Table 3).

The sensitivity analysis concerning the 37 patients who responded to QoR-15NO at a different postoperative time point than the rest of the sample revealed consistent findings with the main analyses. This indicates that there were no significant differences regarding the strength of the associations between age, gender, duration, and severity of surgery for these 37 patients with all items of QoR-15 and the total scale score (Table 3).

Discussion

This study aimed to investigate the strength of associations between selected possible predictive factors—gender, age, ASA status, postoperative changes, surgery duration, and severity—and pain-related QoR in elective GI and HPB surgery patients in Norway. Despite the advancements in pain management, a significant number of patients still experience severe pain following surgery.[11–13,29,46] The present study found a significant association between moderate and severe postoperative pain and changes in reported pain levels from pre- to postoperative status, with the negative association indicating a decrease in the quality of recovery following surgery. These findings are in line with previous studies.[47] Sommer et al found that there was a high prevalence of both moderate- and severe pain in the intermediate postoperative period among patients who had undergone abdominal surgery.[48] A recent study identified moderate pain as a significant factor affecting the quality of postoperative recovery and recommended focusing on patients' experiences of post-operative pain.[49] Additionally, several other studies revealed that many patients continue to experience both moderate to severe postoperative pain and highlighted additional efforts to improve patients' postoperative pain experience and quality of recovery.[4,12,26,50,51]

Findings in this study indicate that surgery severity is the most significant predictor of moderate postoperative pain, with patients undergoing more complex procedures reporting higher levels of moderate pain than those with less invasive surgeries. This finding aligns with established literature showing that patients who undergo more extensive or invasive procedures tend to experience greater postoperative pain intensity.[12,49,52] For example, Cachemaille et al found that patients undergoing minor surgeries reported lower levels of moderate to severe pain than those undergoing complex surgeries, such as colorectal procedures.[47] The occurrence of moderate postoperative pain, particularly in severe

surgeries, is generally expected and underscores the importance of balancing effective pain management with minimizing side effects.[53]

Interestingly, this study revealed that patients undergoing minor and intermediate surgeries reported more severe pain than those undergoing major surgeries. This finding supports earlier research indicating that patients undergoing minor surgeries often experience less intensive pain management. Gerbershagen et al indicated that patients undergoing minor surgeries received low or no opioid doses despite reporting high pain levels. They concluded that high pain levels were often overlooked or not taken seriously, resulting in delayed or inadequate administration of analgesics.[26] It is widely recognized that the need for pain medication, especially after minor surgeries, is often underestimated by healthcare professionals. This underestimation of pain medication needs, especially following minor surgeries, can be attributed to concerns over analgesic-related complications, inadequate pain assessment, patient expectations and beliefs, poor communication, and limited patient education.[16,29] Research has shown that providing adequate and timely information helps patients develop an understanding of what to expect regarding postoperative pain relief and improves psychological preparedness.[12,54,55] Effective communication is vital in shaping patient perceptions and outcomes.[56] For instance, patients warned about potential pain may experience it more acutely due to the nocebo effect.[57] Balancing accurate information with managing expectations is essential to minimize negative experiences. Whether undergoing major or minor surgery, patients need clear details about their condition, treatment, and consequences. According to the Norwegian Patient Rights Act, patients are entitled to comprehensive information regarding their health, treatment, and potential risks,[58,59] and healthcare providers are responsible for delivering this information accessible, empowering patients to feel more prepared and in control.[60,61] Moreover, it is acknowledged that major surgeries involve more effective pain management protocols compared to minor and intermediate procedures.[26] However, specific details on the pain management strategies used in this cohort were unavailable.

In this study, the duration of surgery and ASA status were not associated with postoperative pain or quality of recovery. These findings align with previous research. An observational prospective study similarly reported no differences between poor quality of recovery and ASA status or duration of surgery.[62] The duration of surgery was confounded by surgery severity, as longer surgeries tended to be more complex. Only surgery severity remained statistically significant when these factors were analyzed in a multiple model. Findings from other studies reveal that a longer duration of surgery is associated with moderate and severe postoperative pain,[7,47,63] and surgery severity was significant among patients with poor quality of recovery.[62]

Another finding of this study is that female patients report more severe postoperative pain than male patients; however, they do not present a larger change score compared to males. There are conflicting results in the literature regarding the association between gender and postoperative pain. While some studies reported no association,[64] other studies reported significantly higher proportions of females experiencing moderate to severe pain.[21,48,65,66] For example, a large study by Zheng et al confirmed that females experienced significantly higher pain intensity levels than males. The clinical significance of this finding highlights that females are at greater risk of developing chronic post-surgical pain, as prolonged severe pain in the early postoperative period can impede early mobilization and raise the risk of complications.[10] Research regarding QoR-15 also found that females tended to score lower in the total scale score postoperative but did not have a larger change score than males.[9,67] This finding is crucial for perioperative healthcare professionals as it can improve pain management by recognizing gender-specific pain experiences, potentially enhancing QoR.

The study also found that younger patients reported more moderate and severe postoperative pain compared to older patients, with the largest difference observed in moderate pain. Younger patients do not present a larger change score compared to older patients. Studies regarding the incidence and intensity of postoperative pain in older patients are not coherent.[7,21] While some studies indicate that older patients report pain as lower intensity than younger patients,[47,68–71] others found no association between age and postoperative pain.[72–74] A retrospective cohort study found that maximum pain scores decreased significantly with increasing age and highlighted that clinicians should continue to improve postoperative pain management for this specific group of patients based on the fact that older patients receive fewer opioids and express less desire for additional treatment. Older patients may report less pain due to prior experiences,

shaping their perception and resilience,[21] and they may underreport their pain levels. Thus, postoperative pain management should be adjusted according to the individual patient's reported pain scores and desire for additional medication.[26]

Suggesting an MICD for each item to integrate QoR-15 into clinical practice would be relevant. This statement is supported by recommendations from Garimella & Cellini[16] and guidelines by Chou et al[27] regarding postoperative pain management, emphasizing pain assessment tools. This could potentially enhance the immediate QoR by enabling interventions for various domains, such as pain management. A one-point decrease would hold clinical relevance but must be evaluated in the patient's clinical context. Using patient reported data directly in clinical practice, through self-reporting and direct application, could empower patients to have a more active role in their recovery while also providing important information for healthcare professionals.[75] This approach ensures that data, where information directly comes from patients rather than being interpreted by healthcare professionals, is more accurate and reflective of the patients' experience.[76] Moreover, this could potentially reduce documentation requirements for healthcare professionals.

Assessment of pain involving patient education and pain management strategies, according to gender, age, severity, or type of surgery, is essential. Accurate measurement and quantification are crucial for ensuring effective treatment of postoperative pain. The gold standard for this is having patients regularly assess their pain levels after surgery, which helps evaluate the effectiveness of pain management strategies.[16] The guidelines regarding the management of post-operative pain by Chou et al[27] recommend that clinicians offer patient education tailored to individual needs regarding treatment options for managing postoperative pain, how to use pain assessment tools, and guidance on when to report pain. Understanding and discussing expected pain levels for different procedures could improve the patient's pain experience and contribute to better postoperative pain management, enhancing the overall QoR.

Strengths and Limitations

The comprehensive representation of samples from diverse regions across Norway underscores the strength of the study, thus ensuring the generalizability of its findings. However, there are also several limitations that need to be addressed. First, the use of secondary analysis of data may be a limitation due to the predetermined variables. The relatively limited number of variables and data collected may not fully encompass the complexity of factors influencing pain-related QoR among elective GI- and HPB surgery patients. This selective approach potentially influenced the generalizability of the findings but also provided an opportunity for a thorough exploration and analysis of the selected variables. By including all health regions and matching the population on selected factors, it strengthens the potential for generalizing the findings. Secondly, this study does not clarify whether the widely adopted Enhanced Recovery After Surgery (ERAS) protocols, used in various surgical specialties such as GI and HPB surgery, were followed. As a result, there may be variability in perioperative care, treatments offered to the patients, and pain management for different types of surgeries across different hospitals. Thirdly, this study only collected data at two time points—pre-surgery and immediately post-surgery which could have been challenging due to the recent surgery they underwent. This limits our understanding of the recovery process beyond the first day post-operation. We recommend that future research adopt a longitudinal design with data collection at multiple stages to provide a more comprehensive understanding of recovery, particularly regarding QoR and pain management.

Conclusion

The study aimed to identify possible predictive factors associated with pain-related QoR among elective patients undergoing GI- and HPB surgery in Norway. The severity of surgery was the strongest predictive factor for moderate postoperative pain, with minor and intermediate surgeries associated with more severe pain compared to major surgery. Furthermore, females and younger patients experienced more severe postoperative pain, but no significant gender or age difference was found in the change from pre- to postoperative status. There were no clinically significant findings regarding ASA status and duration of surgery in relation to pain-related QoR. These findings suggest that healthcare providers should tailor pain management protocols for patients undergoing minor and intermediate surgeries, with a focus on individualized care for vulnerable patient groups such as females and younger patients. While our study highlights the prevalence of severe postoperative pain, further research is needed to assess the pain management strategies provided to

patient population the long-term impacts of individualized pain management, and to identify additional strategies for managing pain in high-risk groups.

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Disclosure

The authors declare that they have no conflicts of interest.

References

1. Lassen K, Nymo LS, Kørner H, et al. The new national registry for gastrointestinal surgery in Norway: noRGast. *Scandinavian J Surg*. 2018;107(3):201–207. doi:10.1177/1457496918766697
2. Zaghal A, Rifai AE. *Abdominal Surgery: A Brief Overview*. IntechOpen; 2021.
3. Lee A, Chiu CH, Cho MWA, et al. Factors associated with failure of enhanced recovery protocol in patients undergoing major hepatobiliary and pancreatic surgery: a retrospective cohort study. *BMJ Open*. 2014;4(7):e005330–e005330. doi:10.1136/bmjopen-2014-005330
4. Apfelbaum JL, Chen C, Mehta SS, Gan TJ. Postoperative pain experience: results from a national survey suggest postoperative pain continues to be undermanaged. *Anesthesia Analg*. 2003;97(2):534–540. doi:10.1213/01.ANE.0000068822.10113.9E
5. Yoon S-H, Bae J, Yoon S, Lee H-J, Lee H-J. Correlation between pain intensity and quality of recovery after video-assisted thoracic surgery for lung cancer resection. *J Pain Res*. 2023;16:3343–3352. doi:10.2147/JPR.S426570
6. Wu CL, Naqibuddin M, Rowlingson AJ, Lietman SA, Jermyn RM, Fleisher LA. The effect of pain on health-related quality of life in the immediate postoperative period. *Anesth Analg*. 2003;97(4):1078–1085. doi:10.1213/01.ANE.0000081722.09164.D5
7. Wessels E, Perrie H, Scribante J, Jooma Z. Quality of recovery in the perioperative setting: a narrative review. *J Clin Anesth*. 2022;78:110685. doi:10.1016/j.jclinane.2022.110685
8. Kleif J, Waage J, Christensen KB, Gögenur I. Systematic review of the QoR-15 score, a patient- reported outcome measure measuring quality of recovery after surgery and anaesthesia. *Br J Anaesth*. 2018;120(1):28–36. doi:10.1016/j.bja.2017.11.013
9. Stark PA, Myles PS, Burke JA. Development and psychometric evaluation of a postoperative quality of recovery score: the QoR-15. *Anesthesiology*. 2013;118(6):1332–1340. doi:10.1097/ALN.0b013e318289b84b
10. Ren Q, Wu M, Li HY, Li J, Zeng ZH. Failure of enhanced recovery after surgery in liver surgery: a systematic review and meta analysis. *Front Med Lausanne*. 2023;10:1159960. doi:10.3389/fmed.2023.1159960
11. Botea M, Bedreag O, Dejeu G, Maghiar O. Improving perisurgical pain control: ten Mistakes to be avoided. *European J Anaesthesiol*. 2020;37(3):251–253. doi:10.1097/EJA.0000000000001088
12. Paladini A, Rawal N, Coca Martinez M, et al. Advances in the management of acute postsurgical pain: a review. *Cureus*. 2023;15(8):e42974–e42974. doi:10.7759/cureus.42974
13. Fredheim OMS, Kvarstein G, Undall E, Stubhaug A, Rustøen T, Borchgrevink PC. Postoperative pain in patients admitted to Norwegian hospitals. *Tidsskr nor Laegeforen*. 2011;131(18):1763–1767. doi:10.4045/tidsskr.10.1129
14. Wu CL, Rowlingson AJ, Partin AW, et al. Correlation of postoperative pain to quality of recovery in the immediate postoperative period. *Reg Anesth Pain Med*. 2005;30(6):516–522. doi:10.1016/j.rapm.2005.07.190
15. Pirie K, Traer E, Finniss D, Myles PS, Riedel B. Current approaches to acute postoperative pain management after major abdominal surgery: a narrative review and future directions. *British J Anaesthesia*. 2022;129(3):378–393. doi:10.1016/j.bja.2022.05.029
16. Garimella V, Cellini C. Postoperative pain control. *Clin Colon Rectal Surg*. 2013;26(3):191–196. doi:10.1055/s-0033-1351138
17. Fredheim O, Borchgrevink P, Kvarstein G. Behandling av postoperativ smerte i sykehus [Management of postoperative pain in hospitals]. *Tidsskrift for den Norske Lægeforening*. 2011;131(18):1772–1776. doi:10.4045/tidsskr.10.1184
18. Kim BJ, Soliz JM, Aloia TA, Vauthey J-N. What is the best pain control after major hepatopancreatobiliary surgery? *Adv Surg*. 2018;52(1):235–246. doi:10.1016/j.yasu.2018.03.002
19. Akter N, Ratnayake B, Joh DB, Chan S-J, Bonner E, Pandanaboyana S. Postoperative pain relief after pancreatic resection: systematic review and meta-analysis of analgesic modalities. *World J Surg*. 2021;45(10):3165–3173. doi:10.1007/s00268-021-06217-x
20. Ambulkar R, Moharana SK, Solanki SL, Salunke BG, Agarwal V. Acute postoperative pain management techniques, their efficacy and complications after major gastrointestinal and hepato-pancreato-biliary cancer surgeries: an observational study. *J Perioper Pract*. 2024;17504589231224563. doi:10.1177/17504589231224563
21. van Dijk JFM, Zaslansky R, van Boekel RLM, et al. Postoperative pain and age: a retrospective cohort association study. *Anesthesiology*. 2021;135(6):1104–1119. doi:10.1097/ALN.0000000000004000
22. Zhang H, Yang YT, Jiang L, Xu X, Zhang J, Zhang L. Predicting risk factors for acute pain after hepatobiliary and pancreatic surgery: an observational case control study. *BMJ Open*. 2024;14(8):e078048. doi:10.1136/bmjopen-2023-078048
23. Kaye A, Urman R, Rappaport Y, et al. Multimodal analgesia as an essential part of enhanced recovery protocols in the ambulatory settings. *J Anaesthesiol Clin Pharmacol*. 2019;35(5):40–45. doi:10.4103/joacp.JOACP_51_18
24. Cheung CK, Adeola JO, Beutler SS, Urman RD. Postoperative Pain Management in Enhanced Recovery Pathways. *J Pain Res*. 2022;15:123–135. doi:10.2147/JPR.S231774
25. Gan TJ. Poorly controlled postoperative pain: prevalence, consequences, and prevention. *J Pain Res*. 2017;10:2287–2298. doi:10.2147/jpr.s144066
26. Gerbershagen HJ, Aduckathil S, van Wijck AJM, Peelen LM, Kalkman CJ, Meissner W. Pain intensity on the first day after surgery: a prospective cohort study comparing 179 surgical procedures. *Anesthesiology*. 2013;118(4):934. doi:10.1097/ALN.0b013e31828866b3

27. Chou R, Gordon DB, de Leon-Casasola OA, et al. Management of postoperative pain: a clinical practice guideline from the American pain society, the American society of regional anesthesia and pain medicine, and the American society of anesthesiologists' committee on regional anesthesia, executive committee, and administrative council. *J Pain*. 2016;17(2):131–157. doi:10.1016/j.jpain.2015.12.008
28. Yang MMH, Hartley RL, Leung AA, et al. Preoperative predictors of poor acute postoperative pain control: a systematic review and meta-analysis. *BMJ Open*. 2019;9(4):e025091–e025091. doi:10.1136/bmjopen-2018-025091
29. Walton LL, Duff E, Arora RC, McMillan DE. Surgery patients' perspectives of their role in postoperative pain: a scoping review. *Int J Nursing Stud Adv*. 2023;5:100124. doi:10.1016/j.ijnsa.2023.100124
30. Maribbay GML, Bdair IA, Alalyani MM, Al-Shloul MN. Nurses' knowledge, attitudes, and barriers toward pain assessment and management in Assir Region, Saudi Arabia. *J Holistic Nurs*. 2023;41(1):90–100. doi:10.1177/08980101221076677
31. Nguyen TH, Vu ST, Thu Do HT, et al. Postoperative pain management among registered nurses in a Vietnamese hospital. *TheScientificWorld*. 2020;2020(2020):1–6. doi:10.1155/2020/6829153
32. Fillingim RB. Individual differences in pain: understanding the mosaic that makes pain personal. *Pain*. 2017;158(Suppl 1(Suppl 1)):S11–s18. doi:10.1097/j.pain.0000000000000775
33. Bayman EO, Oleson JJ, Rabbitts JA. AAAPT: assessment of the acute pain trajectory. *Pain Med*. 2021;22(3):533–547. doi:10.1093/pm/pnaa440
34. Coccolini F, Corradi F, Sartelli M, et al. Postoperative pain management in non-traumatic emergency general surgery: WSES-GAIS-SIAARTI-AAST guidelines. *World J Emerg Surg*. 2022;17(1):50. doi:10.1186/s13017-022-00455-7
35. Churruca K, Pomare C, Ellis LA, et al. Patient-reported outcome measures (PROMs): a review of generic and condition-specific measures and a discussion of trends and issues. *Health Expect*. 2021;24(4):1015–1024. doi:10.1111/hex.13254
36. Myles PS, Shulman MA, Reilly J, Kasza J, Romero L. Measurement of quality of recovery after surgery using the 15-item quality of recovery scale: a systematic review and meta-analysis. *British Journal of Anaesthesia, BJA*. 2022;128(6):1029–1039. doi:10.1016/j.bja.2022.03.009
37. Bergestuen L, Moger T, Oterhals K, et al. Translation and validation of the Norwegian version of the postoperative quality of recovery score QoR-15. *Acta Anaesthesiol Scand*. 2024;68(1):43–50. doi:10.1111/aas.14322
38. American Society of Anesthesiologists. ASA physical status classification system. Available from: https://www.asahq.org/standards-and-guidelines/asa-physical-status-classification-system. Accessed December 13, 2020.
39. NORGAST. *Årsrapport 2022*. 2022. Available from: https://www.kvalitetsregistre.no/sites/default/files/2023-06/A%CC%8Arsrapport%202022%20NoRGast_0.pdf. Accessed December 21, 2024.
40. Kleif J, Gögenur I. Severity classification of the quality of recovery-15 score—An observational study. *J Surg Res*. 2018;225:101–107. doi:10.1016/j.jss.2017.12.040
41. Myles PS, Myles DB. An Updated Minimal Clinically Important Difference for the QoR-15 Scale. *Anesthesiology*. 2021;135(5):934–935. doi:10.1097/ALN.0000000000003977
42. NCEPOD. Surgical Outcome Risk Tool v2 (SORT). University College London Hospitals. 2024. Avilable from: http://www.sortsurgery.com/. Accessed December 21, 2024.
43. Wong DJN, Harris S, Sahni A, et al. Developing and validating subjective and objective risk-assessment measures for predicting mortality after major surgery: an international prospective cohort study. *PLoS Med*. 2020;17(10):e1003253–e1003253. doi:10.1371/journal.pmed.1003253
44. *IBM SPSS Statistics for Windows. Version 27*. Armonk, NY: IBM Corp; 2020.
45. *Stata Statistical Software*. College Station, TX: StataCorp LLC.; 2023.
46. Tan M, Law LS-C, Gan TJ. Optimizing pain management to facilitate enhanced recovery after surgery pathways. *Can J Anaesth*. 2015;62(2):203–218. doi:10.1007/s12630-014-0275-x
47. Cachemaille M, Grass F, Fournier N, et al. Pain intensity in the first 96 hours after abdominal surgery: a prospective cohort study. *Pain Med*. 2020;21(4):803–813. doi:10.1093/pm/pnz156
48. Sommer M, de Rijke JM, van Kleef M, et al. The prevalence of postoperative pain in a sample of 1490 surgical inpatients. *Eur J Anaesthesiol*. 2008;25(4):267–274. doi:10.1017/S0265021507003031
49. Lorenzen MD, Pedersen CF, Carreon LY, Clemensen J, Andersen MO. Measuring quality of recovery (QoR-15) after degenerative spinal surgery: a prospective observational study. *Brain Spine*. 2024;4:102767. doi:10.1016/j.bas.2024.102767
50. Fletcher D, Fermanian C, Mardaye A, Aegerter P. A patient-based national survey on postoperative pain management in France reveals significant achievements and persistent challenges. *Pain*. 2008;137(2):441–451. doi:10.1016/j.pain.2008.02.026
51. Maier C, Nestler N, Richter H, et al. The quality of pain management in German hospitals. *Dtsch Arztebl Int*. 2010;107(36):607–614. doi:10.3238/arztebl.2010.0607
52. Raja SN, Carr DB, Cohen M, et al. The revised international association for the study of pain definition of pain: concepts, challenges, and compromises. *Pain*. 2020;161(9):1976–1982. doi:10.1097/j.pain.0000000000001939
53. Prommala P, Prommala P, Toskulkao T, Changmai S. The relationships between selected factors and postoperative pain among patients undergone general anesthesia in recovery room. *Nursing J Ministry Public Health*. 2023;33(1):118–130.
54. Mubita WM, Richardson C, Briggs M. Patient satisfaction with pain relief following major abdominal surgery is influenced by good communication, pain relief and empathic caring: a qualitative interview study. *Br J Pain*. 2020;14(1):14–22. doi:10.1177/2049463719854471
55. Gustafsson UO, Scott MJ, Hubner M, et al. Guidelines for perioperative care in elective colorectal surgery: enhanced recovery after surgery (ERAS®) society recommendations: 2018. *World J Surg*. 2019;43(3):659–695. doi:10.1007/s00268-018-4844-y
56. Lozano PM, Allen CL, Barnes KA, Peck M, Mogk JM. Persistent pain, long-term opioids, and restoring trust in the patient-clinician relationship. *J Pain*. 2024;27:104694. doi:10.1016/j.jpain.2024.104694
57. Williams JB, Sade RM, D'Amico TA. Framing for success: nocebo effects in thoracic surgery. *Ann Thorac Surg*. 2013;95(1):9–11. doi:10.1016/j.athoracsur.2012.10.048
58. Lovdata. Lov om helsepersonell m.v. (helsepersonelloven) [The Health Personnel Act (Health Personnel Act)]. 2001.
59. Lovdata. Lov om pasient- og brukerrettigheter (pasient- og brukerrettighetsloven) [The Patient and User Rights Act. 2001]. 2001.
60. Suhonen R, Leino-Kilpi H. Adult surgical patients and the information provided to them by nurses: a literature review. *Patient Educ Couns*. 2006;61(1):5–15. doi:10.1016/j.pec.2005.02.012
61. Tørstad S, Iversen ES. Informasjonsbehov ved utskriving fra kirurgisk avdeling [Information needs upon discharge from the surgical department]. *Tidsskriftet sykepleien*. 2004;92(3):44–48. doi:10.4220/sykepleiens.2004.0021

62. Ferraz SM, Moreira JP, Mendes LC, et al. Evaluation of the quality of recovery and the postoperative health status after elective surgery. *Rev Bras Anestesiol*. 2018;68(6):577–583. doi:10.1016/j.bjane.2018.06.002
63. Chan JJI, Thong SY, Tan MGE. Factors affecting postoperative pain and delay in discharge from the post-anaesthesia care unit: a descriptive correlational study. *Proc Singapore Healthcare*. 2018;27(2):118–124. doi:10.1177/2010105817738794
64. Ip Hui YV, Abrishami A, Peng Philip WH, Wong J, Chung F. Predictors of postoperative pain and analgesic consumption: a qualitative systematic review. *Anesthesiology*. 2009;111(3):657–677. doi:10.1097/ALN.0b013e3181aae87a
65. Caumo W, Schmidt AP, Schneider CN, et al. Preoperative predictors of moderate to intense acute postoperative pain in patients undergoing abdominal surgery. *Acta Anaesthesiol Scand*. 2002;46(10):1265–1271. doi:10.1034/j.1399-6576.2002.461015.x
66. Theodoraki K, Staikou C, Fassoulaki A. Postoperative pain after major abdominal surgery: is it gender related? An observational prospective study. *Pain Pract*. 2014;14(7):613–619. doi:10.1111/papr.12114
67. Kleif J, Edwards HM, Sort R, Vilandt J, Gögenur I. Translation and validation of the Danish version of the postoperative quality of recovery score QoR-15. *Acta Anaesthesiol Scand*. 2015;59(7):912–920. doi:10.1111/aas.12525
68. Koh JC, Song Y, Kim SY, Park S, Ko SH, Han DW. Postoperative pain and patient-controlled epidural analgesia-related adverse effects in young and elderly patients: a retrospective analysis of 2435 patients. *J Pain Res*. 2017;10:897–904. doi:10.2147/JPR.S133235
69. Barrington JW, Lovald ST, Ong KP, Watson HP, Emerson RH. Postoperative pain after primary total knee arthroplasty: comparison of local injection analgesic cocktails and the role of demographic and surgical factors. *J Arthroplasty*. 2016;31(9):288–292. doi:10.1016/j.arth.2016.05.002
70. Kalkman CJ, Visser K, Moen J, Bonsel GJ, Grobbee DE, Moons KGM. Preoperative prediction of severe postoperative pain. *Pain*. 2003;105(3):415–423. doi:10.1016/S0304-3959(03)00252-5
71. Bisgaard T, Klarskov B, Rosenberg J, Kehlet H. Characteristics and prediction of early pain after laparoscopic cholecystectomy. *Pain*. 2001;90(3):261–269. doi:10.1016/S0304-3959(00)00406-1
72. Gagliese L, Weizblit N, Ellis W, Chan VWS. The measurement of postoperative pain: a comparison of intensity scales in younger and older surgical patients. *Pain*. 2005;117(3):412–420. doi:10.1016/j.pain.2005.07.004
73. Morin C, Lund JP, Villarroel T, Clokie CML, Feine JS. Differences between the sexes in post-surgical pain. *Pain*. 2000;85(1):79–85. doi:10.1016/S0304-3959(99)00248-1
74. Gagliese L, Jackson M, Ritvo P, Wowk A, Katz J. Age is not an impediment to effective use of Patient-controlled analgesia by surgical patients. *Anesthesiology*. 2000;93(3):601–610. doi:10.1097/00000542-200009000-00007
75. Holmes MM, Lewith G, Newell D, Field J, Bishop FL. The impact of patient-reported outcome measures in clinical practice for pain: a systematic review. *Qual Life Res*. 2017;26(2):245–257. doi:10.1007/s11136-016-1449-5
76. Enden T, Bernklev T, Jelsness-Jørgensen L-P, Amdal CD. Pasientene kjenner best egen helse [Patients know their own health best]. *Tidsskrift for den Norske Lægeforening*. 2018;138(8). doi:10.4045/tidsskr.17.1054