



Nurses' practice for selection the site and painless intramuscular injections in Upper Egypt

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Abstract

The study aimed to: assess nurses' practice for selection the site and painless intramuscular injections.

Subjects and Method: data were collected from all available nurses (250) working in medical and surgical departments at Upper Egypt university Hospitals.

Two tools were utilized; 1.interview questionnaire 3. Painless injection practice observational chick list.

Results: Dorsogluteal site to administer intramuscular injections was preferred for use by 116 (46.4%) nurses, as regard safe injection; there was highly significant difference between Upper Egypt Universities hospitals and most of them avoid the patient to look to the needle, inject the medication slowly. Regarding safe injection Sohag was the highest government where the nurses change needle after aspiration. Increased incidence of abscess in Aswan and Sohag Universities.

Conclusions: The research revealed a significant difference between Upper Egypt universities hospitals regarding safe and painless technique.

Recommendations: The choice of site must be based on good clinical judgment and using an evidence based. Additional research on the safety and painless intramuscular injection covering all aspects including site and needle selection is needed.

Keywords: intramuscular injection, painless and Upper Egypt

Introduction

Intramuscular (IM) injections have been an integral part of drug administration in nursing practice for almost half a century. However, there are some conflicting practices which warrant investigation to determine their effectiveness in this aspect of patient care. To this end, this paper presents the results of a literature review which was carried out in order to establish current understanding of present day knowledge, procedures and guidelines for the administration of IM injections. Areas addressed within this review include injection sites used, injuries associated with IM injections, issues surrounding needle selection and volume administered through IM injections, injection techniques and nursing skills associated with IM injections.

Synthesis of the research reviewed allows the development of research-based guidelines for this skill. These guidelines offer a framework for nurses who wish to provide practice in line with current research into the process of drawing up and administration of intramuscular injections. Areas addressed within this review include injection sites used, injuries associated with IM injections, when alternative routes are not viable or do not facilitate absorption of medication. (Ford *et al.*, 2010) [2].

Injections may be viewed as a traumatic procedure for patients, therefore it is important to assess if an injection is necessary and justified prior to its administration. An

appropriate injection technique reduces discomfort and complications for the patient (Prabhakaran *et al.*, 2018) [17]. Necessary skills for good injection technique include: knowledge of anatomy and physiology, pharmacology, suitable injection sites and injection techniques for patients, clinical holding and effective communication skills.

The introduction of alternative analgesia techniques, (epidurals, patient and nurse controlled analgesia) has reduced the volume of injections administered. Therefore, it is acknowledged that nurses are currently administering fewer injections. Some principles of intramuscular injections may be based on custom and practice. It is essential that nursing practice is evidence based practice and each patient is individually assessed. It is recommended that nurses regularly review information on this practice (Greenway, 2014) [4].

An understanding of each sites is essential if nurses are to make informed decisions with regard to administration of IM injections. These sites include; (The deltoid, dorso gluteal, rectus femorus, vastus lateralis and ventro gluteal site. All muscles have blood supply and are innervated, although only the dorso gluteal injection site has close proximity to a major nerve and blood vessel. (Hoffmann *et al.*, 2014) [6].

Poor practices can create adverse risks for patients and healthcare workers (Lam *et al.*, 2018) [10]. Adverse events

for patients include: hemorrhage in those with bleeding disorders; pain; sciatic nerve injury; injection fibrosis; infection, failure to ensure correct siting, depth or rate of injection are linked to complications.

Significance of the study

Intramuscular injections (IM) are a common technique used to deliver medication deep into the large muscles of the body. More than 12 billion IM injections are administered annually throughout the world. However, it is not a benign procedure, and unsafe injection practices are estimated to have significant impacts on patient morbidity and mortality. Different methods are used by the nurses to reduce pain during intramuscular injections such as applying heat and cold. Therefore, this research assessed nurses practice for selection the site and painless intramuscular injections

Aim of the study

To assess nurses practice for selection the site and painless intramuscular injections

Research questions

What are nurses practices used for selection intramuscular injections site?

Are the nurses used painless intramuscular injections?

Research design

Cross sectional design was utilized to fulfill the aim of this study.

Technical Design

Setting

The study was conducted at the Medical and Surgical department at Assuit, Sohag, Aswan, Minia and South Valley University Hospitals.

Subjects

A convenience sample of all available nurses (250 nurses) working in medical and surgical department and who are willing to participate in the study.

Tools

Tool I: Interview questionnaire for nurses

It was developed by the researchers in order to assess their knowledge about safe intramuscular injection. It was developed by expertise on medical and nursing field. Modifications were done based on review related literature, theoretical and clinical learning experience of the researchers and expertise selected certain items to suite the aim of the study. Content validity of this tool was tested by expertise in medical and nursing field and consists of two parts.

Part I: Socio demographic data

This part comprised nurse name, age, level of education, and years of experience.

Part II: Safe intramuscular injection

This part included structured items to assess criteria of selection of the site, most sites used for intramuscular injection, most complication concerned, how nurse select needle size, if the nurse change the needle between

medication preparation and injection& if they rotate site of injection.

Scoring system

1= done.

Zero= not done.

Tool II: Observational chick list related to pain less injection practice

This tool was used to identify nursing performance related to painless injection and contain certain items such as: asking the patient to image any situation other than injection, avoid the patient to look to the needle, use topical anesthesia, after sterilizing the injection site with alcohol, let the skin dry, ask the patient to take deep breath, ask the patient to relax the muscle, inject the medication slowly, apply manual pressure to the injection site for 10 seconds after injection, ask the patient to move the muscle after injection, massage the site after injection, after injection, apply gel or cream, and then ice over the injection site, & warm up the medication.

Observational chick list performed and confirmed by the researcher. Scoring system was rated for two levels; done and not done, each item was observed, categorized and scored into either done correctly = 1, not done = 0 total system scores for all items was (10) grades. Those who obtained less than (70%) were considered having unsatisfactory level. While those who obtained above than (70%) were considered having satisfactory level of practice.

Methods of data collection

Administrative approval

An official permission was obtained from the Head of Medical and Surgical Department at Assuit, Sohag, Aswan University, Minia in South Valley Hospitals to conduct the study.

Pilot study

The pilot study was carried out in Feb. 2017 to test the clarity and feasibility of the study tools on a group of 250 nurses. It has also provided an estimate of the time needed to fill out the tool; no change was done in the assessment sheet, so the 25 nurses selected for the pilot study were included in the main study.

Ethical considerations

Before conducting the actual study, an official permission was obtained and the purpose of the study was explained to all nurses and their consent was obtained informally. Purpose of the study was simply explained to nurses who agreed to participate in the study prior to any data collection.

Field work

The data were collected over a period of 6 months starting from Feb. 2017 till the end of July 2017. The data collection was done in the following phases:

- Questionnaire sheet was designed to assess nurses knowledge about safe intramuscular injection and the content were consistent with related literature (nursing text book, journal and internet source) about safe intramuscular injection practice and techniques of

painless intramuscular injection then the content was revised by expertise in nursing field.

- The researcher was available at the department 5 days/week at morning and afternoon shifts (10.0 a.m - 8.00 p.m) to collect the required data and observe nurses performance related to painless injection technique.
- The researchers filled out the interview questionnaire sheet for nurses to assess their knowledge about safe intramuscular injection and consisted of cause of selection of the site, most sites used for intramuscular injection, most complication concerned, how nurse select needle size, if the nurse change the needle between medication preparation and injection& if she rotate site of injection.
- The researchers filled out the observational chick list related to technique for pain less injection to identify nursing performance related to painless injection and contain certain items such as: asking the patient to image any situation other than injection, avoid the patient to look to the needle, use topical anesthesia, after sterilizing the injection site with alcohol, let the skin dry, ask the patient to take deep breath, ask the patient to relax the muscle, inject the medication slowly, apply manual pressure to the injection site for 10 seconds after injection, ask the patient to move the muscle after injection, massage the site after injection, after injection, apply gel or cream, and then ice over the injection site, & warm up the medication.

Analysis of the results

The current study was carried out on assessment of nursing practice related to safe intramuscular injection and painless technique.

Part I: Assessment of nurses' practice about intramuscular injection.

Table 1: Socio-demographic characteristics of nurses (n=250):

Socio-demographic characteristics		N.=250	%
Governments	Aswan	50	20
	Sohag	50	20
	Assiut	50	20
	Minia	50	20
	South Valley	50	20
Age groups	18>25years	78	31.2
	25>35 years	145	54
	35>50 years	27	10.8
mean± SD	27.7±6.8		
Technical institute	Technical institute	132	52.8
	Diploma	118	47.2
Years of experience	<10 years	180	72
	10 -20 years	49	19.6
	>20 years	21	8.4
mean± SD	8.4±6.7		

This table shows that; the majority of nurses were between

25 to 35 years old and the mean age was (27.7±6.8), graduated from technical institute their mean years of experience was (8.4±6.7)

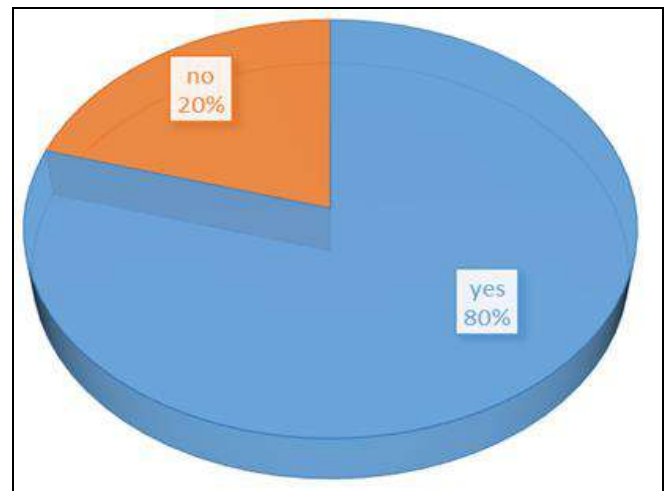


Fig 1: Distribution of nurses (n=250) regarding changing of needle after medication aspiration.

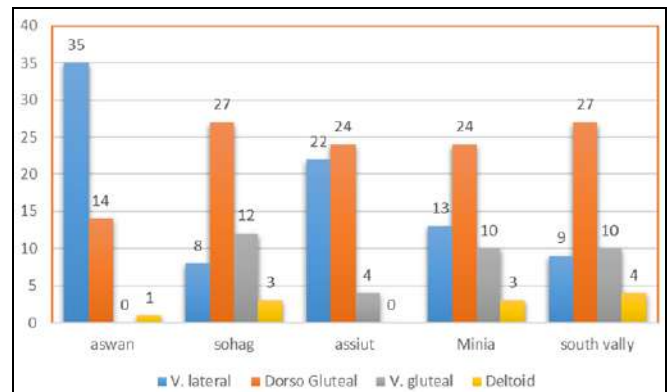


Fig 2: Distribution of Upper Egypt governments (n=250) according to most common injection sites used by nurses.

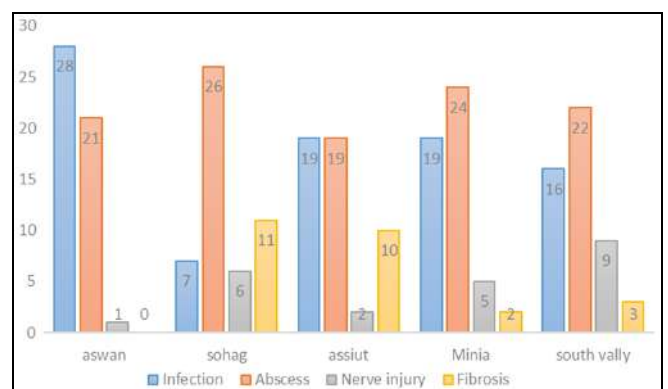


Fig 3: Distribution of Upper Egypt governments (n=250) according to complications of intramuscular injection.

Part II: Assessment of nurses' practice about painless injection.

Table 2: Distribution of painless techniques among Upper Egypt governments (n=250):

Technique for painless injection:	Aswan		Sohag		Assiut		Minia		South Valley		P. Value
	Done	Not done	Done	Not done	Done	Not done	Done	Not done	Done	Not done	
Ask the patient to image any situation other than injection	1	49	40	10	21	29	23	27	27	23	0.001**
Avoid the patient to look to the needle	40	10	47	3	39	11	41	9	49	1	0.008*
Use topical anesthesia	22	28	13	37	17	33	18	32	15	35	0.393 ^{Ns}
After sterilizing the injection site with alcohol, let the skin dry.	47	3	15	35	34	16	26	24	17	33	.001**
Ask the patient to take deep breath	42	8	29	21	34	16	28	22	25	25	.004*
Ask the patient to relax the muscle	43	7	39	11	40	10	35	15	37	13	.783 ^{Ns}
Inject the medication slowly	43	7	43	7	42	12	38	12	38	12	.467 ^{Ns}
Apply manual pressure to the injection site for 10 seconds before your injection	4	46	35	15	21	29	23	27	24	26	.001**
Ask the patient to move the muscle after injection	11	39	41	9	25	25	28	22	30	20	.001**
massage the site after injection	32	18	29	21	28	22	32	18	35	15	.622 ^{Ns}
After injection, apply gel or cream, and then ice the injection site.	4	46	9	41	8	42	13	37	10	40	.207 ^{Ns}
Warm up the medication	34	16	24	26	23	27	25	25	31	19	.051*

* =Significant difference, **= highly significance, ^{Ns}= Non significant difference

The table clarifies that there were statistical difference between Upper governments regarding painless techniques in relation to the following steps: asking the patient to image any situation other than injection, after sterilizing the

injection site with alcohol, let the skin dry, apply manual pressure to the injection site for 10 seconds before your injection and ask the patient to move the muscle after injection.

Table 3: Total distribution of painless techniques among nurses (n=250):

Technique for painless injection:	Done		Not done	
	No.	%	No.	%
Ask the patient to image any situation other than injection	112	44.8	138	55.2
Avoid the patient to look to the needle	216	86.8	34	13.6
Use topical anesthesia	165	66	85	34
After sterilizing the injection site with alcohol, let the skin dry.	111	44.4	139	55.6
Ask the patient to take deep breath	158	63.2	92	36.8
Ask the patient to relax the muscle	194	77.6	56	22.4
Inject the medication slowly	204	81.6	46	18.4
Apply manual pressure to the injection site for 10 seconds before your injection	143	57.2	107	42.8
Ask the patient to move the muscle after injection	135	54	115	46
massage the site after injection	156	62.4	94	37.6
After injection, apply gel or cream, and then ice the injection site.	44	17.6	206	82.4
Warm up the medication	137	54.8	113	45.2

The table clarifies that major of nurses avoid the patient to look to the needle, inject the medication slowly and ask the patient to relax the muscle but they didn't, apply gel or

cream, after injection and then ice the injection site

Part III: Relationships

Table 4: Relationship between intramuscular injection practice and governments distribution. (n=150)

Items	Government					Total	t. test P. Value
	Aswan	Sohag	Assiut	Minia	South Valley		
Most selected site	V. lateral	35	8	22	13	9	87
	Dorso Gluteal	15	27	24	24	27	116
	V. gluteal	0	12	4	10	10	36
	Deltoid	1	3	0	3	4	11
Complications	Infection	28	7	19	19	16	89
	Abscess	21	26	19	24	22	112
	Nerve injury	1	6	2	5	9	23
	Fibrosis	0	11	10	2	3	26
Causes of injection site selection	are the easier access	6	13	10	16	13	58
	the large muscle's bulk	3	3	5	4	5	20
	the lower sensibility at the pain	0	1	0	1	2	4
	The request of the patient.	6	8	4	5	9	32
	Patient age	31	7	18	16	10	82
	years in nursing	0	4	1	0	0	
	knowledge of nerve injury	2	1	2	2	2	9
	less complication	1	1	4	1	1	8
volume of medication	1	4	3	3	4	15	

	patient general condition	0	6	3	1	2	12	
Change needle after medication aspiration	Yes	79.6%						0.001**
	No	20.4%						

* =Significant difference **= highly significance ^{Ns}= Non significant difference

This table shows highly significant difference between intramuscular injection practice and governments distribution. Also demonstrated that Sohag University was

the highest government where the nurses change needle after aspiration with significant difference between the three governments

Table 5: Relationships between injection sites most selected and nurses education and their years of experience (n=250)

Items		Most sits selected					Total	t. test P. Value
		V. lateral	Dorso Gluteal	V. gluteal	Deltoid	Other sites		
Education	technical institute	53	47	23	0	1	124	0.001*
	Diploma	34	69	13	10	0	126	
Years of experience	<10	62	74	36	7	1	250	0.001*
	10 -20	11	35	0	3	0		
	>20	14	7	0	0	0		

* =Significant difference **= highly significance ^{Ns}= Non significant difference

This table showed that there were statistical difference between nurses' education and the most injection site

selected also significant difference found regarding their years of experience and the most injection site selected.

Table 6: Relationship between nurses' education level and their years of experience and occurrence of IM injection complications (n=250).

Items		Complications				Total	P. Value
		Infection	Abscess	Nerve injury	Fibrosis		
Educational level	Technical institute	48	56	4	8	116	0.21 ^{Ns}
	Diploma	41	56	11	18	126	
Years of experience	<10 years	61	12	0	8	81	0.001 **
	10 -20 years	14	24	11	4	53	
	>20 years	14	7	0	14	35	

This table showed that there were no statistical difference between nurses' education level and occurrence of IM injection complications but there was a statistical significant difference between nurses' years of experience and occurrence of IM injection complications.

Discussion

Intramuscular injection application is one of the most commonly used treatment modality in injection applications. (Tuğrul and Denat, 2014) ^[15].

Despite it considered as a simple technique, when intramuscular injection process is not done carefully, it can cause serious complications. These complications can be listed as abscess, necrosis, hematoma, ecchymosis, infection, pain, periostitis, vascular and nerve injury (Gülner and Çalışkan, 2014) ^[5] and (Kaya *et al.*, 2015) ^[7].

Many medications must be injected intramuscularly with a substantially large needle necessary to penetrate the muscle layers and transfer more viscous medications through the needle. These types of injections are painful, because the long needle penetrates deeply through the layers of skin as well as many layers of muscles.

Accordingly, it has become desirable to provide an injection technique that less pain desired, In the present study the majority of nurses mean age was (27.7±6.8) this result disagreed with Walsh & Brophy (2011) ^[16] who stated that most nurses ranged in age from 30 to 49 years

In relation to educational level the present study show that the highest percentage was technical institute this finding

inconsistent with Walsh & Brophy (2011) ^[16] who mentioned that the majority of nurses were diploma prepared

Concerning the years of experience the findings concluded that most nurses had less than 10 years of experience this disagreed with Duncan *et al.*, (2016) ^[8] who stated that the majority of nurses were worked in nursing for >10 years Regarding distribution of painless techniques among nurses; in Sohag University with significant difference between Upper Egypt governments. The present study finding revealed that there were increased in frequency of performing the technique of asking the patient to image any situation other than injection, avoiding the patient to look to the needle, applying manual pressure to the injection site for 10 seconds before injection, and asking the patient to move the muscle after injection, In Aswan University with significant difference between Upper Egypt governments also increased frequency of performing the technique of letting the skin dry after sterilizing the injection site with alcohol asking the patient to take deep breath, and warming up the medication.

According to (Macqueen *et al.*, 2012) ^[9] applying simple pressure to the site for 10 seconds before an intramuscular injection would reduce injection pain, this an approach suggested by anecdotal observation and the gate control theory. Pressure application, is effective practice, as it is a simple and cost effective method for pain reduction especially in intramuscular injection of benzathine Penicillin.

The most technique used in this study were; avoid the patient to look to the needle, inject the medication slowly and ask the patient to relax the muscle but they didn't, apply gel or cream, after injection and then ice the injection site

Kaux and Emonds (2018) ^[18] and others advocate introducing the needle into the site at 90° using a quick dart-like motion to minimize pain. Armington *et al.*, (2016) encourages the use of distraction techniques such as engaging the patient in conversation prior to the thrust of the needle whereas others Alexander, (2018) ^[19] advocate that a warning such as 'take a deep breath' should be given.

Considering distribution of Upper Egypt governments according to changing the needle after aspiration of medication and rotation of the site of injection results show that majority of nurses, in general, changed needle after aspiration of medication, but increased percentage of nurses who perform this step in Sohag university this result agreed with (Šakić *et al.*, 2012) ^[13] who concluded that Most nurses practitioners used two needle

As regard distribution of Upper Egypt governments according to most common injection sites were the dorsogluteal muscle used by nurses this findings is consistent with (Šakić *et al.*, 2012) ^[13] who mentioned that dorsogluteal site was the primary site for giving intramuscular injections, although it is not a desirable place for IM injection and also agree with Walsh & Brophy, (2011) ^[16] who stated that 99% of nurses use dorsogluteal muscle and also these results are consistent with other estimation studies of IM injection practices that confirm that dorsogluteal site, is also used significantly more than other sites.

In relation to distribution of Upper Egypt governments according to complications of intramuscular injection, there was increased incidence of infection and abscess complications in Aswan and Sohag University respectively this findings is in accordance with (Akbar *et al.*, 2014) ^[1] who reported that It is a large percentage of cases getting abscess after intramuscular injections furthermore, (Sambandam *et al.*, 2016) ^[14] added that although the procedure appears minor, IM injections need proper assessment of the patient, asepsis, and appropriate techniques are required to prevent the rare but dangerous complications.

Concerning relationships between injection sites most selected and nurses education and their years of experience; study findings show that, there were statistical difference between nurses' education and their years of experience and the most injection site selected this result was in the same line with those of (Ogston, 2014) ^[11] who mentioned that site selection may be based on familiarity and confidence rather than on "best practice". However, there is sufficient evidence that the ventro gluteal IM site is the preferred site whenever possible, and is an acceptable site for oily and irritating medications. The ventrogluteal site is free from blood vessels and nerves, and has the greatest thickness of muscle when compared to other site

The study showed that there were no statistical difference between nurses' education level and occurrence of IM injection complications but statistical significant difference was observed between their years of experience and occurrence of IM injection complications, there were

different causes other than nurse mistakes many factors might affect.

Conclusion

The research revealed a significant difference between Upper Egypt universities hospitals regarding safe and painless technique. Dorsoglutal muscle was the most site selected Infection and abscess were the most complication but most of nurses change the needle before injection.

Recommendations: The choice of site must be based on good clinical judgment and using an evidence based. Additional research on the safety and painless intramuscular injection covering all aspects including site and needle selection is needed.

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