



ORIGINAL ARTICLE

Medicine Science 2022;11(2):490-5

Surgical intensive care nurses' capabilities to identify ankle contracture with case analysis

Yeliz Cigerci¹, Ozlem Soyer Er¹, Fatima Yaman², Oznur Gurlek Kisacik³, Sumeyra Gundogmus⁴, Ipek Altinbas⁴,
 Hamide Nur Erkan⁴

¹Afyonkarahisar Health Sciences University, Faculty of Health Sciences, Department of Surgical Nursing, Afyonkarahisar, Turkey

²Kutahya Health Sciences University, Faculty of Medicine, Department of Physical Therapy and Rehabilitation, Kutahya, Turkey

³Afyonkarahisar Health Sciences University, Faculty of Health Sciences, Department of Fundamentals Of Nursing, Afyonkarahisar, Turkey

⁴Afyonkarahisar Health Sciences University, Faculty of Health Sciences, Afyonkarahisar, Turkey

Received 13 September 2021; Accepted 15 January 2022

Available online 06.03.2022 with doi: 10.5455/medscience.2021.09.290

Copyright@Author(s) - Available online at www.medicinescience.org

Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.



Abstract

Determining the surgical intensive care nurses' skills to identify ankle contracture with case analysis. This descriptive study was conducted with 61 nurses over the age of 18 who volunteered to participate in the study from the surgical intensive care units of two university hospitals between February and March 2019. In the collection of data, the Sociodemographic and Occupational Characteristics Form and Ankle Contracture Identification Test were used. Of the nurses, 82.0% did not receive in-service training on the ankle contracture, 32.8% frequently encountered ankle contracture in patients, 90.2% stated that the development of ankle contracture in patients was related to nursing care and 86.9% reported that it is preventable. As a result of the four case analyzes given to the nurses to identify ankle contracture, immobilization (90.5% - 91.7%), age (7.1% - 82.1%), length of stay (45.2%- 82.1%) and gender (4.8%-26.2%) were stated as risk factors by nurses in all four cases. While 26.2% of the nurses stated cooperating with a physiotherapist in the first case as the first intervention to prevent ankle contracture, 47.5% in the second case, 39.3% in the third case, and 41% in the fourth case mentioned changing position as the first preventive intervention. Almost all the nurses determined that the patient's bed dependency was the primary risk factor, while they were seen to give priority to the change of position in the order of interventions to prevent ankle contracture.

Keywords: Nursing, ankle contracture, foot drop, intensive care

Introduction

The concept of intensive care is a whole set of approaches based on preserving the vital functions of patients and maintaining them normally [1]. Intensive care units (ICUs), on the other hand, are defined as care centres where normal care and treatment are inadequate, patients who cannot fulfil their normal life functions are accepted, and where many of the technological tools and a disciplined approach within the team are mandatory [1,2]. Due to long periods of inactivity of intensive care patients, many negative problems may occur in the respiratory, cardiovascular,

nervous, gastrointestinal, genitourinary, endocrine, metabolism and musculoskeletal systems. The main problems that occur in the musculoskeletal system are joint degenerations, degeneration of collagen fibres, hypotonia, atony, muscle atrophy, decrease in muscle strength and bone density [3].

Joint contracture is defined as a decrease in the range of passive motion of a joint secondary to the shortening of the connective tissue and muscles around the joint [4,5]. The most common contracture in patients who are immobilized for a long time is ankle contracture deformity/foot drop [6]. Ankle contracture (AC) occurs as a result of the limitation of the foot joint, shortening of the tissues around the joint, and fibrosis [7]. The tendons and muscles associated with plantar flexion of the foot are susceptible to damage through chronic overstretching and prolonged positioning, resulting in an unnatural joint position. In the ICU, patients are usually in a supine position, which results in extension of the toes and prolonged dorsiflexion of the foot. This position leads to Achilles tendon shortening and contracture with a limited range of motion of the joint [8]. Joint contractures starting after the 4th

*Corresponding Author: Yeliz Cigerci, Afyonkarahisar Health Sciences University, Faculty of Health Sciences, Department of Surgical Nursing, Afyonkarahisar, Turkey. E-mail: yelizceylin@hotmail.com

day of immobility become visible after 10 days and lead to severe physical limitations after 14 days [9]. The rate of AC development in intensive care unit patients varies between 24-28% [4,10].

Patients with joint contractures development in the ICU have higher mortality [9]. Contractures on lower extremities affect ambulation and increase the risk of falls. Especially the coexistence of many joint contractures brings a burden to healthcare professionals and family members in regards to the care that needs to be provided [4]. Nurses are the team members interacting most with the patient in the delivery of healthcare services. Nurses have an important role in preventing foot drops. Prevention, early diagnosis and treatment of complications that may occur due to prolonged hospital stay due to minor and major complications in surgery is possible with surgical nurses who have comprehensive knowledge and experience. It is aimed with the right nursing care to be carried out to protect unconscious patients from complications that will limit their life when they regain consciousness, if possible. Within the scope of the legal regulations in the field of nursing of our country, the planning and implementation of interventions to prevent contracture development in patients have been defined among the duties, authorities and responsibilities of intensive care nurses [11]. Therefore, the inclusion of preventive nursing interventions in their care by intensive care nurses is closely related to their capabilities to identify AC that may limit the patient's life activities. However, it was seen in the literature review that studies examining the capability of surgical nurses to identify AC were limited. Therefore, it was aimed in this study to examine the capability of surgical intensive care nurses to identify AC with the case analysis.

Materials and Methods

Design and setting of the study

This descriptive study was conducted in the surgical intensive care units of Afyonkarahisar University and Kütahya Health Science University University hospitals between February and March 2019.

Population and sample of the study

The population of the study consisted of 100 nurses working in General Surgery, Cardiovascular and Thoracic Surgery Diseases, Anesthesia ICUs of the mentioned hospitals between February and March 2019. Sample selection was not performed and reaching the entire population of the study was aimed. A total of 61 nurses, who were not on leave/sick leave during the time of the study data collection and volunteered to participate in the study, formed the study sample. The response rate of intensive care nurses was 61%.

Collection of data

The "Sociodemographic and Occupational Characteristics Form" was used to evaluate the sociodemographic and occupational characteristics of the nurses working in the ICU, and the "Ankle Contracture Identification Test (ACIT)" to evaluate their skills to identify AC. The researchers visited the ICU nurses during the daytime shift. Questionnaires were given to the nurses by the researchers after they were informed about the study and their consent was obtained. Nurses who agreed to participate in the study were asked to fill in the questionnaires anonymously

at a convenient time. The questionnaires were collected at the researchers' next visit. Participants needed about 15 minutes to complete the questionnaires.

Data collection tools

In the collection of data, the Sociodemographic and Occupational Characteristics Form and Ankle Contracture Identification Test were used.

Sociodemographic and occupational characteristics form

This form was developed by the researchers in line with the literature to determine the sociodemographic and occupational characteristics of nurses. Sociodemographic and Occupational Characteristics Form consists of a total of 21 questions on characteristics such as age, gender, educational status, duties in the intensive care unit, the ICU they work in, years of experience in the profession and the intensive care unit, working method, weekly working hours, preference to work in the intensive care, willingness to continue working, the status of finding self-adequate to work, participating in the in-service training, and status of receiving training for foot drop.

Ankle contracture identification test

The researchers prepared 4 case samples that nurses could encounter in a clinical setting after conducting a literature review. After each case sample, two questions were prepared in which nurses were asked to identify the risk factors for the development of ankle contracture and preventive nursing interventions. There were 8 questions in total for the 4 case samples. Furthermore, expert opinion (4 academician nurses, 1 intensive care specialist, 2 intensive care nurses) was obtained during the preparation of case samples.

The 4 case samples were as follows: The first case was a patient who underwent coronary artery bypass graft (CABG) surgery and with a diagnosis of deep vein thrombosis (DVT), the second case was an elderly patient with chronic diseases who developed acute renal failure (ARF) after surgery, who was immobile and in a coma, the third case was a young male patient who came with a gunshot injury, agitated and subjected to a physical restraining and the fourth case was a patient who came to the emergency department with the complaint of sudden nausea and vomiting, then underwent colectomy and was in the ICU for a long time.

Data analysis

The data obtained from the study were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows 21.0 (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) package program. Nurses and patients' sociodemographic and occupational characteristics were analyzed with frequency, percentage distribution, mean and standard deviation values.

Ethical approval

Written approval was obtained from the non-interventional research ethics committee of a university (2019/5). Permission was obtained also from the institutions where the research would be carried out. The verbal consent of the participating nurses was

obtained after explaining the purpose of the study.

Results

The mean age of the intensive care nurses was 29.4±6.3 years, 59.7% were women and 65.6% were undergraduates. While 65.6% of the nurses were working in Health Sciences University Hospital, 40.0% in the anaesthesia intensive care unit and 95.1% as clinical nurses in intensive care units. The average working year of the nurses in the intensive care unit was 4.9 ± 3.2 years, 85.2% of them were working in day and night alternated shifts (Table 1).

All the participants stated of participating in the in-service training given in their institutions, however, 82.0% of them did not receive in-service training for AC, and 14.8% mentioned that they received training other than in-service training. While 72.1% of the nurses reported using an auxiliary product to prevent AC, 44.3% of the auxiliary product used was an ankle-foot orthosis (AFO). Of the nurses, 32.8% stated frequently encountering AC on patients and 88.5% reported practising the intervention to maintain the anatomical position to prevent AC. Furthermore, 90.2% of the nurses thought that the development of AC in patients was related to nursing care and 86.9% stated it was preventable (Table 2).

Table 1. Distribution of sociodemographic and occupational characteristics of nurses

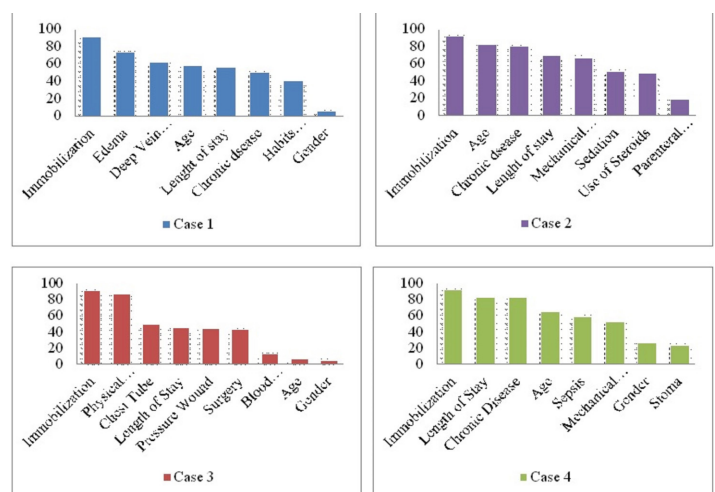
Characteristics	Mean±SD
Age (years)	29.4 ±6.3
Working Duration at the Profession	8.0±6.0
Working Duration in ICU	4.9±3.4
Characteristics	n (%)
Gender	
Woman	34 (55.7)
Man	27 (44.3)
Education Status	
Vocational School of Health Services	9 (14.8)
Associate degree	10 (16.4)
Undergraduate	40 (65.6)
Graduate	2 (3.3)
Hospital Where the Participant Works	
AHSU	21 (34.4)
KHSU	40 (65.6)
ICU Unit Where the Participant Works	
Anaesthesia	40 (65.5)
Cardiovascular and Thoracic Surgery	12 (19.7)
General Surgery	9 (14.8)
Duty In Intensive Care	
Charge Nurse	3 (4.9)
ICU Nurse	58 (95.1)
ICU Mode of Function(shift)	
Daytime Only	6 (9.8)
Night Only	3 (4.9)
Night and Day Alternating	52 (85.2)
Status of Choosing To Work At ICU	
Yes	50 (82.0)
No	11 (18.0)
Desire to Work in ICU	
Yes	60 (98.4)
No	1 (1.6)
Status of Finding Self-Adequate to Work in ICU	
Yes	48 (78.7)
No	13 (21.3)

Table 2. Training and prevention status of nurses regarding AC

Characteristics	n (%)
Participation in In-Service Training in the Institution	
Yes	61 (100.0)
No	-
Status of Receiving In-Service Training on AC	
Yes	11 (18.0)
No	50 (82.0)
Status of Receiving Any Training Other than In-Training for AC	
Yes	9 (14.8)
No	52 (85.2)
Status of Using Any Auxiliary Product for AC Prevention	
Yes	44 (72.1)
No	17 (27.9)
Auxiliary products used to prevent AC*	
Pillow	19 (31.1)
Ankle-Foot Orthosis(AFO)	27 (44.3)
Gel Products	12 (19.7)
Splint	3 (4.9)
Frequency of Encountering with AC	
Never	10 (15.4)
Rarely	19 (31.1)
Moderate Frequency	7 (11.5)
Often	20 (32.8)
Always	5 (8.2)
AC Prevention Interventions*	
Position Change	46 (75.4)
Use of assistive devices to maintain anatomical position	54 (88.5)
ROM Exercise	36 (59.0)
Physiotherapy	5 (8.2)
Thinking that ABK development is related to nursing care	
Yes	55 (90.2)
No	3 (4.9)
No Opinion	3 (4.9)
Can AC Development Be Prevented With Effective Nursing Care?	
Yes	53 (86.9)
No	8 (13.1)

* Multiple options were chosen. AC: Ankle Contracture

The risk factors identified by the nurses for ACI according to the cases are given in Figure 1. As a result of the four case analyzes given to the nurses to identify AC, in all four cases, risk factors were stated as immobilization between 90.5% and 91.8%, age 7.1% and 82.1%, length of stay 45.2% and 82.1%, and gender 4.8% and 26.2%. Other case-specific risk factors were identified as having a chronic disease between 50.0% and 82.1% and being dependent on a mechanical ventilator between 52.4% and 66.7%. While edema development with 73.8%, DVT development with 61.9%, and habits (smoking, alcohol, etc.) with 40.5% were identified as the risk factors in the first case, use of steroids with 48.8%, sedation with 51.2%, and parenteral nutrition with 19.0% were identified as the risk factors in the second case. In the 3rd case, the risk factors were physical restraint with 86.9%, pressure wound 44.0%, chest tube 48.8%, surgery 42.9%, and blood transfusion 13.1%, and sepsis with 58.3% in the 4th case.

**Figure 1.** Risk factors with identified effects in AC related to the cases

The first three most used interventions in regards to the cases are given in Figure 2. The order of interventions to prevent AC was as followed: In the first case, 26.2% of the nurses mentioned cooperation with a physiotherapist as the first intervention, 26.2% ROM exercise as the second one and 32.8% mobilization application as the third one. In the second case, 47.5% of them stated changing the position as the first, 37.7% to support the joint spaces as second, and 41.0% mobilization as third. In the third case, 39.3% of them indicated changing positions as the first, 29.5% ROM exercises as the second, and 24.6% applying mobilization as the third. In the 4th case, 41.0% of them specified the position change as the first one, 32.8% the ROM exercise as second, and 36.1% prevention from falls and traumas as the third one.

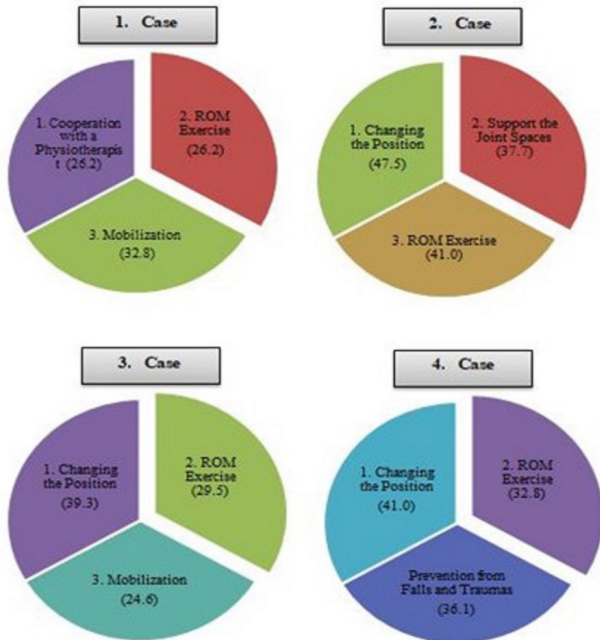


Figure 2. Distribution of the first three most used interventions in regards to the cases

Discussion

In this study, the skills of surgical intensive care nurses to identify risk factors, that may cause AC, as well as their status of being able to identify preventive nursing interventions, were examined in line with case studies. Most of the nurses stated not receiving training on AC and that the AC development in patients is related to nursing care and can be prevented. In a study conducted on stroke patients, the incidence of ABK decreased in the group in which nurses provided evidence-based care compared to the routine care group [12]. Providing evidence-based training to nurses, in particular, can be a way to reduce the incidence of AC. In this study, most of the nurses stated that the assistive devices to maintain the anatomical position were prevention interventions and used in the unit they work. An ankle-foot orthosis (AFO) is one of the most commonly used methods to prevent foot drops in patients with stroke [13]. The application of footboard support in stroke patients is recommended practice to prevent ankle contractures [14]. In the studies, heel protectors [8] and foot boots [15] have been reported to be the factors that prevent the development of AC. In this study, nurses stated that they often encountered ABK. However, there are

very few studies showing its incidence [4,10]. Failure to evaluate AC with objective parameters can be a factor that makes it difficult to diagnose. In one study, all patients were re-evaluated every three days with goniometric scores for AC development [8]. It may be recommended to monitor with a goniometer to facilitate diagnosis and make the changes visible.

AC development occurs in intensive care patients due to being bedridden for a long time [16]. Immobility is the most important risk factor in contracture development. Contracture may also develop as a result of inactivity due to arterial and venous catheters, physical restraint, pressure wounds [4], oedema, hemodynamic and neurological changes. The length of stay in the intensive care unit and the duration of being connected to a mechanical ventilator are other factors that increase the development of contractures [17]. In the literature, AC has been reported to develop in approximately half of the patients who develop sepsis [10]. In this study, immobility known to be a very important etiological factor, especially in intensive care patients, was identified as a high-risk factor in all cases. Furthermore, physical restraint, duration of stay, age, and edema were reported as secondary risk factors for each case. Although gender has been indicated as a risk factor in all cases, its rate was quite low.

About 10% of all patients undergoing surgery have a high risk of complications [18]. In one study, while 30.5% of patients experienced a prolonged hospital stay (≥ 11 days) after surgery, 17% experienced a prolonged ICU stay (5 days) [19]. Contractures of normal joints subject to immobility during prolonged hospital stays can theoretically be prevented [4]. Appropriate position, joint range of motion exercises (active or passive), early mobilization are the basic principles in preventing AC formation [5]. Heel protectors and pillows can be used to maintain the normal position of the foot [8]. In the first case analysis, nurses stated "cooperation with the physiotherapist" as the first intervention to be used. ROM exercises are known to be an important intervention in the preservation of the joint range of motion in intensive care units [20]. In addition to having many etiological factors, AC requires a multidisciplinary approach in the prevention, rapid diagnosis and treatment [16]. Especially for patients in intensive care, identification of AC by nurses and its quick coordination with the multidisciplinary team should be considered as a protective intervention. It can be also said that surgical nurses give necessary importance to team cooperation and thus prioritize patient safety. Guidelines for the prevention of complications related to immobility suggest that patient positioning is an important strategy [21]. It is often used to prevent contractures [22]. According to the case analysis in this study, position change has been determined as a priority intervention by the nurses. Other priority interventions such as supporting the joint spaces of the patients and protecting them from falls and traumas also seem to be associated with positioning. It can be said that surgical nurses easily determine the priority nursing interventions that will be applied to prevent AC.

Limitations

The results of this study are limited to surgical intensive care nurses of two institutions. Furthermore, performing analyzes specific to certain scenarios limits generalization to other patient outcomes.

Conclusion

As a result of this study, the majority of surgical intensive care nurses were found not to receive training on AC and that the AC development in patients is related to nursing care and can be prevented. Furthermore, almost all of them were found to consider immobilization as a primary risk factor for AC development, give priority to the position change, but choose different interventions based on the cases. Contractures starting after the 4th day of immobility lead to serious physical limitations after 14 days. Therefore, it is recommended to begin to exercise and preventive practices in intensive care patients to prevent AC from the day of immobilization. Intensive care nurses' awareness and knowledge of AC should also be improved. Therefore, it is recommended to plan training for intensive care nurses in line with this purpose.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

All authors declare no financial support.

Ethical approval

Written approval was obtained from the non-interventional research ethics committee of Afyonkarahisar Health Science University (2019/5).

References

1. Beğer T. Pressure sores in intensive care: risk factors and prevention. *J Crit Intensive Care* 2004;4:244-53.
2. Terzi B, Kaya N. Nursing care of critically ill patients. *J Crit Intensive Care* 2011;1:21-5.
3. Şahin OA. 2006. A study for evaluation of nursing care (PhD thesis), Marmara University Institute of Health Sciences, İstanbul.
4. Clavet H, Hébert PC, Fergusson D, et al. Joint contracture following prolonged stay in the intensive care unit. *CMAJ* 2008;178:691-7.
5. Gezer İA. 2011. Diz kontraktürlü hastalarda farklı fizik tedavi yöntemlerinin etkinliğinin karşılaştırılması (Thesis in medicine), Selcuk University Meram Medical Faculty Physical Medicine and Rehabilitation Department, Konya
6. Springhouse. Professional guide to signs & symptoms. Lippincott Williams & Wilkins. 5th ed. 2006.
7. Kutlu AK, Dıramalı A, Temiz C. The effect of exercise on blood parameters and vital signs in bedridden patients. *JEUNF* 2011;27:25-36.
8. Meyers T. Prevention of heel pressure injuries and plantar flexion contractures with use of a heel protector in high-risk neurotrauma, medical, and surgical intensive care units: A randomized controlled trial. *J Wound Ostomy Continence Nurs.* 2017;44:429-33.
9. Clavet H, Doucette S, Trudel G. Joint contractures in the intensive care unit: quality of life and function 3.3 years after hospital discharge. *Disabil Rehabil.* 2015;37:207-13.
10. Hamzah N, Bahari MA, Abdullah SJF, et al. Incidence and predictors of early ankle contracture in adults with acquired brain injury. *Neurology Asia.* 2015;20:49-58.
11. Nursing Regulation No. 27910, Official Gazette dated April 19, 2011 <https://www.resmigazete.gov.tr/eskiler/2011>
12. Hu J, Lin L, Chen N, et al. Analysis on effect of evidence-based nursing intervention on limb function and complications of patients with hemiplegia after stroke. *Revista Argentina de Clínica Psicológica.* 2020;29:1151-9.
13. Lee JH, Choi IR, Choi HS. Immediate effects of ankle-foot orthosis using wire on static balance of patients with stroke with foot drop: A cross-over study. *Healthcare(Basel).* 2020;8:116.
14. Topçuoğlu MA, Tülek Z, Boyraz S, et al. Acute stroke nursing: standards and practical applications. *Turkish Journal of Cerebrovascular Diseases.* 2020;26:1-90.
15. Meyers TR. Preventing heel pressure ulcers and plantar flexion contractures in high-risk sedated patients. *J Wound Ostomy Continence Nurs.* 2010;37:372-8.
16. Nori SL, Stretanski MF. Foot drop. 2020; In: StatPearls. StatPearls Publishing, Treasure Island (FL).
17. Júnior N, Ventura BR, Martinez BP, et al. Impact of hospitalization in an intensive care unit on range of motion of critically ill patients: A pilot study. *Rev Bras Ter Intensiva.* 2014;26:65-70.
18. Puppo Moreno AM, Abella Alvarez A, Morales Conde S, et al. The intensive care unit in the postoperative period of major abdominal surgery. *Med Intensiva (Engl Ed).* 2019;43:569-77.
19. Almashrafi A, Alsabti H, Mukaddirov M, et al. Factors associated with prolonged length of stay following cardiac surgery in a major referral hospital in Oman: A retrospective observational study. *BMJ Open,* 2016;6:e010764.
20. Mac Neill HL. Splinting in the intensive care unit. *CMAJ.* 2008;178:1688.
21. Goldhill DR, Badacsonyi A, Goldhill AA, et al. A prospective observational study of ICU patient position and frequency of turning. *Anaesthesia.* 2008;63:509-15.
22. Wiles L, Stiller K. Passive limb movements for patients in an intensive care unit: A survey of physiotherapy practice in Australia. *J Crit Care.* 2010;25:501-8.