Hemşirelik Bilimi Dergisi

Journal of Nursing Science

http://dergipark.gov.tr/hbd

e-ISSN:2636-8439

DOI: https://doi.org/10.54189/hbd.1116552

Orijinal Araştırma

Knowledge and Applications of the Nurses: the Application of Corticosteroid

Hemşirelerin Kortikosteroid İlaç Uygulamalarına Yönelik Bilgi ve Uygulamaları

Aycan KÖK[a], Sakine BOYRAZ ÖZKAVAK[*,b]

[a] *Uzman Hemşire,* Aydın Adnan Menderes Üniversitesi, Sağlık Bilimleri Enstitüsü, İç Hastalıkları Hemşireliği ABD, Aydın, TÜRKİYE

[b] *Prof Dr.* Aydın Adnan Menderes Üniversitesi, Hemşirelik Fakültesi, İç Hastalıkları Hemşireliği ABD, Aydın, TÜRKİYE

ABSTRACT

This study was conducted with 71 nurses working at hospital in order to determine the knowledge of nurses for corticosteroid drugs and to evaluate the effect of their knowledge on the practice. This study was carried out descriptively and cross-sectionally. 74.6% of the participants are women and 49.3% are high school / associate degree graduates. It was determined that the participants did not know the physiological system of corticosteroid hormones. It was determined that as the knowledge score for corticosteroid treatment / drug increased, the application score increased significantly. The knowledge level of undergraduate/ graduate graduates among participants was found to be higher than high school/ associate degree graduates.

As a result, it was determined that the nurses working in internal diseases clinics / units had insufficient knowledge of corticosteroid drug and this situation had a negative effect on the application.

Keywords: Corticosteroid, Nurse.

ÖZET

Bu araştırma, iç hastalıkları klinik/ ünitelerinde kortikosteroid ilaçlara yönelik hemşirelerin bilgi ve uygulamalarını belirlemek ve bilgilerinin uygulamaya etkisini değerlendirmek amacıyla, Aydın Adnan Menderes Üniversitesi Uygulama ve Araştırma Hastanesi'nde çalışan71 hemşire ile yapıldı. Katılımcıların %74.6'sı kadın ve %49.3'ü lise/ön lisans mezunudur. Katılımcıların "kortikosteroid hormonların salgılanmasını düzenleyen fizyolojik sistem/süreçleri, plazmada taşınma yollarını, nerede metabolize olduğunu ve vücuttan atılma yollarını "bilmediği" saptandı. Katılımcıların, ilaçların saklanma koşullarını ve tek doz İ.V. yolla uygulama saatini doğru bildikleri saptandı. Katılımcıların kortikosteroid tedavi/ilaca yönelik bilgi puanı arttıkça uygulama puanının da anlamlı olarak arttığı saptandı. Katılımcıların, lisans+lisansüstü mezunlarının bilgi düzeyi, lise+önlisans mezunlarına göre daha yüksek bulundu.

Sonuç olarak; iç hastalıkları klinik/ünitelerinde çalışan hemşirelerin kortikosteroid ilaç bilgilerinin yetersiz olduğu ve bu durumun uygulamaya olumsuz yansıdığı saptandı.

Anahtar Kelimeler: Hemşirelik, Kortikosteroid

* Corresponding Author: Sakine BOYRAZ ÖZKAVAK

Addresses: Aydın Adnan Menderes Üniversitesi, Hemşirelik Fakültesi, İç Hastalıkları Hemşireliği ABD, Aydın, TÜRKİYE

E-mail : smemis@adu.edu.tr

Received Date: 13.05.2022 Accepted Date: 14.12.2022

INTRODUCTION

The structure of corticosteroid drugs is similar to cortisol secreted from the adrenal cortex of the adrenal gland. These drugs are used in the treatment of many diseases thanks to their intracellular activities through receptors (Alparslan, 2008; turkdermatoloji.org.tr, 2017, Heidary & Heidari, 2022). These drugs are used in cases such as allergic conditions, respiratory diseases, dermatological disorders, endocrine system disorders, gastrointestinal diseases, hematological diseases, rheumatology and autoimmune diseases, uveitis, organ transplantations, multiple sclerosis, coronavirus disease and nephrotic syndrome (Alparslan, 2008; Liu et al., 2013, turkdermatoloji.org.tr, 2017, Pulakurthi et al.,2021).

Side effects such as osteoporosis, diabetes, hypertension, weakness, fatigue, hyperlipidemia, atopic lubrication, acne formation in the body, increase in the amount of hair, stria formation, psychological problems, gastric ulcer, risk of infection and late healing of wounds can develop in individuals depending on corticosteroid treatment (characterized by excessive increase of cortisol in plasma) (Fine et al., 2018; Doğan, 2007; Barret, Barman, Boitano and Brooks, 2015; Akiyama et al., 2014). According to Health Statistics Yearbook prepared by Turkey Ministry of Health (Ministry of Health, 2018), it is reported that 54.3 million boxes of systemic hormonal preparation drugs (excluding sex hormones and insulins) were consumed and the sales value was 476.7 million TL in Turkey in 2007. Following the clinical application process is important because of the wide use of corticosteroid drugs, the development of many side effects and the high cost.

Aim

Nursing care is essential in patients receiving corticosteroid therapy because leads to early identification of possible complications and intervention to minimize them (Heidary & Heidari, 2022). It is the responsibility of the nurse to inform the patient who is receiving corticosteroid treatment about the side effects and to implement follow-up and interventions to prevent side effects (Alparslan & Kapucu, 2008; Birol, 2004). However, no research on the theoretical knowledge and application of nurses regarding corticosteroid treatment has been reached. This study was carried out to determine the knowledge and applications of nurses for corticosteroid drug applications in internal medicine clinics/units and to evaluate the effect of their knowledge on the application.

METHOD

Design and Setting

The study was carried out in internal diseases clinics/units (hematology, oncology, cardiology, neurology, pulmonology, dermatology, endocrine and nephrology clinic, general medicine service 1-2 and wound care unit) at hospital. In this hospital, 134 nurses (total: 580 nurses) work in internal diseases clinics/units. No sample selection was made in the study. It is aimed to reach the whole universe. However, the study was carried out with 71 nurses.

The data of the study were collected between November 2018 and December 2018 after obtaining institutional approval from Aydın Adnan Menderes University Application and Research Hospital.

Participants

The nurses who were on maternity leave and unpaid leave (18 nurses), who participated in the pre-trial of the structured questionnaire (10 nurses) and were reluctant to participate in the study (35 nurses) were not included in the study.

Data Collection Form

The data of the study were collected with the "Structured Questionnaire" prepared in line with the literature (Liu et al., 2013; Fine et al., 2018; Akiyamave et al., 2014; Alparslan and Kapucu, 2008; Birol, 2004; Doğan, 2007; Barret et al., 2015 ; Gentilini et al., 2018; Lee, Kim, Jeong, Zouboulis and Lee, 2013).

"Structured Questionnaire" consists of three parts. These are;

Part 1: It consists of questions that question the socio-demographic (age, gender, clinical/unit, educational status, etc.) characteristics of the participants.

Part 2: It consists of 15 questions (12 closed-ended, 3 open-ended) evaluating the participants' knowledge of corticosteroid drug treatment. A total of 15 points were obtained from the questions in this section.

Part 3: It consists of 10 questions (1 closed-ended, 9 open-ended) that question practices of nurses for corticosteroid treatment. 1 point was given to those who answered the open-ended practice questions truely in accordance with the literature such as "Where and at what temperature do you store the steroid drugs (at parenteral forms)?", "When you apply steroid medications in the form of pulse therapy, with which liquid and how long do you administer the drug?", "What time do you apply steroids when you are administering a single dose (intravenously or per oral)?", and "How is steroid treatment ended in your clinic?". Also, 1 point was given to those who gave "blood glucose" as an answer to the question "What laboratory findings do you follow in the patient receiving steroid treatment in your clinic?", who gave any of "blood pressure", "blood pressure / pulse" or "pulse" as an answer to the question “Which vital sign(s) do you follow in the patient receiving steroid treatment in your clinic?”, and who gave "salt and carbohydrate restriction" as an answer to the question “What restrictions or precautions do you impose on the patient receiving steroid treatment in your clinic?” (Liu et al., 2013; Fine et al., 2018; Akiyama and others, 2014; Alparslan and Kapucu, 2008; Birol, 2004; Doğan, 2007; Barret et al., 2015; Gentilini et al., 2018; Lee, Kim, Jeong, Zouboulis and Lee, 2013). A total of 10 points were obtained from this section.

Data Collection

The “structured questionnaire” was presented to the expert panel (pharmacologist, physician, nurse, pharmacist) and then was applied to 10 nurses who were not included in the study. After the necessary arrangements were made, it was finalized.

The participants were given the necessary explanation regarding the structured questionnaire, verbal consent was obtained, and the questionnaire was filled out by the researchers through face-to-face interview method.

Data Analysis

In all hypothesis tests, 0.05 was accepted as the level of significance and $p < 0.05$ was considered as statistically significant.

Linear relationship between numerical variables was examined by Spearman Rank correlation analysis. The compliance of numerical variables to normal distribution was evaluated with the Kolmogorov Smirnov test. In the comparison of the knowledge scores, Mann Whitney U for two groups, Kruskal-Wallis in the case of more than two groups, and then the Dunn Test was used by making Bonferroni correction. The comparison of categorical variables between groups was carried out with Chi-square tests.

Limitations of Research

The limitations of the study are that it is a descriptive study, that the entire universe could not be reached, and that it is conducted in a single center.

Ethics

The study was approved by the ethics committee (no:50107718-050.04.04) approval. All research participants provided informed consentprior to participating in the study. Necessary “institution permit” was obtained from the hospital where the study was carried out.

RESULTS

Participant Characteristics

12.7% of the participants work in the hematology service, 11.3% in the internal medicine service and 11.3% in the oncology service. It was determined that the total working time of 35.2% of the participants was between 5 and 9 years and 39.5% were working in the clinic for between 1 and 4 years.

It was determined that 90.1% of the participants did not receive in-service training on corticosteroid drug treatment.

When the distribution of knowledge scores of the participants regarding the physiological processes of corticosteroid hormones / drugs was examined, it was found that 56.3% knew the organ in which corticosteroid hormones

were secreted. However, it was found out that the participants did not know the physiological system / processes (66.2%) that regulate the secretion of corticosteroid hormones, how they are transported in the plasma (81.7%), where they are metabolized (70.4%) and the ways they are excreted from the body (67.6%) (Table 1).

It was determined that the participants did not know the effects of corticosteroid drugs on protein (91.5%), carbohydrate (83.1%), fat metabolism (97.2%) and immune system (85.9%). (Table 1).

Table 1. Distribution of Knowledge Score of the Participants about the Physiological Processes of Corticosteroid Hormones / Drugs and their Effects on the Body (N = 71)

	knowing n %	unknowing n %
The place where the corticosteroid hormones / drugs are secreted	40 (**56.3**)	31(43.7)
The system that regulates their secretion	24 (33.8)	47 (**66.2**)
Their transport in plasma	13 (18.3)	58 (**81.7**)
Their metabolized organ	21(29.6)	50 (**70.4**)
The way they are excreted from the body	23 (32.4)	48 (**67.6**)
Their effects on the metabolism of proteins	6 (8.5)	65 (**91.5**)
Their effects on carbohydrate metabolism	12 (16.9)	59 (**83.1**)
Their effects on fat metabolism	2 (2.8)	69 (**97.2**)
Their effects on the immune system	10 (14.1)	61 (**85.9**)

It was found that more than half of the participants knew about the storage conditions before (63.4%) and after (63.4%) the preparation of corticosteroid drugs. On the other hand, it was determined that only 28.2% of the participants knew that the pulse therapy of corticosteroid drugs (high dose, 1-5 days 1gr / day IV) would be applied with saline solution and in 30 minutes (8.5%) (Table 2).

It was determined that 31% of the participants ended the corticosteroid treatment in the clinic by decreasing the dose. It was found that although more than half of the participants knew the correct time of administration of a single dose of corticosteroid treatment, only a quarter (26.8%) applied it at the right time (a.m. 06: 00-07: 00). It was determined that the participants followed up blood glucose (19.7%), blood pressure (16.9%) and pulse in the patients receiving corticosteroid treatment, and that only 35.2% of the participants imposed salt and carbohydrate restrictions on the patients receiving corticosteroid treatment (Table 2).

Table 2. Distribution of the Knowledge and Application Status of Participants Regarding Storage, Preparation and Administration of Corticosteroid Drugs (N = 71)

Questions regarding storage, preparation and application of corticosteroid drugs	knowing n %	unknowing n %
Storage condition before preparation	45 (**63.4**)	26 (36.6)
Storage condition after preparation (parenteral form)	45 (**63.4**)	26 (36.6)
The time corticosteroid drugs should be administered in a single dose intravenously.	44 (**62**)	27 (38)
Application of corticosteroid drugs	**Correct application n %**	**False application n %**
Liquid used with medication in the treatment of pulse	20 (28.2)	51 (**72.8**)
Duration for the application of pulse treatment	6 (8.5)	65 (**91.5**)
Way of termination of corticosteroid treatment in the clinic	22 (31)	49 (**69**)
Single dose application time (PO or İ. V.)	19 (26.8)	52 (**73.2**)
Laboratory test followed	14 (19.79)	57 (**80.3**)
Vital signs followed in the patient	12 (16.9)	59 (**83.1**)
Restrictions / measures put on patients	25 (35.2)	46 (**64.8**)

I.V. = intravenously, P.O.= per oral

When it was examined that whether the average scores of the theoretical and practical knowledge varied according to the age of the participants, it was found that there was a significant relationship between age and theoretical knowledge (r = 0.209; p <0.014), practical knowledge (r = 0.301; p <0.011) and total knowledge score (r = 0.317; p <0.007). Theoretical and practical knowledge increase as age increases (Table 3).

When it was examined that if the average scores of the participants varied, it was seen that as the theoretical knowledge score increased, the practical knowledge score increased significantly (r = 0.709; p <0.001) (Table 3).

Table 3. Comparison of The Age, Working Year, Average Score of Theoretical Knowledge and Practical Knowledge of the Participants (N = 71)

	theoretical knowledge r p	practical knowledge r p	total knowledge r p
Theoretical knowledge		**0.709; 0.001**	
Age	**0.209; 0,014**	**0.301;0.011**	**0.317;0.007**

Non-parametric correlation, spearman-correlation analysis

There was a significant difference between theoretical knowledge (p <0.014), practical knowledge (p <0.036) and total knowledge score (p <0.013) of the participants who were high school / associate degree graduates and undergraduate / graduate graduates. The knowledge score of the participants with undergraduate and graduate education levels was higher (Table 4).

Table 4. Comparison of The Educational Background of the Participants with the Theoretical Knowledge, Practical Knowledge and the Total Knowledge Score (N = 71)

	theoretical knowledge Avg. (min.-max.)	practical knowledge Avg. (min.-max.)	total knowledge Avg. (min.-max.)
High school/Associate(n=35)	5 (0-13)	1 (0-7)	7 (0-20)
Undergraduate/Graduate (n=36)	7 (0-13)	3 (0-9)	10 (0-20)
p	**0.014**	**0.036**	**0.013**

Mann-Whitney test, Wilcoxon W
Avg= Average, min.=minimum, max.=maximum

DISCUSSION

In the literature, it is reported that the secretion of cortisol hormone is regulated by the hypothalamus-pituitary-adrenal axis, it is carried in the blood by binding to globins carrying albumin, transcortin and cortisone, and it is metabolized in the liver and excreted from the body through urine and faeces (Barret et al., 2015; Gün, 2014). In this study, more than half of the participants were determined to know the organ in which corticosteroid hormones / drugs are secreted. However, it was determined that the majority of the participants did not know the physiological system / processes (66.2%) that regulate the secretion of corticosteroid hormones, the ways in which they are transported in plasma (81.7%), where they are metabolized (70.4%) and the ways they are excreted from the body (67.6%). (Table1). No studies evaluating the theoretical knowledge and practice instances of nurses regarding corticosteroid treatment have been found. In a study in which pharmacology knowledge levels of nurses were examined as a whole, it is reported that they have insufficient information about drugs (Işıklı, 2006). In another study evaluating the knowledge of the emergency nurses about drugs, it has been reported that the knowledge level of the nurses has been limited (Cabilan, Eley, Hughes & Sinnot, 2015).

In the literature, it is reported that corticosteroid drugs increase the amount of amino acid in plasma by increasing the catabolism of proteins, the amount of plasma glucose by increasing glucose production in the liver and the amount of plasma fatty acid by decreasing the passage of fatty acids into the cell, and also delay wound healing by decreasing the number of immune system elements and suppressing the immune system (Barret et al., 2015; Zwol et al., 2017; Malkawi et al., 2018; Doğan, 2007; Kuo, Harris and Wang, 2015; Khalil, Cullen, Chambers and Mcgrail, 2017). In this study, it was determined that almost all of the participants did not know the effects of corticosteroid drugs on protein, carbohydrate, fat metabolism and immune system (Table 1). In different studies, it is reported that nurses generally have low level of knowledge about drug action mechanisms (Aştı & Kıvanç, 2003; Işıklı, 2006). Connecting the dots' between knowledge and clinical practice provide the platform for nurses to gain and build trust with their patients (Montayre et al. 2021). We are of the opinion that due to the insufficient theoretical knowledge of the participants regarding the physiological processes of corticosteroid drugs, they will be insufficient to prevent, follow and manage the side effects that may develop during the treatment.

In the literature, pulse therapy of corticosteroid drug (high dose, 1-5 days 1gr / day IV) is recommended to be applied in normal saline, in nearly 30 minutes, and intravenously (Samancı and Balcı, 2001). Also administration of 1 gm of methylprednisolone daily (pulse dosing) has also been reported in the literature with claims of favorable outcomes (Yaqoob et al. 2021). In this study, it was determined that only a quarter of the participants applied the pulse therapy with saline solution, and only a few participants applied this therapy within 30 minutes (Table 2). This result shows the need for the application protocol for corticosteroid drugs. In a study examining parenteral drug administration errors, it was reported that one third of the participants did not prepare and administer the drug using the correct technique (Aslan & Ünal, 2005).

Abrupt discontinuation of corticosteroid treatment causes adrenal insufficiency due to the decrease in ACTH secretion. Therefore, treatment should be ended by decreasing the dose (Barret et al., 2015). It was found that approximately one third of the participants were aware that corticosteroid treatment was ended by decreasing the dose in the clinic (Table 2). Although drug treatment is legally under the responsibility of the physician, the nurse also has a responsibility to prevent malpractice (Turkey Official Gazette, 2010).

Fisun, Seval and Birol (2014) reported in their study that one fourth of their nurses applied the drugs at the wrong time. Medication administration errors are an important patient

safety issue. Nurses are responsible for administering medication to patients (Schroers, Ross&Moriarty, 2021). In this study, although two-thirds of the nurses knew that corticosteroid drugs should be administered between 06:00 and 07:00 in the morning, it was determined that one-quarter administered the medicine at the right time (Table 2). This result suggests that theoretical knowledge is insufficient in reflecting on application. Side effects such as diabetes, hypertension, hyperlipidemia, atopic lubrication, psychological problems, ulcer, edema, infection risk and late healing of wounds may develop due to corticosteroid treatment (Fine et al., 2018; Doğan, 2007; Barret et al., 2015; Akiyama et al., 2014; Kelly, 2014). It is the responsibility of the nurse to inform the patient about the side effects that may develop due to medications and to provide the necessary nursing care to prevent side effects (Alparslan & Kapucu, 2008; Birol, 2004; Karadakovan, 1989; Turkey Official Gazette, 2010). In this study, it was determined that only one fifth of the participants followed "blood glucose" and "blood pressure and pulse" (16.9%) in the patients receiving corticosteroid treatment. Similarly, it was found that one third of the participants imposed “salt and carbohydrate restriction” on the patients receiving corticosteroid treatment (Table 2). These results suggest that the participants do not adequately implement the necessary follow-up and preventive interventions for the side effects of the drug. Side effects that may develop in the patient are an important problem to be considered in terms of increasing health care costs and extending the length of hospital stay.

In this study, as the theoretical knowledge score of the participants increased, the practical knowledge score increased significantly ($p < 0.001$) (Table 3). This is an expected and positive situation. In his study, King (2003) reports that nurses need to increase the level of knowledge for good practice and that their education may increase their confidence in drug management. In a study examining erroneous medical practices, 62.1% of the errors are reported to result from lack of information (Ertem, Oksel and Akbıyık, 2009).

It was found that there was a significant relationship between the mean age of the participants and theoretical knowledge ($p < 0.014$), practical knowledge ($p < 0.011$), total knowledge score averages ($p < 0.007$). Theoretical and practical knowledge increase as age increases (Table 3). It has been observed that the age of the nurses affects their perceptions of the factors that cause medication errors (Uzuntarla&Büyük, 2021).

There was a significant difference between high school / associate degree and undergraduate / graduate education levels of the participants in terms of theoretical knowledge ($p < 0.014$), practical knowledge ($p < 0.036$) and total knowledge score averages ($p < 0.013$). The level of knowledge of people with undergraduate and graduate education levels was found to be higher (Table 4). This is an expected and positive situation. Aştı and Kıvanç (2003) report that the nurses who have undergraduate and graduate degrees know more about the effects of drugs and the factors affecting the dose of administration ($p < 0.001$). In their study, Avşar and Çiftçi (2014) report that there is a significant relationship ($p < 0.05$) between educational status and knowledge level.

CONCLUSION

As a result of this study, participants theoretical knowledge about the physiological processes of corticosteroid hormones/drugs is insufficient. They did not administer the drug early in the morning, and were not at the desired level to monitor, prevent and manage the side effects that may develop during the treatment.

It is recommended that the corticosteroid medication administration and follow-up guide be posted on the clinic boards so that nurses can see it.

KAYNAKLAR

1. Akiyama N, Akiyama Y, Kato H, Kuroda T, Ono T, Imagawa K, Asakura K, Shinosaki T, Murayama T, Hanasaki K. Pharmacological Evaluation of Adipose Dysfunctionvia 11b-Hydroxykortikosteroid Dehydrogenase Type 1 in the Development of Diabetes in Diet-Induced Obese Mice with Cortisone Pelle tImplantation, The Journal of Pharmacology and Experımental Therapeutics, 2014, 349, 66–74.
2. Alparslan B, Kapucu S. Kortikosteroidlerin Kullanımında Hemşirenin Sorumlulukları, Sağlık Bilimleri Fakültesi Hemşirelik Dergisi, 2008, 77-84.

3. Aslan Ö, Ünal Ç. Cerrahi yoğun bakım ünitesinde parenteral ilaç uygulama hataları, Gülhane Tıp Dergisi, 2005, 47, 175-178.

4. Aştı T, Kıvanç M. Ağız Yolu ile İlaç Verilmesine İlişkin Hemşirlerin Bilgi ve Uygulamaları, Atatürk Üniversitesi Hemşirelik Yüksekokulu Dergisi, 2003, 6(3), 1-9.

5. Avşar G, Çiftçi B. Hemşirelerin Oral ilaç Tedavileri ile İlgili Bilgi ve Uygulamalarının Değerlendirilmesi, Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi, 2014, 3(2), 710-722.

6. Barret K, Barman S, Boitano S, Brooks H. Adrenal Medulla ve Adrenal Korteks, In: Ganong'un Tıbbi Fizyolojisi, Gökbel H. İstanbul, Nobel Kitabevi, 2015, s353-376.

7. Birol L. Hipofiz Fonksiyon Bozuklukları ve Hemşirelik Bakımı, In:İç Hastalıkları ve Hemşirelik Bakımı(2.baskı), Ankara, 2004, s679-694.

8. Cabillan C, Eley R, Hughes J, Sinnot M.Medication Knowledge and Willingnessto Nurse-InitiateMedications in an Emergency Department: A Mixed-Methods Study, Journal of Advanced Nursing, 2015, 72(2), 396–408.

9. Doğan A. Böbrek Üstü Bezi Korteks Hormonları, In:Tıbbi Fizyoloji (11.baskı), Çavuşoğlu H, Çağlayan Yeğen B., Nobel Kitabevi, 2007, s944-959.

10. Ertem G, Oksel E, Akbıyık A. Hatalı Tıbbi Uygulamalar (Malpraktis) ile İlgili Retrospektif Bir İnceleme, Dirim Tıp Gazetesi, 2009, 84(1), 1-10.

11. Fardet L, Petersen I, Nazareth I. Prevalence of long-term oral glucocorticoid prescriptions in the UK over the past 20 years, Rheumatology ,2011, 50, 1982-1990.

12. Fine N, Doig C, Elhassan Y, Vierra N, Marchetti P, Bugliani M, Nano R, Piemonti L, Rutter G, Jacobson D, Lavery G, Hodson D.Glucocorticoids Reprogram β-Cell Signaling to Preserve Insulin Secretio, Diabetes, 2018, 67(2), 278–290.

13. Fisun V, Seval Ç, Birol V. Sık Karşılaşılan İlaç Uygulama Hataları ve İlaç Güvenliği, Acıbadem Üniversitesi Sağlık Bilimleri Dergisi, 2014, 5(4), 271-275.

14. Gentilini M, Viglietti A, Benitez C, Molli A, Cerrone G, Giambartolomei G, Delpino M.inhibition of Osteoblast Function by Brucella abortus is reversed by Dehydroepiandrosteroneandinvolves erK1/2 andestro gen receptor, Frontiers Immunology, 2018, 9,8.

15. Gün F. İdrar ve Serum Kortizolve Kortizon Seviyelerinin Ölçümünde Immunoassay Ve Sıvı Kromatografi-Sıralı Kütle Spektrometre Metotlarının Karşılaştırılması. Uzmanlık Tezi, 2014. Selçuk Üniversitesi Tıp Fakültesi Tıbbi Biyokimya Anabilim Dalı.

16.

17. Heidary S, Heidari H. Crohn's Disease and Nursing Care from A Patient Treated with Corticosteroids:A Case Report. Nursing and Health Sciences Journal, 2022, 2(1).

18. Işıklı D. Hemşirelerin Farmakoloji Bilgi Düzeylerinin Değerlendirilmesi, Yüksek Lisans, Selçuk Üniversitesi Sağlık Bilimleri Enstitüsü, Konya, 2006, 62.

19. Kelly AK. Nursing Management of Endocrine ProblemsIn: Medical-SurgicalNursing: Assesmentand Management of Clinical Problems, Ninth Edition, Missouri: Elsevier-Mosby; 2014. s1213-1214.

20. Khalil H, Cullen M, Chambers H, McGrail M.Medication saffecting healing: an evidence-based analysis, Int Wound J 2017, 14,1340–1345.

21. Kuo T, Harris C, Wang J. Metabolic functions of glucocorticoid receptor in skeletal muscle, Moleculerand Cellular Endocrinology, 2013, 380, 79-88.

22. Lee S, Kim J, Jeong M, Zouboulis C, Lee S. 11b-hydroxykortikosteroid dehydrogenasetype 1 is expressed in human sebaceousglands and regulates glucocorticoid-induced lipid synthesisandtoll-likereceptor 2 expression in SZ95 sebocytes, British Association of Dermatologists, 2013, 168, 47–55.

23. Liu J, Mustafa S, Barrat D, Hutchinson M.Corticosteron epreexposure increases NF-K btranslocationandsensitizes IL-1βresponses in BV2 microglia-likecells, Frontiers in Immunology, 2018, 9(3).

24. Malkawi A, Alzoubi K, Jacob M, Matic G, Ali A, Faraj A, Almuhanna F, Dasouki M, Mensah-Nyagan A, Do-Rego J, Beaujean D, Luu-The V, Pelletıer G, Vaudry H.Neurokortikosteroids: Expression of KortikosteroidogenicEnzymesandRegulation of Kortikosteroid Biosynthesis in the Central Nervous System, TheAmerican Societyfor Pharmacology and Experimental Therapeutics, 1999, 51(1).

25. Montayre J, Ramjan L, Maneze D, Ho M, Maceri A, Salamonson Y. "Connecting the dots" – The transfer of bioscience knowledge by new graduate nurses to the clinical setting: A qualitative study. Nurse Edication Today 97, 2021. 104729.

26. Özdemir P, Yazıcıoğlu M.Kortikosteroidler ile İlişkili Alerjik Reaksiyonlar, Çocuk Dergisi, 2017, 17(1), 4-11.

27. Pulakurthi Y, Pederson J, Saravu K, Gupta N, Balasubramanian P, Kamrowski S, Schmidt M, Vegivinti C, Dibas M, Reierson N, Pisipati S, Joseph B, Selvan P, Dymtriw A, Keesari P, Sriram V, Chittajallu S, Brinjikji W, Katamreddy R, Chibbar R, Davis A, Malpe M, Mishra H, Kallmes K, Hassan A, Evanson K. Corticosteroid therapy for COVID-19. A

systematic review and meta-analysis of randomized controlled trials. Medicine, 2021, 100(20).

28. Samancı N, Balcı N.Kortikosteroidler ve Klinikte Kullanımları, Türkiye Klinikleri Tıp Bilimleri, 2001, 21.

29. Schroers G, Ross J, Moriarty H, The Joint Commission Journal on Quality and Patient Safety. Elsevier, 2021, 47(1), 38-53.

30. Türkiye Cumhuriyeti Resmi Gazete. (2010). Hemşirelik Yönetmeliği. Erişim adresi: https://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.13830&MevzuatIliski=0&sourceXmlSearch=hem%C5%9Firelik

31. Türkiye Sağlık Bakanlığı. (2018). Türkiye Sağlık Bakanlığı Sağlık İstatistikleri Yıllığı. Erişim adresi: https://dosyasb.saglik.gov.tr/Eklenti/31096,turkcesiydijiv1pdf.pdf?0

32. Uzuntarla E, Büyük E. Hemşirelerin İlaç Uygulama Hata Deneyimleri ile İlaç Hata Nedenlerine Yönelik Algıları. Samsun Sağlık Bilimleri Dergisi, 2021; 6(3), 641-654.

33. Yaqoob H, Greenberg D, Hwang F, Curtis L, Vernik D, Manglani R, Wang Z, Murad M, Chandy D, Epeldaum O. Comparison of pulse-dose and high-dose corticosteroids with no corticosteroid treatment for COVID-19 pneumonia in the intensive care unit. Journal of Medical Virology. 2022; 94, 349-.356.

34. Zwol A, Oosterloo N, Betue C, Bogers A, Liefde I, Deutz N, JoostenK.Effects of glucocorticoids on serum amino acid levels during cardiac surgery in children,ClinicalNutrition ESPEN, 2018, 23,212-216.

35. Kortikosteroid Tedavisi ve Etkileri, http://turkdermatoloji.org.tr/icerik/detay/143 (14.05.2018).