





## SCALES USED IN THE SURGICAL PROCESS: A COMPREHENSIVE REVIEW

## CERRAHİ SÜREÇTE KULLANILAN ÖLÇEKLER: KAPSAMLI BİR İNCELEME

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## ABSTRACT

**Aim:** This study aimed to review and evaluate common scales frequently utilized by nurses to assess surgical patients.

**Methods:** The most common symptoms and complications in surgical patients were determined by the authors, and keywords were created. For each symptom and complication, a literature review was conducted on CINAHL, PubMed, Google Scholar, and SCOPUS, and the assessment scales employed in previous studies were examined.

**Results:** Various scales are utilized at each stage of treatment from the moment of patient's hospitalization to discharge. A comprehensive literature review revealed that the most frequently used scales included pain assessment scales, fall risk assessment scales, nausea-vomiting risk scales, venous thromboembolism risk assessment scales, consciousness status assessment scales, all of which were included in the nurse observation forms.

**Conclusion and recommendations:** Continuous assessment is of vital importance for patients undergoing a surgical procedure to avoid complications and allow a healthy recovery. Surgical nurses are expected to evaluate patients within the scope of individual care, taking preventive measures for possible complications. For this reason, universally accepted risk assessment scales should be used in institutions, once their validity and reliability have been demonstrated, while risk assessment should be repeated at different stages of the surgical process, and patient-specific care should be planned accordingly.

**Keywords:** Complication, Nursing Care, Operative Process, Risk Management.

## ÖZET

**Amaç:** Bu çalışmada, hemşirelerin cerrahi hastalarında sık kullandığı ölçeklerin belirlenmesi amaçlandı.

**Yöntem:** Çalışmada yazarlar tarafından cerrahi hastalarında sık görülen semptom ve komplikasyonlar belirlenerek, anahtar kelimeler oluşturuldu. Her bir semptom ve komplikasyon için CINAHL, PubMed, Google Scholar ve SCOPUS'ta literatür taraması yapılarak çalışmalarda kullanılan ölçekler incelendi.

**Bulgular:** Ameliyat sürecinde hastanın hastaneye yatışından, taburculuğuna kadar geçen süreçte birçok ölçeğin kullanıldığı bilinmektedir. Literatür incelendiğinde en sık kullanılan ölçekler; ağrı değerlendirme ölçekleri, düşme riski belirleme ölçekleri, bulantı-kusma risk ölçekleri, venöz tromboemboli riski belirleme ölçekleri, bilinç durumu değerlendirme ölçeklerinin kullanıldığı ve bunlara hemşire gözlem formlarında yer verildiği görüldü.

**Sonuç ve öneriler:** Hastaların cerrahi süreci komplikasyon gelişmeden geçirmeleri ve sağlıklı bir iyileşme süreci geçirebilmeleri için sürekli değerlendirme önemlidir. Cerrahi hemşirelerinin hastaları bireye özgü bakım kapsamında değerlendirmeleri, oluşabilecek komplikasyonları önleyici girişimlerde bulunmaları beklenir. Bu nedenle kurumlarda, geçerliliği ve güvenilirliği ortaya konmuş, evrensel olarak kabul gören risk belirleme ölçeklerinin kullanılması, risk değerlendirmesinin cerrahi sürecin farklı evrelerinde tekrarlanması ve hastaya özgü bakımın bu doğrultuda planlanması gerekir.

**Anahtar kelimeler:** Ameliyat Süreci, Hemşirelik Bakımı, Komplikasyon, Risk Yönetimi

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## INTRODUCTION

The ever-growing global population, prolonged life expectancy, and dramatic rise in the prevalence of chronic diseases have inevitably brought about a substantial increase in the need for surgical treatments. About 4511 surgical operations are estimated to occur annually per 100,000 people worldwide (Hanna et al., 2020). Although surgical procedures are now safely carried out thanks to advanced technology and care opportunities, some risks may arise depending on the anatomical and physiological factors associated with the patient or the surgical procedure itself (Aslan et al, 2021; Cengiz & Aygin, 2019). The evaluation of the patient in the surgical process begins as soon as the decision of surgery has been finalized. Performed by anesthesia care teams and surgical teams, this evaluation is designed to determine the physical and mental state of patients, process other relevant clinical information to optimize their preoperative condition, inform them about anesthetic and surgical procedures and related risks, and minimize anxiety (Kıvrak & Haller, 2021). Various tools have been developed and put into use to help the healthcare team specifically measure the risks and benefits of elective surgery. A prominent example is the widely accepted and widely used American Society of Anesthesiologists Physical Status score (ASA-PS). The use of scales in the evaluation of the patient in surgical procedures provides great benefits in terms of determining the patient's readiness for the surgical procedure, revealing the risks of possible complications and early intervention (Layer et al., 2021).

The scoring systems for patient evaluation commonly found in the current literature are often diagnostic and prognostic. Diagnostic scales aim to measure the severity of the patient's current illness and symptoms, which include pain scales and measurement tools that assess a person's level of consciousness. Prognostic, or risk assessment scales, on the other hand, are utilized to determine and manage the risk for symptoms and complications that may occur in the course of treatment. Scales developed to assess the risk of falling, risk of deep vein thrombosis, and constipation are examples of such prognostic scales (Tetreault et al, 2015). Holistic and qualified nursing care is essential for the success of surgical treatment. Surgical nurses play a vital role in the follow-up of patients from the preoperative period to their discharge and in the management of surgery-related risks (Mohammed et al, 2018). This study, therefore, aimed to examine the scales that are frequently used by nurses in the care of surgical patients.

## MATERIALS AND METHODS

A list of symptoms and complications associated with surgical treatment was created by the authors. Common issues such as anxiety, pain, nausea and vomiting, constipation, altered state of consciousness, deep vein thrombosis, falls, pressure sores, and malnutrition were included in the study. By adding the term 'perioperative care' to the list of keywords, a separate literature review was performed for each symptom and complication identified. Various scales employed in previous research were examined during the literature review conducted on CINAHL, PubMed, and Google Scholar and SCOPUS databases.

### Surgery-Related Anxiety

Contracting a serious disease and becoming hospitalized constitutes one of the key moments in an individual's life, which impacts one's physiological and psychological well-being. In particular, the requirement for surgical operation causes psychological reactions such as fear, worry, and anxiety. It was determined that 60-80% of patients receiving surgical treatment experienced anxiety, especially in the preoperative period (Ping et al, 2012; Nigussie et al, 2014; Mingir et al, 2014; Acar et al, 2013). Anxiety does not only affect the preoperative period, but it may also become a key component during and after the operation, since it may cause problems such as difficult venous access, delay in jaw relaxation during anesthesia induction, cough, tachycardia, arrhythmia, hypertension, autonomic fluctuations and increased need for anesthetics. Besides, anxiety, in the postoperative period, is also associated with impaired postoperative pain, larger amounts of anesthetic use, tachycardia, arrhythmia, hypertension, nausea and vomiting, prolonged recovery time, and increased risk of infection (Pokharel et al, 2011; Bailey, 2010). Therefore, a variety of pre- and post-operative scales have so far been developed in an attempt to measure anxiety in surgical patients, the most common of which include Spielberger State-Trait Anxiety Inventory (STAI) and (STAI-II), Beck Depression Inventory (BDI), Hospital Anxiety and Depression Scale (HADS), Depression, Anxiety and Stress Scale (DASS), Hamilton Anxiety Rating Scale (HAM-A), Anxiety Specific to Surgery Questionnaire (ASSQ),

Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I), Amsterdam Preoperative Anxiety and Information Scale (APAIS), Zung Self-Rating Anxiety Scale (SAS), and Symptom Checklist-90-Revised (SCL-90-R) (Ping et al, 2012; Nigussie et al, 2014; Mingir et al, 2014; Acar et al, 2013; Pokharel et al, 2011; Bailey, 2010).

### **Pain**

Pain is a subjective sensation experienced at varying degrees of intensity after surgical procedures. Postoperative acute pain often begins with the traumatization of the tissue, continues to decrease in the process, and ends with the healing of the tissue (Mac Lellan, 2006; Dequeker et al, 2018). Because it does not only affect the individual physically, but also affects the social and spiritual aspects, pain relief interventions should be implemented. In pain management, a great responsibility falls on the surgical nurses, who spend the most time with the patient, throughout the whole time the patient is admitted to the clinic and discharged. The surgical nurse should start the post-operative pain management with pre-operative education and define the factors influencing various pains such as the patient's previous pain experiences, coping methods, pain perception, education and culture (Eti Aslan, 2006; Glowacki, 2015; Sinatra, 2010). In order to be able to define and evaluate the pain in the postoperative period, the patient's age, clinical and state of consciousness should be evaluated, along with the selection of appropriate pain scales for use. While choosing the right pain scale, several considerations, including easy applicability, low cost, and confirmed validity and reliability, ought to be factored in (Allred & Shaffer, 2015). Most widely utilized scales found in the literature appear to be classified as single and multidimensional scales. Single-dimensional ones include Verbal Rating Scales (VRS), Numerical Rating Scales (NRS), Visual Analog Scales, and Burford Pain Thermometer. Multidimensional pain scales are listed as McGill Pain Questionnaire (MPQ), Dartmouth Pain Questionnaire (DPQ), West Haven-Yale Multidimensional Pain Inventory (WHYMPI), Wisconsin Brief Pain Questionnaire (WBPQ), Memorial Pain Assessment Card (MPAC), Pain Perception Profile and Behavior Models (Çöçelli et al, 2008). In addition to these scales, nurses with an active role in pain management are advised to utilize the Behavioral Pain Scale together with the Richmond Agitation Sedation Scale (RASS) or Ramsay Sedation Scale (RSS) for sedated patients experiencing difficulty in communicating (Payen & Chanques, 2012), while using the Critical-Care Pain Observation Tool (CPOT) for intubated, sedated and communicative patients treated in the intensive care units. As for pediatric patients, they are recommended to employ the Face, Legs, Activity, Cry and Consolability (FLACC) scale, Wong-Baker Faces Pain Rating Scale, and Toddler-Preschooler Postoperative Pain Scale (TPPPS), Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) for postoperative pediatric pain, Neonatal Infant Pain Scale (NIPS) and Premature Infant Pain Profile (PIPP) for newborns (Sezer & Korkmaz, 2021; Demir, 2012; Bringuier et al, 2009; Gerstman et al, 2021).

### **State of Consciousness**

Consciousness is defined as the state of being aware of oneself and one's environment. An altered state of consciousness is such a complex condition that it can develop secondary to the deterioration of neuronal metabolism, from a pathology that mostly develops on an organic basis and occurs with loss of neurotransmitter function, disrupting the anatomical integrity of the central nervous system. Post-traumatic intracranial lesions (bleeding, mass, edema) and changes in consciousness with neurosurgical procedures are observed in surgical patients. Developed in 1974, the Glasgow Coma Scale (GCS) is a clinical scale that is still the most widely used measurement tool. The GCS is used to objectively describe the extent of unconsciousness in all types of acute medical and trauma patients. Although it is known that the use of the scale is limited in intubated patients with hearing loss or speech impairment, it is frequently used throughout the world thanks to its practicality and applicability, as well as being a common tool designed for use by all healthcare professionals (Jain & Iverson, 2021).

Delirium, a type of altered state of consciousness, is a syndrome characterized by acute onset, fluctuations in mental status, and reversibility. It has been reported that delirium develops in 10-30% of hospitalized patients. Factors including advanced age, surgical procedure, and intensive care history increase the risk of delirium. Early diagnosis of delirium is paramount in preventing prolonged hospital stay, increased morbidity, hospital costs and mortality that develops as a result of delirium, and to control delirium symptoms in the early period. Using the Confusion Assessment Method for Intensive Care Units (CAM-ICU), NEECHAM Confusion Scale, Intensive Care Delirium Screening Checklist

(ICDSC), Delirium Rating Scale-Revised-98 (DRS-R-98) or Pre-delirium Scoring System in patients hospitalized in intensive care units has been reported to allow accurate measurement of delirium risk, and the use of such tests is important for the early recognition of delirium and the management of appropriate treatment (İnal et. al., 2018; Elibol & Karaöz, 2019; Erbay & Girgin, 2020).

### **Nausea and Vomiting**

Nausea and vomiting are one of the postoperative complications due to anesthetic agents, muscle relaxants, and decreased peristaltic movements. They mostly follow a mild or temporary course, but they also have serious adverse effects on certain patients, which could be summarized as decreased movement after surgery, restriction of oral intake, dehydration, deterioration of the surgical incision, impaired quality of life, delayed recovery and discharge (Myles & Wengritzky, 2012; Tünay & İlginel, 2018). The prevalence of nausea and vomiting requires reliable measurement of this subjective symptom for their effective management. Frequently used scales include the Morrow Assessment of Nausea and Emesis (MANE), Visual Analogue Scale (VAS), Rhodes Index of Nausea, Vomiting, and Retching (INVR), and Functional Living Index-Emesis (FLIE). The Baxter Retching Faces (BARF) Scale is often used in children (Gürcan & Turan, 2019). Nurses are expected to systematically evaluate nausea and vomiting and make appropriate interventions in accordance with their nursing diagnoses (Aygin, 2016). While evaluating the frequency and severity of nausea-vomiting, scales that are specifically designed to assess the impact of such subjective symptoms.

### **Deep Vein Thrombosis**

Venous thromboembolism (VTE) is a health problem that causes platelet activation and clot formation, damages the endothelial layer, and results in deep vein thrombosis (DVT) and pulmonary embolism (PE) (White et. al., 2003). Deep vein thrombosis poses a significant risk, especially in patients undergoing major surgery. This risk increases with the type and duration of surgical intervention and is the most common preventable cause of hospital deaths (Brotman et al, 2004). Prevention of DVT could be more effective than its treatment and control of risk factors is of great importance (Autar, 2007; Chong et al, 2012; Geerts et. al., 2008). It is recommended that patients be admitted to the hospital in the preoperative period and the risk of DVT should be measured once their clinical situation has changed. The surgical nurse plays a paramount role in providing prophylaxis by defining the risk of DVT before, during and after the operation (White et. al., 2003; Büyükyılmaz & Şendir, 2014; Morrison, 2006). DVT risk assessment reduces such complications as thrombus formation and embolism in patients, and is considered an acceptable prophylaxis method, as it is safe, easy to apply, and cost-effective (Findlay, 2010). It is emphasized to increase the use of DVT risk diagnosis scales, as they have many benefits from protecting and maintaining the health of patients, providing international health policies, reducing the cost and workload in health expenditures, and increasing the quality of nursing care. Internationally adopted scales in the literature seem to include the Wells Scoring Method and the Autar Dvt Risk Diagnostic Scale (Gürsoy & Çilingir, 2018). In addition, Revised Geneva Score for Assessing Clinical Probability of Pulmonary Embolism, Wells Score for Pulmonary Embolism Risk and STOPDVTs Clinical Assessment Tool are other measurement scales designed to determine the risk of DVT (Alp et. al., 2019).

### **Constipation**

Constipation is a serious symptom that affects postoperative recovery, patient quality of life, comfort, respiratory and circulatory function, and quality of nursing care. The etiology of this condition, commonly occurring after surgery, involves the site of the surgical procedure, type of anesthesia, intestinal manipulation during the surgery, postoperative immobility time, suppression of the feeling of defecation, use of bolts, inability to protect privacy, inability to verbally express their discomfort, use of opioid or non-opioid analgesics, insufficient including changes in fluid intake and dietary habits. Nursing care is critical in the management of postoperative constipation. Nurses should determine the risk of constipation with a standard risk scale in the preoperative period, evaluating the risk and current situation in the planning of nursing practices in the postoperative period. They should monitor patients' bowel sounds, elimination activity, mobilization, oral feeding and fluid intake after surgery (Arı & Yılmaz, 2016; Çelik et. al., 2015). The literature contains several measurement tools developed to assess the risk and severity of constipation. Most frequently used scales in studies are the Constipation Risk

Assessment Scale (CRAS) (Richmond & Wright, 2005; Kutlu et. al., 2011) and Constipation Severity Scale (CSS) (Kaya & Turan, 2011). In order to establish a standard for defining constipation, the Rome Committee laid down the Rome I criteria in 1989, and these criteria were reviewed in 1999 and the Rome II criteria were specified. Finally, with the adjustments made in 2006, Rome III criteria emerged. These criteria, which consist of questions directed to the individual in order to define elimination, are especially helpful in defining chronic constipation (Li et. al., 2020).

### Falls

Although falling is primarily a patient safety issue, it may cause serious physical, psychosocial and economic problems in surgical patients before, during and after the operation. The common causes of falls might include medications, limitations brought about by the disease, postural blood pressure changes, visual disturbances, problems experienced during patient transfer, improper positioning or fixation of the patient on the operating table, changes in consciousness, muscle weakness, balance disorder and use of assistive devices in walking (Berke & Aslan, 2010). Research to determine the factors that increase the risk of falling is instrumental in the prevention and minimizing of falls. Nurses, who play a crucial role in preventing falls, need to guide their colleagues and other healthcare professionals in developing a multifaceted approach in clinics, collect and analyze data regularly, and take precautions for falls in nursing care in line with the latest scientific evidence (Fındık et. al., 2019). In our country, the Itaki Fall Risk Scale is frequently employed in clinical settings and studies, while the Morse Fall Scale (MFS), Hendrich II Fall Risk Model, DENN Fall Risk Assessment Scale and Harizmi Fall Risk Assessment Scale are among the other scales used. After being evaluated with the Itaki Fall Risk Scale, prepared based on research conducted by a commission formed by the Ministry of Health Quality Improvement Department, a four-leaf clover figure is placed in the room of the patients with a high risk of falling, so that the risk are known by the whole team and necessary precautions are taken (Karaaslan et. al., 2019).

### Pressure Ulcers

Primarily caused by prolonged pressure on the skin, pressure ulcers, also called pressure sores, is a serious health problem that is common all over the world, which causes severe pain and suffering, impairs patient quality of life, and imposes a financial burden on the health care institution (Konateke, 2021). It can be characterized as ulcerations or necrosis that occur as a result of complete closure of the capillaries in the skin and subcutaneous tissues due to prolonged or repeated pressures, especially in the parts of the body where there are bony prominences, and the cessation of circulation in that area. Pressure ulcers cause a significant rise in mortality and morbidity rates by prolonging the hospital stay, increasing both the burden of caregivers and the cost of care (Kıraner et. al., 2016).

Surgery-related pressure ulcers are wounds that develop within the first 48-72 hours after the surgical procedure, and the risk factors can be listed as anesthesia, duration of the operation, type of operation, duration of immobilization, position of the patient during the operation, support surfaces used during the operation, moistness of the skin, blood loss, hypotension, use of heating device/equipment, hypothermia and hyperthermia, tools used in positioning, and utilization of vasopressors (Özşaker et. al., 2019; Şahin & Başak, 2020; Soyer & Özbayır, 2018).

The current evidence-based guidelines recommend that the risk of pressure ulcers in surgical patients be accurately measured through valid and reliable risk assessment tools prior to any interventions intended to prevent pressure ulcers (Konateke, 2021). The most familiar and widely employed scale for the assessment of pressure ulcer risk is the Braden Risk Assessment Scale. Despite the advantages of this common tool, its use in surgical patients seems to be limited since it does not contain information about the surgical procedure. Therefore, other measurement tools like Risk Assessment Scale of Injuries related to Patient Positioning (ELPO), Scott Triggers Tool, 3S Operating Room Pressure Ulcer Risk Assessment Scale and Cassandra Munro's Pressure Ulcer Risk Assessment Scale (CMUNRO) are also used in the assessment of perioperative pressure ulcer risks (Konateke, 2021; Soyer & Özbayır, 2018; Xiong et. al., 2019). Apart from these, Suriadi and Sanada Pressure Ulcer Risk Assessment Scale, Braden Q Pressure Ulcer Risk Assessment Scale, Waterlow Pressure Ulcer Risk Assessment Scale and Norton Risk Assessment Scale are among other risk prediction tools (Kılıç & Sucudağ, 2017).

## Malnutrition

Malnutrition is the structural deficiencies and dysfunctions in the organs as a result of the deprivation of the macro or micro nutrients that are essential for the tissues. The incidence of malnutrition in patients treated in surgical clinics ranges between 20% and 50% (Güler & Tireli, 2018). The European Society for Clinical Nutrition and Metabolism (ESPEN) and the United States health organizations recommend evaluating the nutritional status and determining nutritional risks within the first 24 hours after the patient's admission to the hospital (Damar et al., 2020). The risk of malnutrition increases especially after orthopedic surgeries and gastrointestinal system surgeries, in cases characterized by changes in the state of consciousness, and situations that prevent oral feeding and swallowing. Nutritional screening protocols should be implemented as part of the preoperative assessment. After screening and evaluation, a nutritional treatment plan should be devised for high-risk patients, and continuous monitoring should be maintained (Rippin et al, 2018; Varan & Halil, 2015).

In determining the nutritional status of the patients, nurses primarily carry out anthropometric measurements (weight, body mass index, calf diameter, middle arm diameter, middle arm muscle diameter, triceps skin thickness, etc.). The body mass index (BMI) enables the diagnosis of malnutrition in the early period so that effective interventions can be timely made. Most common scales developed to assess nutritional status in detail include Nutritional Risk Screening Scale (NRS-2002), Malnutrition Screening Tool, Mini Nutrition Assessment, Malnutrition Universal Screening Tool, Prognostic Nutritional Index, Subjective Global Assessment, Patient-Oriented Subjective Global Assessment, Nutriskor. Test, and GLIM Criteria (Akmansu & Kanyılmaz, 2021).

## Surgery-Related Complications and Mortality

Even though surgical procedures are planned to improve patient's health, anesthesia and surgical modifications may also pose certain health risks. Despite the recent improvements in overall perioperative mortality, complication rates are still high, particularly in elderly patients and in the presence of comorbidity. It is known that 4.2 million patients die within 30 days of surgery worldwide every year. The previous work in the literature seems to provide contradicting rates for surgery-related mortality. Therefore, it is emphasized that using evidence-based best practice to control perioperative mortality is paramount in planning patient-specific care (Layer et al., 2021).

The ASA-PS classification (American Society of Anesthesiologists Physical Status score) developed by the American Society of Anesthesiologists is widely used to determine the risk of the surgery for the patient. Although this scale, developed by anesthesiologists, has its limitations in terms of the type of surgery and patient-related variables, the advantages of the ASA classification are that it is easy to use clinically and creates a common language for all healthcare professionals. Over the last decade, various scales have been developed in an attempt to accurately predict surgery-related risks, mortality risk, and frailty, which mainly include Postoperative Morbidity Index (PMI), POSSUM (Physiologic and Operative Severity Score for the Enumeration of Mortality and Morbidity), Comprehensive Complications Index (CCI), Modified Accordion Severity Grading System, American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) (Menzenbach et al, 2021; Cheng et al, 2018; Panayi et al., 2019).

Postoperative complications are a key determinant of surgical outcomes and quality of care. These complications develop depending on the type of surgery and the risk factors of the patient, whose incidence varies between 7% and 50% (Grocott et al., 2007). Without a clear standardization of postoperative complications, especially the type of surgery, comorbidities of patients and perioperative patient management are of vital importance (Martin et al., 2002). Although the development of complications after surgery is more common in patients who have undergone medium and high-risk surgery, it causes a prolonged hospital stay, increased use of health resources and high costs (Nicholls et al., 2002; Moonesinghe et al., 2014). It is emphasized that the classification and management of postoperative complications should be used together with reporting criteria (Clavien et al., 2017). Nursing care, the main responsibility of nurses, involves determining the risk of complications in patients during the preoperative period, thus improving quality of care in the postoperative period. The Comprehensive Complication Index, Patient-Centered Pelvic Floor Surgery Complication Scale, and Clavien-Dindo Classification can be given as examples of scales developed for this purpose in recent years (Sillero-Sillero & Zabalegui, 2019; Gillespie et al., 2020).

### Postoperative Quality of Life

Quality of life is a state of being satisfied with one's mental, social, and physical functioning as a whole, forming a system in their life according to their personal needs. According to the World Health Organization, quality of life is defined as "a person's perception of their own life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (Rustemeyer & Gregersen, 2012; Fezzi et. al., 2011). Quality of life is an indicator of one's status of dependency/independence, the extent to which they perform daily life activities and fulfill their own needs. It also includes the perception of the individual's health status, complaints, expectations and beliefs during the illness and treatment process (Müezzinoğlu et. al., 2005; Aydiner Boylu & Paçacıoğlu, 2016). In cases where a person's health deteriorates, coping with the disease, compliance with the treatment process, protecting and improving their health are associated with quality of life (Ayaz et. al., 2005). Surgery directly affects the daily life activities and quality of life of patients. It is necessary for the surgical nurse to implement interventions to increase the patient's quality of life during the pre- and postoperative period (Oksel, 2008; Tedik, 2017). In this regard, the nurse's use of the quality of life scale appropriate for the patient constitutes the first step of the relevant assessment. Common measurement tools for measuring quality of life in surgery patients found in the literature include the Short Form Health Survey (SF-36) and World Health Organization Quality of Life Assessment (WHOQOL). Other relevant scales could be listed as follows: the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30) for cancer patients undergoing surgery, the Impact of Weight on Quality of Life Scale in patients receiving bariatric surgery (Çömlekçi, 2011) and the City of Hope Quality of Life-Ostomy Questionnaire (CoH-QoL-OQ) in patients with intestinal ostomies (Konjevoda et. al., 2020; Eroğlu et. al., 2019; Vitaloni et. al., 2019; Sarıcı, 2021).

Since the surgical process is multidimensional and involves more than one discipline, many scales have been developed to assess the situation and predict the associated risks. Over the recent years, surgery-specific scales such as the Post-Operative Recovery Index (PoRI) and the Post-Discharge Surgical Recovery Scale (PSR) have been developed (Aslan et. al., 2021; Cengiz & Aygin, 2019). Besides, scales designed to determine fall risk, pressure ulcer risk and state of consciousness are widely used in all patient groups. Since there are multiple scoring systems for different conditions, the choice of scale should be guided by the surgical procedure, patient's age, and type of outcome that concerns the patient (Kıvrak & Haller, 2021).

**Table 1.**Scales Used in the Surgical Process

Symptom/Complication	Scales
<b>Anxiety</b>	✓ Spielberger State-Trait Anxiety Inventory (STAI) and (STAI-II)
	✓ Beck Depression Inventory (BDI),
	✓ Hospital Anxiety and Depression Scale (HADS),
	✓ Depression, Anxiety and Stress Scale (DASS)
	✓ Hamilton Anxiety Rating Scale (HAM-A)
	✓ Anxiety Specific to Surgery Questionnaire (ASSQ)
	✓ Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I)
	✓ Amsterdam Preoperative Anxiety and Information Scale (APAIS)
	✓ Zung Self-Rating Anxiety Scale (SAS)
	✓ Symptom Checklist-90-Revised
<b>Pain</b>	✓ Verbal Rating Scales (VRS)
	✓ Numerical Rating Scales (NRS)
	✓ Visual Analog Scales
	✓ Burford Pain Thermometer
	✓ Multidimensional pain scales
	✓ McGill Pain Questionnaire (MPQ)
	✓ Dartmouth Pain Questionnaire (DPQ)
	✓ West Haven-Yale Multidimensional Pain Inventory (WHYMPI)
	✓ Wisconsin Brief Pain Questionnaire (WBPQ)
✓ Memorial Pain Assessment Card (MPAC)	

<b>State of Consciousness</b>	<ul style="list-style-type: none"> <li>✓ Glasgow Coma Scale (GCS)</li> <li>✓ Confusion Assessment Method for Intensive Care Units (CAM-ICU)</li> <li>✓ NEECHAM Confusion Scale</li> <li>✓ Intensive Care Delirium Screening Checklist (ICDSC)</li> <li>✓ Delirium Rating Scale-Revised-98 (DRS-R-98)</li> </ul>
<b>Nausea and Vomiting</b>	<ul style="list-style-type: none"> <li>✓ Morrow Assessment of Nausea and Emesis (MANE)</li> <li>✓ Visual Analogue Scale (VAS)</li> <li>✓ Rhodes Index of Nausea, Vomiting</li> <li>✓ Retching (INVR)</li> <li>✓ Functional Living Index-Emesis (FLIE)</li> <li>✓ The Baxter Retching Faces (BARF)</li> </ul>
<b>Constipation</b>	<ul style="list-style-type: none"> <li>✓ Constipation Risk Assessment Scale (CRAS)</li> <li>✓ Constipation Severity Scale (CSS)</li> <li>✓ Rome III criteria</li> </ul>
<b>Deep Vein Thrombosis</b>	<ul style="list-style-type: none"> <li>✓ Wells Scoring Method</li> <li>✓ Autar Dvt Risk Diagnostic Scale</li> <li>✓ Revised Geneva Score for Assessing Clinical Probability of Pulmonary Embolism</li> <li>✓ Wells Score for Pulmonary Embolism Risk</li> <li>✓ STOP DVTs Clinical Assessment Tool</li> </ul>
<b>Malnutrition</b>	<ul style="list-style-type: none"> <li>✓ Nutritional Risk Screening Scale (NRS-2002)</li> <li>✓ Malnutrition Screening Tool</li> <li>✓ Mini Nutrition Assessment</li> <li>✓ Malnutrition Universal Screening Tool</li> <li>✓ Prognostic Nutritional Index</li> <li>✓ Subjective Global Assessment</li> <li>✓ Patient-Oriented Subjective Global Assessment</li> <li>✓ Nutriskor Test</li> <li>✓ GLIM Criteria</li> </ul>
<b>Pressure ulcers</b>	<ul style="list-style-type: none"> <li>✓ Cassandra Munro's Pressure Ulcer Risk Assessment Scale (CMUNRO)</li> <li>✓ Scott Triggers Tool</li> <li>✓ 3S Operating Room Pressure Ulcer Risk Assessment Scale</li> <li>✓ Suriadi and Sanada Pressure Ulcer Risk Assessment Scale</li> <li>✓ Braden Q Pressure Ulcer Risk Assessment Scale</li> <li>✓ Waterlow Pressure Ulcer Risk Assessment Scale</li> <li>✓ Norton Risk Assessment Scale</li> <li>✓ Risk Assessment Scale of Injuries related to Patient Positioning (ELPO)</li> </ul>
<b>Falls</b>	<ul style="list-style-type: none"> <li>✓ Itaki Fall Risk Scale</li> <li>✓ Morse Fall Scale (MFS)</li> <li>✓ Hendrich II Fall Risk Model</li> <li>✓ DENN Fall Risk Assessment Scale Harizmi Fall Risk Assessment Scale</li> </ul>
<b>Surgery-Related Complications and Mortality</b>	<ul style="list-style-type: none"> <li>✓ ASA-PS classification (American Society of Anesthesiologists Physical Status score)</li> <li>✓ Postoperatif Morbidite İndeksi (PMI)</li> <li>✓ Patient-Centered Pelvic Floor Surgery Complication Scale</li> <li>✓ Clavien-Dindo Classification</li> <li>✓ Postoperative Morbidity Index (PMI),</li> <li>✓ POSSUM (Physiologic and Operative Severity Score for the Enumeration of Mortality and Morbidity),</li> <li>✓ Comprehensive Complications Index (CCI)</li> <li>✓ Modified Accordion Severity Grading System,</li> <li>✓ American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP)</li> </ul>



<b>Postoperative Quality of Life</b>	<ul style="list-style-type: none"> <li>✓ Short Form Health Survey (SF-36)</li> <li>✓ Post-Operative Recovery Index (PoRI)</li> <li>✓ Post-Discharge Surgical Recovery Scale (PSR)</li> <li>✓ World Health Organization Quality of Life Assessment (WHOQOL)</li> <li>✓ European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30)</li> <li>✓ Weight on Quality of Life Scale</li> <li>✓ City of Hope Quality of Life-Ostomy Questionnaire (CoH-QoL-OQ)</li> </ul>
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## CONCLUSION

Millions of surgical procedures are performed worldwide each year. In these procedures, undesirable situations may occur depending on the patient's general condition, different diseases, and the effects of anesthesia or surgery. Therefore, an accurate assessment of the patient becomes crucial for communicating the risk of surgery to patients, guiding clinical decision-making and management, and establishing realistic expectations about the value of undergoing surgery. Collecting objective and subjective data from the patient and identifying individual risks are essential for the early detection and prevention of problems. This research effort attempted to identify various scales developed and used to assess the risk of complications and symptoms that may be experienced by patients before, during and after surgery. A detailed review of the current literature revealed that a range of different scales were used by researchers for specific situations and health problems. In order to manage the surgical process at an optimal level, we need to identify, evaluate and manage the issues that may arise during each stage of treatment, which underscores the importance of specialized and experienced surgical nurses in the healthcare sector. When we look at the national health system, we observe that pain scales, consciousness assessment scales, ASA classification, fall and pressure ulcer risk scales are frequently used in clinical settings, while the use of symptom-specific scales is mostly limited to academic research endeavors. Therefore, we could suggest that wider adoption of risk assessment scales for potential problems in the surgical process is needed so that care protocols specific to complications and symptoms can be timely planned after continuous or periodic evaluation, and such assessments should be thoroughly recorded to streamline the current health system in this direction.

## Author Contributions

**Plan, design:** AC, AÇY; **Material, methods and data collection:** AC, AÇY, FZA; **Data analysis and comments:** AÇY, DA; **Writing and corrections:** AC, AÇY, FZA, DA

## Conflict of interest

The authors declare that they have no conflict of interest

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