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YOUTUBE VIDEOS AS A SOURCE OF INFORMATION ON INTRAMUSCULAR INJECTION APPLICATION WITH THE Z TECHNIQUE: CONTENT, QUALITY AND RELIABILITY ANALYSIS

Z Tekniği ile İntramüsküler Enjeksiyon Uygulama Konusunda Bilgi Kaynağı Olarak YouTube Videoları: İçerik, Kalite ve Güvenilirlik Analizi

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ABSTRACT

YouTube videos about intramuscular injection with the Z technique were evaluated for content, quality and reliability. A search of YouTube was made on 13 November 2023 using the keywords of "Z technique" and "intramuscular injection". 40 videos that fulfilled the inclusion criteria were assessed for usefulness using the Z Technique Intramuscular Injection Administration Checklist (ZIAC), reliability using the Quality Criteria for Consumer Health (DISCERN), and quality using the Global Quality Scale (GQS) scores. Most of the videos used in the study belonged to individual content producers. The videos were determined to be of medium quality, and reliability, but their usefulness was not at the desired level based on their ZIAC, DISCERN, and GQS scores (respectively; 16.92±2.72; 2.92±0.763; 3.03±0.77). Furthermore, the videos' usefulness (ZIAC), reliability (DISCERN), and quality (GQS) scores all showed a strong positive correlation. It was determined that the dorsogluteal region was preferred in 48.1% of the videos (n=13), and the region was determined correctly in 67.5% of the videos (n=27). To provide the most reliable information to healthcare professionals, particularly nurses, it is recommended that expert nurses and educators create qualified videos about the use of intramuscular injection with the Z technique and share them on YouTube.

Keywords: Content, Intramuscular injection, Reliability, Quality, Z Technique.

ÖZ

Z tekniği ile intramüsküler enjeksiyon uygulama konusundaki YouTube videoları, içerik, kalite ve güvenilirlik açısından değerlendirildi. 13 Kasım 2023 tarihinde "Z tekniği" ve "intramüsküler enjeksiyon" anahtar kelimeleri kullanılarak YouTube'da arama yapıldı. Dahil edilme kriterlerini karşılayan 40 videonun yararlılığı Z Tekniği ile İntramüsküler Enjeksiyon Uygulaması Kontrol Listesiyle (ZİUK), güvenilirliği Tüketici Sağlığı Bilgileri için Kalite Kriterleri (DISCERN) ve kalitesi Küresel Kalite Skalası (GQS) puanlarına göre değerlendirildi. Araştırmada kullanılan videoların çoğu bireysel içerik üreticilerine aitti. Videoların ZİUK, DISCERN ve GQS puanları dikkate alındığında orta düzey güvenirlik ve kalitede olduğu fakat yararlılıklarının istenilen düzeyde olmadığı belirlendi (sırasıyla; 16.92±2.72; 2.92±0.763; 3.03±0.77). Ayrıca videoların yararlılık (ZİUK), güvenirlik (DISCERN) ve kalite (GQS) skorlarının pozitif yönde güçlü korelasyona sahip olduğu saptandı. Videonun %48.1'inde (n=13) dorsogluteal bölgenin tercih edildiği ve videoların %67.5'inde (n=27) bölge tespitinin doğru yapıldığı belirlendi. Başta hemşireler olmak üzere sağlık profesyonellerine en güvenilir bilgileri sunabilmek için, alanında uzman hemşire ve eğitimcilerin Z tekniği ile intramüsküler enjeksiyon uygulamasına yönelik nitelikli videolar üretmeleri ve YouTube'da paylaşmaları önerilmektedir.

Anahtar kelimeler: Güvenilirlik, İçerik, İntramüsküler enjeksiyon, Kalite, Z Tekniği.

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INTRODUCTION

Intramuscular injection (IM) is the most commonly used parenteral drug administration method for delivering drugs to the body's large muscles via the skin and subcutaneous tissue for prophylactic or therapeutic purposes (Milutinović, Tomić, Puškaš, Brestovački-Svitlica & Simin, 2018). According to reports, 16 billion injections are administered worldwide each year, with IM injections accounting for 90.0% of these (WHO, 2015). IM injection administration is a complex psychomotor skill that requires sufficient knowledge and technique (Srividya, Nagabushan & Drupad, 2015). If the proper injection technique is not used, serious complications such as abscess, necrosis, infection, tissue damage, hematoma, nerve, bone, and vascular injuries, periostitis, and contracture can occur (Larkin, Ashcroft, Elgellaie & Hickey, 2017). The most common complications related to IM injection are pain at the injection site and drug leakage (Ayinde & Ross, 2020; Dinç, 2011). Anxiety and fear due to pain can cause patients to refuse treatment, and drug leakage causes the expected benefits of treatment not to be obtained (Dinç, 2011; Taddio et al., 2021).

The Z technique is most commonly used in adult and adolescent patients. The skin at the injection site is pulled 2.5-3 cm to the side or downward, the skin and subcutaneous tissue are separated, and the needle is inserted into the muscle tissue at a 90-degree angle. This technique is recommended to prevent the leakage of especially oily and irritating drugs (Annutto, 2023). Previous studies report that IM injection with the Z technique reduces pain and tissue trauma by preventing the drug from leaking into the SC tissue (Abdelkhalek, 2019; Kara & Güneş, 2016; Sblendorio, 2023; Zeyrek et al., 2019). However, previous research found that nurses did not prefer the Z technique for IM injection application, and their knowledge of the Z technique was not at the required level (Baş & Keçeci, 2023; Wynaden et al., 2015). Aditionally, it was determined that nurses' knowledge about safe IM injection practices was generally not evidence-based and they preferred more traditional methods in their practice (Elsaid & Abdelkhalek, 2019; Gaikwad, Sindhu & Sarda, 2017). According to the literature, complications associated with IM injection application can be avoided or minimized if nurses have adequate knowledge and skills in this area (Centers for Disease Control and Prevention, 2023). In this context, it is recommended that IM injection application procedures be prioritized in basic nursing education and in-service training to improve nurses' knowledge and skills (Mehta, Pillai & Singh, 2014).

As technology advanced, the internet and social networking sites gained popularity as information sources (Drozd, Couvillon & Suarez, 2018). These advances in digital technology

enable students to learn and collaborate regardless of time or location (Ellaway, Fink, Graves & Campbell, 2014). YouTube is the best-known of these platforms. It has been suggested that YouTube is an effective and powerful tool for health education, and its use for health purposes is increasing by the day (Madathil, Rivera-Rodriguez, Greenstein & Gramopadhye, 2015). A study on the use of information technologies by nurses and nursing students found that YouTube was the most popular website (Tatlı et al., 2018). Previous research indicates that healthcare professionals and patients frequently use YouTube to access healthcare information (Madathil et al., 2015; Garside, Fisher, Blundell & Gordon, 2018). Despite these advantages, it is widely acknowledged that the quality and reliability of the information provided in videos on YouTube differ and some misinformation exists (Culha, Seyhan, Merder, Ariman & Culha, 2021). It has been reported that many of the most frequently viewed nursing skills videos on YouTube do not provide accurate information or are poor quality (Ferhatoglu, Kartal, Ekici & Gurkan, 2019; H. Tosun & A. Tosun, 2022). The literature search revealed no known study evaluating YouTube videos' content, reliability, and quality on IM injection with the Z technique. The reliability of information sources is essential for the nursing practice that can have serious consequences, such as IM injection. Therefore, educators and healthcare professionals should thoroughly review video content for accuracy and appropriateness before using YouTube as a resource. In this sense, we hope that the publication will contribute to the nursing literature.

MATERIAL AND METHOD

Purpose and Design of Study

The purpose of this study was to assess the content, quality, and reliability of YouTube videos as a source of information about IM injection with the Z technique. The research was designed in a descriptive model.

Population and Sample of Study

On November 13, 2023, videos were searched using the keywords "Z track technique" and "IM injection" in YouTube's (www.youtube.com) search feature, with "sort by relevance" as the default filter. Each search was performed on a single session. A newly created YouTube account was used for the search so that existing caches and cookies would not affect the new search. Inclusion criteria; they are audio and visual quality videos with English language and less than 20 minutes of video duration. In total, 511 videos were accessed. All videos were evaluated for exclusion criteria. Because English is a universal language that is widely accepted

around the world, the study only included English videos. The graphs show that videos achieve their peak value in video ranking systems at 10 minutes. Therefore, videos that exceeded 20 minutes in duration, contained only explanations, were irrelevant, contained commercial product promotion, and were repetitive were excluded. Additionally, low-quality audiovisual content was excluded from the study. Finally, 40 videos that fulfilled the inclusion criteria were assessed (Figure 1). Each video was watched in its entirety.

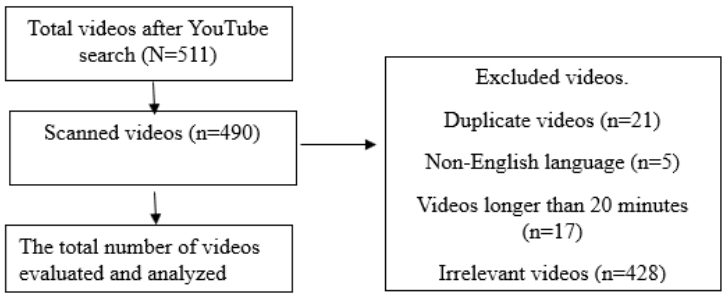

Figure 1. Flowchart for analyzing YouTube videos about IM injection with the Z technique.

Data Collection and Analysis

Since YouTube search results change every day, a playlist was created by recording the 40 videos used in the study. The "video title" and "URL" of the videos used in the study were saved in another file. The videos were evaluated in three stages. Two independent researchers evaluated the videos' usefulness in the first stage, reliability in the second stage, and quality in the final stage. IM injection application with the Z technique is one of the basic nursing skills, and this technique is preferred in adults and adolescents. For this reason, researcher (SD and EB), one with a Ph.D. in Department of Nursing Fundamentals and the other with a Ph.D. in Department of Pediatric Nursing, independently evaluated the videos. Then the researchers came together and made a common decision. Inconsistencies between the two researchers were resolved through consensus after consulting a researcher (AE), who is an assistant professor of Department of Nursing Fundamentals. The contents of the instruments that are used to assess the video content are listed in Table 1. Video titles and URLs were collected for recording the videos. Descriptive features such as the duration of the video on YouTube (years), the length of the video (seconds), the number of views, likes, dislikes, and comments, the videos' country of origin, broadcast source, and who appeared in them were all determined. Table 2 shows the demographic characteristics of the videos.

Table 1. Tools Used to Evaluate Videos for IM Injection Application with Z Technique in Terms of Reliability, Quality, and Usefulness.

ZIAC	
1.	Hand hygiene.
2.	Material preparation.
3.	Medicine and drug card control.
4.	Patient identity verification.
5.	Wearing nonsterile gloves.
6.	Positioning.
7.	Identifying the injection site.
8.	Cleaning the injection site (in one stroke with a cotton pad soaked in antiseptic, in a circular motion from the center to the outside).
9.	Waiting 5 seconds for the antiseptic to dry.
10.	Removing the protective sheath without contaminating the needle.
11.	Diverting the patient's attention and causing his/her muscles to relax (by talking and telling him/her to breathe deeply).
12.	Stretching the skin on the area to be injected by sliding it approximately 3 centimeters (cm) towards the edge with the side of the hand.
13.	Inserting the needle into the tissue at a 90° angle with the active hand (quickly and smoothly).
14.	Holding the syringe agitated with the passive hand and aspirating by holding the plunger with the active hand.
15.	Injecting the drug slowly (1 ml in 10 seconds) into the muscle.
16.	Waiting 10 seconds after giving the medicine.
17.	Removing the syringe from the tissue.
18.	Releasing passive hand-tensioned tissue.
19.	Apply pressure to the area for 10 seconds with dry cotton.
20.	Throwing the needle without its protective cover into the sharps medical waste bin.
21.	Giving the patient a comfortable position.
22.	Take off gloves and wash your hands.
23.	Recording the procedure performed and the patient's reactions.
24.	Observing the patient for allergies and evaluating whether there is any ecchymosis, pain, hardening, and loss of sensation in the area.
DISCERN	
1.	Are the aims clear and achieved?
2.	Are reliable sources of information used? (i.e., the publication cited, the speaker is a specialist in diabetes)
3.	Is the information presented both balanced and unbiased?
4.	Are additional sources of information listed for patient reference?
5.	Are areas of uncertainty mentioned?
GQS	
1.	Poor quality, poor flow of the site, most information missing not at all useful for patients
2.	Generally poor quality and poor flow, some information listed but many important topics missing, of very limited use to patients
3.	Moderate quality, suboptimal flow, some important information is adequately discussed but others poorly discussed, somewhat useful for patients
4.	Good quality and generally good flow. Most of relevant information is listed, but some topics not covered, useful for patients
5.	Excellent quality and excellent flow, very useful for patients

The data was analyzed using SPSS (Statistical Package for Social Sciences) for Windows 26.0. Descriptive analyses were conducted on both discrete variables and continuous variables. The video content was analyzed, and the Kappa value was used to calculate the agreement between two independent reviewers. When the content of the videos was reviewed, two

independent reviewers' kappa value was 0.79. A Spearman correlation analysis was used to investigate the relationship between DISCERN, GQS, ZIAC total scores, and video demographic data. A p-value of <0.05 was considered statistically significant.

Usefulness

There is no validated standard measurement instrument in the literature to assess YouTube videos on IM injection with the Z technique. Therefore, to evaluate the usefulness of the video, the researchers prepared and used the "Z Technique Intramuscular Injection Administration Checklist" by the literature (Sabuncu et al., 2015; Kaşıkçı and Akın, 2021). Z Technique Intramuscular Injection Administration Checklist (ZIAC) consists of 24 items. One point was given to each correctly answered question. The ZIAC total score ranges between 0 and 24 (Table 1). A high score means that there is valuable and instructive information in the video. The content validity index of ZIAC was determined with the Davis technique (Davis, 1992). ZIAC consulted seven different experts in the fundamentals of the nursing field to determine content validity. Experts evaluated each item and assigned a score ranging from one to four. According to expert opinions, the Content Validity Index (CVI) of 24 items was 0.97, the final version of the scale was developed following the experts' suggestions.

Reliability

The video's reliability was assessed using the Quality Criteria for Consumer Health (DISCERN), a 5-item measure created by Charnock et al. (Table 1). For every item, a "yes" response is worth one point. The total score obtained from this tool varies between 0-5. Videos with less than three points are poor-quality videos and are not recommended for use. Videos with a score of three are considered to be of medium quality and these videos should be used with additional information sources. Videos that score above 3 contain useful information for people and are considered high-quality videos (Charnock, Shepperd, Needham & Gann, 1999).

Quality

The Global Quality Score (GQS), developed by Bernard et al. (2007), was used to assess the quality and usability of each video's content. The lowest score obtained from the GQS, which consists of 5 items, is 1 and the highest score is 5 (Table 1). Videos with 1-2 points are classified as low quality, videos with 3 points as medium quality, and videos with 4 or 5 points as high quality (Bernard et al., 2007).

Limitations of Study

This study has some limitations. The videos were assessed just in English, from a single search engine, limited to only one day. Given that videos are constantly uploaded to the internet, those uploaded after the study period were excluded. Since there is no validated standard measurement tool in the literature to evaluate the quality of videos for IM injection applications with the Z technique, the authors developed a new scoring system (ZIAC) that considers guidelines and literature.

Ethics of Study

This study did not require approval from the local research ethics committee because it only used data that was publicly accessible.

RESULTS

33.3% (n=14) of the videos belong to American content producers, only 10.0% (n=4) were prepared by channels with academic/hospital/educational content and was determined that 27.5% (n=11) of them included real patients. The median score for the duration of videos on YouTube was 5.7 years (1-16), and the median score for the length of videos was 363 seconds (105-890). It was found that 42.5% (n=17) of the videos received 3 points from GQS, while 57.5% (n=23) received 3 points from DISCERN. When the contents of the videos were examined, the kappa value of two independent raters was found to be 0.67. The median number of views for the 40 videos included in the study is 216.923.03 (min=55, max=4639328). The median scores of the number of likes, dislikes, and comments of the videos were determined as 1529.83 (min=0, max=45000), 0 (min=0, max=0), 6.38 (min=0, max=14.016), respectively. The GQS, DISCERN, and ZIAC total score averages of the videos were found to be 3.03±0.77; 2.92±0.76; 16.92±2.72, respectively (Table 2).

Table 2. Demographic Characteristics of Videos, Distribution of GQS, DISCERN, and ZIAC Scores (n=40).

Variables	N	%
Country of origin of videos		
India	1	2.4
France	1	2.4
USA	14	33.3
Canada	1	2.4
Unknown	23	57.5
Publication source		
Academic/hospital/education channel	4	10.0
Individual channel	36	90.0
Material contained in the videos		
Model	25	62.5

Patient		11	27.5
Other		4	10.0
Quality score of videos (GQS)			
Total score=one		1	2.5
Total score=two		7	17.5
Total score=three		17	42.5
Total score=four		14	35.0
Total score=five		1	2.5
Reliability score of videos (DISCERN)			
Total score=one		2	5.0
Total score=two		5	12.5
Total score=three		23	57.5
Total score=four		10	25.0
Total score=five		0	0
Demographic data of videos		**Median (IQR [a])**	**Min-Max**
Video length (in seconds)		363.00 (382.25)	105-890
Number of views		216923.03 (61382.75)	55-4639328
Likes		1529.83 (230.25)	0-45000
Dislikes		0 (0)	0
Comment		6.38 (4.00)	0-14.016
Time on YouTube (in years)		5.70 (3.75)	1-16
Tools	**Mean (SD)**	**Median (IQR [a])**	**Min-Max**
GQS	3.03 (0.77)	3.00 (1.00)	1.00-5.00
DISCERN	2.92 (0.76)	3.00 (0.87)	0.00-4.00
ZIAC	16.92 (2.72)	17.00 (3.87)	12.00-22.00

[a] IQR: Interquartile range.

It was determined that there was a weak positive correlation between video length and DISCERN and ZIAC average score (r_s:0.378, p=0.016; r_s: 0.366, p = 0.020, respectively). There was a weak positive correlation between the number of views and the time spent on YouTube, a positive strong correlation between the number of views and the number of likes, and a moderate positive correlation between the number of views and the number of comments (r_s:0.434, p=0.005; r_s:0.879, p=0.000; r_s:0.590, p=0.000). A moderate positive correlation was found between the number of likes and comments (r_s:0.634, p=0.00). It was determined that there was a high positive correlation between DISCERN, GQS, and ZIAC total scores (Table 3).

Table 3. Correlation Analysis of Data (n=40).

		Time on YouTube (in years)	Video length (in seconds)	Views	Likes	Dislikes	Comment	ZIAC	DISCERN	GQS
Time on YouTube (in years)	r_s	-	-	-	-	-	-	-	-	-
	p									
Video length (in seconds)	r_s	-0.133	-	-	-	-	-	-	-	-
	p	0.414								
Views	r_s	**0.434****	0.048	-	-	-	-	-	-	-
	p	0.005	0.767							
Likes	r_s	0.218	0.185	**0.879****	-	-	-	-	-	-
	p	0.176	0.253	0.000						

Dislikes	r_s	-	-	-	-	-	-	-	-	-
	p	-	-	-	-					
Comment	r_s	0.082	0.101	**0.590****	**0.634****	-	-	-	-	-
	p	0.616	0.536	0.000	0.000					
ZIAC	r_s	0.142	**0.366***	-0.016	0.024	-	0.021	-	-	-
	p	0.383	0.020	0.924	0.885		0.896			-
DISCERN	r_s	-0.038	**0.378***	0.049	0.144	-	0.045	**0.712****	-	-
	p	0.814	0.016	0.764	0.376		0.784	0.000		
GQS	r_s	0.088	0.279	0.112	0.202	-	0.177	**0.707****	**0.818****	-
	p	0.587	0.081	0.490	0.212		0.273	0.000	0.000	

*p < 0.05. **p < 0.01. r_s: Spearman Correlation Analysis.

The inter-rater reliability of GQS, DISCERN, and ZIAC mean scores is shown in Table 4. GQS received 3.02±0.76 points from the first rater and 3.10±0.84 points from the second rater. The first rater scored DISCERN at 3.00±0.75, while the second rater gave it a score of 2.85±0.83. ZIAC received 16.50±2.74 points from the first rater and 17.35±2.99 points from the second rater. There was good agreement between two independent raters on GQS, DISCERN, and ZIAC mean scores (ICC:0.881, ICC:0.922, and ICC:0.892, respectively). The first and second raters' GQS, DISCERN, and ZIAC results showed a strong positive correlation (r_s:0.739, p=0.000; r_s:0.825, p=0.000; r_s:0.818, p=0.000, respectively).

Table 4. Inter-rater Reliability of GQS. DISCERN and ZIAC Scores.

	First rater		**Second rater**			
Tools	Mean ± SD	Median (IQR*)	Mean ± SD	Median (IQR*)	r_s/p	ICC
GQS	3.02±0.76	3.00 (0.00)	3.10±0.84	3.00 (1.00)	0.739**/0.000	0.881
DISCERN	3.00±0.75	3.00 (0.00)	2.85±0.83	3.00 (1.00)	0.825**/0.000	0.922
ZIAC	16.50±2.74	16.00 (3.00)	17.35±2.99	17.00 (5.00)	0.818**/0.000	0.892

**p < 0.001. r_s: Spearman Correlation Analysis. ICC: Intraclass Correlation.

Table 5 shows the distribution of videos based on the completion status of the process steps in the ZIAC checklist. In the videos, it was determined that the steps of verifying the patient's identity (37.5%), waiting 5 seconds for the antiseptic to dry (37.5%), applying pressure to the area with dry cotton for 10 seconds after the procedure (37.5%) and recording the procedure and the patient's reactions (37.5%) were frequently missed. In addition, it was determined that the dorsogluteal region was preferred in 48.1% (n = 13) of the 27 videos for IM injection, while the ventrogluteal region was used in 37.1%. However, it was determined that the region was detected correctly only in 67.5% of the videos.

Table 5. Distribution of Videos Based on The Completion Status of Process Steps in the ZIAC Checklist.

	Completion status	
ZIAC	**n**	**%**
1. Hand hygiene.	27	%67.5
2. Material preparation.	19	%47.5
3. Medicine and drug card control.	19	%47.5

4.	Patient identity verification.	15	%37.5
5.	Wearing nonsterile gloves.	30	%75.0
6.	Positioning.	18	%45.0
7.	Identifying the injection site.	27	%67.5
8.	Cleaning the injection site (in one stroke with a cotton pad soaked in antiseptic in a circular motion from the center to the outside).	40	%100
9.	Waiting 5 seconds for the antiseptic to dry.	15	%37.5
10.	Removing the protective sheath without contaminating the needle.	35	%87.5
11.	Diverting the patient's attention and causing his/her muscles to relax (by talking and telling him/her to breathe deeply).	18	%45.0
12.	Stretching the skin on the area to be injected by sliding it approximately 3 centimeters (cm) towards the edge with the side of the hand.	40	%100
13.	Inserting the needle into the tissue at a 90° angle with the active hand (quickly and smoothly).	40	%100
14.	Hold the syringe agitated with the passive hand and aspirate by holding the plunger with the active hand.	20	%50.0
15.	Inject the drug slowly (1 ml in 10 seconds) into the muscle.	19	%47.5
16.	Waiting 10 seconds after giving the medicine.	19	%47.5
17.	Remove the syringe from the tissue.	40	%100
18.	Releasing passive hand-tensioned tissue.	40	%100
19.	Apply pressure to the area for 10 seconds with dry cotton.	15	%37.5
20.	Throwing the needle without its protective cover into the sharps medical waste bin.	19	%47.5
21.	Giving the patient a comfortable position.	18	%45.0
22.	Take off gloves and wash your hands.	25	%62.5
23.	Recording the procedure performed and the patient's reactions.	15	%37.5
24.	Observing the patient for allergies and evaluating whether there is any ecchymosis. pain. hardening and loss of sensation in the area.	18	%45.0
IM injection site			
	Dorsogluteal region	13	%48.1
	Ventrogluteal region	10	%37.1
	Other regions (deltoid. vastus lateralis)	4	%14.8

*The evaluation was made based on a total of 27 videos with region detection.

DISCUSSION

In this research, YouTube videos were assessed for content, quality, and reliability as a source of information about IM injection using the Z technique, and the results were discussed in line with the literature. The majority of the videos used in the study were produced by individual channels, and the number of videos created by academic/hospital/education channels was insufficient. Previous research results support this finding (Kocayiğit & Bal, 2022). In the literature, it is recommended to prefer videos uploaded by health professionals for accurate and reliable information (Lee, Seo & Hong, 2014). GQS, DISCERN, and ZIAC scores for the videos showed that their usefulness was not at the desired level; 42.5% had medium quality, and 57.5% had medium reliability. Previous studies conducted on YouTube use on various health-related topics support our findings (Culha et al., 2021). In addition to the benefits of YouTube videos, such as their ease of access and availability of up-to-date information, it is not always possible to obtain the most accurate information due to disadvantages such as the

abundance of options, inaccurate and untrustworthy content, and a lack of content control (Kocayiğit & Bal, 2022). Considering that health professionals and patients frequently use YouTube videos to get health information, it is recommended to examine before using YouTube content as a source (Madathil et al., 2015; Tatlı et al., 2018; Garside et al., 2018).

The average score of DISCERN and ZIAC was found to have a weak positive correlation with the length of the videos in this study. Our findings are consistent with those reported in the literature, with more useful videos being significantly longer due to the additional time required to provide reliable and comprehensive information (Abedin et al., 2015). On the other hand, research indicates that the average duration of viewing for variously lengthened YouTube health videos is six minutes (Aydin & Akyol, 2020). In this regard, it is thought that it would be beneficial if quality videos with sufficient content should not take too long to receive user interaction. The DISCERN, GQS, and ZIAC total scores of the videos were found to have a high positive correlation in this study. According to the literature, some studies show that as videos' usefulness and usability increase, so do their quality and reliability (Aydin & Akyol, 2020). This positive high correlation shows that videos with correct content prepared following DISCERN and GQS criteria receive more interaction from users.

The videos used in the study were assessed and scored independently by two researchers. Thus, it was aimed to reduce the effect of differences caused by the authors' biases when evaluating the videos. This study found satisfactory agreement between two independent raters regarding GQS, DISCERN, and ZIAC mean scores. In this context, it can be said that the videos were evaluated objectively and accurately.

When the videos were assessed according to the process steps of IM injection application with the Z technique, it was determined that the steps of verifying the patient's identity in the videos, waiting 5 seconds for it to dry after applying the antiseptic, applying pressure to the area with dry cotton for 10 seconds after the procedure, and recording the procedure and the patient's reactions were frequently missed. To ensure patient safety and prevent possible medication errors, it is expected that the patient's identity is verified within the scope of correct principles in medication administration and the procedures are recorded on nursing forms. Failure to check the patient ID may result in the medication being administered to the wrong patient, and failure to record it may result in medication administration being repeated by different nurses (Çoban, Şirin, Kavuran & Çiftçi, 2015). In this case, patient safety is endangered. A study conducted on nurses' safe medication practices supports our findings and shows that patient identification and record-keeping steps are often neglected (Çoban et al.,

2015). It has been reported that if the skin is cleaned with an antiseptic and not allowed to dry before receiving an IM injection, the needle causes more pain, and bacteria cannot be neutralized (Gittens & Bunnell, 2009). Additionally, it was determined that massage was applied to the area after IM injection in the majority of the videos we used in this study which is consistent with previous research. Massage application is not recommended because it causes bruising and tissue irritation in the injection site (Kaya & Palloş, 2012). In the videos, it was determined that the DG region (48.1%) was preferred more frequently for IM injection and the region was determined correctly in only 67.5% of the cases. It is recommended to use the ventrogluteal region instead of the dorsogluteal region because it is far from the large vascular system and nerves. The dorsogluteal region was removed from the CDC's (Centers for Disease Control and Prevention) list of recommended injection sites due to its proximity to the inferior gluteal artery and sciatic nerve (Centers for Disease Control and Prevention, 2023). However, despite the risks, it has been reported that nurses often prefer the dorsogluteal region for IM injection administration (Wynaden et al., 2015).

It was determined that the majority of the videos used in the research had medium quality and reliability and their usefulness was not at the desired level. Furthermore, it was discovered that the total amount of videos produced by academic/hospital/educational channels was inadequate. It was found that the ZIAC, GQS, and DISCERN scores of the videos had a high positive correlation. When using the Z technique for IM injection, it was found that the steps of verifying the patient's identity, waiting 5 seconds for it to dry after applying the antiseptic, applying pressure to the area with dry cotton for 10 seconds after the procedure, and recording the procedure and the patient's reactions were frequently skipped. Finally, it was seen in the videos that the dorsogluteal region was mostly used as the injection site and the injection site determinations were made incorrectly.

CONCLUSION

Based on our findings, we can conclude that not every video on YouTube about the subject is scientific rigorous, as the videos are of medium quality and reliability. We think this study is going to raise awareness, particularly among health professionals, students, and the general public, about the use of scientific YouTube videos as a resource. To provide the most reliable information to healthcare professionals, particularly nurses, it is recommended that expert nurses and educators produce high-quality videos regarding IM injection with the Z technique and share them on YouTube and similar social media platforms. It would be

beneficial to emphasize issues critical to patient safety in the videos, such as verifying patient identity, selecting the correct injection site, and recording procedures performed.

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