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Enhanced recovery after surgery programs: How much do perioperative nurses know?

Enhanced recovery after surgery (ERAS) protocols have been shown to improve recovery and reduce patients' risk of morbidity and mortality[1]. Some researchers have noted 30 to 50 per cent reductions in post-operative hospital length of stay[2–4], reductions in surgical site infections[5] and decreases in admission costs[6–9]. Over the past two decades, ERAS protocols have been developed to cater to the specific needs and nuances across surgical specialties and subspecialties including general surgery (e.g. breast, hepatobiliary, colorectal and upper gastric surgeries), neurosurgery and gynaecological, orthopaedic and vascular surgeries[2,6]. ERAS protocols cover the entire surgical journey, including pre-admission, pre-operative, intra-operative and post-operative phases in the pathway[2].

ERAS protocols

ERAS protocols are multi-component and no single component by itself will improve patient outcomes in surgery. Individual components within each phase of the surgical pathway vary, depending on the surgery type.

ERAS components in the pre-operative phase include providing and/or managing nutritional support, smoking cessation and control of alcohol intake, counselling, pre-operative selective bowel preparation and carbohydrate loading. During the intra-operative phase, components include minimally invasive (keyhole) surgery, minimalisation of drains, temperature control and antibiotic administration before incision. Finally, during the post-operative period ERAS components including clinical interventions to prevent nausea and vomiting, early removal of drains and tubes, multimodal opioid-sparing pain control, early mobilisation, early oral intake of fluids and post-discharge follow-up are implemented[2,10].

Given that ERAS protocols encompass the entire surgical care pathway, a whole-of-team approach – involving surgeons, anaesthetists, nurses and allied health professionals – is imperative if the protocols are to be implemented successfully across a health service.

But how much do perioperative nurses know about ERAS protocols? To answer this question, we undertook a national survey.

The study

From July to November 2023, we undertook an online survey to describe and compare surgeon, anaesthetist, perioperative nurse and surgical ward nurse perceptions of ERAS protocols[11]. Our research team included perioperative and clinical nurse researchers, a surgeon, an anaesthetist and two health consumers.

Following ethics approvals and endorsements for each professional college, we actively recruited practitioners from surgery, anaesthetics, perioperative nursing and surgical ward nursing who were currently practicing in Australia. The sample comprised fellows and members of four professional organisations – the Royal Australasian College of Surgeons

(RACS), the Australian Society of Anaesthetists (ASA), the Australian College of Perioperative Nurses (ACORN) and the Australian College of Nursing (ACN).

The questionnaire we used was adapted to suit the Australian context from one developed by Beal et al.[12] in the United States of America. Our questionnaire included 28 items related to knowledge and beliefs about ERAS, learning preferences and future planning, and 14 demographic questions about age, sex, role, specialty, experience etc. Response options for ERAS knowledge and beliefs were based on 5-point Likert scales of agreement ('very unknowledgeable' to 'very knowledgeable' and 'strongly disagree' to 'strongly agree').

Results

A total of 178 respondents replied to the survey, including 116 (65.2%) nurses, 36 (20.2%) surgeons and 26 (14.6%) anaesthetists. Although over half the respondents reported being 'knowledgeable' about ERAS protocols, group differences were statistically significant, with nurses' scores being much lower than surgeons and anaesthetists scores (see Figure 1).

A greater proportion of surgical ward nurses reported they were knowledgeable to very knowledgeable about ERAS protocols compared to perioperative nurses (see Table 1). However, there were fewer surgical ward nurse respondents in our survey, and there was no statistically significant association between knowledge level and the two nursing groups.

There were significant differences between nurses' responses to beliefs about the benefits of ERAS protocols (e.g. I believe ERAS protocols improve patient care)[12]. Nurses reported lower levels of agreement than their surgeon and anaesthetist counterparts for most of these statements. For learning preferences, just over 70 per cent of nurses compared with 40 per cent of surgeons and 56 per cent of anaesthetists reported a lack of information about ERAS protocols as a barrier to gaining knowledge about ERAS. These results may be indicative of the extent to which ERAS protocols are implemented across Australian health services.

Table 1: Comparison of perioperative nurse and surgical ward nurse self-reported knowledge

	Perioperative nurses (N=100) n (%)	Surgical ward nurses (N=16) n (%)
Very unknowledgeable	28 (28.3%)	2 (13.3%)
Fairly unknowledgeable	23 (23.2%)	2 (13.3%)
Neutral	11 (11.1%)	4 (26.7%)
Knowledgeable	34 (34.3%)	5 (33.3%)
Very knowledgeable	3 (3.0%)	2 (13.3%)

Missing: perioperative nurses n = 1, surgical ward nurses n = 1

Barriers and enablers to ERAS implementation

Our survey respondents reported barriers to ERAS protocol implementation such as lack of knowledge and support by senior clinicians and managers, organisational culture, patient complexity, lack of resources and lack of ability to adapt the content of ERAS protocols to the local context[12]. Similar reasons have been reported by other researchers in this area[13,14].

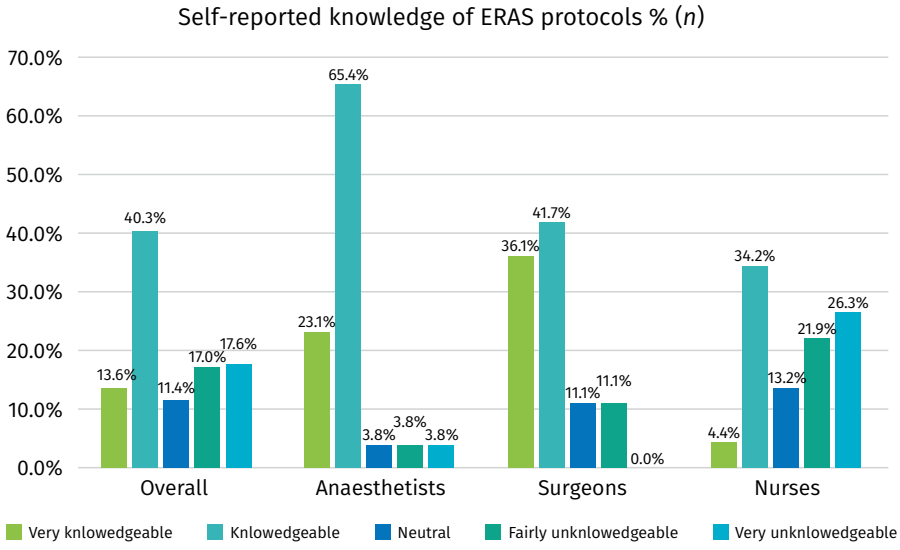

Figure 1: Survey respondents reported knowledge levels of ERAS protocols[12]

Despite the proven benefits of ERAS protocols, an evidence–practice gap exists in their widespread adoption[16]. In a 2020 editorial published in the *Journal of Perioperative Nursing*, Duff attributed some of the challenges to implementing ERAS protocols to the fragmentation of surgical care; that is, the care provided in the perioperative department operates independently of the surgical care provided in pre-admission clinics and the surgical wards. However, the surgeon is the 'common denominator' across the surgical care pathway and is thus well-positioned to lead the implementation of ERAS protocols[16].

Surgeons as implementation leaders

Surgeons play a critical role in the successful implementation and sustainment of ERAS protocols. Their leadership in this care pathway is essential because they:

- possess clinical expertise and have a constant presence along the continuum of surgical care
- can coordinate interdisciplinary teams
- can influence protocol adherence
- play a spearhead role in the education and training of others in the team
- are well positioned to advocate for resources
- are focussed on data collection and analysis to enable monitoring of outcome measures.

Surgeons' leadership in the implementation process can also contribute to increasing nurses' knowledge of and engagement in ERAS protocols.

Where to now?

Although the sample size of our survey was insufficient to allow generalisation, our survey results indicate that perioperative and surgical ward nurses lack basic knowledge about ERAS and its benefits. Moreover, nurses from various health services we are affiliated with in Queensland have anecdotally reported that they were unaware of any exposure they have had to ERAS or its implementation.

Thus, we must target nurses' educational needs, as they play a pivotal role in the success of ERAS due to their continuous interactions with patients throughout the perioperative journey.

The success or failure of ERAS in enhancing patient outcomes depends on the quality of its implementation efforts. To effectively embed and sustain ERAS protocols in practice, health care leaders must focus more on using knowledge translation methods that address the barriers identified in this editorial. Without this, it is unlikely that ERAS protocol benefits will be realised in practice.

Indeed, there is much work yet to be done in Australian hospitals.

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Prevalence of pre-operative anxiety among adult patients undergoing elective surgery: A prospective observational single-centre study

Abstract

Objective: This study aimed to investigate the prevalence of pre-operative anxiety in elective surgical patients at a major metropolitan hospital in Australia.

Background: Globally, 310 million people are admitted for surgery every year. It is estimated that up to 80 per cent of these patients experience clinically relevant anxiety in the pre-operative period. Pre-operative anxiety can result in post-operative complications such as pain, delayed wound healing, surgical site infection, prolonged recovery and extended hospital stays. While pre-operative anxiety has many negative consequences, this anxiety has often been overlooked in clinical practice.

Methods: A prospective study was conducted between November 2021 and June 2022, involving 308 adult patients scheduled for elective surgery. Pre-operative anxiety levels were measured using the Amsterdam pre-operative anxiety and information scale (APAIS), and age, sex and surgery type were collected.

Results: In total, 308 patients were enrolled, more than half (58%, n=279) were women. The mean (± SD) APAIS score out of 20 was 8.69 (± 4.08). Almost one-third (32.4%, n=100) of patients had significant pre-operative anxiety (APAIS score > 11/20). Women were three times more likely to experience anxiety than men (OR=3.39, 95% CI 1.97–5.82). Conversely, older patients were less likely to experience anxiety, with a reduction in anxiety of two per cent for each year above 18 years (OR=0.98, 95%CI 0.97–0.99). Patients reported higher anxiety levels related to the surgery itself compared to the anaesthesia, with mean scores of 5.04 (± 2.48) and 3.65 (± 2.07) out of 10, respectively. More than half the patients (54.9%, n=169) reported needing more information about anaesthesia and surgery.

Conclusions: Findings suggest that clinically relevant anxiety is common yet underdiagnosed. A higher prevalence is observed among females and those under the age of 30. The surgical procedure more than the anaesthesia was reported to cause higher anxiety.

Relevance to clinical practice: Identifying the prevalence of high pre-operative anxiety highlights the importance of routine screening and the use of a standardised assessment tool for accurate evaluation in clinical practice. Prioritising interventions for at-risk groups, such as women and younger patients, is imperative to mitigate the risks of post-operative pain, delayed wound healing, surgical site infection, prolonged recovery and extended hospital stays.

Keywords: pre-operative anxiety, surgery, APAIS

Introduction

Surgery is widely recognised as a distressing event that commonly triggers anxiety in patients. Pre-operative anxiety is a normal and predictable response characterised by feelings of unease, fear and apprehension accompanied by physiological manifestations such as increased blood pressure, heart rate and respiratory rate[1,2]. Intense and prolonged pre-operative anxiety can negatively impact post-operative outcomes including, but not limited to, increased pain, surgical site infection, delayed wound healing, prolonged recovery and extended hospitalisation[3–5].

Pre-operative anxiety occurs among patients scheduled for surgery, regardless of the nature of the surgery. Several studies have assessed the prevalence of pre-operative anxiety. In a systematic review and meta-analysis of 28 studies conducted across developed and developing countries, the estimated prevalence of pre-operative anxiety ranged from 21 to 80 per cent. The overall pooled prevalence of pre-operative anxiety was found to be 48 per cent[6]. Another systematic review and meta-analysis of 27 studies focusing on low and middle-income countries reported a pooled prevalence of pre-operative anxiety at 55.7 per cent[7]. The causes of pre-operative anxiety include anticipation of pain, loss of independence, fear of anaesthesia and surgical complications, changes in appearance and unfavourable diagnosis[6,8].

Multiple factors, including demographic, psychological and surgery-related aspects, have been identified as contributors to pre-operative anxiety. Factors such as previous surgical experiences and access to information regarding anaesthesia and the surgical procedure have been found to influence pre-operative anxiety levels[9]. Gender has also been shown to play a role, with a recent systematic review of 27 studies involving 5575 surgical patients indicating that females tend to experience higher levels of pre-operative anxiety than males[7]. Furthermore, patients with a history of mental illnesses, including chronic anxiety and depression, may be more prone to experience high pre-operative anxiety levels[10].

The management of pre-operative anxiety often involves using sedatives and anxiolytic medications, including fentanyl, midazolam, morphine and ketamine[11]; however, these pharmacological interventions can have adverse effects such as respiratory difficulties, drowsiness and potential interference with anaesthesia medications[12]. Consequently, non-pharmacological approaches are gaining popularity as alternative interventions. These include interventions like aromatherapy, music therapy, audio-visual interventions and educational interventions[13–16]. The management of pre-operative anxiety lacks a widely accepted guideline or protocol. As a result, the choice between pharmacological and non-pharmacological interventions is primarily based on the preferences of the treating team. For instance, a report conducted in the United Kingdom demonstrated that a significant majority of anaesthetists (95%) favoured non-pharmacological interventions, such as patient communication and reassurance, as their preferred approach to managing pre-operative anxiety in adult patients[17].

Various instruments have been validated to measure patients' level of pre-operative anxiety. These include the Hospital anxiety and depression scale (HADS), the Amsterdam pre-operative anxiety and information scale (APAIS), the state–trait anxiety inventory (STAI), and the visual analogue scale (VAS)[18–21]. The APAIS is one of the most widely used tools to screen for pre-operative anxiety because it is a short and quick self-completion tool that has been translated into many languages[18]. Additionally, objective methods such as heart rate, blood pressure, cortisol levels and urinary catecholamine levels can be used to estimate pre-operative anxiety[22].

While systematic reviews and meta-analysis have provided insights into the global prevalence of pre-operative anxiety, yet a clear gap in knowledge exists about the Australian context. With its diverse cultural and socioeconomic factors and unique health care system, Australia provides a unique environment that can influence pre-operative anxiety levels in distinct ways. Hence, this study contributes to the global understanding of pre-operative anxiety, enriching the literature and informing future studies. The aim of this study was to determine the prevalence of anxiety among Australian elective surgical patients and to examine whether independent variables such as age, gender and type of surgery had an influence on pre-operative anxiety.

Methods

Study design, setting and population

A prospective observational study was conducted at the Royal Brisbane and Women's Hospital (RBWH) between November 2021 and June 2022. Located in Brisbane, the RBWH is the largest hospital in Queensland and performs over 27 500 surgical procedures annually, eight per cent more than other metropolitan hospitals in the area.

The study included patients who underwent elective surgery at the RBWH, were 18 years of age or older and able to communicate in English. Patients scheduled for day surgery only were excluded from the study. The researchers determined that a sample size of 300 participants was necessary to avoid sampling error (point precision of +/-5%). The calculation to determine the prevalence of anxiety was done using the sample size calculator from the Australian Bureau of Statistics. The calculated proportion was 32.47 per cent with a sample size of 300 (95% CI, 37.78–27.17%)[23].

Ethical approval for the study was obtained from the RBWH Human Research Ethics Committee with the reference number HREC/2021/QRBW/74417. Informed consent was obtained from all participants. The hospital admission team reviewed the surgical list to identify eligible participants. These patients were then sent an SMS containing a link to the information statement and consent form. Patients who were interested in participating in the study returned the signed consent form prior to the day of surgery.

Data collection and instrument

After obtaining written informed consent, participants were asked to complete the APAIS in the pre-operative holding area. The data were collected using the REDCap (V12.0.13) electronic clinical data management system[24]. In case participants encountered any difficulties while completing the questionnaire, the researcher was available to provide assistance. Demographic information, including age, gender and type of surgery, was extracted by the researcher from the patient's medical records.

The APAIS is a validated tool widely used to assess pre-operative anxiety levels among surgical patients. Its development was driven by the recognition of the importance of measuring anxiety before surgery, as anxiety can significantly impact patient outcomes and overall surgical experience. It consists of two scales: an anxiety-related scale and an information-needs scale (see Table 3). There are six questions that are rated on a Likert scale ranging from 1 (not at all) to 5 (extremely), allowing patients to express the intensity of their anxiety or information requirements.

The anxiety scale has four questions (1, 2, 4 and 5) that assess the severity of anxiety symptoms experienced by patients. The scores from these four questions are added to give an anxiety score between 4 and 20. A score of 11 or higher on the anxiety scale indicates a moderate to severe level of anxiety, suggesting that patients may benefit from additional support and interventions to manage their anxiety effectively[25–27].

The information-needs scale has two questions (3 and 6) that evaluate the patients' information needs and preferences. The scores from these two questions are added to give an information-needs score between 2 and 10. A score of 5 or higher on the information scale suggests a greater need for information, indicating that patients require additional communication and education regarding their upcoming surgery[25–27].

The validity of the APAIS has been extensively examined through comparisons with other established anxiety assessments. These studies have demonstrated the reliability and accuracy of the APAIS in measuring pre-operative anxiety[26,27].

Statistical analysis

Descriptive statistics were used to summarise the characteristics of the patients and APAIS questionnaire items. Continuous data were described using mean and standard deviation (mean ± SD) or median and interquartile range (IQR), while categorical data were presented as frequencies and percentages. Univariate logistic regression was used to evaluate the significance of independent variables including age, gender and surgery type. Subsequently, a multivariate logistic regression analysis was used to develop a model of patient characteristics associated with total anxiety score on the APAIS. Finally, the model was checked to ensure the logistic regression assumptions held true.

Results

Demographic characteristics

A total of 308 patients (179 (57%) women) were recruited for the study with an average age of 51 years (SD ± 17). The surgeries were classified into eight surgical specialties based on the study site's classification. These specialties were ear nose and throat surgery (14%), general surgery (13%), maxillofacial surgery (8%), neurosurgery (10%), orthopaedic surgery (22%), urologic surgery (7%), vascular surgery (7%) and 'other' surgeries (19%), which included but were not limited to skin graft and biopsy. Further details regarding gender, age and surgery type are shown in Table 1.

Prevalence of pre-operative anxiety

Overall, 32.4 per cent (95% CI, 27.24–37.70) of surgical patients in this study experienced a moderate to severe level of pre-operative anxiety, as indicated by a score of

Table 1: Patient demographics and surgery types

		N=308
Gender	female	179 (58%)
	male	129 (42%)
Age in years (mean ± SD)		51 (± 17)
Type of surgery	Ear, nose, throat	42 (14%)
	general	40 (13%)
	maxillofacial	26 (8%)
	neuro	31 (10%)
	orthopaedic	68 (22%)
	urologic	21 (7%)
	vascular	22 (7 %)
	other	58 (19 %)

11 or higher on the APAIS (see Table 2). The mean anxiety score, which combines both anaesthesia-related and surgery-related anxiety, was found to be 8.69 out of 20 (± 4.08).

Notably, patients had a higher level of anxiety about the surgical procedure itself, with a mean score of 5.04 out of 10 (± 2.48), compared to their anxiety about anaesthesia, which had a mean score of 3.65 out of 10 (± 2.07). Furthermore, patients expressed a greater need for information about the procedure compared to anaesthesia (mean scores 2.85±1.30 and 2.11± 1.10, respectively). The mean scores for each APAIS item are shown in Table 3.

Statistical analysis of factors associated with pre-operative anxiety

A logistic regression was performed to ascertain the effects of age and gender on the pre-operative anxiety of patients scheduled for surgery. The logistic regression model was statistically significant (X^2 (df=2, N = 308) = 25.22, p < .001). The model explained 11.0 per cent (Nagelkerke R2 = 0.11) of the variance in anxiety and correctly classified 67.2 per cent of cases. Females were three times as likely to experience anxiety before surgery compared to males (OR=3.39, 95%CI 1.98–5.83). Older patients were significantly less likely to experience anxiety with a reduction in anxiety of two per cent for each additional year above 18 years (OR=0.98, 95%CI 0.97–0.99). The type of surgery was not associated with pre-operative anxiety (see Table 4).

Table 2: Prevalence of pre-operative anxiety (N=308)

Anxiety level	APAIS anxiety score (range: 4–20)	n (%)
nil anxiety	4	45 (14.6 %)
mild anxiety	5 to 10	163 (53%)
moderate to severe anxiety	11 to 20	100 (32.4 %)

The APAIS anxiety score is the sum of scores for questions 1,2,4 and 5.

Discussion

This prospective observational study examined the prevalence of pre-operative anxiety among 308 adult surgical patients. The findings indicate that the majority of participants (85.4%) experienced some level of pre-operative anxiety, with over one third reaching a clinically significant level, indicating the need for treatment[25–27]. These results align with a recent study in Jordan that used the same assessment tool, the APAIS, and reported a prevalence of pre-operative anxiety at 30.1 per cent[28]. When comparing the prevalence of pre-operative anxiety across different countries, it is evident that the rates vary. A systematic review and meta-analysis, including 28 studies from developed and developing countries estimated the pooled prevalence of pre-operative anxiety at 48 per cent[6]. Similarly, another systematic review and meta-analysis that included 27 studies focusing on low and middle-income countries found a pooled prevalence of pre-operative anxiety at 55.7 per cent[7]. None of the studies included in these systematic reviews were conducted in Australia, which left a significant knowledge gap regarding pre-operative anxiety within the Australian population. This underscores the significance of our study in filling this gap and offering valuable insights specific to the Australian context.

Table 3: Pre-operative APAIS scores by item (N=308)

APAIS domain	APAIS item	Mean score (SD)
Anaesthesia-related anxiety	1. I am worried about the anaesthetic	1.96 (± 1.15)
	2. The anaesthetic is on my mind continually	1.69 (± 1.04)
	Total score for anaesthesia-related anxiety	3.65 (± 2.07)
Surgery-related anxiety	4. I am worried about the procedure	2.52 (± 1.26)
	5. The procedure is on my mind continually	2.52 (± 1.35)
	Total score for surgery-related anxiety	5.04 (± 2.48)
	Total anxiety score	**8.69 (± 4.08)**
Need-for-information	3. I would like to know as much as possible about the anaesthesia	2.11 (± 1.10)
	6. I would like to know as much as possible about the procedure	2.85 (± 1.30)
	Total need-for-information score	**4.96 (± 2.13)**

The mean anxiety score in this study was 8.69 (± 4.08) out of 20. It was observed that patients were more anxious about the surgical procedure itself than the anaesthesia. These findings align with a cross-sectional study of 3200 elective adult surgical patients in Germany, which also used the APAIS tool and reported higher anxiety levels related to the surgical procedure than anaesthesia[29].

To address the significant issue of pre-operative anxiety in health care, it is recommended to implement universal screening for pre-operative anxiety as a standard care practice for all surgical patients. One such screening tool is the APAIS, which helps identify patients with elevated anxiety levels and enables the provision of appropriate interventions[30]. Detecting patients with high levels of anxiety and prioritising them to receive appropriate interventions is crucial, as high levels of pre-operative anxiety can have negative impacts on post-operative outcomes, including increased pain, delayed wound healing, surgical site infection, prolonged recovery and extended hospitalisation[3–5].

Pre-operative anxiety prevalence rates vary across countries; this can be attributed to multiple factors, including the use of different assessment tools to measure anxiety levels. Therefore, it is crucial to standardise the assessment tool in future research to ensure consistency and facilitate meaningful comparisons across studies. Moreover, cultural, socioeconomic and health care system factors can significantly influence patients' experiences and pre-operative anxiety. These factors can be incorporated into the assessment and management of pre-operative anxiety, so health care providers can tailor their interventions accordingly.

In our study, female patients experienced three times the level of anxiety compared to male patients. This corroborates the findings of the systematic reviews by Bedaso et al.[7] which consistently demonstrated higher levels of pre-operative anxiety among females across 5575 surgical patients. This indicates a notable pattern of elevated anxiety in female patients during the pre-operative period[7]. However, the precise reasons behind this gender difference in pre-operative

Table 4: Logistic regression model: Influence of patient demographic characteristics on anxiety experienced before surgery (N=308)

Variable	Beta (β)*	Standard error (SE)	Significance	Odds ratio (OR) (95% OR)
Gender (female)	1.222	0.276	<0.001	3.393 (1.975–5.829)
Age (years)	-0.017	0.008	0.028	0.983 (0.968–0.998)
Constant	-0.660	0.425	0.120	0.517

* Standardised beta is similar to a correlation coefficient.

anxiety remain incompletely understood. A systematic review by Farhane-Medina et al.[10] that included 44 studies, of which 31 were empirical studies, suggested that a combination of psychosocial and biological factors may contribute to higher anxiety levels experienced by women, with factors such as gender roles, social support, hormones and genetics likely influencing this disparity[10]. In addition, gender differences in anxiety expression should be considered, as women may be more open in discussing and seeking support for their anxiety compared to men. Thus, variations in anxiety levels between genders do not necessarily imply that women inherently experience higher levels of anxiety.

Health care providers should be attentive to the higher levels of pre-operative anxiety experienced by female patients. Implementing gender-specific approaches to address anxiety, such as providing additional support, adequate information and reassurance, may help alleviate anxiety levels in this patient population. For instance, educational resources that concentrate on coping strategies could be provided, family members or support networks could be involved in the care process or access to specialised counselling services could be facilitated.

Our study findings suggest that age is negatively associated with pre-operative anxiety. Older patients experienced significantly less anxiety, as anxiety decreased by two per cent with each additional year over 18. This finding was consistent with findings from research in Turkey in which 186 younger elective surgical patients (≤30 years) had a significantly higher pre-operative anxiety score[31]. Similarly, a study of 155 patients undergoing foot nail surgery in Spain reported higher levels of pre-operative anxiety in younger patients compared to those over 65 years old[32], and research in Ethiopia found higher anxiety levels in patients between 18 and 31 years of age than patients between 31 and 45[33]. In contrast, Woldegerima et al.[34] suggest that older patients may be more prone to anxiety due to comorbidities. Therefore, it is important to take age into account as a significant determinant of pre-operative anxiety and develop tailored interventions to effectively alleviate anxiety and improve patient outcomes in different age groups.

In this study, the surgical specialty was not identified as a predictor of pre-operative anxiety. However, the literature shows inconsistency regarding the influence of surgical type on anxiety levels. Some studies report no significant impact of surgical specialty on anxiety[18,26], while others suggest that orthopaedic and cardiac surgery patients may experience higher anxiety levels[35,36]. To address the inconsistent findings regarding the relationship between surgical specialty and pre-operative anxiety, it is recommended to implement pre-operative anxiety screening for all surgical patients, regardless of their surgical specialty. This ensures that patients at risk of anxiety are identified and provided with tailored interventions and support, regardless of their specific surgical specialty.

Limitations

There are several limitations that should be acknowledged in this study. Firstly, the assessment of anxiety did not consider other potential factors that could influence anxiety levels, such as previous surgical history, education level, chronic anxiety or depression. Secondly, the variability in waiting times experienced by participants resulted in an inconsistent measurement of anxiety. Some patients had longer waiting times – up to six hours – while others had just arrived in the pre-operative holding area. This variation in waiting times may have impacted anxiety levels and potentially contributed to higher levels of anxiety among specific individuals.

Relevance to clinical practice

Identifying the significant prevalence of pre-operative anxiety among elective surgical patients highlights the importance of incorporating pre-operative anxiety screening into routine assessments to identify those with high anxiety levels. Elevated anxiety levels have been associated with negative post-operative outcomes, including delayed recovery, prolonged hospital stays, increased post-operative pain and higher rates of complications. Recognising that women and younger patients are at higher risk of experiencing anxiety enables clinicians to prioritise interventions and support for these groups. The use of a standardised assessment tool is essential for assessing pre-operative anxiety accurately in clinical practice.

Conclusions

A significant prevalence of pre-operative anxiety among elective surgical patients is highlighted in this study, with moderate to severe anxiety experienced by approximately one-third of the participants. Pre-operative anxiety is found to be more prevalent in females and younger patients, while lower levels of anxiety are observed in older patients. The study does not find surgical specialty to be a significant predictor of pre-operative anxiety. The importance of screening surgical patients

for pre-operative anxiety is emphasised, and the understanding and management of pre-operative anxiety can be enhanced through the standardisation of assessment tools. Further research is needed to explore potential interventions for alleviating pre-operative anxiety.

Declaration of conflicting interests and funding statement

The authors have declared no competing interests with respect to the research, authorship and publication of this article.

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All authors have contributed equally. All authors have read and approved the final version of the manuscript.

Ethics approval and consent to participate

Ethical approval for the study was provided by the Royal Brisbane and Women's Hospital Human Research Ethics Committee with the reference number HREC/2021/QRBW/74417. Informed consent was obtained from all participants. Any information taken from the participants was kept confidential. We used codes rather than names of the participants while we were collecting the data.

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Data access

The data presented in this study are available, on request, from the corresponding author.

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The effects of an abdominal vibration stimulation program on the quality of bowel preparation in patients undergoing screening and surveillance colonoscopy: A general surgeons blinded, randomised controlled trial

Abstract

Background: Effective colonoscopy is considered accurate and safe when there is good quality bowel preparation. In this study, we aimed to evaluate the effectiveness of an abdominal vibration stimulation program on the quality of bowel preparation in patients undergoing screening and surveillance colonoscopy.

Design: This study was a single-centre, randomised, controlled trial.

Methods: The participants consisted of 72 patients who received elective in-patient screening and surveillance colonoscopy at a tertiary hospital in central Thailand. Patients were randomly assigned to two groups: an experimental group (n=38) and a control group (n=34). Both groups received the same bowel cleansing regimen of 90 ml split-dose sodium phosphate solution. The experimental group received the abdominal vibration stimulation. General surgeons, who were blinded to which group participants were assigned, evaluated the bowel preparation of all participants using the Boston Bowel Preparation Scale (BBPS).

Results: The experimental group showed a statistically significant higher mean score on the BBPS than the control group (p=0.049). The BBPS score for the colon and rectum as a whole of the experimental group was 7.21 ± 1.80 and for the control group was 6.29 ± 2.08.

Conclusion: The addition of abdominal vibration stimulation can improve the quality of bowel preparation in patients undergoing screening and surveillance colonoscopy.

Keywords: colonoscopy, bowel preparation, abdominal vibration stimulation

Introduction

Colorectal cancers are the third most commonly diagnosed forms of cancer in men and the second most common in women. Sixty percent of cases occur in developing countries, and the incidence of the disease exhibits regional variations[1]. The American Cancer Society reports that, in the United States of America, one in 23 men and one in 26 women may develop colorectal cancer at some time in their life[2]. Colonoscopy is the most widely accepted procedure worldwide for assessing the colon and detecting polyps and establishes the international standard for diagnosis of colon diseases. Therefore, it offers an alternative for colorectal cancer screening in the general population and is the only examination that facilitates colorectal cancer surveillance in risk groups. This method relies on viewing images inside the colon so it requires thorough preparation of the bowel for optimal examination[3].

Poor bowel preparation prolongs procedure time and increases the need for sedative medication[4]. Consequently, patients require repeat examinations, which leads to delays in screening for disease, particularly colon cancer, and results in post-endoscopy complications such as abdominal pain and intestinal perforation[5].

Walking exercise, at least 3000 steps, during bowel preparation can improve bowel clearance. Noh et al.[4] used the Boston Bowel Preparation Scale (BBPS) to compare bowel clearance in patients who undertook conventional walking exercise with bowel clearance in patients who received abdominal vibration stimulation and found that vibration achieved similar results to walking – BBPS score for the entire colon for vibration was 7.38±1.55 and for walking was 7.39±1.55 (p=0.297)[4]. Therefore, a method should be developed that provides a similar effect as that of walking exercise for patients unable or unwilling to perform walking exercise.

Research findings have indicated that using abdominal massage and whole-body vibration therapy can help relieve severe constipation. Physical massage of the abdomen and whole-body vibration therapy increases bowel movement resulting in reduced constipation symptoms and alleviated abdominal distension[6,7]. Studies have also found that abdominal vibration stimulation with a slimming belt can enhance gastrointestinal function, reduce transit time inside the colon and relieve constipation in elderly patients[4]. Therefore, we hypothesised that abdominal vibration stimulation may improve bowel cleansing in preparation for colonoscopy.

Aim

The aim of the research was to compare the quality of bowel preparation in colonoscopy patients who received abdominal vibration stimulation in combination with usual bowel preparation and colonoscopy patients who received only the usual bowel preparation.

Hypothesis

Patients undergoing colonoscopy who receive the abdominal vibration stimulation program in combination with usual bowel preparation will have better quality of bowel preparation than patients who receive only the usual bowel preparation.

Methods

Study design

This study was performed as a single-centre, randomised, controlled trial. General surgeons evaluated the bowel preparation of all participants using the Boston Bowel Preparation Scale (BBPS) and were blinded to whether participants were assigned to the experimental or control group.

Participant selection

The participants were recruited on a voluntary basis. The population included male and female patients aged between 18 and 80 years who had been pre-scheduled by a doctor for a colonoscopy.

Inclusion criteria

The inclusion criteria for the participants were enrolled patients who had indications and a doctor's referral for a diagnostic colonoscopy to detect colorectal cancer, lower gastrointestinal bleeding or inflammatory bowel disease; evaluate acute and chronic diarrhea, chronic constipation or unexplained abdominal pain, and intervene after abnormal radiological examination results for ablation or removal of foreign bodies from the colon.

Exclusion criteria

The exclusion criteria were allergy to laxatives, allergy to sodium phosphate (Swiff, Xubil), body mass index (BMI) more than or equal to 35 kg/m^2, bedridden status, pregnancy, obstruction of the colon or suspected obstruction determined by a doctor's diagnosis, history of pelvic cancer, history of colon surgery (except appendectomy) and physical examination showing palpation of a lump in the abdomen

or suspected presence of abdominal aneurysm by the doctor performing the examination.

Withdrawal criteria

The withdrawal criteria were cancellation of the colonoscopy by the doctor performing the examination, and not receiving a complete evaluation of bowel cleansing from the general surgeon. Complete evaluation included evaluation of all three parts of the colon – the left colon, transverse colon and right colon.

Study procedure

Control group

One day before the colonoscopy

The day before their colonoscopy, the nurse on duty assessed participants through collection of health information and gave them standard practical advice in preparation for the colonoscopy. The researcher then recorded personal information from medical records and interviews, and the nurse at the surgical unit recommended the standard practice of preparing for the examination with pamphlets and educational videos.

Participants were advised to drink water and take a sodium phosphate laxative. A total of 90 ml of laxative was divided into two doses of 45 ml each, given at 6:00 pm and 10:00 pm. Participants drank 1000 ml of water with each laxative dose.

Day of the colonoscopy

On the day of the colonoscopy, participants waited for their appointments and received usual care from the nurse on duty. At 6.30 am, the nurse in the surgical unit took participant's blood to monitor electrolytes after taking the laxative.

Experimental group

One day before the colonoscopy

Participants in the experimental group received the same care as participants in the control group and the researcher recorded personal information from medical records and interviews. In addition to the usual bowel preparation of water and sodium phosphate laxative, participants in the experimental group received abdominal vibration stimulation with a slimming belt set at 50–100 Hz (slimming belt level 2–4) in three rounds of ten minutes each with 20-minute breaks between rounds – total of 70 minutes, from 7.00 pm to 8.10 pm. To prevent nausea, vomiting or choking on the laxatives remaining in the stomach[4], abdominal vibration started one hour after taking the first laxative dose, to allow participants time to excrete and clear the intestines first.

Day of the colonoscopy

Participants in the experimental group received the same care as participants in the control group. In addition to electrolyte monitoring, participants in the experimental group received abdominal vibration stimulation once again, as on the previous evening, in the surgical unit from 7.00 am until 8.10 am.

All participants

A pedometer watch was used to check the number of steps walked by all participants. The data indicated that the number of steps were not different between the experimental group and control group.

After the colonoscopy, the general surgeon who performed the procedure assessed the cleanliness of the colon of all participants by using the BBPS.

Study outcomes and data collection instruments

The primary outcome was adequacy of bowel cleansing which was assessed using the BBPS. The BBPS scores of the experimental and control groups were compared. Information was collected by the researchers via interviews with the patients. The screening instrument was the Thai version of Mini-Cog, which screens for elderly people with cognitive impairments. Mini-Cog consists of two parts – Part 1 is a short-term memory test and Part 2 is an executive function test. In this study, the instrument was only used with patients over 60 years of age. If the total score was greater than or equal to three, it meant that there was no cognitive impairment[8].

Personal data for each participant was collected by the researchers from interviews and medical records using a personal data record form. The form had two parts – Part 1: General records and Part 2: Records of injury/illness, treatment regime and practice during the colonoscopy.

BBPS scores were recorded for each participant by the surgeon performing the colonoscopy using the version of the BBPS that has images showing the cleanliness of bowel preparations. Scores were given for cleanliness at three sites – the left colon and rectum, the transverse colon and the right colon. Cleanliness was rated using a scale ranging from 0 to 3 where a higher score was given for greater cleanliness. The scores for all three sites were combined giving a total score for the colon and rectum as a whole with a maximum of nine points. Total BBPS scores of greater than or equal to six were considered to correspond to adequate bowel cleansing[9]. This BBPS was used for assessment during each examination for every patient participating in the

study. The general surgeons who performed the colonoscopy were blinded concerning assignment to the experimental or control group.

Sample size

The sample size was calculated based on the effect size values of a previous study by Noh et al.[4] finding that, when comparing colorectal cleanliness scores between the groups receiving and not receiving the abdominal vibration stimulation program, the mean standard deviation of the bowel cleanliness scores were 7.38±1.55 and 6.17±1.15, respectively. The effect size was calculated with the G*Power 3.1 program by using the mean and standard deviation values to obtain an effect size of 0.887, whereby Power=0.95 and α=0.05, to obtain a total sample size of 70 people. Furthermore, to prevent data loss during data collection, 20 per cent was added to the sample size for an increase to a total of 84 cases divided into intervention and control groups of 42 each (see Figure 1).

Random allocation

The participants were randomly divided into two groups using simple random sampling. A table

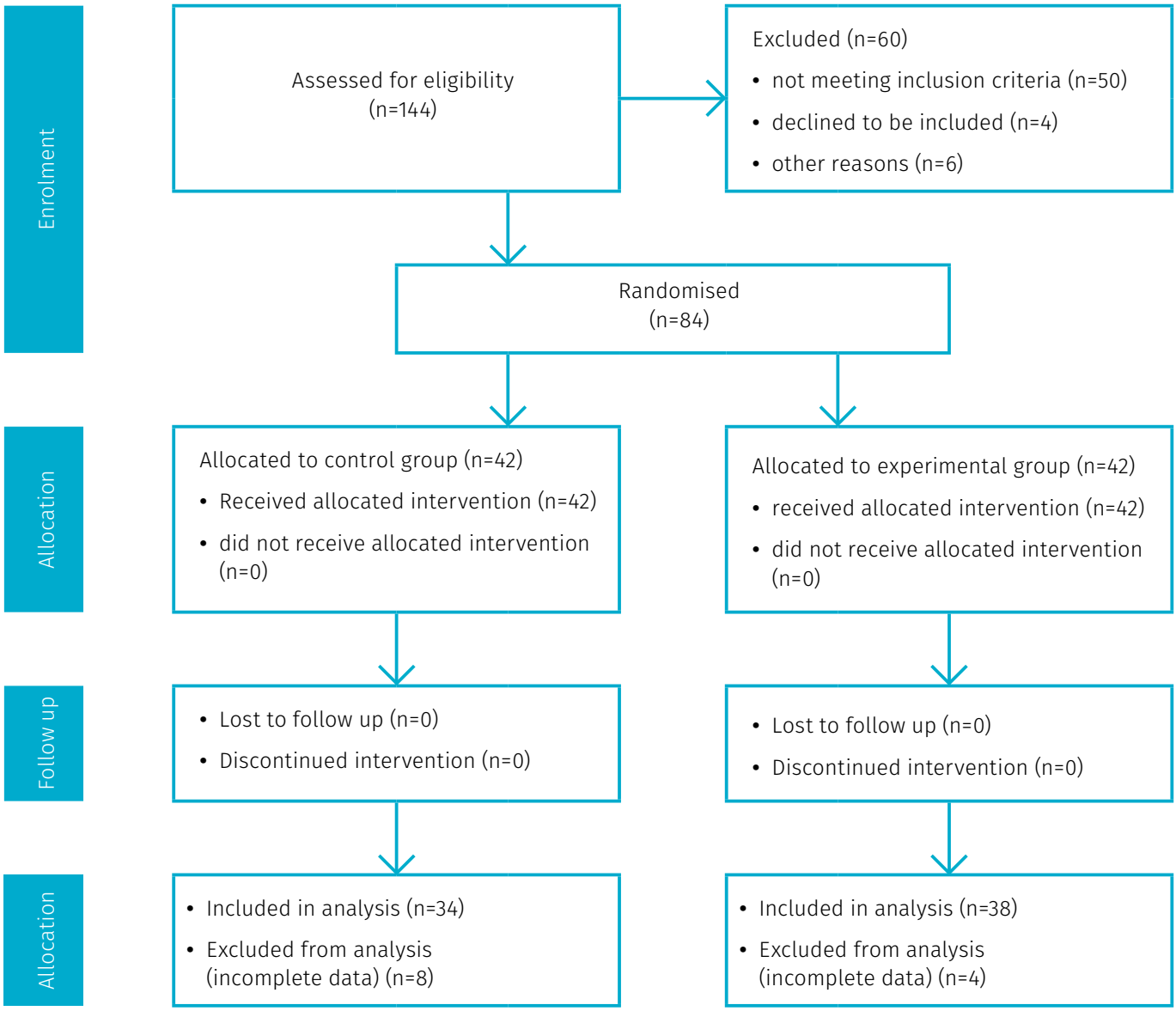

Figure 1: Consort diagram

of random numbers from 1 to 84 was generated by computer to identify participants to be in the experimental and control groups, and the numbers were placed in envelopes. The 42 participants in the experimental group received the abdominal vibration stimulation and usual bowel preparation, and the 42 participants in the control group received usual bowel preparation only.

Statistical analysis

This research was analysed using a statistical computer program package, the SPSS (Version 18), with a significant level for hypothesis testing at 0.05. The following personal information was analysed: general information and information on illness/injury, treatment regime and practice during the colonoscopy. Descriptive statistics were used to describe the variable characteristics of the samples, including frequency, percentage and median distributions to analyse and compare variances in personal data between the experimental and control groups. Nominal data was tested by chi-square testing or Fisher's Exact Test, and statistical differences in median cleanliness of bowel preparations between the experimental and control groups was compared using Mann-Whitney U test.

Ethical considerations

This study was approved by the Institution Review Broad, Faculty of Nursing and Faculty of Medicine Siriraj Hospital, Mahidol University (MU-MOU CoA: No. IRB-NS2022/677.2803) on 28 March 2022. The Thai Clinical Trials Registry identification number is TCTR20230202005.

Results

1. Baseline characteristics

The participant group consisted of patients who had been scheduled for elective colonoscopy that was planned by a doctor in advance. The participant group included 84 participants aged from 18 to 80 years who were divided into two equal groups with 42 patients in the experimental group and 42 patients in the control group. The researcher removed 12 participants because they had not been assessed for cleanliness of all three parts of the colon, either due to risk from the examination or because they were not fully assessed. Consequently, 72 patients participated in the research study – 38 in the experimental group and 34 patients in the control group (see Figure 1).

Table 1 shows data for the following characteristics: age (years), gender, BMI, presence of diabetes mellitus and hypertension, history of constipation according to Rome IV criteria, history of laparotomy/laparoscopy, regular medications, indication for colonoscopy, numbers of steps per day, time to first bowel movement (minutes), timing of colonoscopy after last laxative, cecal intubation success, time to cecal intubation (minutes), total procedure time (minutes) and findings of colonoscopy. Apart from presence of hypertension, there were no statistically significant differences between the two groups.

2. Adequacy of bowel cleansing

Table 2 shows the median total BBPS scores for the colon and rectum as a whole, the median BBPS scores for the three sections of the colon and the number of participants who were rated as having excellent bowel preparation (total BBPS score of 8 or 9). The median BBPS scores of the experimental and control groups were compared using the Mann-Whitney U test.

Statistically significant differences were found in the total BBPS scores for the colon and rectum as a whole, (p=0.049*) and in the left colon (p=0.008). However, no statistically significant differences between the groups were found in quality of bowel preparation of the right colon (p=0.364) and transverse colon (p=0.102).

The total BBPS scores in the control group ranged from 1 to 9 with a median of 6. The total BBPS scores in the experimental group ranged from 2 to 9 with a median of 7. A score of 6 or 7 means good bowel preparation, a score of 8 or 9 is considered to mean excellent bowel preparation. More participants in the experimental group had scores indicating excellent bowel preparation than in the control group (22 (58%) and 13 (38%), respectively) but this difference was not statistically significant (p=0.096).

Discussion

In Thailand, colorectal cancer is the fourth most common cancer – after liver, lung and breast cancers – with 11496 new cases per year and a mortality rate of 6845 cases per year. Screening and prevention by removing colon polyps during the early stages of the disease significantly decreases the mortality rate for colorectal cancer. Therefore, it is useful to know the risk factors for developing the disease so screening can be targeted to various groups[10]. Furthermore, certain factors – including age, obesity, hypotensive medications, some bowel conditions and mobility limitations – may affect the efficacy of bowel preparation programs.

Table 1: Participant characteristics and endoscopic findings

		Experimental group (n=38)	Control group (n=34)	p-value
Age in years (mean ± standard deviation)		61.8 ± 8.6	63.2 ± 11.7	0.559
Gender	Female	22 (58%)	17 (50%)	0.502
	Male	16 (42%)	17 (50%)	
Body mass index (mean ± standard deviation)		22.5 ± 4.0	22.7 ± 3.6	0.859
Diabetes mellitus		3 (8%)	8 (24%)	0.101
Hypertension		13 (34%)	22 (65%)	0.010*
Constipation**		20 (53%)	13 (38%)	0.221
Previous laparotomy/laparoscopy		9 (24%)	11 (32%)	0.412
Current opioid user		0	1 (3%)	0.472
Indication for colonoscopy	bleeding per rectum	21 (55%)	11 (32%)	
	bowel habit change	6 (16%)	8 (24%)	
	abdominal pain	4 (11%)	3 (9%)	
	constipation	6 (16%)	3 (9%)	
	colorectal cancer screening	1 (3%)	9 (27%)	
Number of steps walked during mechanical bowel preparation (median and interquartile range)		798 (625–1270)	853 (472–1788)	0.437
Time to first defecation after completion of sodium phosphate in hours (mean ± standard deviation)		1.2 ± 0.7	1.2 ± 1.0	0.823
Time to colonoscopy after completion of sodium phosphate in hours (mean ± standard deviation)		14.7 ± 2.1	15.0 ± 2.0	0.495
Successful cecal intubation		38 (100%)	33 (97%)	0.472
Time to cecum intubation in minutes (mean ± standard deviation)		25.0 ± 10.3	25.6 ± 11.1	0.817
Total endoscopic examination in minutes (mean ± standard deviation)		38.7 ± 12.8	40.2 ± 13.6	0.640
Endoscopic findings	normal appearance	18 (47%)	14 (41%)	
	colorectal neoplasms	6 (16%)	16 (47%)	
	haemorrhoids or rectal prolapse	8 (21%)	2 (6%)	
	diverticular disease	4 (11%)	2 (6%)	
	colitis	2 (5%)	0	

** p-value < 0.05*
*** According to Rome IV criteria*

The incidence of colorectal cancer has been found to increase with age after the age of 40 years whereby those aged 60 to 79 are fifty times more likely to be at risk than those aged under 40[10]. In addition, complications related to bowel preparation regimens may also be increased in the elderly[11]. Participants in this study were aged between 60 and 80 years of age, with a median age of 62.5 years, so may have had a higher risk of complications related to bowel preparation. However, there was no statistical difference between the ages of participants in the control and experimental groups.

The participants in this study had BMIs in the normal range of 18.5 to 22.9 kg/m^2. According to a study by Soltani et al.[12], high BMI is associated with colorectal cancer. Obesity has also been associated with multiple gastrointestinal disorders including colon polyps and colon cancer. In addition, a high BMI (>30 kg/m^2) is associated with inadequate bowel preparation[13]. Only participants with a BMI less than 35 kg/m^2 were included in our study; therefore, inadequate bowel preparation due to obesity was unlikely.

Medications for hypertension may affect gastrointestinal mobility and therefore have an impact on bowel preparation[13]. There were more participants with hypertension in the control group of our study than in the experimental group (22 (65%) and 13 (34%), respectively) and this may have affected bowel preparation.

Certain bowel conditions may lead to difficult and risky bowel preparation. The indications for colonoscopy in the participants in our study included rectal bleeding (in 21 participants (55%) in the experimental group and 11 participants (32%) in the control group), change in bowel habit (in six participants (16%) in the experimental group and eight participants (24%) in the control group) and colorectal cancer screening (in one participant (3%) in the experimental group and nine participants (27%) in the control group).

Table 2: Quality of bowel preparation using Boston Bowel Preparation Scale (0 = worst, 9 = best)

	Experimental group (n=38) mean ± standard deviation	Control group (n=34) mean ± standard deviation	p-value
Total BBPS score	7.21 ± 1.80	6.29 ± 2.08	0.049*
BBPS score for right colon	2.03 ± 0.79	1.85 ± 0.82	0.364
BBPS score for transverse colon	2.47 ± 0.69	2.18 ± 0.83	0.102
BBPS score for left colon and rectum	2.71 ± 0.61	2.26 ± 0.75	0.008*
Number of participants with excellent bowel preparation**	22 (58%)	13 (38%)	0.096

* p-value < 0.05
** Total BBPS score of 8 or 9

The endoscopic findings of participants' colonoscopies included colorectal neoplasms (in six participants (16%) in the experimental group and 16 participants (47%) in the control group), haemorrhoids or rectal prolapse (in eight participants (21%) in the experimental group and two participants (6%) in the control group) and diverticular disease (in four participants (11%) in the experimental group and two participants (6%) in the control group). The higher number of colorectal neoplasms in the control group, may have resulted in more difficult bowel preparation in the control group[14]. However, the endoscopic finding for nearly half the participants in both groups was normal appearance (18 participants (47%) in the experimental group and 14 participants (41%) in the control group). We found that the results of bowel preparation in the experimental group, who received abdominal vibration stimulation, were significantly better than the control group.

The number of steps taken by participants in our study ranged from 472 to 1788, with a median of 816 steps. This is fewer steps that the recommended 3000 and is due to limited space available for participant physical activity in the hospital. The median number of steps taken by participants in the experimental group was 798 (IQR 625–1270) while the median number of steps taken by participants in the control group was 853 (IQR 472–1788). This difference is not statistically significant (p=0.437) so walking is unlikely to have affected bowel preparation in our study. This is consistent with a study by Noh et al.[4] who compared the effect on bowel

preparation of walking a minimum of 3000 steps and abdominal vibration stimulation – the median number of steps taken by participants in the control group was 634 steps.

The results of this study indicate that abdominal vibration stimulation might improve the quality of bowel preparation in patients undergoing inpatient colonoscopy; this could be because the abdominal vibration stimulation affects autonomic neurological mechanisms. Vibrations from the slimming belt are effective for colon function at 50–100 Hz through the abdominal wall. Parasympathetic induction of the gastrointestinal tract stimulates colon motility and relaxation of the sphincter; thus, faecal matter stuck in the lining of the colon is excreted. According to pathophysiological concepts, this resulted in the differences between the experimental group and the control group, as bowel cleansing using laxatives only relies solely on physical mechanisms and may be insufficient for good bowel preparation[4].

The use of abdominal vibration stimulation, whether delivered by an instrument or by human massage, in combination with laxatives can improve the quality of colon function[4]. Although both methods have limitations, using a slimming belt is the most suitable option for modern nursing contexts as it is easily available, not expensive, easy to use, safe for patients and meets international standards. It facilitates the provision of quality nursing care with less labor. However, there may be side effects from using a slimming belt – one patient in our study reported mild itching of the abdominal skin after using the belt.

In our study, the colonoscopy could not be performed on one participant in the control group due to a large amount of residual faecal matter. If the colonoscopy had been performed, there would have been a risk of intestinal perforation from obstruction of faeces inside the colon; therefore, re-preparation of the colon was required. This did not occur in the experimental group.

In conclusion, the results of this study indicate that the use of the abdominal vibration stimulation in patients undergoing inpatient colonoscopy produces better quality of bowel preparation than the use of laxatives alone.

Limitations

The limitations of this study include that it was conducted in a single centre and random allocation of participants into experimental and control groups may have resulted in uneven distribution of certain bowel conditions and other characteristics in the two groups. In addition, there are no guidelines for duration of abdominal vibration stimulation with a slimming belt. Noh et al.[4] used abdominal vibration stimulation for between 30 and 80 minutes and reported no significant difference in BBPS scores between different durations. In our present study, therefore, participants received abdominal vibration stimulation for a total of 60 minutes in six rounds or of ten minutes each.

Conclusion

Abdominal vibration stimulation appears to provide positive outcomes for the quality of bowel preparation in patients who undergo colonoscopy screening and surveillance.

Knowledge translation

This study found that participants in the experimental group had better quality of bowel preparation than the control group. Both groups were allowed to walk normally and neither group walked the 3000 steps that is recommended for improving bowel preparation. It can be concluded, therefore, that abdominal vibration stimulation can be used in patients who are unable or unwilling to walk and patients with limited mobility. Furthermore, since the participants were aged between 60 and 80 years, the results of this study could be used as a guideline for developing and planning bowel preparation in adult and elderly patients undergoing colonoscopy. A program may also be developed for outpatient colonoscopy.

Conflict of interest and funding statement

The authors declare no conflicts of interest.

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Nurses' perceptions of artificial intelligence (AI) integration into practice: An integrative review

Abstract

Introduction: The integration of artificial intelligence (AI) technologies into health care is revolutionising nursing practice, substantially impacting patient care, clinical decision-making and health system efficiency. This integrative literature review explores the perceptions, attitudes and concerns of nurses regarding the use of AI use in clinical settings.

Review methods: A comprehensive literature search was undertaken using Health Source: Nursing/Academic Edition, EBSCO: MEDLINE Complete, CINAHL and Scopus. Search terms included 'artificial intelligence', 'AI', 'A.I.', 'machine learning', 'nurse' and 'nursing practice, and 'opinion', 'idea', 'insight', 'perspective', 'concern' and 'perception'. The terms were combined using Boolean operators (AND, OR) to refine the search. 'Citing forward' was also used in Scopus to search for newer literature that was relevant to the topic.

Discussion: Findings reveal that AI technology capabilities, such as predictive analytics and robotic automation, are viewed positively for their potential to enhance workflow efficiency and improve patient outcomes. However, nurses show concerns about ethical implications for data privacy, and the potential deskilling of human expertise. The review emphasises the need for comprehensive training programs, strong organisational support and an innovative culture to facilitate the successful use of AI in nursing practice.

Conclusion: Future directions stress the significance of AI competency, collaboration and continuous education to prepare nurses for their progressing practice in a technologically advanced health care environment. Appreciating the importance of these factors is vital for promoting a collaborative and innovative atmosphere, enabling nurses to effectively and efficiently utilise AI to improve patient care and advance the nursing profession.

Keywords: artificial intelligence, machine learning, deep learning, perspective, nursing practice

Introduction

The integration of artificial intelligence (AI) technologies into different workplace disciplines has helped improve systems, decision-making and outcomes[1]. Health care workers, one of the important workforces of today, stand poised for significant evolution with the use of AI technologies[2]. Nurses, as the frontline of health care, play a significant role in delivering effective and quality patient care, and are vital to the successful implementation and use of AI technologies in clinical settings. According to Sarker[3], AI has a spectrum of technologies, including predictive analytics, machine and deep learning, natural language processing and robotics. In the context of health care, Lindroth et al.[4] suggest that these technologies have vast potential to support clinical decision-making, boost

efficiency and improve patient outcomes. From predictive analytics to robotics, AI systems hold the potential to streamline workflows, reduce errors and personalise patient care.

Understanding nurses' perspectives of AI adoption is vital because this will facilitate successful implementation of these technologies. This integrative literature review, including qualitative, quantitative and mixed methods research, sought to unravel and analyse existing research on nurses' perspectives of AI integration, with a focus on recognising their perceptions, concerns and attitudes towards integrating AI systems into practice. By investigating the present-day status of AI adoption in health care, identifying common themes and concerns among nurses, this review aims to deliver valuable information for health care leaders, policymakers, educators and researchers.

Review methods

A comprehensive literature search was undertaken using Health Source: Nursing/Academic Edition, EBSCO: MEDLINE Complete, CINAHL and Scopus. Search terms included 'artificial intelligence', 'AI', 'A.I.', 'machine learning', 'nurse' and 'nursing practice, and 'opinion', 'idea', 'insight', 'perspective', 'concern' and 'perception'. The terms were combined using Boolean operators (AND, OR) to refine the search. 'Citing forward' was also used in Scopus to search for newer literature that was relevant to the topic.

Literature that discussed nurses' perceptions, concerns and attitudes towards AI use were eligible for inclusion in this review. Studies of AI in the context of allied health and other medical professionals not directly related to nursing practice were excluded. Only peer reviewed articles that were published in English from 2019 to 2024 were included. Systematic reviews, literature reviews, study protocols, scoping reviews and grey literature were excluded in this review.

Quality appraisal

Primary research studies were appraised using the EQUATOR Network. Research was assessed using the appropriate methodological tool. For example, GRAMMS for mixed-method study designs, TREND for quasi-experimental studies, CONSORT for randomised clinical trials, STROBE for observational studies and SRQR for qualitative studies.

Results

A total of 202 studies were initially retrieved. Following review of titles and abstracts, articles that did not meet the inclusion criteria were removed, as were duplicate papers. A total of 22 articles were included in the review – six observational studies, nine qualitative studies, two mixed-method studies, three quasi-experimental studies and two randomised control trials. Research papers originated from the United States of America (5), the United Kingdom (4), Singapore (4), Turkey (4), China (1), Denmark (1), South Korea (1), the Philippines (1) and Taiwan (1). One Australian editorial piece was also used to provide Australian and perioperative-specific content.

Discussion

The included research papers were read and reread until no further themes could be identified. Five themes were highlighted through thematic analysis – 'current landscape of AI adoption in health care', 'nurses' perceptions of AI', 'concerns about and barriers to AI adoption', 'implications for all nurses including the perioperative workforce' and 'future directions and implications'. Robust information was used to support these themes in relation to the perspective of nurses on the integration of AI in nursing practice. This discussion will be presented in sections corresponding to the five detected themes.

Current landscape of AI adoption in health care

The adaptation of AI into health care systems has dynamically evolved, offering a wide option of applications aimed at improving operational efficiency, clinical decision-making and, most importantly, patient outcomes[1]. Lee and Yoon[5] affirm that AI technologies are being used to mitigate diverse challenges and provide opportunities in a range of health care settings, from diagnosis and treatment to administrative works and health management.

One promising capability of AI is clinical decision support systems (CDSS). In their qualitative study, Sandhu et al.[6] found that physicians and nurses were positive about the value of a machine learning early warning system for sepsis, and that CDSS helped nurses to make data-driven decisions regarding diagnosis, treatment plans, medication management and risk stratification related to sepsis. Yahagi et al. conducted a randomised control trial (n=100) that compared the effect of an AI chatbot (ChatGPT) with standard information from anaesthesia nurses on surgical patients' pre-operative anxiety. Participants in the experimental group interacted with ChatGPT which personalised patient education based on the patient's response. The researchers reported statistically significant (p=0.001) reduction in pre-operative anxiety in the Chat GPT group compared to the control group[7].

Robotic process automation (RPA) is another technology increasingly being applied in many sectors, including health care[8]. Health

care providers use RPA to perform multiple repetitive administrative operations and duties, ranging from scheduling appointments to processing bills and entering data. A quasi-experimental study of paediatric nurses (n=43) by Karaarslan et al.[9] reported a positive attitude towards robotic automation, and that nurses perceived that AI integration would have the potential to reduce the general administrative burden on staff, allowing them to devote more time to direct patient care, enhancing health care professional efficiency and satisfaction.

Nurses' perceptions of AI

A study by Castagno and Khalifa[10], emphasised that understanding nurses' perceptions of AI is important to the success of AI technologies and their adoption in nursing practice. Nurses are considered the first line of health care workers who provide patient care; therefore, their understanding of the practical implications and the benefits and challenges of adopting technology will be valuable[11]. So far, research into nurses' perception of AI technologies has identified a spectrum of attitudes and viewpoints[10]. Ergin et al.[12] reported that while some nurses are excited by the potential AI offers –improving clinical decision-making and enhancing workflow efficiency leading to better patient outcomes – others appear to have reservations or even be sceptical about the advancement of AI in nursing practice and patient care.

One of the perceived uses of AI technologies is supporting nurses to complete tasks and help with delivery of care. A mixed-method study by Jauk et al.[13] found an overall positive perception of the potential for predictive analytic models to identify delirium, anticipate clinical deterioration and prioritise interventions for an increase in patient safety and quality care. The nurses who participated in the study acknowledged the usefulness of support systems powered by AI to provide timely evidence-based recommendations pertaining to diagnosis, planning of treatment and medication management.[13]

Another factor contributing to nurses' perception of the adoption of AI is ease of use and user experience.[14] According to Yoo et al.[14], it is accepted that AI systems are easy to use if they can be integrated easily into the workflow, are intuitive to use and require manageable training to incorporate in practice. Providing necessary feedback by user interfaces in real time, as well as self-customisation, will foster the use and adoption of AI-driven solutions in the clinical practice of nurses.

A qualitative study by Petitgand et al.[15] suggested that apprehension from nurses may also be focused on the possibility that these AI technologies may take over or reduce human expertise and intuition in nursing practice, thereby interfering with the proper balance between automation and the human touch in the delivery of patient care. Therefore, appreciation of organisational factors, such as leadership support, resource allocation and workplace culture, is essential in influencing nurses' attitudes toward AI adoption.

Consequently, according to Ali Mohamad et al.[16] health care organisations that value innovation, invest in training and education, or have a culture of collaboration and empowerment will find nurses in their workforce positively disposed to AI. A mixed-method study by Liaw et al.[17] reported positive responses from participants who underwent nurse education using AI-enabled simulation indicating the potential value of educational interventions and training programs that promote corrective strategies for the existing knowledge gaps, misconceptions and concerns among nurses regarding the integration of AI. Such interventions will provide an opportunity for gaining practical experience and acquiring skills and experience in interdisciplinary collaboration that will empower nurses to harness all potentials of AI technologies in practice and contribute toward the present quality improvement effort.

Concerns about and barriers to AI adoption

There is significant potential to improve the delivery of health care and patient outcomes with AI[11]; however, many concerns about and barriers to integrating the technology into nursing practice exist. It is important to identify and understand those challenges to address the risks and ensure responsible implementation of AI technologies in nursing workflows in the most effective manner.

Maintaining privacy and security is vital to how AI is used in health care. Uymaz et al.[18] found that nurses were positive about using AI nurses with outpatients with chronic diseases. However, the researchers also noted that 'apprehensions regarding the privacy of personal data and information are widespread'[18 p.16]. Data breaches, unauthorised access and inappropriate use of sensitive health information point to the need for strong safeguards and encryption protocols adhering to regulatory standards.

Nurses are also concerned about how AI is developed and utilised. A qualitative study by van der Gaag et al.[19] explored nursing regulators'

perceptions of AI and reported that nurses have ethical concerns about algorithmic bias, fairness and transparency when AI-driven decision support systems influence clinical decision-making and, as a result, patient care outcomes. The unintended consequences of AI include risks of harm, discrimination and erosion of human autonomy and accountability, which underscore the need for ethical frameworks, guidelines and oversight mechanisms to ensure the responsible development and deployment of AI in health care settings[19].

Furthermore, the preparedness of nurses regarding AI technologies will be based on their competency, confidence and familiarity with the use of these tools. Zhang et al.[20] conducted a qualitative study of AI use in the mental health sphere and suggested that limited familiarity with AI concepts, coupled with few opportunities for training and educational resources, may inhibit nurses from optimally using and integrating AI, especially for mental health care. It is therefore necessary to have robust training programs that offer continuing education initiatives and hands-on workshops to prepare nurses with the required knowledge and skills to use AI in nursing practice.

Organisational culture and leadership support are also important factors in the adoption of AI technologies within nursing practice. Quantitative research (n=288) by Huo et al.[21] found that participation of medical staff significantly influenced acceptance of medical AI. In addition, the researchers strongly suggested that an organisation with a culture of innovation, collaboration and learning would be best placed to transcend the current resistance to change, encouraging AI adoption by nursing staff[21]. A study by Haugsten et al.[22] highlighted that a strong leadership commitment, along with the need for effective and clear communication and strategic alignment of AI initiatives with organisational goals, is required to drive a cultural transformation toward a shared vision in health care delivery using AI.

Implications for all nurses including the perioperative workforce

AI technologies can influence nursing practice through various aspects of health care delivery, such as patient care delivery, clinical decision support and optimisation of workflow[18,19]. From support with clinical decisions to predictive analytics and robotic assistance, AI-driven innovations are changing the landscape of nursing practice within perioperative settings. AI-enhanced applications empower nurses with real-time recommendations based on evidence and alerts for making informed decisions at the point of care. Sandhu et al.[6] state that, through analysis of patient data, medical literature and best practice guidelines, support tools will help to identify prospective risks, optimise treatment regimens and predict adverse events, thus improving patient safety, quality of care and clinical outcomes.

Predictive analytic models can help nurses tailor the care plan and intervention for the patient, considering their risk profile, preferences and needs[19]. In a retrospective observational study conducted by Chen et al.[23] data from medical records was used to develop an AI model to predict sepsis or septic shock, respiratory failure and mortality in patients with pneumonia; the researchers then tested the model. The model was based on predictive analytics algorithms which could analyse electronic records, such as medical histories and other sources of health data, and recommend evidence-based care planning, disease management and strategies for health management. Such information may help a nurse shape intervention, monitor change and empower the patient with self-care.

AI technologies enhance the clinical skills and expertise of nurses by accessing current medical knowledge, decision support tools and educational resources. Research by Samala and Rawas[24] supported this notion and suggested that virtual health assistants, chatbots and simulation-based training can help develop competency programs that support the development of skills, consolidation of knowledge and the promotion of lifelong learning in the fields of clinical assessment, diagnostic reasoning and therapeutic interventions.

AI-based technologies will empower patient engagement and satisfaction by offering personalised, responsive and available health care services. A randomised controlled trial by Liaw et al.[25] supported the idea that virtual health assistants, telemedicine platforms and remote monitoring solutions will provide avenues for nurses to reach patients post-operatively. It will also facilitate consistent communication and a care continuum. Therefore, a new cadre of empowered patients should be able to interact with nurses for their health management, care transition and recovery processes.

Future directions and implications

The integration of AI into nursing practice has much potential for the future, from shaping patient care to transforming nursing education and workforce development[26]. As AI continues to grow, there will be more emphasis on AI literacy, digital fluency and interprofessional collaboration in nursing. Bobak et al.[27] highlighted the importance of interprofessional education programs to create a conducive environment of collaboration among the nursing graduate, data scientist, engineer and other stakeholders to prepare nursing graduates to harness the potential of AI technologies in clinical practice for value addition to an interprofessional team.

The nursing profession encourages a culture of lifelong learning, and education and training play an important role in this. A quasi-experimental study by Ergin et al.[8] revealed that participants' knowledge about AI increased after training. Similarly, Abuzaiid et al.[28] concluded that nurses lack understanding of AI and education and training about AI is needed. Health care organisations need to invest in innovation hubs and research centres to ignite a sense of curiosity, experimentation and collaboration among the nursing staff. Thus, empowerment through learning, mentorship and professional development is envisaged to enable nurses to leverage technological advancements for the purpose of manoeuvring a dynamic practice environment and thriving in the digital age

Robert[29] argues that adoption of AI within clinical practice will redefine the role for the nurse, thereby creating new opportunities for specialisation, collaboration and leadership. Advanced practice roles will be better armed by the increased role for data analysts and informaticians in guiding clinical decisions, driving quality improvements and affecting policy with integrated AI technologies[29]. More effective utilisation of nurses within the capabilities of the health team can be realised through models that are team-based in shared decision-making processes and have a care-based approach to collaboration[28].

The future of nursing should be about accepting innovation, disruption and transformation in line with the technological trends that are emerging and the needs of society. Zhai et al.[30] identified barriers to and facilitators of implementation of AI in nursing and concluded that management is important for addressing user resistance, improving usability and enhancing connection between nursing and technical staff.

AI technologies have the potential to streamline perioperative workflows, transform nursing education and provide logistical and administrative support[31]. With an innovation-based mindset, nurses will lead and shape future care delivery and nursing practices.

Conclusion

The integration of AI into all nursing practice specialties presents a revolutionary shift in health care delivery, with wide implications for patient care, nursing education and workforce development. This integrative literature review traversed the multifaceted landscape of AI use in nursing practice, from nurses' perceptions and concerns to the impact on clinical practice and future directions. Nurses' perspectives towards AI implementation reflect a complex variety of factors, including perceived usefulness, ease of use, privacy and security concerns, organisational support and improvement of patient outcomes. Nurses as the frontline of the health care profession, play an essential role in driving the responsible and effective integration of AI technologies into clinical practice.

Quality education programs supporting the introduction and ongoing use of AI will be vital, as will be strong nursing leadership in this area. By assessing and addressing different barriers, concerns and needs, health care organisations can promote a culture of collaboration, innovation and continuous learning that boosts nurses' competence to utilise AI to improve patient care and advance nursing practice.

Declaration of conflicting interests

The authors have declared no competing interests with respect to the research, authorship and publication of this article.

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Investigation of post-operative comfort levels and factors affecting comfort in urology patients

Abstract

Purpose: To examine the post-operative comfort levels of patients who underwent surgery in the urology clinic and investigate the factors that affect post-operative comfort.

Methods: This study is a descriptive, cross-sectional study. The research was conducted in the urology clinic of a university hospital. The sample consisted of 123 participants. Data were collected using the patient identification form, the general comfort questionnaire (GCQ) and the perianesthesia comfort questionnaire (PCQ).

Results: The average age of the participants was 60.96 years (±11.97) and 89 (72.4%) were men. The total mean score for general comfort was 3.05 (±0.38) and for perianesthesia comfort was 4.93 (±0.52). When the correlation between GCQ and PCQ scores was examined, it was found that there was a positive statistically significant relationship between the two ($p<0.01$, $rs=0.572$).

Conclusion: It was determined that the general comfort of the patients was above the moderate level, and their comfort was negatively affected by pain and the presence of urinary catheters.

Keywords: comfort, nursing, post-operative, surgery, urology

Introduction

Surgical treatment can be considered as a controlled trauma that can affect patients physiologically, psychologically and socially. With technological and scientific advances, surgery has been applied for many years as a method of diagnosis and treatment for many conditions[1–4]. The surgical process begins when the patient enters the operating room, continues with anaesthesia procedures and ends when the patient is transferred to the recovery unit or intensive care unit. During surgery, patients may encounter many problems related to anaesthesia and interventions[4]. In various studies, patients have reported pain, nausea and/or vomiting, fatigue and other symptoms in the post-operative period[5–7]. These problems experienced by patients prolong the post-operative recovery period and affect the quality of life and comfort of patients.

Comfort, which is a versatile and complex concept, refers to a state of physical ease and freedom from pain in daily life[8,9]. According to the Turkish Language Association[10], comfort is 'the state of not feeling sadness, uneasiness or distress' or 'leisureliness'. Comfort can holistically be defined as finding peace or relief and meeting the basic needs of individuals when coping with problems. In the nursing literature, this process consists of determining the needs of the patient, family or society, taking necessary measures for meeting these needs, and evaluating the comfort level

after applying those measures[7,9]. Since Nightingale, comfort has been regarded as a goal and desired outcome for quality care in nursing practice. It plays an important role in holistic nursing care together with experience, dimensions or components of a dynamic process, control, quality of life, hope, reconciliation, decision making, pain control and nursing intervention and processes[7,8,11].

According to Kolcaba, who developed the theory of comfort related to health care, comfort is an 'expected result with a complex structure within the physical, psychospiritual, social and environmental integrity to provide help with the needs and problems of an individual'[12, p.14]. Kolcaba continued her studies on the holistic comfort theory for about 15 years, and in 1988 published the taxonomic structure of this theory, which has three levels (relief, ease and transcendence) and four dimensions (physical, psychospiritual, environmental and sociocultural[7,9,12,13].

While providing holistic care to the patient, nurses take the comfort theory as a guide[9,12,13]. In particular, nurses ensure that patients undergoing surgery go through this process comfortably with the help of individualised nursing care practices and planned training for recovery before surgery, after surgery and after discharge[11,14].

Nursing practices, such as mobilising patients soon after surgery, teaching deep breathing and coughing exercises, ensuring controlled transition and appropriate nutrition for the patient, play an active role in preventing the development of post-operative complications, increasing quality of life, ensuring the comfort of the patient and accelerating the healing process[3,4,15].

The aim of the present study was to examine the post-operative comfort levels and investigate factors affecting comfort of patients who underwent surgery in the urology clinic.

Materials and methods

This study was designed as descriptive and cross-sectional research. It was carried out with patients who underwent surgery in the urology clinic of a university hospital in Izmir between July 2019 and January 2020. All patients who underwent surgery at the specified clinics between the specified dates and left the intensive care unit after recovery constituted the population of the study. The study sample consisted of a total of 123 patients over the age of 18 who volunteered to participate in the study and had no communication problems.

The sample size was calculated based on data from a study conducted by Ören[2]. The impact factor was determined with the mean score of the attitude scale in this study. Using the G-Power 3.1 software, 0.35 standard deviation was determined as the smallest effect and the sample size was calculated as a total of 89 patients with 95% power, 95% confidence interval and 0.05 margin of error. Patients with any disease (dementia, psychological disorder etc.) and advanced stage cancer that could affect the patient's thought processes and decision-making ability were excluded from the study. Research data were collected through face-to-face interviews by one of the researchers. The duration of the interviews was 15 to 20 minutes.

Data collection forms were used when patients were able to answer questions after they left the intensive care unit. The data was collected using a patient information form, prepared by the researchers, the perianesthesia comfort questionnaire (PCQ) and the general comfort questionnaire (GCQ).

The patient information form consists of 27 questions about sociodemographic characteristics of the patients and surgical information.

The PCQ was created by Katherine Kolcaba and takes into account the taxonomic structure of comfort – three levels and four dimensions. The Turkish validity and reliability study of the PCQ was carried out by Üstündağ and Aslan who found the Cronbach's alpha value to be 0.83[3]. In the present study, the Cronbach's alpha value was 0.708. The PCQ consists of 24 items, both positive items and negative items that are included in a mixed order. Items are rated using a six-point Likert-type scale with negative items scored in reverse. The highest score that can be obtained is 144, and the lowest score is 24. The average score is determined by dividing the total score by the number of items. The average score is then evaluated on a scale from 1 to 6. A low score indicates poor levels of comfort and a high score indicates good comfort[3].

The GCQ was also developed by Katharine Kolcaba, in 1992, and later adapted into Turkish by Kuğuoğlu and Karabacak in 2008. The GCQ was created based on the taxonomic structure of comfort – three levels and four dimensions. The Turkish validity and reliability study of the GCQ was conducted by Kuğuoğlu and Karabacak who found the Cronbach's alpha value to be 0.85[16]. In the present study, the Cronbach's alpha value was 0.875. The GCQ consists of 48 items, in three sub-dimensions – relief (16 items), ease (17 items) and transcendence (15 items). The

Table 1: Sociodemographic characteristics of participants (N = 123)

Characteristic		n (%)
Age in years (mean±SD) 22–85 (60.96±11.97)	18–65 (young)	78 (63.4%)
	66–79 (middle-aged)	39 (31.7%)
	80–99 (old)	6 (4.9%)
Gender	men	89 (72.4%)
	women	34 (27.6%)
Literacy and education level	illiterate	7 (5.7%)
	literate	16 (13.0%)
	primary school	36 (29.3%)
	high school	41 (33.3%)
	university	23 (18.7%)
Chronic disease status	yes	64 (52.0%)
	no	59 (48.0%)
Smoking status	yes	39 (31.7%)
	no	84 (68.3%)
Alcohol use status	yes	18 (14.6%)
	no	105 (85.4%)
Companion status	yes	117 (95.1%)
	no	6 (4.9%)

SD = standard deviation

questionnaire included both positive items and negative items that are included in a mixed order. Items are rated using a four-point Likert-type scale, with negative items scored in reverse. The highest score that can be obtained from the scale is 192, and the lowest score is 48. The average score is determined by dividing the total score by the number of scale items. The average score is then evaluated on a scale from 1 to 4 where 1 indicates low comfort and 4 indicates high comfort[16].

The SPSS 21.0 program was used to analyse the study data. The Kolmogorov Smirnov test was used to check whether the data was normally distributed. Data was presented using descriptive statistics (number, percentage, mean, standard deviation, median, interquartile range). The Mann Whitney U test, Kruskal Wallis Test and Spearman Correlation Analysis were used to analyse the data. $P < 0.05$ was accepted as statistically significant in all analyses.

Approval from the relevant Scientific Ethics Committee and written permission from the hospital were obtained to carry out the research. In addition, the purpose of the study was explained to the patients before they were enrolled in the study and their written and verbal consents were obtained.

Results

There were 123 participants in the study, aged from 22 to 85 years. The majority were men and had a companion. The sociodemographic characteristics of the patients are listed in Table 1.

In terms of clinical characteristics, 33 (26.9%) of the participants included in the study were diagnosed with a bladder tumour, 101 (82.1%) received information about surgery before the operation, 90 (73.2%) were given general anaesthesia, 64 (52.0%) had open surgery, 122 (99.2%) had planned surgery and 78 (63.4%) had previously undergone surgery.

In terms of post-operative problems, it was determined that 94 (76.4%) of study participants did not experience nausea and/or vomiting, whereas 74 (60.2%) experienced pain after surgery. The majority of participants (107, 87.0%) stated that they started walking after the surgery, and 115 (93.5%) stated that they started to eat. In addition, it was found that 67 (54.5%) of the participants had a urinary catheter at the time of the interview.

Table 2 shows the distributions of the mean scores for overall GCQ and PCQ, and the mean scores for the four dimensions assessed by the GCQ (physical, psychospiritual, environmental and sociocultural). The mean overall GCQ score of the participants was 3.05 (±0.38), indicating that their general comfort was above the moderate level. Of the four GCQ dimensions, the physical was found to have the lowest score (2.75 ±0.37). In addition, it was found that the mean PCQ score of the patients was 4.93 (±0.52).

Table 3 shows the median comfort scores obtained for the two questionnaires in relation to certain participant characteristics and variables. It was determined that

Table 2: General comfort questionnaire and perianaesthesia comfort questionnaire scores

Questionnaire		Mean score (±SD)	Range of scores
GCQ overall score		**3.05 (±0.38)**	**2.00–3.71**
GCQ dimensions	physical	2.75 (±0.37)	1.67–3.42
	psychospiritual	3.42 (±0.45)	2.46–4.00
	environmental	2.93 (±0.61)	1.38–3.92
	sociocultural	3.06 (±0.35)	2.20–4.00
PCQ overall score		**4.93 (±0.52)**	**3.50–5.79**

SD = standard deviation

age (GCQ p = 0.174, PCQ p = 0.601), gender (GCQ p = 0.118, PCQ p = 0.675) and type of surgery (GCQ p = 0.528, PCQ p = 0.254) did not affect comfort levels. However, post-operative pain and catheter presence were found to reduce comfort levels assessed using the GCQ (p = 0.003 and p = 0.001, respectively). Correlation analysis showed that there was a moderate positive correlation between GCQ and PCQ scores (p<0.01, rs=0.572).

Discussion

While surgical procedures are used in diagnosis and treatment to save lives, complications that may develop and other problems inherent in this process can disrupt the comfort of patients[5,17]. During the surgical process, nursing practices play an important role in providing individualised care to meet patients' needs and ultimately increase patient comfort by creating a safe environment that allows patients to relax[4,9].

In the present research, two questionnaires were used to examine the comfort levels of the patients – the GCQ and the PCQ. We found the mean GCQ score was 3.05 (±0.38) and the mean PCQ score was 4.93 (±0.52). The mean GCQ scores obtained in the present research are above the general average reported in the literature. Üstündağ[18] examined the comfort level of patients who underwent coronary artery bypass graft surgery and reported that the mean GCQ score was 3.33 (±0.24), and Ören[2] reported that the mean GCQ score was 2.89 (±0.32). On the other hand, the mean PCQ scores are consistent with the literature. Üstündağ[18] reported that the mean PCQ score was 5.06 (±0.50), while Ören[2] reported that the mean PCQ score was 4.96 (±0.56). Similarly, Yilmaz et al.[4], Sönmez[19] and Gürçayır and Karabulut[20] reported mean PCQ scores of 4.26 (±0.58), 5.17 (±0.5) and 4.93 (±0.66), respectively.

Bakır and Yurt[11] evaluated the post-surgical comfort level of patients in all surgical clinics and reported that the overall comfort of patients in the urology clinic was lower than that of other clinics and lower than the average for all clinics. Furthermore, the score for the physical dimension of comfort in urology patients was lower than the scores for the other three dimensions. The present research, with the study sample consisting solely of urology patients, was consistent with this finding – the physical comfort score was 2.75 (±0.37) which is lower than the scores for the other dimensions.

Physical comfort includes factors that affect physical condition such as relaxation, rest, patient's response to illness and trauma, homeostasis, patient's nutritional status and continuity of bowel function[7,21]. In this context, the low physical dimension scores in urology patients found in both studies indicate that urology surgeries negatively affect patient comfort. Furthermore, painful procedures such as urinary catheters are more frequently performed and may be among the factors that negatively affect patient comfort.

In the present research, no significant difference was found between GCQ and PCQ scores with respect to patient characteristics such as age, gender, education level, chronic disease status and smoking or alcohol use. Other studies in the literature also reported that patient characteristics such as age, education level and chronic illness have no effect on comfort level[1,2,20,22].

Üstündağ[18] found no statistically significant relationship between patient characteristics and PCQ, but a significant difference was found in GCQ scores with respect to gender and education level. In addition, Üstündağ[18] reported that the overall comfort level of male patients was higher, and the overall comfort score

Table 3: Correlation of comfort scores with certain variables (N = 123)

Characteristic/variable		n	General comfort questionnaire scores		Perianaesthesia comfort questionnaire scores	
			Median (IQR)	Statistical test result	Median (IQR)	Statistical test result
Age in years	18–65 (young)	78	3.06 (2.69–3.27)	X^2 = 3.502 p = 0.174	5.02 (4.49–5.42)	X^2 = 1.019 p = 0.601
	66–79 (middle-aged)	39	3.19 (2.98–3.38)		5.04 (4.67–5.25)	
	80–99 (old)	6	3.17 (2.96–3.36)		4.71 (3.84–5.42)	
Gender	men	89	3.19 (2.73–3.33)	z = –1.562 p = 0.118	5.04 (4.50–5.29)	z = –0.419 p = 0.675
	women	34	3.06 (2.79–3.25)		4.94 (4.66–5.42)	
Companion status	yes	117	3.15 (2.74–3.29)	z = –0.341 p = 0.733	5.00 (4.63–5.31)	z = –0.300 p = 0.764
	no	6	3.16 (2.86–3.38)		5.10 (4.52–5.33)	
Received information before the operation	yes	101	3.17 (2.78–3.30)	z = -0.727 p = 0.467	5.04 (4.65–5.29)	z = -0.908 p = 0.364
	no	22	3.06 (2.72–3.27)		4.90 (4.26–5.35)	
Surgery type	laparoscopic	59	3.19 (2.79–3.29)	z = -0.631 p = 0.528	5.00 (4.71–5.42)	z = -1.140 p = 0.254
	open	64	3.11 (2.71–3.31)		5.04 (4.46–5.25)	
Previous surgery	yes	78	3.24 (2.81–3.32)	z = -1.916 p = 0.055	5.04 (4.70–5.29)	z = -0.300 p = 0.765
	no	45	3.06 (2.67–3.26)		5.00 (4.46–5.40)	
Post-operative nausea/ vomiting	yes	29	3.08 (2.69–3.34)	z = -0.003 p = 0.998	5.04 (4.83–5.23)	z = -0.310 p = 0.757
	no	94	3.16 (2.77–3.29)		5.00 (4.49–5.34)	
Post-operative pain	yes	74	3.06 (2.69–3.25)	z = -2.968 **p = 0.003***	5.00 (4.59–5.35)	z = -0.401 p = 0.689
	no	49	3.25 (3.01–3.35)		5.08 (4.58–5.29)	
Post-operative mobilisation	yes	107	3.19 (2.79–3.31)	z = -1.757 p = 0.079	5.04 (4.67–5.38)	z = -1.678 p = 0.093
	no	16	3.01 (2.67–3.22)		4.73 (4.54–5.10)	
Post-operative feeding	yes	115	3.15 (2.75–3.29)	z = -0.005 p = 0.996	5.04 (4.63–5.33)	z = -1.298 p = 0.194
	no	8	3.19 (2.69–3.29)		4.71 (4.29–5.07)	
Presence of urinary catheter	yes	67	3.25 (2.98–3.35)	z = -3.263 **p = 0.001***	5.04 (4.67–5.33)	z = -1.210 p = 0.226
	no	56	3.06 (2.69–3.24)		4.91 (4.47–5.25)	

χ^2 = Kruskal Wallis Test, z = Mann Whitney U test
* Statistically significant result (p < 0.05)

increased as the education level increased. Sönmez[19] reported that the mean PCQ score was significantly higher in men compared to women, while Bakır and Yurt[11] found no significant difference in overall comfort with respect to gender. Bakır and Yurt[11] did, however, find that comfort level decreased with increasing age. With advancing age, physiological functions slow down and certain disorders develop which reduce the tolerance of patients to surgical procedures and resulting changes, this, in turn, may adversely affect patient comfort[23].

Failure to provide information to patients undergoing surgical procedures in line with their individual needs may result in certain problems such as difficulty complying with treatment during and after surgery, increased anxiety, difficulty in controlling pain and deterioration in comfort[18]. Similar studies in the literature report that education and information given before surgery positively affect post-operative comfort levels[4,19,20,22]. In the present research, no significant difference was found in mean GCQ and PCQ scores with respect to receiving pre-operative information and other variables such as type of anaesthesia and type of surgery. Considering the results of other studies in the literature, addressing this information gap about the needs of the patients and providing holistic nursing care will positively affect the post-operative comfort level of patients.

Previous hospitalisation or surgical experience, being aware of the situations that may be encountered during the surgery and memory of bad experiences such as pain and suffering related to previous surgical interventions may negatively affect patient comfort levels[2]. In the present research, however, it was found that history of previous surgery did not affect comfort levels. Similarly, Sönmez[19] and Üstündağ[18] also found no significant difference in comfort levels with respect to history of previous surgery. On the other hand, Şahin and Rızalar[1] reported that past surgical experience had a positive effect on comfort levels, finding that the comfort levels of patients who had previously undergone surgery was higher compared to those who had not.

In the present research, 59 participants (48%) underwent laparoscopic surgery and 64 participants (52%) underwent open surgery. When the comfort scores obtained from both questionnaires were examined, no significant difference was found between the two types of surgery. This is despite a current belief that laparoscopic surgery is more comfortable than open surgery due to its positive effects on factors such as hospital stay and recovery time, pain and early return to nutrition or daily life activities[24,25].

Urinary catheters are used more frequently in urology clinics and cause pain during insertion and removal. Furthermore, infections may develop due to prolonged stay of urinary catheters, and pain and difficulties occur during mobilisation. All these factors negatively affect patient comfort. Of the participants in the present study, 67 (54.5%) had a urinary catheter and these participants had a significantly lower comfort score on the GCQ compared to participants who did not have a urinary catheter ($p = 0.001$).

While pain is an expected finding after surgery, if pain cannot be controlled it can cause many problems, such as tachycardia, immunosuppression and prolonged catabolismic activity, that negatively affect post-operative comfort as well as delaying the healing process[7]. Consistent with studies in the literature[1, 19], the results of the present research showed that pain had a negative effect on comfort level assessed using the GCQ.

In addition to pain, another problem that can negatively affect patient comfort after surgery is nausea and vomiting. Şahin and Rızalar reported that post-operative nausea and vomiting may reduce patient comfort after surgery[1]. In the present research, however, no significant difference was found in patient comfort in the presence of nausea and vomiting.

Lastly, when we examined the correlation between PCQ and GCQ scores, we found that there was a moderate positive correlation between the two questionnaires. As overall comfort level increases, early post-operative comfort level also increases. This is consistent with studies by Ören[2] and Üstündağ[18] that used PCQ and GCQ to assess patient comfort and also reported a positive correlation between the two scales.

Limitations of the research

Since the present research was conducted in the urology clinic of a single university hospital in Izmir, the results represent the participants included in the study and cannot be generalised to the Turkish population. Since the research data were obtained using self-reported data collection tools, the reliability of the data is limited to the information provided by the participants.

Conclusion

Results of this research showed that the overall comfort of the patients was above the moderate level. In addition, it was determined that patient comfort was negatively affected in the presence of pain and urinary catheter. During the surgical process, factors that negatively affect patient comfort should be determined and monitored, and appropriate holistic nursing care should be provided by considering the individual characteristics of the patients. For example, removing the urinary catheter as early as possible improves comfort and is also important for preventing infections. Conducting similar studies in other areas may enhance patient comfort and the quality of care in clinical settings.

Declaration of conflicting interests

The authors have declared no competing interests with respect to the research, authorship and publication of this article.

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Improving access to quaternary and tertiary health services for Aboriginal and Torres Strait Islander patients by addressing their social, emotional and spiritual wellbeing

Abstract

Our facility had no specific admission pathway to support the admission of Aboriginal and Torres Strait Islander patients for planned gastroenterology procedures. The project aimed to decrease failure-to-attend rates with a health and wellness check that uses a yarning approach to support patients' social and emotional well-being. The program was adapted from a previous model in surgical services that had significantly reduced non-attendance and cancellations. Results from the three-month pilot showed a decrease in non-attendance from 6.6 to 4.1 per cent, underscoring the effectiveness of the approach and benefit to Aboriginal and Torres Strait Islander peoples by improving their access to tertiary health services.

Keywords: Aboriginal and Torres Strait Islander patients, cultural considerations, health and wellness checks, co-design, health care collaboration, social and emotional wellbeing, improving access to health services

Problem identification

The difference in life expectancy between Indigenous and non-Indigenous populations in Australia is currently 10.6 years for males and 9.5 years for females[1]. Ensuring access to tertiary and quaternary health services for Aboriginal and Torres Strait Islander people is essential if we wish to close this gap. Many Aboriginal and Torres Strait Islander people experience health-related, social and economic disadvantages that hinder their access to specialist health services. Despite a greater need for support, Aboriginal and Torres Strait Islander people are slipping through the gaps of our current one-size-fits-all system that prepares patients for planned hospital admission[2]. As a result, they are more likely to experience delays in essential and even life-saving treatments.

We completed a successful proof of concept pilot of a social, cultural and emotional wellness check (health and wellness check) in the surgical and perioperative service at Royal Brisbane and Women's Hospital (RBWH)[2]. During that pilot study, pre-surgery checks were conducted for six months, resulting in a 45 per cent decrease in patient-initiated cancellations and a 33 per cent decrease in failure-to-attend rates. Of the 505 Aboriginal and Torres Strait Islander people contacted, 52 per cent were confused regarding preparation for surgery, 21 per cent requested more information regarding their procedure, 14 per cent had

medical issues that could lead to cancellations, and 5 per cent were unwilling to attend their surgery.

The purpose of the health and wellness check is to ensure that Aboriginal and Torres Strait Islander patients have their social and emotional needs addressed so they are appropriately prepared to access treatment. This is achieved by the Aboriginal and Torres Strait Islander liaison officer and nurse navigator connecting meaningfully with patients to assess their needs, facilitate early referral and connect them to appropriate support services. Health and wellness checks are conducted with a yarning approach that builds rapport and meaningful disclosure of personal issues while maintaining cultural integrity. The wellness check is not simply a checklist, form or set of questions – it is a philosophy of care that embraces an indigenous ideology of holistic health care and the importance of social and emotional wellbeing.

The health and wellness checks involve a proactive approach to patient engagement. The nurse navigator identifies individuals through the hospital scheduling system and conducts comprehensive phone interviews on days 7 and 3 before their scheduled admission for their procedure. The interviews delve into details, encompassing admission particulars, referrals, current clinical status and, crucially, cultural considerations. By incorporating cultural elements into the assessment process, the initiative recognises the diverse needs of patients, particularly focusing on the social and spiritual well-being of Aboriginal and Torres Strait Islander individuals.

Implementation strategies

The three-month pilot program aimed to adapt the surgical pre-admission health and wellness check for the RBWH gastroenterology department. The adaptation process adopted a co-design method, employing human-centred design. This approach ensured that the health and wellness check was not a rigid, checklist-driven process but a dynamic and adaptive system that truly addressed the needs and preferences of the patients and the service. A Cultural Advisory Committee, led by an Aboriginal and Torres Strait Islander community member, provided advice and ensured that the initiative aligned with the cultural nuances and preferences of the community.

A significant part of this initiative was a training program designed to enhance the skills of staff in addressing the specific needs of Aboriginal and Torres Strait Islander patients by connecting them with the appropriate support services. The program was co-designed in partnership with the local community. The program covered nurse navigation, Indigenous hospital liaison service and community interface services discharge planning, and employed innovative cultural awareness training methodologies such as patient stories, role play and simulation. The training was complemented by an implementation toolkit with practical resources such as policies, procedures, checklists, forms and educational materials to guide clinicians. It was crafted to assist with the integration of the wellness check into the existing workflow.

Findings

This project aimed to assess the influence of health and wellness checks on patient attendance at gastroenterology procedures. Figure 1 summarises the outcomes for the 72 patients included in the project.

Attendance

In the patient cohort who answered at least one call, 90 per cent successfully completed their scheduled procedure or were

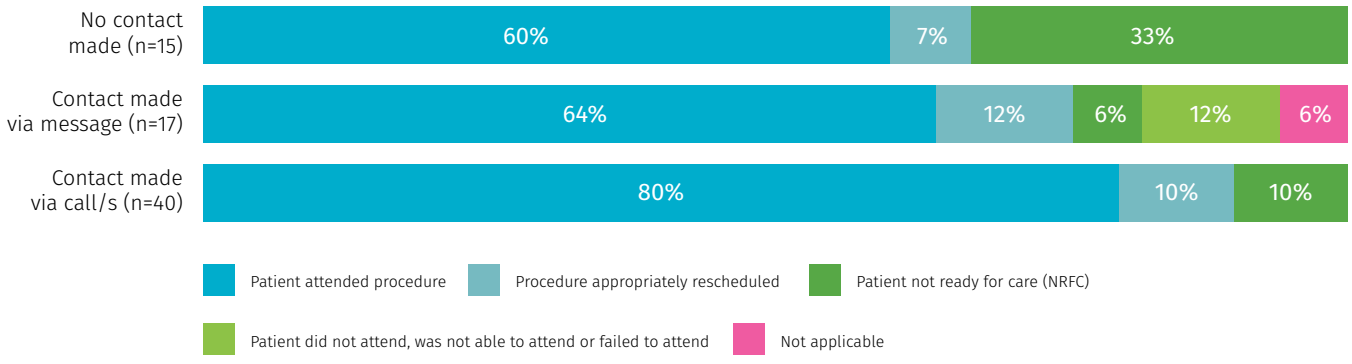

Figure 1: Contact outcome versus attendance outcome (N = 72)

appropriately rescheduled. In contrast, only 67 per cent of patients who were not contacted successfully completed their procedure. This indicated the positive impact of the health and wellness checks on care coordination. Interestingly, there was also an improvement in attendance in the cohort of patients who were not contacted but a message was left – 18 per cent did not attend compared to 33 per cent of patients who were not contacted. These findings underscore the role of effective communication in improving patient engagement and attendance.

Figure 2 shows the percentage of patients that failed to attend for the months from October 2021 to May 2023. The average percentage for the control months (October 2021 to January 2023) was 6.6 per cent. The average percentage for the three months of the project (March, April and May 2023) was 4.1 per cent.

The reduction in the failure-to-attend rates from 6.6 per cent to 4.1 per cent underscores the effectiveness of the measures taken during the study, reflecting an improvement in the overall management of patient appointments and, consequently, a positive influence on the hospital's operational efficiency. This shift in rates not only signifies a successful implementation of the health and wellness check but also highlights the potential for continued optimisation of health care services through targeted interventions focused on social, cultural and emotional well-being.

Significance of cultural understanding

There are several cases that demonstrate the significance of cultural understanding. In one instance, a patient felt comfortable sharing sensitive information about their marijuana use during a health and wellness check, which resulted in a more effective care plan. Another case involved identifying and treating chronic wounds that had not been addressed previously, leading to improved admission outcomes. Another example involved coordinating transportation and accommodation for a patient with diabetes who had amputated toes. Finally, there were many instances where patients and their families were able to reschedule appointments, resulting in better patient flow and resource utilisation for the hospital.

Challenges

The health and wellness checks identified many challenges faced by Aboriginal and Torres Strait Islander patients in accessing health care services (see Figure 3). These challenges include patient readiness for care, lack of awareness about fasting instructions and medications, issues with document delivery, lack of support for Aboriginal and Torres Strait Islander patients in hospitals, and persistent difficulties with transportation and accommodation. To improve access to health care, hospitals, primary health centres and Indigenous liaison officers need to work collaboratively to identify and resolve these challenges as early as possible. It is also essential

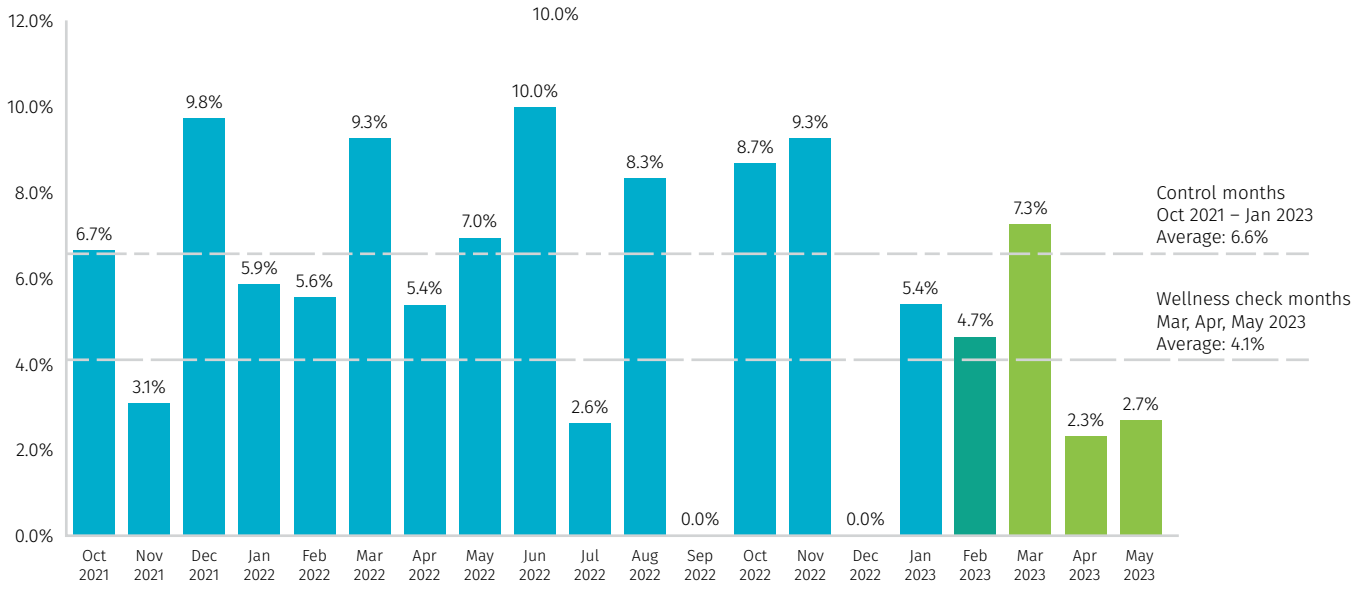

Figure 2: Procedures only – failure-to-attend percentage

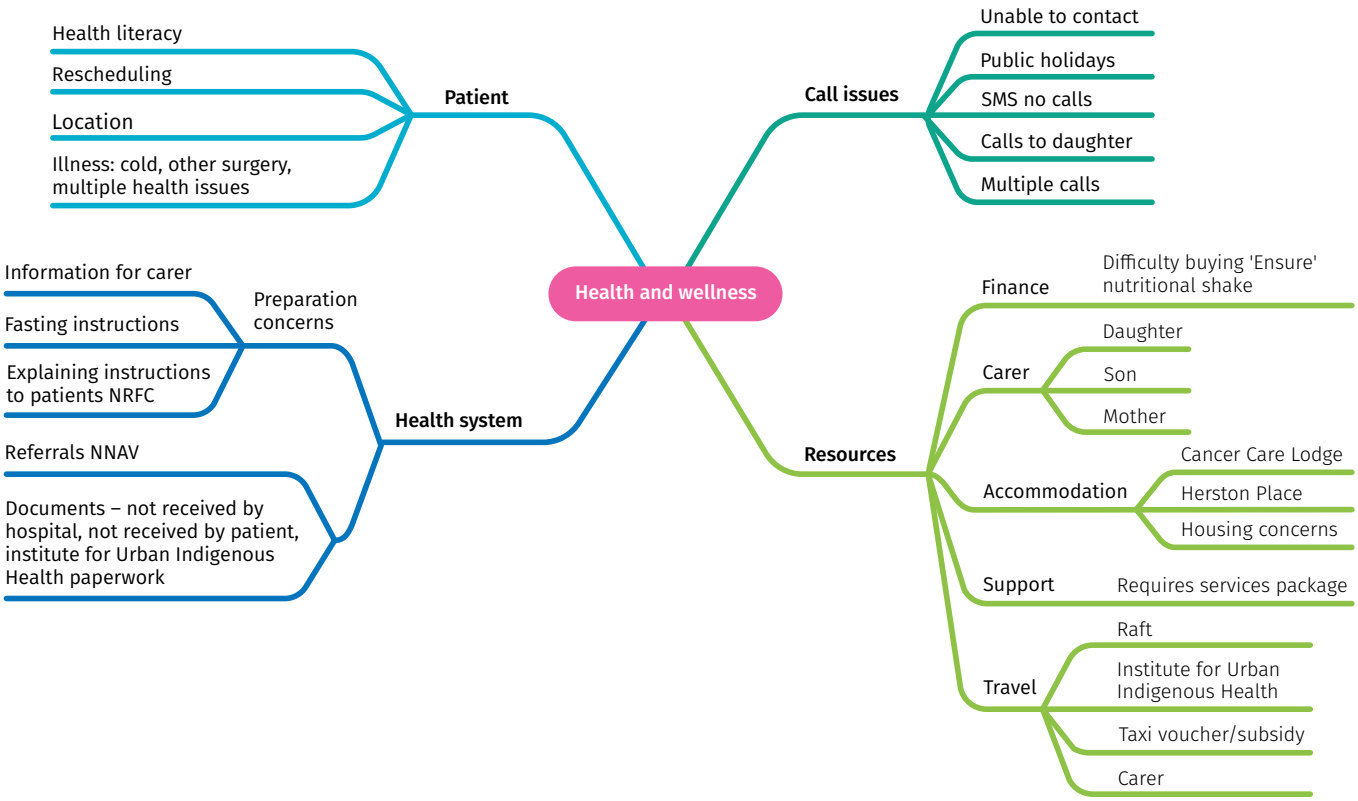

Figure 3: Challenges faced by Aboriginal and Torres Strait Islander patients when accessing health care services

to raise awareness of wellness checks throughout the department, encouraging staff to communicate effectively and provide support to Aboriginal and Torres Strait Islander patients who require additional assistance.

Discussion

This project highlights the positive outcomes of health and wellness checks while acknowledging associated challenges. Notably, the time-consuming nature of the checks and difficulties in effectively communicating procedural instructions to patients pose obstacles. The complexity of issues identified during these checks, coupled with the time required for effective problem-solving, contributes to the time-intensive nature of the process. At least 50 per cent of the calls were not made due to the department's limited resources and staff members' workloads. The clinicians completing the health and wellness checks need to be resourced appropriately to capture 100 per cent of Aboriginal and Torres Strait Islander patients attending the department for procedures.

According to the findings, the hospital system is not adequately identifying at least 30 per cent of Aboriginal and Torres Strait Islander patients attending procedures. Identification training is recommended for all hospital staff to appropriately identify Aboriginal and Torres Strait Islander patients attending procedures. Such training should be designed to enhance the accuracy and sensitivity of the identification process, ensuring that Aboriginal and Torres Strait Islander patients are recognised, and their unique health care needs are met in a culturally appropriate manner.

The observation that a considerable number of patients, even after being identified and contacted, face challenges in recalling essential information such as fasting and medication instructions points to a broader issue of communication barriers within the health care system, particularly affecting Aboriginal and Torres Strait Islander patient groups. These challenges are compounded for patients with a history of non-attendance at appointments and those managing multiple comorbidities, underscoring the need for tailored communication strategies that are both accessible and effective.

The project has identified a deficiency in cultural awareness among staff. It also emphasises the crucial role of education provided by

nurse navigators, cultural capability officers and Aboriginal and Torres Strait Islander liaison services. The development of cultural awareness has resulted in improved empathy and communication, which has reduced barriers and unintentional disrespect, particularly when dealing with Aboriginal and Torres Strait Islander patients. This initiative presents an opportunity to extend the benefits of enhanced cultural awareness to other departments for the benefit of Aboriginal and Torres Strait Islander patients undergoing other procedures.

Conclusion

The results of this project indicate that successful attempts to call Aboriginal and Torres Strait Islander patients have a significant impact on improving their attendance at procedures. Therefore, it is essential to establish efficient communication channels to reduce the chances of missed appointments and enhance patient care outcomes. Further research and interventions may be necessary to tackle the challenges related to unsuccessful call attempts and explore strategies to minimise patient non-attendance.

Declaration of conflicting interests

The authors have declared no competing interests with respect to the research, authorship and publication of this article.

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Investigating the relationship between self-esteem and body image in patients scheduled for rhinoplasty

Abstract

Objective: The aim of this study was to investigate the relationship between body image and self-esteem in patients scheduled for rhinoplasty.

Materials and methods: This descriptive, cross-sectional study was conducted at the otorhinolaryngology clinic of a public hospital between September 2022 and June 2023. The sample consisted of 78 patients who volunteered to participate in the study. The personal information form, body image scale and Rosenberg self-esteem scale were used in the study. Descriptive statistics, t-tests, Mann-Whitney U tests, Kruskal-Wallis variance analysis and Pearson correlation analysis were used for statistical analysis.

Results: The study revealed that 41 (52.6%) of the participants were between the ages of 18 and 25, with the majority, 53 (67.9%), being female. The participants displayed high levels of self-esteem (1.18±1.38) and positive body image (157.22±21.56). The scores for self-esteem and body image were similar for different characteristics including age, gender, marital status, education level, occupation/employment, income–expenditure, having children and chronic disease ($p>0.05$). However, it was noted that individuals without a history of aesthetic surgery had significantly higher body image scores, while those who had undergone aesthetic surgery had higher self-esteem scores ($p<0.05$).

Conclusion and recommendations: Based on the results of this study, it can be concluded that patients who are scheduled for rhinoplasty have high self-esteem and positive body image. Furthermore, there was a weak negative correlation found between body image and self-esteem.

Keywords: rhinoplasty, self-esteem, body image, nursing

Introduction

Aesthetic surgery aims to transform the external appearance of an otherwise normal body part into a shape that will be perceived as more beautiful in society or the individual's mind; thus reconstructing the individual's body image and increasing the patient's satisfaction with their body[1,2]. Rhinoplasty is a surgical method used to change the shape of the nose and aims to preserve both facial aesthetics and nasal function. It is divided into functional rhinoplasty, which focuses on improving the airways, and aesthetic rhinoplasty, in which the main goal is to improve facial aesthetics. Aesthetic nose correction falls within the field of aesthetic surgery[3]. Such interventions positively affect the emotional state, body image, social life and mental health of the individual[2].

The fact that the nose is in the centre of the face plays an important role in facial beauty. For this

reason, in recent years, with the understanding of the importance of rhinoplasty in improving facial beauty, the number of patients seeking rhinoplasty has gradually increased[3]. A beautiful face improves body image and self-confidence[4]. The results of studies of aesthetic surgery show that the main psychological reasons why people resort to aesthetic surgery are depression, low self-esteem and anxiety about body image[5]. Self-esteem is the individual's perception of themself as valuable, worthy of admiration and love[6]. As long as the individual likes themself physically, self-esteem increases and they have positive feelings about themself[7].It has been reported that low self-esteem is the driving force that leads individuals to plastic surgery procedures[8].

Body image is the internal perception of an individual's external appearance, including physical, cognitive and attitudinal dimensions[5]. Body image is the picture of one's own body in the mind; it is how a person perceives the appearance of their own body[9]. If an individual feels physically well, they are more likely to have a positive body image[10]. People with a negative body image are more interested in plastic surgery[11]. Although its effects vary according to different parts of the body, body image significantly affects self-esteem. People who psychologically enjoy their body image show higher self-esteem. On the contrary, a negative body image may lead to lower self-esteem[8,12].

Successful results of aesthetic surgery improve basic psychological variables such as self-esteem, body image and mental health[13]. Although individuals know the procedure's risks, they want it because it increases their self-confidence[8]. First of all, the body image and self-esteem of patients who apply for aesthetic surgery should be determined; nurses should provide guidance and counselling to patients seeking aesthetic surgery due to deteriorated body image and low self-esteem. It is necessary to identify the reasons that cause patients with impaired body image and low self-esteem to want plastic surgery. These patients should be referred to psychiatric clinics according to their needs and should be re-evaluated for plastic surgery after receiving adequate psychological support[7].

Studies examining the relationship between body image and self-esteem in patients scheduled for rhinoplasty are limited in the literature. This study aimed to evaluate the relationship between body image and self-esteem levels in patients scheduled for rhinoplasty. The results may be used to guide care management for patients scheduled for rhinoplasty and contribute to obtaining positive patient outcomes with accurate and rapid evaluation.

Materials and methods

The study

The study was descriptive, cross-sectional and correlational research conducted in the otolaryngology clinic of a state hospital between September 2022 and June 2023.

The population of the study consisted of patients who underwent aesthetic rhinoplasty surgery in the same hospital. The known population sampling method was used to calculate the study sample. To determine the sample size, the number of patients who underwent aesthetic rhinoplasty surgery in the same hospital between June 2021 and June 2022 (n= 114) was taken into consideration and the sample size was calculated as 78 patients with a five per cent margin of error and 90 per cent confidence interval. Patients who planned to undergo aesthetic rhinoplasty surgery in the otorhinolaryngology clinic of the relevant hospital on the specified dates, were older than 18 years of age, volunteered to participate in the study, could read and write, could speak and understand Turkish, and had no mental, physical or communication disabilities were included in the study sample.

Data collection

A patient information form, the Rosenberg self-esteem scale (RSES) – short form and the body image scale (BIS) were used in the study. Data were collected by face-to-face interviews in the patient room before surgery.

Patient information form

The researchers created this form in line with the relevant literature. Age, gender, marital status, occupation/employment, education level, monthly income–expenditure, history of plastic surgery, having children and having chronic diseases were included[14].

Rosenberg self-esteem scale (RSES) – short form

The RSES was developed by Morris Rosenberg in 1965 to measure self-esteem. The Turkish validity and reliability study was conducted by Çuhadaroğlu in 1986[15]. The scale has 63 items in total, grouped into 12 domains, and the first 10 questions are used to measure self-esteem. Five of the ten questions consist of positive statements and five consist of negative statements. A four-point Likert-type scale is used to rate the statements as 'very true', 'true', 'false' and 'very false'.

Scoring involves cumulative scaling that combines the ratings of certain items. A score of 0–1 indicates high self-esteem, 2–4 indicates moderate self-esteem, and 5–6 indicates low self-esteem. The Cronbach alpha reliability coefficient of the RSES is 0.85. In this study, the Cronbach alpha reliability coefficient of the scale was found to be 0.80.

Body image scale

This tool was developed in 1953 by Secord and Jourand, the Turkish validity and reliability of the scale was conducted by Hovardaoğlu in 1989[16]. The Turkish version of the scale consists of 40 items and determines the satisfaction of the individual with each body part or function. The items are rated using a five-point Likert-type scale with responses of 'I don't like it at all', 'I don't like it', 'I am undecided', 'I like it' and 'I like it a lot', scored from 1 to 5, respectively. The total score obtained from the scale ranges from 40 to 200 with a cut-off score of 135 – those with a score below 135 are defined as the group with low or negative body image. The Cronbach alpha reliability coefficient of the Turkish version of the scale was found to be 0.91. In this study, the Cronbach alpha reliability coefficient of was found to be 0.93.

Data analysis

The IBM SPSS Statistics 26.0 program was used to analyse the data obtained in the study. Skewness and kurtosis values were used to determine whether the data were normally distributed. It was determined that the data showed normal distribution with skewness values between 0.07 and 0.27 and kurtosis values between -0.62 and 0.53. Nonparametric tests were used in some variables where parametric tests could not be performed. Descriptive statistics, t-test, Mann-Whitney U test, Kruskall-Wallis variance analysis and Pearson correlation analysis were used in statistical analyses.

Table 1: Participant descriptive characteristics (N = 78)

Characteristics		n
Age in years	18–25	41 (52.6%)
	26–60	37 (47.4%)
Gender	female	53 (67.9%)
	male	25 (32.1%)
Marital status	single	45 (57.7%)
	married	33 (42.3%)
Education level	middle education	41 (52.6%)
	university	37 (47.4%)
Occupation/ employment	civil servant	22 (28.2%)
	self-employed	20 (25.6%)
	unemployed	11 (14.1%)
	student	9 (11.5%)
	homemaker	8 (10.3%)
	worker	8 (10.3%)
Monthly income–expenditure	income less than expenditure	26 (33.3%)
	income matches expenditure	36 (46.2%)
	income more than expenditure	16 (20.5%)
Parental status	has a child	24 (30.8%)
	does not have a child	54 (69.2%)
Presence of chronic disease	yes	7 (9.0%)
	no	71 (91.0%)
Previously had aesthetic surgery	yes	5 (6.4%)
	no	73 (93.6%)

Ethics and permissions

Ethical permission was obtained from Bartın University Social and Human Sciences Ethics Committee (07.07.2022/SBB-0336) and institutional permission was obtained from the Provincial Health Directorate to which the hospital is affiliated. Permission to use the scale was obtained, via email, from the authors who studied the validity and reliability of the data collection tools. The patients included in the study were interviewed pre-operatively and informed consent was obtained after explaining the purpose of the study. The study was conducted according to the principles of the Declaration of Helsinki.

Results

Table 1 shows the descriptive characteristics of participants. Most participants (41, 52.6%) were young adults aged between 18 and 25. The majority (53, 67.9%) were female, a little more than half (45, 57.7%) were single, nearly half were university graduates (37, 47.4%) and had monthly income equivalent to expenses (36, 46.2%). Most participants (54, 69.2%) had no children, and nearly all had no chronic disease (71, 91.0%) or history of aesthetic surgery (73, 93.6%).

Table 2 shows the possible and actual ranges and means of participant RSES and BIS scores. The mean RSES score was 1.18 (±1.38), indicating that participants had high self-esteem. The mean BIS score was 157.22 (±21.56), indicating that participants generally had a positive perception of their bodies.

Table 3 shows correlation between the mean scores of the RSES and the BIS. There was a weak but significant negative correlation between self-esteem and body image (r=-0.307; p=0.006). Accordingly, increased body image scores correlated with decreased self-esteem scores. Since lower RSES scores indicate high self-esteem, this relationship suggests that as a patient's satisfaction with their body increases, their self-esteem increases.

Table 4 shows the comparison of the mean scores of RSES and BIS according to the descriptive characteristics of the patients. It was found that those who had had plastic surgery before had a significantly higher score on the RSES, and those who had not had aesthetic surgery before had a significantly higher score on the BIS ($p<0.05$). No significant difference between RSES and BIS scores were found according to age, gender, marital status, education level, occupation/employment, monthly income–expenditure, having children and having chronic disease ($p> 0.05$).

Table 2: Ranges and mean scores of the Rosenberg self-esteem scale (RSES) and body image scale (BIS)

Tool	Possible range	Reported range	Mean (±SD)
RSES	0–6	0–6	1.18 (±1.38)
BIS	40–200	112–197	157.22 (±21.56)

SD: standard deviation

Table 3: Correlation between the mean scores of the RSES and BIS

Tools		RSES	BIS
RSES	r	1	-0.307
	p		0.006*
BIS	r	-0.307	1
	p	0.006*	

r = Pearson correlation coefficient
*p<0.05

Discussion

It has been suggested that body image and self-esteem are interrelated concepts[9]. Negative body image may lead to low self-esteem[8]. Barlas et al.[17] found that body image scores of plastic surgery patients were high[17]. Hamurcu[18] reported that self-esteem decreased as body image decreased. In the current study, it was found that there was a weak but significant relationship between body image and self-esteem. This finding supports the results of studies indicating that there is a relationship between body image and self-esteem.

In this study, it was observed that the mean self-esteem and body image of participants was high. In the literature, it is stated that patients who undergo surgery for aesthetic purposes have higher self-esteem and body image than those who undergo surgery for treatment[19]. Chowdhury et al.[3] found that the pre-operative self-esteem scores of patients who sought aesthetic rhinoplasty were lower than the self-esteem scores of patients who were scheduled for functional rhinoplasty, indicating that those who sought aesthetic rhinoplasty had higher self-esteem. Heidarzadeh et al.[4] reported that patients who applied for aesthetic surgery had better body image and self-esteem than patients who did not apply for aesthetic surgery; however, the differences were not statistically significant.

People with low self-esteem may believe that plastic surgery is a solution to meet the standards of society regarding their appearance. However, it has been found that people are generally dissatisfied with their bodies even after surgery. People who have a positive body image and are at peace with their

Table 4: Comparison of the descriptive characteristics of the patients and the mean scores of the RSES and BIS

Characteristic		RSES score Mean (±SD)	BIS score Mean (±SD)
Age in years	18–25	1.32 (±1.36)	158.15 (±21.68)
	26–60	1.03 (±1.40)	156.19 (±21.69)
	Test value	t=0.923, p=0.359	t=0.398, p=0.692
Gender	female	1.15 (±1.32)	157.70 (±23.42)
	male	1.24 (±1.53)	156.20 (±17.37)
	Test value	U=649.50, p=0.883	U=662, p=0.996
Marital status	single	1.18 (±1.31)	156.00 (±20.16)
	married	1.18 (±1.48)	158.88 (±23.55)
	Test value	t=-0.013, p=0.990	t=-0.580, p=0.564
Education level	middle education	1.41 (±1.50)	160.12 (±21.92)
	university	0.92 (±1.21)	154.00 (±20.98)
	Test Value	t=1.615, p=0.111	t=1.257, p=0.213
Occupation/employment	civil servant	0.86 (±1.12)	154.77 (±24.61)
	self-employed	1.35 (±1.49)	153.60 (±18.59)
	unemployed	1.27 (±1.55)	168.36 (±20.21)
	student	1.00 (±1.00)	160.00 (±20.99)
	homemaker	1.63 (±2.06)	161.88 (±20.49)
	worker	1.25 (±1.28)	149.88 (±22.45)
	Test value	KW=1.762, p=0.788	KW=5.311, p=0.395
Monthly income–expenditure	income less than expenditure	1.54 (±1.63)	158.04 (±23.95)
	income matches expenditure	1.08 (±1.38)	156.06 (±20.54)
	income more than expenditure	0.81 (±0.75)	158.50 (±20.99)
	Test value	KW=1.808, p=0.220	KW=0.287, p=0.908
Parental status	has a child	1.25 (±1.48)	159.54 (±23.17)
	does not have a child	1.15 (±1.35)	156.19 (±20.95)
	Test value	U=624, p=0.783	U=603.50, p=0.630
Presence of chronic disease	yes	1.43 (±2.14)	153.86 (±23.26)
	no	1.15 (±1.30)	157.55 (±21.54)
	Test value	U=243, p=0.919	U=233, p=0.786
Previously had aesthetic surgery	yes	2.40 (±1.67)	124.80 (±17.92)
	no	1.10 (±1.33)	159.44 (±20.04)
	Test value	**U=83, p=0.031***	**U=39, p=0.003**

U = Mann-Whitney U test, KW = Kruskall Wallis test, t = independent variables t-test
*p<0.05

bodies may want to have plastic surgery to improve their appearance and to further improve their existing positive self-esteem because they or others want it[8]. In this study, unlike the literature, the patients in the sample showed dissatisfaction in the nasal area because only rhinoplasty was to be performed. This situation may be related to psychosocial factors of the change they want, which is a research question that should be examined separately.

Some studies report that people's self-esteem does not change after plastic surgery, suggesting that rhinoplasty does not affect people's self-esteem. According to psychological theories, characteristics such as self-esteem are multidimensional structures, and a change in beauty, which is one of these dimensions, cannot completely change the entire structure. On the other hand, according to psychoanalytic views, physical concerns can also be considered as an expression of deeper psychological problems that people do not recognise[20]. Some researchers report that psychological reasons play an important role in the desire for plastic surgery[21]. Therefore, not only characteristics such as self-esteem but also other factors should be examined[20].

In this study, age was not a significant factor affecting body image and self-esteem scores of the participants. Most of the participants in the study were young people aged between 18 and 25 years. This is consistent with a study by Çiçek[22] showing that young people are more likely to undergo rhinoplasty. The desire to look beautiful and the of onset of anxiety about this issue begins in late adolescence and early adulthood[21]. There are many studies in the literature that have found that patients who apply for plastic surgery are in young adulthood[4,19,20,23].

In this study, body image and self-esteem scores of men and women were similar. It can be said that the gender variable does not affect self-esteem and body image in patients scheduled for rhinoplasty. Similarly, Radman and Pourhoseinali's[21] found that body image scores of rhinoplasty patients were similar between the genders. Most of the participants were women in both Radman and Pourhoseinali's research and the current study. Other studies have also found that women are more common than men among patients undergoing rhinoplasty[20,23,24]. In many societies and cultures, women are more likely to undergo rhinoplasty than men[17]. In most societies, women are evaluated more according to their physical attractiveness than their abilities or personal or social achievements. The cultural or social pressure on women may cause women to want to be physically and sexually attractive, thus increasing their desire for aesthetic surgery. Since being beautiful and attractive may be a source of power for women, women may use aesthetic operations to gain power[25]. Having a career, getting married and having children is a life desire for many women, and there is a possibility that they may want to have plastic surgery to realise this desire[8].

In this study, marital status was not a significant factor affecting body image and self-esteem scores of the participants. Similarly, Radman and Pourhoseinali[21] reported no statistically significant difference in body image score between married and single rhinoplasty patients. The majority of participants in the current study were single (45, 57.7%), which is consistent with other studies that have found that the majority of rhinoplasty patients are single[4,17,19,20,21]. Among the reasons why single people consider plastic surgery more than married people, is the common belief that physical beauty is the most important factor in marriage and that it is necessary to be as beautiful as possible for a successful marriage[25].

In this study, education level was not a significant factor affecting body image and self-esteem scores of the participants. Çapar[27] evaluated the self-esteem of women who underwent aesthetic surgery and also found that there was no significant difference between the education level of women and their self-esteem after surgical intervention. In contrast, Gören[19] observed that body image and self-esteem increased as the education level increased. Similar to other studies[5,17,19,20,28] we found that 37 (47.4%) of the participants were university graduates. The fact that the majority of the sample in the study was female and had a high level of education may have increased the likelihood of applying for rhinoplasty to get help from specialists for an area of their body that they were not satisfied with.

The highest frequency of occupation in our study was civil servant (22, 28.2%), followed by self-employment (20, 25.6%). Borujeni et al.[20] reported student as the occupation with the highest prevalence, followed by unemployed and self-employed. We did not find that occupation/employment was significant in relation to body image and self-esteem scores of the participants.

In our study, nearly half the participants (36, 46.2%) had income equal to expenses. We found that income and expenditure did not significantly affect body image and self-esteem scores of the participants. Socioeconomic status

may be a motivating factor for rhinoplasty, but the fact that the majority in our study were middle-income contradicts the common perception that aesthetic surgery is usually performed by people with high incomes. Chowdhury et al.[3] suggest that the reason for the low rate of rhinoplasty in high-income individuals may be due to the institution where the study was conducted.

This study also found no significant difference in body image and self-esteem scores of participants with and without children. There were more participants who did not have children (54, 69.2%) than participants with children in the current study. Obeid et al.[26] also reported that the proportion of individuals with children in the non-rhinoplasty group (83, 51.88%) was higher than in the rhinoplasty group (70, 43.75%) and suggested that parental responsibilities and personal perceptions of family members potentially affect the decision to undergo plastic surgery.

Almost all of the patients in the current study did not have chronic disease. This may be explained by the fact that the majority of the patients who participated in the study were in young adulthood and therefore had a low probability of developing chronic diseases.

In this study, it was observed that there was a significant difference between body image and self-esteem scores of participants who had previously had aesthetic surgery and those who had not. It was found that those who had undergone plastic surgery before had higher self-esteem and less positive body image perceptions. This may be related to the positive feedback received from the environment after aesthetic surgery. In contrast, Karaca and Beydağ[7] reported that there was no significant difference between the mean body image and self-esteem scores of women who had undergone aesthetic surgery before and those who had not.

Strengths and limitations

A limitation of the study is that it was conducted only in a state hospital.

Conclusion

This study found that participants scheduled for rhinoplasty had high self-esteem and positive body image. In addition, there was a weak negative relationship between body image and self-esteem. It was found that participants with a history of aesthetic surgery had higher self-esteem and less positive body image than those who had not previously had aesthetic surgery. The variables of age, gender, marital status, educational status, income–expenditure, occupation/employment and presence of chronic disease do not affect body image and self-esteem. Before deciding on aesthetic surgery, patients should be evaluated not only physically but also psychologically and socially by different disciplines such as nurses, doctors and psychologists. We recommend qualitative research into the reasons why patients seek rhinoplasty.

Declaration of conflicting interests

The authors have declared no competing interests with respect to the research, authorship and publication of this article.

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Perioperative anaphylaxis: Management and risk reduction strategies in 2024

Abstract

The Australian and New Zealand College of Anaesthetists (ANZCA) reports anaphylaxis is the most common cause of death associated with anaesthesia in Australia, and the incidence is rising. Anaphylaxis is a life-threatening event that without early recognition and prompt crisis management results in morbidity and mortality. Trigger agents for anaphylaxis in the Australian perioperative environment are commonly neuromuscular blocking agents, antibiotics and chlorhexidine. Many cases of mild to life threatening anaphylaxis (grades 1–3) in Australia are under-reported.

The Australian Perioperative Anaphylaxis guidelines have recently been updated to optimise management of patients experiencing anaphylaxis during anaesthesia. The Australian Therapeutic Goods Administration (TGA) also launched an initiative in March 2023 to reduce perioperative anaphylaxis, withdrawing 44 products containing pholcodine due to its association with anaphylactic reactions during general anaesthesia.

Keywords: perioperative anaphylaxis, trigger agents, grades of anaphylaxis, crisis management, anaphylaxis box, risk reduction strategies, pholcodine, chlorhexidine

Introduction

Anaphylaxis is a life-threatening event; without early recognition and prompt crisis management anaphylaxis may result in patient morbidity and mortality[1–3]. In the United Kingdom, incidence of perioperative anaphylaxis is estimated at one in every 7000 to 10 000 anaesthetics delivered[1]. While the Australian and New Zealand College of Anaesthetists (ANZCA) similarly provides statistics that anaesthesia is very safe, perioperative anaphylaxis is the most common cause of death associated with anaesthesia in Australia[2].

The ANZCA Safety of Anaesthesia report for 2015–2017 identified 35 deaths under anaesthesia; eight of these deaths (23%) were attributed to anaphylaxis[2]. The Victorian Consultative Council on Anaesthetic Mortality and Morbidity (VCCAMM) triennial report from 2012–2014 highlighted 227 cases of morbidity during anaesthesia; the primary cause of 54 events was anaphylaxis, including six deaths[3]. Harper et al.[1] and Gibbs et al.[4] both highlighted that not all cases of perioperative anaphylaxis are reported unless there is mortality, and the overall incidence of anaphylaxis in perioperative settings is rising. It is suspected that some cases of mild to life threatening anaphylaxis (grades 1–3) in Australia are not reported as reporting of cases where no mortality occurs is voluntary[1,4,5]. Under-reporting of anaphylaxis cases is hypothesised to be due to less severe clinical manifestations during surgery and anaesthesia, differential diagnoses and altered expression of symptoms[1,4,5].

This paper provides an overview of the recent changes in the prevention

and management of anaphylaxis in patients undergoing anaesthesia or surgery in the perioperative setting and the required nursing care to reduce and prevent the associated mortality and morbidity.

Background

The VCCAMM triennial report 2012–2014 highlighted trigger agents for cases of anaphylaxis in the operating theatre. Neuromuscular blocking agents (NMBAs) were the responsible trigger agents for 23 of 54 anaphylaxis cases identified[3]. Other known trigger agents included cefazolin, ticarcillin-clavulanic acid, ceftriaxone, chlorhexidine, patent blue V, hyaluronidase and gelofusine[3].

After publication of the VCCAMM report in 2015, recommendations were made to the Therapeutic Goods Administration (TGA) in Australia to review evidence that pholcodine was increasing sensitivity of patients to quaternary ammonium ions (QAI) in NMBAs[2,6,7]. Pholcodine is an opioid cough suppressant found in many cough medicines that can be purchased over the counter in Australia[7,8]. The QAIs in NMBAs act as an epitope that bind to immunoglobulin E (IgE) antibodies and generate anaphylactic responses. International researchers have recognised that previous exposure to QAI epitopes, in substances such as pholcodine, cleaning agents and topical cosmetics, can sensitise people to other medications with similar QAI epitopes resulting in anaphylaxis[4,9,10]. Florvaag et al.[11] and de Pater et al.[12] performed serum analysis of patients in Norway and found extensive evidence of reduced prevalence of IgE antibodies to NMBAs and episodes of perioperative anaphylaxis after the withdrawal of pholcodine from the Norwegian market[11,12].

The Australian TGA withdrew 44 products containing pholcodine from Australian pharmacies in March 2023 and initiated recalls on products with an associated risk of anaphylactic reactions during general anaesthesia[13,14]. In total, 55 products containing pholcodine have been cancelled from the Australian Register of Therapeutic Goods[14]. ANZCA supports the decision to withdraw pholcodine from the Australian pharmaceutical market and had approached the TGA to restrict inclusion of pholcodine in cough medicines with the aim of reducing incidences of anaphylaxis associated with NMBAs during general anaesthesia, similar to experiences overseas[2,3,7,15]. Patients consuming pholcodine in the 12–24 months prior to administration of an NMBA increase the risk of anaphylaxis during general anaesthesia. Vigilance in checking pholcodine consumption needs to be continued as there is the potential for people to have access to medicines that are restricted or withdrawn from market[5,7].

Table 1: Perioperative anaphylaxis grades of severity

Grade of severity	Clinical signs and symptoms
Grade 1 (mild)	Patients present with mucocutaneous clinical symptoms, such as urticaria, erythema and peripheral angioedema which are often not readily evident due to the sterile drapes covering patients during surgery[2,17].
Grade 2 (moderate)	Patients present with hypotension and/or bronchospasm combined with mucocutaneous clinical symptoms[2,17]. Hypotension and bronchospasm commonly occur during induction of anaesthesia, consequently these symptoms may be attributed to other causes[2,17].
Grade 3 (life-threatening)	Patients present with severe hypotension and bronchospasm, ventilation and oxygenation are compromised, with tachycardia and decreased tissue perfusion evident and 30% of cases have a reduced or absent capnography trace[2,17]. Decreased tissue perfusion associated with distributive shock may delay mucocutaneous symptoms of anaphylaxis until blood pressure levels are normalised[1,2,17].
Grade 4 (cardiac arrest)	Patients suffer cardiac or respiratory arrest. Pulseless electrical activity (PEA) is the most common presenting symptom of grade 4 anaphylaxis and is often preceded by bradycardia[2,17].

Discussion

Severity of anaphylaxis

Currently, the Ring and Messmer grading system, which was first described in 1977, is used by ANZCA and the Australian and New Zealand Anaesthetic Allergy Group (ANZAAG) to describe the clinical severity of anaphylaxis[2,16,17]. This grading system is summarised in Table 1.

Anaphylaxis presentations may be immediate or delayed. In the perioperative environment, common trigger agents for anaphylaxis are administered intravenously with onset of significant reactions occurring within three to five minutes of administration[1,2]. For example, anaphylaxis related to chlorhexidine is increasing[18,19]. When patients have a central venous catheter (CVC) impregnated with chlorhexidine inserted, the onset of anaphylactic reaction can be within three to five minutes[1]. However, chlorhexidine applied as skin preparation, wipes, swabs, eye drops, bladder irrigation, mouth washes, oral pastes or lubricant gel require cutaneous absorption and subsequent reaction times are slower (longer than 45 minutes) [1,18,19]. These delayed reactions are classed as mild to moderate (grades 1 or 2); they are not as severe and have less potential for morbidity and mortality[1].

Updates to management of anaphylaxis in the operating theatre

ANZCA and ANZAAG updated the Perioperative Anaphylaxis guidelines in 2022 as part of a five-yearly routine review. Recent changes to significant international guidelines have been made by other peak bodies, for example, the Association of Anaesthetists of Great Britain and Ireland (AAGBI), the Japanese Society of Anesthesiologists and the Brazilian Association of Allergy and Immunology[2,20].

Five key changes to the ANZCA 2022 guidelines are:

1. Cardiac compressions should be initiated at a systolic blood pressure of less than 50mmHg in the anaesthetised patient[2, p.2.]
2. A graded approach to volume replacement with an initial crystalloid fluid bolus of 500mL in a moderate (Grade 2) and 1000mL in a life threatening (Grade 3) reaction to be repeated as required and titrated to clinical response. In the case of a cardiac arrest (Grade 4) reaction the recommendation remains for an initial bolus of 2000mL[2, p.2].
3. A more graded approach to IV adrenaline bolus dosing with lower starting doses for each grade of reaction and guidance on how to escalate doses if there is no response[2, p.2].
4. Manual left uterine displacement (LUD) should be applied during the management of hypotension or cardiac arrest due to anaphylaxis in the pregnant patient to minimise aortocaval compression (in preference to left lateral tilt)[2, p.2].
5. Oesophageal intubation has been added to the differential diagnosis list for refractory bronchospasm and has been included on the immediate management card[2, p.3].

Management of grade 3 and grade 4 anaphylaxis in the operating theatre

ANZCA and ANZAAG developed reference cards for immediate and refractory management of anaphylaxis. The cards provide clarity for the perioperative team in managing individual patient experiences of anaphylaxis[2,20,21]. Anaphylaxis algorithms provided by ANZCA align with the Australian Resuscitation Council advanced life support algorithms to optimally manage a patient experiencing life-threatening anaphylaxis[2,20]. The differential diagnosis card assists with excluding other potential causes of PEA arrest and optimising crisis management of patients requiring resuscitation[2,20].

Adrenaline administration is emphasised to manage anaphylaxis as it reduces the pathophysiological effects of anaphylaxis[2,17,20,21]. Adrenaline increases cardiac output and promotes bronchodilation and vasoconstriction, reducing both mucosal oedema and mediator release[2,17,20]. Grades 3 and 4 anaphylaxis may require administration of adrenaline 1mg every two minutes or an adrenaline infusion to optimise blood pressure and ventilation[2,17,20]. Cases of lethal anaphylaxis have highlighted inadequate or delayed adrenaline administration[5].

Removal of possible trigger agents such as chlorhexidine, should be considered as refractory anaphylaxis can be due to continued exposure to the allergen. NMBAs and antibiotics, the most common allergens, should be discontinued if possible[2,5]. Between one and twenty per cent of perioperative anaphylaxis cases are biphasic, (secondary reactions occur), requiring crisis and or cardiac arrest management for a prolonged period of time and vigilance in patient monitoring[2,5].

Development of an anaphylaxis box

ANZCA and ANZAAG recommend each operating theatre has an anaphylaxis box on their resuscitation trolley for effective crisis management of anaphylaxis[2,20,21]. Cognitive

aids cards provide prompts and information to prioritise patient care in resuscitation[2,20,21]. A list of all products containing chlorhexidine and latex in each operating theatre is useful to identify potential triggers[18,19,22]. Supplements 1 and 2 include links to anaphylaxis reference cards and recommended inclusions for an anaphylaxis box.

Anaphylaxis risk reduction strategies

Pre-admission checklists for elective surgery should highlight patient history taking and documentation of allergies and sensitivities to inform perioperative staff of potential patient allergens[22]. Patients attending pre-admission clinics or who identify as sensitive to antibiotics, NMBAs, cleaning agents, cosmetics and chlorhexidine require allergen testing to confirm allergy status prior to elective surgery. Questioning about allergies should discuss development of skin rashes after insertion of intravenous cannula or application of antiseptic solutions, cosmetics or cleaning agents to skin, and development of oral swelling after use of mouthwashes[18,19,22]. Preventative strategies should be considered for all elective surgery patients who have previously experienced anaphylaxis[22]. An overview of anaphylaxis preventative strategies is provided in Table 2.

Adherence to the Australian College of Perioperative Nurses (ACORN) Latex and chlorhexidine sensitivity standard reduces risk of patient anaphylaxis to latex and chlorhexidine[22]. This standard highlights the need for training perioperative personnel to recognise latex and chlorhexidine sensitivity, and the importance of latex-free perioperative areas as well as identifying steps to be taken to reduce latex and chlorhexidine exposure in the perioperative environment[22].

Anaphylaxis box (closed)
Source: Monash Children's Hospital

Anaphylaxis box (open, showing contents)
Source: Monash Children's Hospital

Having a list of products containing chlorhexidine and latex in the anaphylaxis box helps to identify potential patient exposure to chlorhexidine and latex[2,22]. Common chlorhexidine-containing products which induce anaphylaxis are urinary catheter lubricant, CVCs coated in chlorhexidine and topical solutions[18,19,22]. Alternative chlorhexidine-free products should be available in every operating theatre for use with patients who have known sensitivities[18,19,22].

Sensitisation to chlorhexidine increases with repeated exposure, particularly with exposure to higher concentrations of chlorhexidine[18,19]. Solutions with 2–4% chlorhexidine are irritating to the epidermis, damaging this skin barrier and increasing the risk of chlorhexidine sensitisation[18,19]. The benefits of using 2-4% chlorhexidine solutions to reduce microbial populations during skin disinfection lacks clarity and evidence[18,19,22].

Patient follow-up and investigation after crisis management is essential to ensure triggers are found and to reduce the risk of greater sensitisation to triggers[2,23]. Patients who experience perioperative

Table 2: Anaphylaxis preventative strategies

Preventative strategy	Actions
Pre-admission checklists	A thorough history is taken with clear documentation of: • allergies and sensitivities on medication charts and surgical safety checklist. Patients are questioned about: • sensitivities to antibiotics, NMBAs, cleaning agents and cosmetics • allergies and development of skin rashes after application of antiseptic solutions to skin and insertion of intravenous cannula, or development of oral swelling after use of mouthwashes • consumption of cough suppressants. After patient attendance at pre-admission clinic, communication with the operating theatre about patient allergies is completed prior to day of surgery admission.
Allergy testing prior to elective surgery	Patients who have previously experienced a known anaphylactic reaction (grades 1–4) are allergy tested prior to undergoing elective surgery to confirm allergen.
Lists of products containing latex and chlorhexidine	A list of products containing latex or chlorhexidine is available in each operating theatre and in each anaphylaxis box to enable rapid removal of allergens, when required.
Alternative products available	Alternative products, without latex and chlorhexidine, are available, including CVCs, IDCs, tourniquets, face masks, tapes, gloves, antiseptic solutions, dressings and lubricants.
Red alert bracelets	Red alert bracelets are applied to patient wrists or legs to highlight patient allergies and reactions to allergen exposure.
Surgical safety checklist	Documentation is completed early to enable preparation of the operating theatre, holding bay and PACU for patient arrival and care.

anaphylaxis must be informed of the event and given referrals for follow-up – letters and brochures from the anaphylaxis box can be completed and placed in their history for discussion when the patient is able to understand the implications of the event[2,21,23].

Perioperative nurses attending multi-disciplinary crisis management training optimises teamwork and familiarity with anaphylaxis guidelines and reduces patient morbidity and mortality during clinical anaphylaxis crises[2,24]. Allocation of a nursing staff member to an anaphylaxis portfolio can provide all perioperative staff with ongoing updates to anaphylaxis preventative measures and management[21]. The staff member can ensure all anaphylaxis protocols are kept up to date and are followed in the operating theatre.

Conclusion

In Australia, perioperative anaphylaxis is an infrequent complication of anaesthesia but is often associated with morbidity and mortality. Early recognition of anaphylaxis and effective crisis management by anaesthetists and the perioperative team is associated with best patient outcomes. Access to an anaphylaxis box facilitates crisis management of a patient experiencing anaphylaxis and assists with identification of trigger agents. Patient referral to allergy clinics is essential after the event to identify trigger agents and minimise future anaphylaxis episodes that can be more severe. Risk reduction strategies should be employed in all perioperative environments to identify patients who are at high risk of anaphylaxis and to remove trigger agents prior to commencement of their perioperative journey.

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Perioperative anaphylaxis: Management and risk reduction strategies in 2024

Supplement 1: ANZCA and ANZAAG reference cards

Reference card	Available from
Anaphylaxis during anaesthesia – immediate management (Paediatric)	www.anzca.edu.au/resources/professional-documents/endorsed-guidelines/anaphylaxis-card-2-paediatric-immediate-management.pdf
Anaphylaxis during anaesthesia – immediate management (Adult)	www.anzca.edu.au/resources/professional-documents/endorsed-guidelines/anaphylaxis-card-1-adult-immediate-management-2022.pdf
Anaphylaxis during anaesthesia – refractory management chart (Paediatric)	www.anzca.edu.au/resources/professional-documents/endorsed-guidelines/anaphylaxis-card-4-paediatric-refractory-managemen.pdf
Anaphylaxis during anaesthesia – refractory management chart (Adult)	www.anzca.edu.au/resources/professional-documents/endorsed-guidelines/anaphylaxis-card-3-adult-refractory-management-202.pdf
Differential diagnosis card for anaphylaxis box	www.anzca.edu.au/resources/professional-documents/endorsed-guidelines/anaphylaxis-card-5-differential-diagnosis-2022.pdf
Post crisis management	www.anzca.edu.au/resources/professional-documents/endorsed-guidelines/anaphylaxis-card-6-post-crisis-management-2022.pdf

Supplement 2: Recommended contents of anaphylaxis box

Recommended number	Item	Notes
6 cards in total	Cognitive aid cards: • Anaphylaxis during anaesthesia – immediate management (Paediatric) • Anaphylaxis during anaesthesia – immediate management (Adult) • Anaphylaxis during anaesthesia – refractory management chart (Paediatric) • Anaphylaxis during anaesthesia – refractory management chart (Adult) • Differential diagnosis card for anaphylaxis box • Post crisis management.	To assist the perioperative team and provide clarity in managing individual patient experiences of anaphylaxis.
4 of each	Pathology request forms, plain serum pathology tubes for tryptase specimens in pathology bags.	For follow-up investigation and identification of allergens.
1 of each	Instructions for drug infusion preparation – adrenaline, noradrenaline, vasopressin and salbutamol.	Optimises preparation speed of vasoactive infusions, particularly for staff not familiar with these infusions.
2 of each	Patient form letters and information brochures that provide details about reactions and treatment individual patients received during their anaphylaxis episode and include recommendations for follow-up to investigate potential triggers of the anaphylaxis.	These can be included in the patient's history for discussion when the patient is able to understand the implications of the event.
2 of each	ANZAAG referral forms.	These begin the process of investigation for trigger agents under safe conditions.
1 of each	List of all products containing chlorhexidine and latex in each operating theatre.	This is useful to identify patient exposure to chlorhexidine and latex.