Akdeniz Hemşirelik Dergisi
Akdeniz Nursing Journal

RESEARCH ARTICLE
ARAŞTIRMA MAKALESİ

Barriers of Nurses' about 'Z-Track Method' Which is Used in Intramuscular Injections Applications

İntramüsküler Enjeksiyon Uygulamalarında Kullanılan 'Z Tekniği' Konusunda Hemşirelerin Engelleri

Yazışma Adresi
Correspondence Address

Ayla KEÇECİ
Duzce University,
Health Sciences Faculty,
Nursing Department,
Düzce, Turkey
aylakececi@gmail.com

Bu makalede yapılacak atıf
Cite this article as

Yüksel Baş D, Kececi A..
Barriers of Nurses' about 'Z-Track Method' Which is Used in Intramuscular Injections Applications
Akd Hemşirelik D 2023; 2(1): 1-9

Derya YÜKSEL BAŞ
Duzce University,
Medical Faculty Hospital,
Düzce, Türkiye

Ayla KEÇECİ
Duzce University,
Health Sciences Faculty,
Nursing Department,
Düzce, Türkiye

Geliş tarihi / Received : May 31, 2022
Kabul tarihi / Accepted : February 06, 2023

ABSTRACT

Aim

This research was conducted to determine the opinions of nurses regarding the Z-track method of intramuscular injection and the factors preventing its use. A phenomenological approach was used in this qualitative research.

Method

The sample consisted of 38 nurses who worked for a minimum of one year in a university hospital. Data were collected using semi-structured in-depth individual face-to-face interviews. Data were analyzed using content analysis and were coded using the NVIVO 11 software. The COREQ checklist was used in the study.

Results

As a result of the content analysis, seven themes and nine subthemes emerged: (a) opinions about personal experiences: method of application, positive personal experiences, and negative personal experiences; (b) factors affecting usage: positive/encouraging factors and negative/discouraging factors; (c) opinions about colleagues; (d) frequency of application; (e) diseases for which the Z-track method is applied; (f) drugs given by the Z-track method; and (g) suggestions for dissemination: suggestions for training, suggestions for patients, suggestions for institutions and suggestions for healthcare professionals.

Conclusion

Obstacles against the use of the Z-track method mostly result from lack of training and role models. However, it has been determined that there is a need for regulations regarding the determination, development and dissemination of standards for the application of the Z-track method.

Keywords

Injection, intramuscular injection, nurses, Z-track method, qualitative study

ÖZET

Amaç

Bu araştırma, hemşirelerin intramüsküler enjeksiyon uygulamalarından Z-tekniğine ilişkin görüşlerini ve kullanımını engelleyen faktörleri belirlemek amacıyla yapılmıştır. Bu nitel araştırmada fenomenolojik yaklaşım kullanılmıştır.

DOI 10.59398/ahd.1123694

Yöntem
Örneklemi bir üniversite hastanesinde en az bir yıl çalışan 38 hemşire oluşturmuştur. Veriler, yarı yapılandırılmış derinlemesine bireysel yüz yüze görüşmelerle toplanmıştır. Veriler içerik analizi kullanılarak analiz edilmiş ve NVIVO 11 yazılımı kullanılarak kodlanmıştır. Çalışmada COREQ kontrol listesi kullanılmıştır.

Bulgular
İçerik analizi sonucunda yedi tema ve dokuz alt tema ortaya çıkmıştır: (a) kişisel deneyimlere ilişkin görüşler: uygulama yöntemi, olumlu kişisel deneyimler ve olumsuz kişisel deneyimler; (b) kullanımı etkileyen faktörler: olumlu/teşvik edici faktörler ve olumsuz/kullanımı engelleyici faktörler; (c) meslektaşlar hakkındaki görüşler; (d) uygulama sıklığı; (e) Z-tekniğinin uygulandığı hastalıklar; (f) Z-tekniğiyle verilen ilaçlar; ve (g) yaygınlaştırma önerileri: eğitim önerileri, hastalar için öneriler, kurumlar için öneriler ve sağlık profesyonelleri için öneriler.

Sonuç
Z-tekniğinin kullanılmasının önündeki engeller çoğunlukla eğitim ve rol model eksikliğinden kaynaklanmaktadır. Ancak Z-tekniğinin uygulanmasına yönelik standartların belirlenmesi, geliştirilmesi ve yaygınlaştırılmasına yönelik düzenlemelere ihtiyaç olduğu tespit edilmiştir.

Anahtar Kelimeler
Enjeksiyon, intramüsküler enjeksiyon, nitel çalışma, Z-tekniği yöntemi

What is known about the field
- Injections with the right methods significantly improves the quality of patient care.
- Z-track method is one of the intramuscular injection techniques.
- Z-track method is effective in reducing tissue damage and pain.

Contribution of the article to the field
- Since nurses have not encountered individuals who have applied the Z-track method before, they apply previously known methods for intramuscular drug administration.
- Nursing education programs need reconstruction or revision for the dissemination of the method.

INTRODUCTION
Approximately 12 billion injections are applied worldwide annually and 5% or less of these applications are performed for vaccination and the rest (95%) for treatment (1-3). Methods for drug administration by injection are preferred because they are faster than other methods, provide full absorption and show effects rapidly. One of the most common methods used in injection applications is intramuscular (IM) injection, which is widely used in the clinic (3-4).

Studies found that administration of injections with the right methods significantly improves the quality of patient care, but nurses' knowledge of IM injection methods and safe injection are generally not based on evidence, their level of knowledge is moderate, they prefer more traditional methods in their applications and they do not frequently use methods that reduce complications (5-8). Although one study showed that the Z-track method reduces tissue trauma and pain, unfortunately it is not a method which is often preferred by nurses (7). Şanlıalp (2013) was found that 81.4% of nurses in Turkey did not use the Z-track method for IM injections (9). Studies on the Z-track method are limited not only in Turkey but also in the world. Most of the existing literature focuses on the knowledge level of nurses regarding safe IM practices and does not focus on the use of the Z-track method, which is one of the safe IM practices (5-9).

In the light of these researches, the aim of this study is to determine the barriers for nurses to use the Z-track method. The results of this study can contribute to encouraging nurses to use the Z-track method, which reduces pain and tissue damage in all IM injection practices in the clinic, to help nurses to provide safe patient care, to guide and develop in-service training for safe injection practices.

METHODS
A qualitative approach was used in the present study to determine nurses' opinions on the Z-track method of IM injection. Qualitative research is an approach that tries to research and understand, dealing with perceptions and events in a realistic and holistic way, using data collection methods such as observation, interview, and document analysis. This approach requires the flexibility of the researcher, reshaping the research process in line with the collected data, and following an inductive approach both in the formation of the research design and in the analysis of the collected data. (10). The study also took a phenomenological approach to comprehensively understand nurses' opinions on the Z-track method of IM injection because the phenomenological approach is particularly useful in exploring the genuine experiences of individuals facing comparable conditions and phenomena (11). The COREQ checklist was used in the study.

Population and sample

The population of the study consisted of 250 nurses working in a university hospital in Turkey and the sample included 38 nurses who volunteered to participate in the study and provided data saturation. The study sample was chosen using a maximum variation sampling method, a purposive sampling method. The maximum variation sampling strategy primarily aims to try to find out whether there are common or shared phenomena among diverse situations and to reveal different dimensions of the problem according to this diversity rather than enabling this diversity to make generalizations. The nurses in the sample were chosen among those differing in age, gender, unit of employment, duration of professional experience and education level. In the present study, the participants were identified with codes such as P1, P2, P3, P4 and so on.

Data collection

Data were collected between May 2017 and September 2017.

Preparation of the data collection tool and the interview form

Data were collected through semi-structured interviews using an interview form. The in-depth individual interview form was prepared in line with the study purpose and based on a literature review (2,8,12-14). Five experts were consulted for feedback on the prepared interview form. In the light of the expert opinions and relevant literature, the researchers then made the necessary revisions and gathered separate questions under a single question by supporting them with alternative and probe questions. In the in-depth interview form prepared in accordance with the purpose of the research, 12 questions including socio-demographic characteristics and questions about IM injection, 13 open-ended questions for those who apply the Z technique; It consists of 10 questions for those who do not apply the Z-track method.

In-depth individual interview process

Before the interview sessions, the nurses were informed by the first author about the purpose of the interview and that the interviews would be recorded with a voice recorder. The interviews were conducted in quiet environments such as the hospital where they were working, the participants' homes or the interview room depending on the participants' preferences. On the other hand, during the data collection process, data saturation was reached after 38 interviews and there was no need for interviewing more participants. The participants were assured that all of their information and sound files would remain confidential, and their written permission was obtained with a verbal informed consent form. The interviews lasted for an average of 39 minutes.

Data analysis

Data were analyzed using content analysis. The transcribed texts were coded using NVIVO 11 software. Finally, after all the data were coded in this way and a code list was created, the similarities and differences between these codes were reevaluated and the themes were created.

Ethical consideration

This study was reviewed and approved by the Non-Invasive Clinical Research Ethics Committee of the university hospital (Date: 07.11.2016; No: 2016/84). All the nurses participating in the present study were informed about the study aim, methods and process and participant rights. All the nurses, who read and signed the informed consent forms prior to the interviews, participated in the study on a voluntary basis.

RESULTS

The results from the present study are presented in two main headings: results about the participants' demographic characteristics and results about the themes, subthemes and codes.

Results about the participants' demographic characteristics

Analysis of some socio-demographic data of the participants showed that 92.11% (n: 30) were female, 31.59% (n: 12) were 25-28 years old, 73.70% (n: 28) had a bachelor's degree, 47.37% (n: 18) had employment duration of 1-5 years in the healthcare institution, 44.74% (n: 17) had a professional experience of 6-10 years, and 55.26% (n: 21) worked in services.

Results about the themes, subthemes and codes that emerged in the content analysis

As a result of the content analysis conducted in line the purpose of the research, seven themes, nine subthemes and the codes related to them emerged.

Theme 1: Personal experiences

The participants' statements revealed that they did not frequently use the method and did not think it would be used in the near future, they applied the method if it was suitable for different types of drugs and if the muscle mass was suitable, those who applied the method used it for iron preparations mostly, there was no consensus on the effect of the method in increasing or decreasing pain, their training did not offer sufficient knowledge about the subject, and there was also no consensus regarding the need for administering IM injections.

Subtheme 1: Rationale for using z-track method

The participants stated that the Z-track method was applied for certain drugs and appropriate muscle mass, they were not adequately knowledgeable about the method and there were not many nurses around them

using the method and it was not preferred much by the nurses.
....., I have not received any training about it, and there is no one around me applying it, you know.... (P23)

Subtheme 2: Positive personal experiences
As an example of their positive personal experiences about the Z-track method, the participants stated that they believed the method often did not lead to dose loss in the patient and caused less pain.
..... intramuscular injection is an application that generally causes pain. But this method could cause less pain.(P15)

Subtheme 3: Negative personal experiences
Some of the participants stated that they believed the Z-track method increased pain, it was a difficult method to apply, they did not often use the method and did not think it would be used in the near future.
... I do not think that future generations will use it because student nurses are not recommended to use it. Naturally, they apply what they have seen. (P21)

Theme 2: Factors affecting usage
The theme of factors affecting usage was divided into two subthemes: positive/encouraging factors and negative/discouraging factors.

Subtheme 1: Positive/encouraging factors
The participants stated that the Z-track method caused no dose loss in patients because it prevented leakage mostly, caused less pain, and reduced complications.
.... The medicine does not come back and I think the pain is less. I think these are the most important effects. (P15)

Subtheme 2: Negative/discouraging factors
The participants stated that the Z-track method was presented superficially in nursing education program. In addition, nursing education was inadequate in this regard, traditional or familiar methods were often preferred and therefore no other method was needed, in-service training did not cover the method, there was a lack of knowledge about the method and there were no practical applications, and the method was not applied on site. They also mentioned other discouraging factors such as unit workload and lack of management support.
... But as I said, the Z-track method was explained in curriculum but it was like "It's up to you to use it or not." Because it was not emphasized so much, I didn't care about it. Clearly, I continued to perform injections in the way that I first learned because of the heavy workload. (P20)
... I mean it is the faculty and instructors that must study on this subject because the training on this subject during our education was really inadequate...It's because of the inadequacy of the knowledge and practice on the Z-track method at university. (P26)

Theme 3: Opinions about colleagues
When the participants' opinions on why their colleagues do not use the Z-track method were examined, it was shown that they thought that the method was not a common practice in the clinical field, that their colleagues were not open to innovation and development, and that they did not have sufficient knowledge about the method. Also, few of the participants stated that their colleagues considered the method as difficult to apply and they made errors in practicing the method.
... they may see it as a time-consuming application. I think there are not many nurses who think that the method does not reduce pain or who do not think that it increases absorption...(P21)
I think this has also something to do with our lack of knowledge about the current research findings. We do not update ourselves. I mean not only as nurses. For example, the hospital staff could be given training and they can say, "Nurses should do this and that." Then, instead of doing what doctors are actually supposed to do, I can apply the Z-track method. It has also something to do with the working environment or culture of the hospital.(P20)

Theme 4: Frequency of application
Most of the participants' statements about the frequency of the application of the Z-track method showed that the method was never applied while few of the nurses stated that the method was applied rarely.
... Just once I asked my colleagues what it was like, I mean how to do it, because I was curious. And they only told me about it verbally. But I have never applied it or I have never seen a nurse applying it. (P29)

Theme 5. Diseases for which the Z-track method is applied
The participants stated that the diseases for which the Z-track method was applied usually included infection and psychiatric diseases.
.....infectious diseases in general. (P1)

Theme 6: Drugs given by the Z-track method
The participants also stated that the Z-track method was often applied with drugs containing iron, difficult-to-absorb drugs and irritant drugs, B12 and streptomycin drugs. In addition, few of the participants stated that the method was sometimes used for drugs except for acinetone, analgesics, drugs that can cause skin pigmentation, chlorpromazine, risperidone, penicillin and drugs in oil-based solutions.
.... the Z-track method is more often used for administering drugs in oil-based solutions, those that are difficult to absorb and those that can cause irritation. These drugs can be pushed back especially by psychiatric patients, so

I know that this method is generally preferred in psychiatry. The Z-track method prevents that situation. Or it reduces irritation much more. (P26)

Theme 7: Suggestions for dissemination
The theme of suggestions for dissemination was divided into four subthemes: suggestions for training, suggestions for patients, suggestions for institutions and suggestions for healthcare professionals.

Subtheme 1: Suggestions for training
The participants generally expressed the need for promoting the benefits and importance of the method and the need for including the method in in-service training.
If I were an instructor at university, I could train my students, as I said earlier, that intramuscular injection should be done basically with the Z-track method and that it could be more beneficial.... If I am a nurse, I can only recommend it to my colleagues in the unit. If I were the head of the unit, I would prepare pamphlets and brochures to explain that the Z-track method is a more useful application than normal intramuscular injection. (P38)

Subtheme 2: Suggestions for patients
The participants stated that patients should be informed about the Z-track method so that this method can be used more effectively by nurses and preferred by patients.
There are drugs that they use chronically, especially for some patients, if you give them additional information at least, because, you know, they use them constantly... (P33)

Subtheme 3: Suggestions for institutions
The participants expressed the need for setting up an application target for healthcare professionals, guidance through prospectuses, using promotional documents such as posters or brochures, specifying the method of application when placing an order, including trainees in applications and increasing the number of experienced people in units with heavy workload.
In order for this method to be promoted, they can arrange things such as in-service training, poster or, brochures and then hand them out. ... Therefore, if something is the right thing to do, all nurses should do it. That is what I think.(P21)

Subtheme 4: Suggestions for healthcare professionals
The participants expressed the need for healthcare professionals to be open to innovation and progress and practicing the Z-track method with experienced nurses in order to spread the use among healthcare professionals.
...if nurses haven't seen it at the beginning, they should definitely be accompanied by someone who has applied it before, or go with someone who has used the Z-track method or the airlock technique before. But seeing it or watching how it is done or practicing it just once is not enough, either. (P1)

DISCUSSION

In addition to those studies suggesting that the Z-track method could be used for certain drugs, some studies suggest that it could be used in all IM injections as a routine practice (2,5,13). However, despite these evidences, the participants in the present study stated that the Z-track method was not preferred most of the time. This result suggests that most nurses in Turkey do not follow current evidence-based medicine practices, knowledge and research at the desired level (15). There are various personal and organizational obstacles preventing nurses from keeping up to date with evidence-based practices and current knowledge. Nurses' research skills need to improve, they are isolated from the academic environment that can discuss research, and they lack the sense of self-esteem that can facilitate accepting change, which are barriers against adopting recent evidence-based practices (16). The participants stated that the Z-track method could be applied in patients with appropriate muscle mass. However, research suggests that the method is even suitable for the elderly with decreased muscle mass (9, 17). The participants' preference of the type of injection application by checking muscle mass suggests that they were not particularly knowledgeable about the subject.

Those participants with experience of the Z-track method stated that the technique prevented complications and dose loss and caused less pain. In the literature, it is particularly emphasized that applying the correct and safe IM injection method is important for the patient to feel less pain during injection and to prevent complications due to injection (7). Several studies found that the Z-track method prevents the drugs administered from leaking back into the subcutaneous tissue, reduces local irritation and reduces pain in the area of frequent injection (14,18-21). In fact, the participants stated that they believed the Z-track method would cause less pain and discomfort in patients, which is similar to the results from previous studies. The participants' belief in the role of the Z-track method in reducing pain could be considered as an important component in popularizing this method.
Some of the participants, on the other hand, stated that they believed the Z-track method would not be used commonly in the near future and it was a difficult method to apply. Şanlıalp (2013) found that the Z-track method was not used commonly because it was considered appropriate for only iron preparations and drugs in oil-based solutions, the method was difficult to apply, nurses were accustomed to other methods, they

were not knowledgeable about this method, they thought the method would cause pain, the method was time consuming and nurses were not willing to use the method (9). The participants in the present study stated that they thought the Z-track was difficult to apply because their training did not place much emphasis on this subject, in-service training practices did not include the method and therefore they lack the required knowledge about the subject, and they were used to conventional methods. These results suggest that the nurses could not adequately reflect evidence-based nursing practices on site and adapt to the contemporary roles of nursing. The results can also be attributed to the fact that individuals normally exhibit negative attitudes towards the unknown and do not prefer to practice a novel thing without feeling safe. In fact, habits and expectations about the result affect behaviors as well as attitudes in realizing behaviors. Unfortunately, stereotypical attitudes and habits do not change easily (22).

The participants stated that the Z-track method had positive outcomes for patients such as preventing leakage and loss of dose, causing less pain and reducing hematoma, ecchymosis, lesion and bleeding complications, and positive outcomes for health professionals such as not causing a disadvantage in terms of time allocated for care. Similarly, research showed that the Z-track method should be used for all IM injections because administering injections using the Z-track method prevents drugs from leaking back to the tissue and causes less local irritation and pain (2,8,14,18-21). Although the majority of the nurses in the present study expressed positive opinions, they had insufficient knowledge about the role of the Z-track method in reducing complications. The participants' statements about the role of the method in reducing complications were also very limited. These results suggest that the level of knowledge of the Z-track method application in reducing IM complications is still not at the desired level among nurses in Turkey.

The participants stated that the factors that negatively affected use of the Z-track method were insufficient knowledge given in nursing training, superficial presentation of the Z-track method in training or in nursing education curriculum, exclusion of the method from in-service training and failure to emphasize the benefits of this method on site. The participants also expressed the lack of practical training about the Z-track method in nursing education and the need for including practical activities in training about the Z -track method and for physical environment designed appropriately. In order for any practice to be permanent, it is essential to provide the required conditions and reinforce the theory with practice. The participants' statements about the lack of the Z-track method and related nursing practices in in-service training are considered as a significant result. Similarly, Şanlıalp (2013) found that the majority of the nurses did not receive any in-service training on IM injections during their employment (9). In addition, Özpulat (2010) and Atay et al. (2009) showed that in-service trainings given to hospital nurses were not designed considering nurses' real needs, opinions and expectations (23,24).

Regarding the negative factors for health professionals, the participants stated that conventional methods were often preferred and, therefore, no other method was required, the Z-track method was never applied on site, nurses did not have technical knowledge of the method and individual factors were effective in avoiding the method. Some of the cultural practices related to the thought and life of the society undergo change at a low rate and some at a higher rate. However, the basic cultural elements that characterise that society and keep it together are learnt from the previous generation and transferred to the next generation (25). This situation could cause nurses to have limitations in accepting and applying innovative practices. While individuals who are open to innovations and follow the developments constantly renew themselves in the direction of success in professional life and develop their skills and abilities, individuals with opposite characteristics show a satisfied and traditionalist attitude that is not open to a situation different from the situations and behaviors they have been accustomed to (24,26). This result can also be attributed to the fact that individuals who continue their practice with traditional methods have an external locus of control. In the literature, individuals who believe that their lives are mostly under the control of powers other than themselves are described as individuals with external locus of control (27). Therefore, this result might be a reflection of the conventional Turkish society, which is composed of a traditional cultural structure and individuals with external locus of control. In terms of institutional factors, the participants expressed the role of the heavy workload of the unit in not using the Z-track method. Research often points out to the excessive workload and burnout in the field of nursing. In fact, excessive workload negatively affects the quality and safety of care (28).

According to the statements of the participants, one of the factors affecting the use of the Z-track method was the support of the management. The support of the management has a positive effect on increasing the work motivation of employees and developing innovative behaviors for patient care (29-31). Therefore, nurse managers should not forget that all kinds of practices aimed at developing nurses provide added value to the institution while improving their innovative behaviours. Again, nursing management should create a working environment that develops and supports nurses'

innovative behaviours. In order to improve care, nurse managers should be role models and lead innovation and use all tools and opportunities to motivate and empower nurses(32).

According to the results from the present study, the participants stated that the Z-track method should be used in infectious diseases, psychiatric diseases, and especially for iron-containing drugs, drugs that are difficult to absorb as well as irritant drugs. Although the Z-track method was originally used only to administer drugs that irritate, cause skin pigmentation, and irritate SC tissue, today its use is recommended routinely for all IM injections (2,3,17,19). The participants' statements about use of the Z-track method for only drugs that contain iron, that are difficult to absorb and that cause irritation indicates that the method is not often used for IM injections and it is still not known much. This result also suggests that the effect of outdated knowledge about this method continues to exist among nurses and nurses do not keep up to date with current research.
Finally, the participants' statements also included suggestions for health professionals as well as those for training, patients and institutions. The participants expressed a need for health professionals to be accompanied by someone with experience of the Z-track method when practicing it and to be open to innovation and progress. Similarly, direct or first-hand practical experience, reinforcement, modeling and social learning are considered as important learning approaches. With social learning, which is a type of learning based on the behavior of others and the observation of these behaviors, general and integrated learning patterns are acquired without the need for trial and error (33). This result suggest that nurses should be provided with environments and mechanisms to ensure their social learning in addition to formal education opportunities offered to them through in-service trainings.

CONCLUSIONS

The results obtained from the interviews conducted in the study showed that the biggest barrier in the use of the Z-track method is that it is not sufficiently included in the education process and its limited use in the clinical field. At the same time, it was also seen that traditional / familiar methods were used because the method was found difficult to use. In order for the Z-track method to become widespread, it is recommended to adopt an institutional management approach, to emphasize the Z-track method in both undergraduate and postgraduate education curricula, to provide adequate opportunities for implementation, and to develop mechanisms to promote the benefits and importance of the method.

Conflict of Interest
There is no any conflict of interest.

Funding Statement
This study was financed by grants from the Duzce University Scientific Research Projects Commission (DÜBAYBP-2017.16.01.601).

Author Contribution
Conceptualization: DY, AK; Design: AK; Counselling: AK; Data Gathering/Processing: DY; Analysis/Interpration: DY, AK; Literature Review: DY; Writing: DY; Critical Review: AK; Resources: DY, AK; Materials: DY

This research was presented as a master thesis.

REFERENCES

1. Mılutınovıć D, Tomıć S, Puškaš V, Brestovačkı Svıtlıca B, Sımın D. Frequency of application and level of nurses' knowledge on administering intramuscular injectıons into the ventrogluteal site. Med Pregl. 2018; LXXI (Suppl 1): 59-64.

2. Guiterrez J.J.P, Munakomi S. Intramusculer Injection. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022.

3. Potter P. A, Perry A. G, Stockert P, Hall A. Fundamentals of nursing: medication administration. 9th ed. Elsevier Health Sciences, USA; 2017.

4. Uslusoy E. Ç, Duran E. T, Korkmaz M. Safe injection practices. Journal of Hacettepe University Faculty of Nursing. 2016; 3(20): 50-57.

5. Greenway K. Rituals in nursing: intramuscular injections. Journal of Clinical Nursing.2014; 23: 3583-3588. .

6. Elsaid R.A.A, Abdelkhalek W.S.S. The Effect of Shot Blocker and Z –Track Techniques on Reducing the Needle Pain and Anxiety Associated With Intramuscular Injection. Internatıonal Journal Of Nursing Didactics. 2019; 9(12): 31-38.

7. Gaikwad H.S, Sindhu A, Sarda N. Comparison of efficacy and safety of intravenous iron sucrose and intramuscular iron sorbitol therapy in patients with anemia during pregnancy in a developing country. Asian Journal Of Medical Sciences. 2017; 8(5): 31-35.

8. Kara D. Investigation of the Effect on Pain of Internal Rotation and Z Way Technique in Intramuscular Injection Administrations [dissertation]. İzmir: Ege University;2011.

9. Şanlıalp A. Assessing Effectiveness of Education About Knowledge and Frequency of Dorsogluteal and Ventrogluteal Site Selection and Z Technique on Nurses' IM Injection Practices[dissertation]. Denizli: Pamukkale University; 2013.

10. Şimşek H, Yıldırım A. Qualitative Research methods in social sciences. 9th ed. Ankara: Seçkin Yayıncılık; 2016.

11. Creswell, J. W. Research design: Qualitative, quantitative and mixed method approaches.3rd ed. CA: Sage Publications; 2009.

12. Carter H, Mccoy T. T. Are we on the same page?: A comparison of intramuscular injection explanations in nursing fundamental texts. Medsurg Nursing. 2008; 4(17): 237-240.

13. Cocoman A, Murray J. Intramuscular injections: A review of best practice for mental health nurses. Journal of Psychiatric and Mental Health Nursing. 2008; 15(5): 424-434.

14. Malkin B. Are techniques used for intramuscular injection based on research evidence?. Nursing Times. 2008;104(50-51): 48-51.

15. Şen E.Ş, Yurt S. Hemşirelerin Kanıta Dayalı Uygulamalara Yönelik Tutumlarının Belirlenmesi DEUHFED. 2021, 14(2),102-107.

16. Çopur E. Ö, Kuru N, Seyman Ç. S. Overview of the evidence based practices in nursing. Journal of Health and Nursing Management. 2015; 1(2):51-55.

17. Taylor C, Lillis C, Lemone P, Lynn P. Fundamentals of Nursing: The Art and Science of Person- Centered Nursing Care 8th ed. Philadelphia:Wolters Kluwer; 2014.

18. Gray, T., & Miller, H. (2008). Injection technique. The Foundation Years, 6(4), 252-255.

19. Hunter J. Intramuscular injection techniques. Nursing Standard. 2008; 22(24): 35-40.

20. Craven R. F, Hirnle C. Jensen S. Fundamentals of nursing: human health and function (Transl. Ed. N. Uysal and E. Çakırcalı). Ankara: Palme Press;2015.

21. Tambunan E. H, Wulandari I. S. Utilizing z-track air lock technique to reduce pain in intramuscular injections. Jurnal Ners. 2015; 10(1): 112–117.

22. Kağıtçıbaşı Ç. New Human And Humans: An Introduction To Social Psychology. 10th ed. Istanbul: Sistem Matbaacılık; 2015.

23. Özpulat F. Determination of opinions of health personnel working at ministry of health Ankara Dışkapı training and research hospital regarding in-service training program, Journal of Nursing Science and Art of Maltepe University, 2010; 283-292.

24. Atak H. The Turkish adaptation of the ten-item personality inventory. Archives of Neuropsychiatry. 2013;50(4): 312-319.

25. Ertürk H.E, Sivritepe S. Cultural change and generations: A survey research about the role of cultural change on the generations. International Peer-Reviewed Journal Of Communication And Humanities Research. 2017; 17: 1-26.

26. Merdan E. Research the relationship between five factor personality theory' and business values: a research in banking. Journal of Gümüşhane University Social Sciences Electronics. 2013;4(7): 140-159.

27. Dil S, Bulantekin Ö. Determination of the Relationship Between Family Functionality and Locus of Control and Levels of Academic Success Among Nursing Students. Çankırı Karatekin University School of Health, Journal of Psychiatric Nursing. 2011;2(1): 17-24.

28. Sayılan A.A, Boğa S.M. Determination of Relationship between Job Stress, Job Demands, Job Control, Social Support Level and Tendency to Make Medical Errors of Nurses. Journal of Nursing Research and Development. 2018; 20(1): 11-22.

29. Sönmez B, Yıldırım A. Determination of nurses' innovative behaviour and their views about the factors affecting their innovative behaviour: a qualitative study in a university hospital. Journal of Health and Nursing Management. 2014; 2(1): 49-59.

30. Duffield C.M, Roche M.A, Blay N, Stasa H. Nursing unit managers, staff retention and the work environment. Journal of Clinical Nursing. 2011; 20:23-33.

31. El Haddad M, Wilkinson G, Thompson L, Faithfull-Bryne A, Moss C. Perceptions of the impact of introducing administrative support for nurse unit managers: A qualitative evaluation. Journal Nursing Management. 2019; 27:1700–1711.

32. Emiralioğlu R., Sönmez B. The relationship of nursing work environment and innovation support with nurses' innovative behaviours and outputs. Journal of Nursing Management. 2021; 29:2132–2141.

33. Bandura, A. A. (2001). Cognitive theory: An agentic perspective. Annual Review of Psychology. 2001; 52(1): 1-26.