Balıkesir Medical Journal
e-ISSN: 2564-6664
B Med J 2023;7(2):41-55
DOI: 10.33716/bmedj.1381699

Early and Targeted Mobilization After Surgical Interventions

Cerrahi Girişimlerden Sonra Erken ve Hedefe Yönelik Mobilizasyon

İnci Kırtıl [1*], Nevin Kanan [2]

[1]Yeditepe University, Faculty of Health Sciences, Department of Nursing, İstanbul, Türkiye
[2]Haliç University, Faculty of Health Sciences, Department of Nursing, İstanbul, Türkiye

Received / Geliş Tarihi: **26/10/2023** ***Accepted / Kabul Tarihi:*** **22/11/2023**

Abstract

Early mobilization, which still has no standard definition, is an important component of enhanced recovery after all surgical interventions. By providing early and targeted mobilization, many postsurgical complications can be prevented, and the recovery period and hospital stay can be shortened. However, there are many obstacles reported by both healthcare team members and patients in the achievement of early and targeted mobilization. In addition, there is currently no strong evidence to guide clinical practice in this context. The establishment of mobilization programs specific to surgical patients in healthcare institutions, informing patients about the mobilization process in the preoperative period, determining step goals, promoting motivation, monitoring the number of steps, and encouraging patients to keep a mobilization diary are among the practices that can be implemented to ensure early and targeted mobilization. It is also underlined that early mobilization involves multidisciplinary teamwork. As healthcare professionals, nurses are important members of the multidisciplinary team in the implementation of early and targeted mobilization programs to maintain the quality of care after surgery. This review aimed to highlight the roles and responsibilities of surgical nurses in early and targeted mobilization practices after surgery and the importance of early and targeted mobilization and discuss the barriers encountered in achieving early and targeted mobilization and the recommendations of current guidelines on this subject.

Key words: Early mobilization; enhanced recovery after surgery; targeted mobilization.

Özet

Günümüzde hala standart bir tanımı olmayan erken mobilizasyon, tüm cerrahi girişimler sonrasında hızlı iyileşmenin önemli bir bileşenidir. Erken ve hedefli mobilizasyonun sağlanmasıyla, cerrahi girişim sonrası birçok komplikasyon önlenmekte, iyileşme ve hastanede kalış süresi kısalmaktadır. Ancak erken ve hedefli mobilizasyonun sağlanmasının önünde hem sağlık ekibi üyeleri hem de hastalar tarafından bildirilen birçok engel bulunmaktadır. Aynı zamanda, günümüzde bu konuda klinik uygulamalara rehberlik edecek ölçüde güçlü kanıtlar bulunmamaktadır. Sağlık kurumlarında cerrahi hastalarına özgü mobilizasyon programlarının oluşturulması, hastaların preoperatif dönemde bu konuda bilgilendirilmesi, adım hedeflerinin belirlenmesi, motivasyonlarının sağlanması, adım sayılarının izlenmesi ve mobilizasyon günlüğü tutmaları yönünde cesaretlendirilmesi, erken ve hedefli mobilizasyonun sağlanmasına yönelik atılabilecek adımlardır. Erken mobilizasyonun multidisipliner bir ekip işi olduğunun da altı çizilmektedir. Bir sağlık profesyoneli olarak hemşireler, cerrahi girişim sonrası bakım kalitesini sürdürmek için erken mobilizasyon programlarının uygulanmasında multidisipliner ekibin önemli bir üyesidir. Bu derleme, cerrahi hemşirelerinin ameliyat sonrası erken ve hedefli mobilizasyon uygulamalarındaki rol ve sorumluluklarını, erken ve hedefli mobilizasyonun önemini, erken ve hedefli mobilizasyonun sağlanmasında karşılaşılan engelleri ve güncel rehberlerin bu konudaki önerilerini vurgulamak amacıyla yazılmıştır.

Anahtar Kelimeler: Cerrahi sonrası hızlandırılmış iyileşme; erken mobilizasyon; hedefli mobilizasyon.

***Sorumlu Yazar / Corresponding Author:** İnci Kırtıl, Yeditepe University, Faculty of Health Sciences, Department of Nursing, İstanbul, Türkiye **E-mail:** incikirtil@gmail.com

INTRODUCTION

Since first described in 1899 (1), the concept of early postoperative mobilization has become an initiative recommended to be applied by various studies conducted in the following years (2). Although there is still no clear definition of mobilization (3,4), it can be described as activities including passive and active range of motion, in-bed and bedside movements, and walking (5,6).

Failure to provide early mobilization after surgery may result in negative consequences for many systems in the human body (5,7,8), extending the recovery period and hospital stay (9). Therefore, early mobilization is considered an important practice in minimizing morbidity and mortality (10). Guidelines published about perioperative care and process management of surgical patients include strong recommendations supporting early mobilization but with a low level of evidence (11-14). Although early mobilization has been regarded as an important element of postoperative care, there is currently no clarity concerning its optimal application (2,13), and it is one of the most frequently overlooked nursing practices for surgical patients (7,15). In the preoperative period, informing patients about the benefits of early and targeted mobilization (16-18), specifying postoperative step targets during this process, motivating patients in the postoperative period in line with these goals, monitoring the number of steps they take, and encouraging them to keep a mobilization diary are accepted as applications that can increase compliance with postoperative mobilization programs (3,4,19).

Early and targeted mobilization

Recovery after surgery is considered an important component of the surgical process (20), and early mobilization is an indispensable element of postsurgical recovery (6). Ries first defined early mobilization at the end of the 1800s (1), after which observational studies were carried out in the 1940s, determining that related practices did not harm patients, which led to increasing adoption of early mobilization. Furthermore, with growing evidence of the negative effects of immobilization, avoiding long-term bed rest after surgery has gained more importance (2).

Today, the Enhanced Recovery After Surgery (ERAS) protocols which support the accelerated recovery process of surgical patients and are accepted in many surgical disciplines highlight the importance of early mobilization (21) and recommend it for patients after undergoing surgical interventions (22). However, the ERAS guidelines published to date contain no structured mobilization programs (22) or specific definitions concerning the activities to be undertaken in the postsurgical period due to the limited number of studies in the literature that demonstrate the superiority of any mobilization program over another (3,23). Although early mobilization is considered to have independent positive contributions to postoperative patient outcomes, and the importance of the timing of early mobilization is emphasized, there is still a lack of sufficient evidence on the effects of frequency or duration of this practice on patient outcomes (24). Therefore, to obtain specific definitions of early mobilization after surgery, further studies are needed to underline the importance of implementing structured early mobilization programs starting from the day the surgery is implemented (23).

Importance of early and targeted mobilization

When early mobilization as described in the ERAS protocols is implemented together with dietary modifications and short-term regulation of hunger during the perioperative period, it

accelerates functional recovery by suppressing the increased catabolic process and surgical stress response that would result in postsurgical muscle loss (17). Studies examining the benefits of mobilization report a decrease in pain, fatigue, delirium development, and urinary catheter-related infections, and an increase in physical functioning (7). In a randomized controlled trial conducted with 40 patients that underwent radical cystectomy and ileal loop diversion, among the cases in which early mobilization had been performed preoperatively there was a significant decrease in the length of postoperative hospital stay, duration of opioid analgesic use, time to first defecation, and duration of nasogastric catheter application while a significant increase was observed in the quality of life (25). After long-term bed rest, many adverse outcomes occur related to gastrointestinal, cardiovascular, respiratory, urinary, endocrine, musculoskeletal, and nervous systems and skin (7). In particular, elderly patients or those having undergone orthopedic or general surgery are at higher risk of complications related to immobility (16).

Early mobilization is a very important factor in the prevention of postoperative pulmonary complications (26,27). Among the pulmonary complications caused by postoperative immobilization are pneumonia (13,16,26), atelectasis (12,14), impairment of lung functions and tissue oxygenation (28-30), and pulmonary embolism (8).

The catabolic process begins as a result of the stress response after surgery, and when combined with prolonged inactivity, the rapid physical loss of function leads to decreased muscle mass and strength (30,31). Without sufficient mobilization, an adult can lose up to 5% of his/her muscle mass (5). Results from studies conducted with healthy young adults showed that after two weeks of immobilization, there was a 5-9% loss in the quadriceps muscle mass and a 20-27% decrease in the quadriceps muscle strength. These effects occur more rapidly in older individuals, with the muscle loss percentage reaching three to six times that of young adults (31).

Long-term bed rest has also been found to increase the risk of developing thromboembolic complications after surgical interventions (11,16,30). Studies conducted with patients undergoing knee arthroplasty to examine the effect of early mobilization on patient outcomes reported that when early mobilization was provided, the risk of developing venous thromboembolism and deep vein thrombosis was reported to be significantly reduced (32,33). In a systematic review of nine non-randomized studies, it was concluded that early mobilization might reduce the incidence of venous thromboembolism and accelerate postsurgical functional recovery (30).

Other postoperative complications that may develop due to the lack of early mobilization include insulin resistance (13,26), pressure injuries (5,8), delayed recovery of gastrointestinal and bowel movements (34,35), bone loss, dehydration, malnutrition, sensory deficiency, isolation (5), neuromuscular weakness, joint contractures, and orthostatic hypotension (27).

Mobilization positively affects not only the physical functions of patients but also their emotional and social well-being. Mobilization is stated to reduce depression and anxiety and also increases patient comfort, independence, quality of life, and satisfaction (7). Long-term postsurgical immobility may also cause problems in functional capacity and ability to perform daily living activities (35). Through patient mobilization, pain and fatigue problems can be reduced, anxiety and depression risks can be minimized, and patient satisfaction can be increased (16). Furthermore, by providing early mobilization, patients can take a more active

role in their postoperative recovery (30), which prevents the decrease in their functionality, thereby significantly affecting their dependency on nurses (5).

Studies show that patients who are mobilized early and frequently after surgical interventions have a shortened length of hospital stay (10,36,37) and consequently reduced costs of care and treatment (37,38). In observational studies, the compliance rates of patients with mobilization targets vary between 28 and 69%, and many of them determined compliance with mobilization goals as an important determinant of early hospital discharge (12). In a systematic review examining the effect of early mobilization on hospital stay in orthopedic surgery, patients who were actively mobilized within the first 24 hours after hip and knee replacement surgery had a 1.8-day decrease in the mean length of hospital stay (39). In addition, in patients who had undergone cardiac surgery, a negative correlation was found between the number of steps taken after surgery and the length of hospital stay and need for re-hospitalization (40,41). Early and frequent physical activity, especially after abdominal surgery is an important factor in ensuring enhanced recovery and reducing costs, treatment, and hospital stay (9). For all these reasons, early mobilization is considered an important practice in minimizing morbidity and mortality (10).

Barriers to early and targeted mobilization

Identifying the barriers to early mobilization after surgery and creating strategies for modifiable elements are important keys to integrating early mobilization into multidisciplinary enhanced recovery protocols (6). Before mobilization, a thorough examination of patient safety criteria and related barriers is vital to minimize risks (42). In a systematic review and meta-analysis on patient safety during early mobilization in intensive care, which reviewed studies that investigated the events negatively affecting patient safety during early mobilization, it is reported that in 33 (69%) studies patients experienced decreased oxygen saturation and hemodynamic changes, and in 31 (65%) studies, intravascular catheter displacement or loss of function is described (43).

Supporting patients to increase their mobility is not only one of the basic nursing care practices but it has also been included in various definitions, care models, and theories on nursing (44). However, in a study conducted with 3143 nurses, patient mobilization was determined as one of the most overlooked nursing practices (45). Similarly, in a qualitative study, the nurses stated that patient mobilization always constituted problems in the care setting and was, therefore, often overlooked (46). The reasons for not complying with mobilization protocols and overlooking this practice are reported by healthcare personnel as staff shortage (44,47,48), walking aid/equipment shortage (44), presence of intravenous fluids and medical equipment, such as catheters, drains and probes (3,14,30,44), lack of consensus on the first mobilization time of the patient (47), intensive workload, time-consuming nature of monitoring mobilization (37,48), and unclear distribution of related responsibilities among team members and/or nurses not considering patient mobilization as part of their duties (16).

Although literature studies report a relationship between early mobilization and positive patient outcomes and guidelines have recommendations in this direction, the level of early mobilization remains low (49-51). Another important barrier to early mobilization after surgery is inadequate control of pain (3,6,13) and nausea-vomiting (24). Thus, there is a need for a multifaceted approach involving pain and nausea-vomiting control (24,34).

Although good management of pain after surgery facilitates early mobilization, orthostatic intolerance may prevent mobilization and extend the length of hospital stay even after daily procedures (52). It should be considered that there will be changes in the hemodynamic parameters of patients with postoperative mobilization (42), and to prevent the development of syncope during mobilization, the bedhead should be raised for one to two minutes before moving the patient (53), the patient should be placed in a sitting position on the edge of the bed to monitor hemodynamic parameters and mobilization should only be undertaken when no change in life signs is observed (42,53).

Early mobilization is also an important issue in patients undergoing obesity surgery. During mobilization, in addition to the safety of this patient population, the safety of healthcare personnel and the availability of appropriate equipment and resources are important priorities. Nurses have concerns about risky situations that may occur in the patient and/or themselves during the mobilization of the patient (e.g., falls and injuries due to the improper use of body mechanics) (44). Lack of motivation in the patient, insufficient cardiovascular reserves, patient safety, respiratory, cardiovascular, and neurological stability, equipment/tools used for nutrition, and comorbidities can also be listed among the other causes of early mobilization failure (6,13,30,54).

Preoperatively informing patients about the benefits of early mobilization might result in an increase in physical activity in the early postoperative period (16,18). Perioperative patient information and education concerning early and targeted mobilization is especially important in patients who tend to avoid mobilization (17). During this process, determining the goals for steps to be taken after surgery, putting up motivational posters, and encouraging the use of pedometers or mobilization diaries to achieve these goals are among other practices that can increase patient compliance with postoperative mobilization programs (3). Mobilizing patients through special programs that help them focus on daily goals will allow mobilization to become part of patient care and prevent considering mobilization simply as an activity to be undertaken if the time permits (16).

Guideline recommendations concerning early and targeted mobilization

The ERAS protocols can be defined as multicomponent and multidisciplinary evidence-based practices covering the perioperative process, created to ensure early recovery by maintaining the functions of organs and systems in the preoperative period and reducing stress response after surgery (2,55,56). In ERAS guidelines, evidence levels and recommendation grades related to early mobilization practices vary depending on the different types of surgical interventions and perioperative processes (2).

For patients to undergo lung, gynecological oncology, and colon/rectum surgery, mobilization within the first 24 hours after surgery is included in the ERAS guidelines as a recommendation with a low evidence level but strong recommendation grade (12,14,57). Although it is stated that promoting early mobilization after surgery in cystectomy surgery performed due to bladder cancer should be part of the ERAS protocols, early mobilization is also included in this guideline as it has a low level of evidence and a strong grade of recommendation (11). In the ERAS guideline created for planning the best perioperative care in major head and neck cancer surgery performed with free flap reconstruction, there is also a recommendation that mobilization should be performed in this patient population within the first 24 hours after surgery (moderate evidence-level, strong recommendation) (24).

In the Spain-ERAS guideline, which includes the perioperative care steps of patients who have undergone abdominal surgery, it is recommended that these patients should be mobilized within the first 24 hours after surgery and should spend two hours out of bed on the day of surgery, followed by at least six hours out of bed on the following days until discharge (high evidence level, strong recommendation) (26). According to the ERAS guideline published for gastrointestinal surgery patients, achieving mobilization goals requires a multidisciplinary approach, daily goals set for mobilization should be given to patients in writing, patients should be encouraged to increase their physical activities in the preoperative period, and they can be recommended to record their daily physical activities using a diary or step counter (weak recommendation) (4).

In the ERAS guideline for bariatric surgery patients, there is no recommendation for early mobilization (56). However, the ERAS guideline for elective colorectal surgery patients states that providing early mobilization through patient education and encouragement is an important component of enhanced recovery after surgery, prolonged immobilization is associated with various negative consequences, and therefore patients should be mobilized in the early period (moderate evidence level, strong recommendation) (13).

The ERAS guideline on the perioperative care of patients undergoing pancreatoduodenectomy suggests that patients should be actively mobilized from the morning of the first postoperative day and that daily mobilization goals should be determined and patients should be encouraged to achieve these goals (very low evidence level, strong recommendation) (34). ERAS guidelines prepared for esophagectomy patients state that the steps related to early mobilization may be variable, but the basic elements include creating a standardized and structured mobilization program, implementing a rehabilitation program before surgery, starting mobilization as soon as possible after surgery, increasing physical activities every day to reach the predetermined goals, introducing mobilization targets to the patient, explaining why each goal is important, and sharing visual/written material with the patient (moderate evidence level, strong recommendation) (30).

In the ERAS guideline specific to patients undergoing cesarean interventions, it is suggested that there are no randomized controlled studies with a strong methodology for early mobilization, but it is recommended that patients should be mobilized in the early period following cesarean section (very low evidence level, weak recommendation) (35). The ERAS guideline on perioperative care in gynecological oncology patients also recommends that early mobilization should be performed within the first 24 hours after surgery (low evidence level, strong recommendation) (57).

In the guideline prepared for patients undergoing liver surgery, it is emphasized that there is not sufficient evidence in the literature that early mobilization after hepatectomy will have negative effects and that patients should be encouraged to be mobilized in the early period from the morning after surgery until discharge from hospital (very low evidence level, weak recommendation). It is also stated that more studies are needed to determine the optimal mobilization time and frequency to improve outcomes after surgery (58). Due to surgical trauma, delayed bowel function causes a prolonged recovery period in patients who have undergone gastrointestinal surgery. Although there is insufficient evidence for early mobilization in gastrectomy patients, the ERAS guideline prepared specifically for this patient population suggests setting detailed structured mobilization goals after surgery, encouraging

patients to actively mobilize in the early period, and encouraging them to reach the determined daily mobilization goals and use simple monitoring devices to reach their targets and provide them with written daily mobilization instructions. It is also stated that mobilization programs implemented this way will improve cooperation with patients and the autonomy of individuals (very low evidence level, strong recommendation) (19).

In the ERAS guideline including the care steps of elective rectal/pelvic surgery patients, it is recommended that a caring environment that encourages patients to mobilize in the early period should be created, and a mobilization plan should be established to ensure that patients spend two hours out of bed on the day of surgery and six hours out of the bed on the following days (low evidence level, strong recommendation) (28). Patients who have undergone breast reconstruction surgery are also recommended to be mobilized within the first 24 hours postoperatively (moderate evidence level, strong recommendation) (8). Lastly, according to the ERAS guideline intended for the care of patients who have undergone total hip or knee replacement surgery, due to the known negative effects of extended immobilization time, it is suggested that patients be mobilized as early as possible after surgery to accelerate the process in which to meet the criteria for discharge from hospital (high evidence level, strong recommendation) (59).

Role of nurses in early and targeted mobilization

Early mobilization is an initiative that requires careful patient identification and management, and interdisciplinary team collaboration and training (54). It is also an evidence-based nursing practice that improves patient outcomes after surgery and prevents the development of many possible complications (7,16,45). Healthcare professionals advocate that the establishment of structured mobilization programs in healthcare institutions and surgical clinics can be an important approach to increase the mobilization of patients (16). In these institutions, nurses involved in all processes of surgery must be actively engaged in all stages of developing structured mobilization programs (3) and patient education (26). Thus, surgical nurses will be able to provide greater support for the mobilization of patients as early as possible (3) and they can become the most competent team members in implementing structured early mobilization programs (5). Therefore, the focus should be on developing mobilization programs aimed at minimizing the dependence of in-patients on nurses, promoting mobilization, and preventing functional decline (5). In this way, nurses will be able to assume more roles and responsibilities in ensuring early mobilization and the process of patients gaining independence in a shorter time will be supported (28). Thus, nursing care and follow-up play an important role in increasing the activity level of patients in the postoperative period and preventing complications related to immobility.

CONCLUSION

To increase compliance with early postoperative mobilization in healthcare institutions, the establishment of early and targeted mobilization programs for surgical patients, structuring of these programs specific to the types of surgical intervention, and patient information and education concerning these programs in the preoperative period are the primary steps to be followed. Other practices that help achieve early and targeted mobilization in the postoperative

period include patient mobilization in line with the predetermined goals, motivating patients to mobilize, creating a caring environment that supports patient independence, monitoring the number of steps taken using simple monitoring devices, and ensuring that patients keep a mobilization diary. In addition, further experimental studies are needed to determine the impact of early and targeted mobilization programs implemented with surgical patients on patient outcomes.

Lack of education and information is one of the barriers not only for patients but also for healthcare personnel, preventing the effective implementation of early mobilization practices. Therefore, nurses working in surgical units should be provided training on current and evidence-based practices concerning early and targeted mobilization programs. In addition, the role and responsibilities of surgical nurses should be emphasized during the preparation, implementation, and monitoring of structured early and targeted mobilization programs.

Ethical approval and consent to participate
Not necessary as it is considered a review.

Consent for Publication
Authors gave permission to publish this review.

Competing interest
The authors declare that they have no competing interests.

Funding
This article did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors Contribution
The authors declare that they have contributed equally to all stages of the preparation of the manuscript and that they have read and fully accept the contents.

REFERENCES

1. Ries E. Some radical changes in the after-treatment of celiotoiny cases. The Journal of the American Medical Association, 1899:33;454.
2. Castelino T, Fiore JF, Niculiseanu P, Landry T, Augustin B, et al. The effect of early mobilization protocols on postoperative outcomes following abdominal and thoracic surgery: a systematic review. Surgery, 2016:159(4);991-1003. DOI: 10.1016/j.surg.2015.11.029
3. Yurko YY, Fearon KCH, Young-Fadok TM. Early nutrition and early mobilization: why they are important and how to make it happen. In: Feldman SL, Delaney CP, Ljungqvist O, Carli F, eds. The SAGES/ERAS Society Manual of Enhanced Recovery

Programs for Gastrointestinal Surgery (E-book) Switzerland: Springer International Publishing; 2015. p.167-79. DOI: 10.1007/978-3-319-20364-5

4. Feldheiser A, Aziz O, Baldini G, Cox BPBW, Fearon KCH, Feldman LS, et al. Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice. Acta Anaesthesiologica Scandinavica, 2016:60(3);289-334. DOI: 10.1111/aas.12651
5. Pashikanti L, Ah Von D. Impact of early mobilization protocol on the medical-surgical inpatient population: an integrated review of literature. Clinical Nurse Specialist, 2012:26(2);87-94. DOI: 10.1097/NUR.0b013e31824590e6
6. Hussey JM, Yang T, Dowds J, O'Connor L, Reynolds JV, et al. Quantifying postoperative mobilisation following oesophagectomy. Physiotherapy, 2019:105(1);126-133. DOI: 10.1016/j.physio.2018.08.004
7. Kalisch JB, Lee S, Dabney WB. Outcomes of inpatient mobilization: a literature review. Journal of Clinical Nursing, 2013:23(11-12):1486-1501. DOI: 10.1111/jocn.12315
8. Temple-Oberle C, Shea-Budgell AM, Tan M, Semple LJ, Schrag C, Barreto M, et al. Consensus review of optimal perioperative care in breast reconstruction: Enhanced Recovery After Surgery (ERAS) Society recommendations. Plastic and Reconstructive Surgery, 2017:139(5):1056e-1071e. DOI: 10.1097/PRS.0000000000003242
9. Wiklund M, Sundqvist E, Olsen MF. Physical activity in the immediate postoperative phase in patients undergoing Roux-en-Y gastric bypass-a randomized controlled trial. Obesity Surgery, 2015:25(12);2245-2250. DOI: 10.1007/s11695-015-1690-y
10. Ziyaeifard M, Khoo BGF, Lotfian S, Azarfarin R, Aminnejad R, Alikhani R, et al. Effects of early mobilization protocol on cognitive outcome after cardiac surgery. Annals of Anesthesiology and Critical Care, 2018:3(1);1-8.
11. Cerantola Y, Valerio M, Persson B, Jichlinski P, Ljungqvist O, Hubner M, et al. Guidelines for perioperative care after radical cystectomy for bladder cancer: Enhanced Recovery After Surgery (ERAS) society recommendations. Clinical Nutritions, 2013:32;879-887. DOI: 10.1016/j.clnu.2013.09.014
12. Carmichael JC, Keller DS, Baldini G, Bordeianou L, Weiss E, Lee L, et al. Clinical practice guidelines for enhanced recovery after colon and rectal surgery from the American Society of Colon and Rectal Surgeons and Society of American Gastrointestinal and Endoscopic Surgeons. Diseases of the Colon and Rectum, 2017:60(8);761-784. DOI: 10.1097/DCR.0000000000000883

13. Gustafsson UO, Scott MJ, Hübner M, Nygren J, Demartines M, Francis N, et al. Guidelines for perioperative care in elective colorectal surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations: 2018. World Journal of Surgery, 2019:43(3);659-695. DOI: 10.1007/s00268-018-4844-y
14. Batchelor TJP, Rasburn NJ, Abdelnour-Berchtold E, Brunelli A, Cerfolio RJ, Gonzalez M, et al. Guidelines for enhanced recovery after lung surgery: recommendations of the Enhanced Recovery After Surgery (ERAS) Society and the European Society of Thoracic Surgeons (ESTS). European Journal of Cardio-Thoracic Surgery, 2019:55(1);91-115. DOI: 10.1093/ejcts/ezy301
15. Currier D, TeKolste D, Wheatley MA. Why day zero matters in early ambulation for postoperative patients: an evidence-based project. Virginia Henderson Global Nursing e-Repository, 2018. Retrieved from (20.09.2023): https://sigma.nursingrepository.org/handle/10755/624140
16. Teodoro CR, Breault K, Garvey C, Klick C, O'Brien J, Purdue T, et al. STEP-UP: Study of the effectiveness of a patient ambulation protocol. Medical Surgical Nursing, 2016:25(2);111-116.
17. Grass F, Pache B, Martin D, Addor V, Hahnloser D, Demartines N, Hübner M. Feasibility of early postoperative mobilisation after colorectal surgery: a retrospective cohort study. International Journal of Surgery, 2018:56;161-166. DOI: 10.1016/j.ijsu.2018.06.024
18. Au D, Matthew AG, Lopez P, Hilton WJ, Awasthi R, Bousquet-Dion G, et al. Prehabilitation and acute postoperative physical activity in patients undergoing radical prostatectomy: a secondary analysis from an RCT. Sports Medicine-Open, 2019:5(18);1-7. DOI: 10.1186/s40798-019-0191-2
19. Mortensen K, Nilsson M, Slim K, Schafer M, Mariette C, Braga M, et al. Consensus guidelines for enhanced recovery after gastrectomy Enhanced Recovery After Surgery (ERAS) Society recommendations. British Journal of Surgery, 2014:101(10);1209-1229. DOI: 10.1002/bjs.9582
20. Van der Meij E, van der Ploeg HP, van den Heuvel B, Dwars BJ, Meijerink WJHJ, Bonjer HJ, et al. Assessing pre- and postoperative activity levels with an accelerometer: a proof of concept study. BMC Surgery, 2017:17(1);56. DOI: 10.1186/s12893-017-0223-0

21. Burgess LC, Wainwright WT. What is the evidence for early mobilisation in elective spine surgery? A narrative review. Healthcare, 2019:7(92);1-21. DOI: 10.3390/healthcare7030092
22. De Almeida EPM, de Almeida JP, Landoni G, Galas FRBG, Fukushima JT, Fominskiy E, et al. Early mobilization programme improves functional capacity after major abdominal cancer surgery: a randomized controlled trial. British Journal of Anaesthesia, 2017:119(5);900-907. DOI: 10.1093/bja/aex250
23. Scott MJ, Baldini G, Fearon KCH, Feldheiser A, Feldman LS, Gan TJ, et al. Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 1: pathophysiological considerations. Acta Anaesthesiologica Scandinavica, 2015:59(10);1212-1231. DOI: 10.1111/aas.12601
24. Dort CJ, Farwell GD, Findlay M, Huber GF, Kerr P, Shea-Budgell MA, et al. Optimal perioperative care in major head and neck cancer surgery with free flap reconstruction a consensus review and recommendations from the Enhanced Recovery After Surgery Society. JAMA Otolaryngology-Head and Neck Surgery, 2016:143(3);292-303. DOI: 10.1001/jamaoto.2016.2981
25. Vermişli Peker S, Çakmak Ö, Müezzinoğlu T, Aslan G, Baydur H. Radikal sistektomi ve ileal loop yapılan hastalarda erken mobilizasyonun iyileşme süreci ve yaşam kalitesine etkisi. 3. Uluslararası 11. Ulusal Türk Cerrahi ve Ameliyathane Hemşireliği Kongresi Özet Bildiri Kitabı, 2019, ss: 830-831.
26. Calvo Vecino JM, Hernandez EV, Ramirez Rodriguez JM, Segurola CL, Trapero CM, Quintas CN. Enhanced recovery for abdominal surgery clinical pathway. Spanish Ministry of Health, Social Services and Equality Working Group, 2015. Retrieved from (20.09.2023): http://portal.guiasalud.es/contenidos/iframes/documentos/opbe/2015-07/ViaClinica-RICA_English.pdf
27. Hanada M, Kanetaka K, Hidaka S, Taniguchi K, Oikawa M, Sato S, et al. Effect of early mobilization on postoperative pulmonary complications in patients undergoing video-assisted thoracoscopic surgery on the esophagus. Esophagus, 2018:15(2);69-74. DOI: 10.1007/s10388-017-0600-x
28. Nygren J, Thacker J, Carli F, Fearon KCH, Norderval S, Lobo DN, et al. Guidelines for perioperative care in elective rectal/pelvic surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. Clinical Nutrition, 2013:31(6);801-816. DOI: 10.1016/j.clnu.2012.08.012

29. Moningi S, Patki A, Padhy N, Ramachandran G. Enhanced recovery after surgery: an anesthesiologist's perspective. Journal of Anaesthesiology Clinical Pharmacology, 2019:35(Suppl 1);S5-S13. DOI: 10.4103/joacp.JOACP_238_16
30. Low ED, Allum W, De Manzoni G, Ferri L, Immanuel A, Kuppusamy KM, et al. Guidelines for perioperative care in esophagectomy: Enhanced Recovery After Surgery (ERAS) Society recommendations. World Journal of Surgery, 2019:43;299-330. DOI: 10.1007/s00268-018-4786-4
31. Hashem DM, Nelliot A, Needham MD. Early mobilization and rehabilitation in the ICU: moving back to the future. Respiratory Care, 2016:61(7);971-979. DOI: 10.4187/respcare.04741
32. Pearse EO, Caldwell BF, Lockwood RJ, Hollard J. Early mobilisation after conventional knee replacement may reduce the risk of postoperative venous thromboembolism. The Journal of Bone and Joint Surgery, 2007:89-B(3);316-322. DOI: 10.1302/0301-620X.89B3.18196
33. Chandrasekaran S, Ariaretnam SK, Tsung J, Dickison D. Early mobilization after total knee replacement reduces the incidence of deep venous thrombosis. ANZ Journal of Surgery, 2009:79(2009);526-529. DOI: 10.1111/j.1445-2197.2009.04982.x
34. Lassen K, Coolsen EMM, Slim K, Carli F, de Aguilar-Nascimento EJ, Schafer M, et al. Guidelines for perioperative care for pancreaticoduodenectomy: Enhanced Recovery After Surgery (ERAS) Society recommendations. Clinical Nutrition, 2012:31(6);817-830. DOI: 10.1016/j.clnu.2012.08.011
35. Macones AG, Caughey BA, Wood LS, Wrench JI, Huang J, Norman M, et al. Guidelines for postoperative care in cesarean delivery: Enhanced Recovery After Surgery (ERAS) Society recommendations. American Journal of Obstetrics and Gynecology, 2019:221(3);247.e1-247.e9. DOI: 10.1016/j.ajog.2019.04.012
36. Delaney CP, Zutshi M, Senagore AJ, Remzi FH, Hammel J, Fazio WV. Prospective, randomized, controlled trial between a pathway of controlled rehabilitation with early ambulation and diet and traditional postoperative care after laparotomy and intestinal resection. Diseases of the Colon & Rectum, 2003:46(7);851-859. DOI: 10.1007/s10350-004-6672-4
37. Halpern WL. Early ambulation is crucial for improving patient health. The American Journal of Nursing, 2017:117(6);15. DOI: 10.1097/01.NAJ.0000520240.29643.e2
38. Larsen K, Hansen TB, Thomsen PB, Christiansen T, Soballe K. Cost-effectiveness of accelerated perioperative care and rehabilitation after total hip and knee arthroplasty.

The Journal of Bone and Joint Surgery, 2009:91(4);761-772. DOI: 10.2106/JBJS.G.01472

39. Guerra ML, Singh JP, Taylor FN. Early mobilization of patients who have had a hip or knee joint replacement reduces length of stay in hospital: a systematic review. Clinical Rehabilitation, 2014:29(9);844-854. DOI: 10.1177/0269215514558641
40. Cook DJ, Thompson EJ, Prinsen SK, Dearani AJ, Deschamps C. Functional recovery in the elderly after major surgery: assessment of mobility recovery using wireless technology. The Annals of Thoracic Surgery, 2013:96;1057-1061. DOI: 10.1016/j.athoracsur.2013.05.092
41. Takahashi T, Kumamaru M, Jenkins S, Saitoh M, Morisawa T, Matsuda H. In-patient step count predicts re-hospitalization after cardiac surgery. Journal of Cardiology, 2015:66(4);286-291. DOI: 10.1016/j.jjcc.2015.01.006
42. Green M, Marzano V, Leditschke IA, Mitchell I, Bissett B. Mobilization of intensive care patients: a multidisciplinary practical guide for clinicians. Journal of Multidisciplinary Healthcare, 2016:9;247-256. DOI: 10.2147/JMDH.S99811
43. Nydahl P, Sricharoenchai T, Chandra S, Kundt FS, Huang M, Fischill M, et al. Safety of patient mobilization and rehabilitation in the intensive care unit: systematic review with meta-analysis. Annals of the American Thoracic Society, 2017:14(5);766-777. DOI: 10.1513/AnnalsATS.201611-843SR
44. Doherty-King B, Yoon JY, Pecanac K, Brown R, Mahoney J. Frequency and duration of nursing care related to older patient mobility. Journal of Nursing Scholarship, 2013:46(1);20-27. DOI: 10.1111/jnu.12047
45. Kalisch JB, Tschannen D, Lee H, Friese CR. Hospital variation in missed nursing care. American Journal of Medical Quality, 2011:26(4);1-9. DOI: 10.1177/1062860610395929
46. Bittner NP, Gravlin G. Critical thinking, delegation, and missed care in nursing practice. The Journal of Nursing Administration, 2009:39(3);142-146. DOI: 10.1097/NNA.0b013e31819894b7
47. Vermişli S, Çam K. Ürolojik radikal cerrahi sonrası erken mobilizasyonun etkinliği. Bulletin of Urooncology, 2015:14;324-326. DOI: 10.4274/uob.467
48. Fiore Jr JF, Castelino T, Pecorelli N, Niculiseanu P, Balvardi S, Hershorn S, et al. Ensuring early mobilization within an enhanced recovery program for colorectal surgery-a randomized controlled trial. Annals of Surgery, 2017:266(2);223-231. DOI: 10.1097/SLA.0000000000002114

49. Gustafsson UO, Hausel J, Thorell A, Lijungqvist O, Soop M, Nygren J. Adherence to the enhanced recovery after surgery protocol and outcomes after colorectal cancer surgery. The Archives of Surgery, 2011:146(5);571-577. DOI: 10.1001/archsurg.2010.309
50. Vlug MS, Bartels SAL, Wind J, Ubbink DT, Hollmann MW, Bemelman WA. Which fast track elements predict early recovery after colon cancer surgery? Colorectal Disease, 2012:14(8);1001-1008. DOI: 10.1111/j.1463-1318.2011.02854.x
51. Bergman S, Deban M, Martelli V, Monette M, Sourial N, Hamadani F, et al. Association between quality of care and complications after abdominal surgery. Surgery, 2014:156(3);632-639. DOI: 10.1016/j.surg.2013.12.031
52. Müller RG, Bundgaard-Nielsen M, Kehlet H. Orthostatic function and the cardiovascular response to early mobilization after breast cancer surgery. British Journal of Anaesthesia, 2010:104(3);298-304. DOI: 10.1093/bja/aep381
53. Akyolcu N. Ameliyat Sonrası Hemşirelik Bakımı. Akyolcu N, Kanan N, Aksoy G, editor. Cerrahi Hemşireliği I. 2. Baskı. İstanbul: Nobel Tıp Kitabevi;2017. p.335-364.
54. Hodgson CL, Capell E, Tipping CJ. Early mobilization of patients in intensive care: organization, communication and safety factors that influence translation into clinical practice. Critical Care, 2018:22(1);1-7. DOI: 10.1186/s13054-018-1998-9
55. Melnyk M, Casey RG, Black P, Koupparis AJ. Enhanced recovery after surgery (ERAS) protocols: time to change practice? Canadian Urological Association Journal, 2011:5(5);342-348. DOI: 10.5489/cuaj.11002
56. Thorell A, MacCormick AD, Awad S, Reynolds N, Roulin D, Demartines N, et al. Guidelines for perioperative care in bariatric surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. World Journal of Surgery, 2016:40(9);2065-2083. DOI: 10.1007/s00268-016-3492-3
57. Nelson G, Bakkum-Gamez J, Kalogera E, Glaser G, Altman A, Meyer AL, et al. Guidelines for perioperative care in gynecologic/oncology: Enhanced Recovery After Surgery (ERAS) Society recommendations-2019 update. International Journal of Gynecological Cancer, 2019:29(4);651-668. DOI: 10.1136/ijgc-2019-000356
58. Melloul E, Hübner M, Scott M, Snowden C, Prentis J, Dejong HCC, et al. Guidelines for perioperative care for liver surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. World Journal of Surgery, 2016:40(10);2425-2440. DOI: 10.1007/s00268-016-3700-1

59. Wainwright TW, Gill M, McDonald AD, Middleton GR, Reed M, Sahota O, et al. Consensus statement for perioperative care in total hip replacement and total knee replacement surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. Acta Orthopaedica, 2019:91(1);3-19. DOI: 10.1080/17453674.2019.1683790