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RESEARCH

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(Re)discussing the drug administration technique by the intramuscular route: a systematic review

(Re)discutindo a técnica de administração de medicamentos pela via intramuscular: revisão sistemática

(Re)discutir la técnica de administración de fármacos por vía intramuscular: revisión sistemática

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ABSTRACT

Objective: The study's purpose has been to identify the production of nursing knowledge related to the medication administration technique by the intramuscular route. It was also aimed to describe the differences, similarities, and occurrence of complications of the technique and to analyze the recommendations described in literature with best practice and clinical updates in the nursing research field. **Methods**: This is a systematic review without meta-analysis. The research was performed through the following electronic databases, LILACS, PUBMED, MEDLINE, DEDALUS, Health Evidence Portal and Libraries SciELO and Cochrane, during the period from 1993 to 2012, then totaling 16 studies. **Results**: The findings have shown the different variations in the limit of the ventrogluteal region, conducting antisepsis, and applying pressure before intramuscular administration. They also showed consonances in the aspiration of the contents of the syringe after insertion of needle into the muscle, caster application site during sequences IM injections, among others. **Conclusion**: The incorporation of best evidence allows safe execution of intramuscular technique, providing comfort and excellence towards the patient care.

Descriptors: Intramuscular injections, Drug administration routes, Bruises, Acute pain, Drug eruption.

RESUMO

Objetivo: Identificar a produção do conhecimento da enfermagem atrelado à técnica de administração de medicamentos pela via intramuscular; descrever as divergências, congruências e ocorrência de complicações acerca da técnica; e analisar as recomendações descritas na literatura com as melhores práticas e atualizações clínicas na enfermagem. **Método**: Revisão sistemática sem meta-análise. Realizada busca nas bases de dados LILACS, PUBMED, MEDLINE, DEDALUS, Portal de Evidência em Saúde e Bibliotecas SciELO e Cochrane, no período de 1993 a 2012, totalizando 16 estudos. **Resultados**: Os estudos evidenciaram divergências na variações de demarcação da região ventroglútea; realização de antissepsia; e aplicação de pressão antes da administração intramuscular. Consonâncias

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na aspiração do conteúdo da seringa após inserção da agulha na massa muscular, rodízio do local de aplicação durante sequências de injeções IM, dentre outros. **Conclusão**: A incorporação das melhores evidências permite a execução segura da técnica intramuscular, gerando conforto ao paciente e excelência na assistência.

Descritores: Injeções intramusculares, Vias de administração de medicamentos, Hematoma, Dor aguda, Erupção por droga.

RESUMEN

Objetivo: Identificar la producción del conocimiento en enfermería junto la técnica de administración de medicamentos por vía intramuscular, describa las diferencias, congruencias, y la ocurrencia de las complicaciones de la técnica y analizar las recomendaciones formuladas en la literatura con las mejores prácticas y las actualizaciones clínicas en enfermería. **Método**: Revisión sistemática sin meta-análisis. Búsqueda realizada en las bases de datos LILACS, PUBMED, MEDLINE, DEDALUS, Portal de Evidencia en Salud y Bibliotecas SciELO y Cochrane, en el período de 1993-2012, por un total de 16 estudios. **Resultados**: Estúdios mostraron diferencias en las variaciones en la demarcación de la región ventral glútea, la realización de la antisepsia y la aplicación de presión antes de la administración intramuscular. Consonancia en la aspiración del contenido de la jeringa después de la inserción de la aguja en el músculo, de ricino secuencias del sitio de aplicación para inyección IM, entre otras. **Conclusión**: La incorporación de la mejor evidencia permite la ejecución segura de la técnica intramuscular, proporcionando comodidad y la excelencia en la atención al paciente.

Descriptores: Inyecciones intramusculares, Vías de administración de medicamentos, Hematoma, Dolor agudo, Erupciones por medicamentos.

INTRODUCTION

In 1945, the use of the intramuscular (IM) route was used by highly trained physicians in order to avoid damages to the patients.[1] Later, the IM technique was delegated to nurses and today is developed in Brazil by professionals of the nursing team or sometimes to either laymen or practitioners without any scientific knowledge.[2]

Although it might be considered by many as a relatively simple procedure, professional practice and studies present reports of complications related to the application of medications through this route.[2]

When we study the IM injections some questions come up, such as questions related to the use of antiseptics, technologies used to minimize pain, possibilities of errors from the outdated technique. Such doubts should be clarified by ensuring a safe technique, which generates comfort and safeguards the integrity of the patient.

In order to deal with the emblematic discussions related to the IM technique, the goal of this study were, as follows: identifying of nursing knowledge related to the medication administration technique by the intramuscular route; describe the divergences, similarities, and occurrence of complications about the technique; and, analyzing the recommendations described in the literature with the best practices and clinical updates in the nursing research field.

METHODS

A systematic review study without meta-analysis, which addresses the initiatives of the Evidence-Based Practice (EBP) for having advocated the search for valid results of the associations between the manifestations presented by the patients and the diagnosis attributed.[3-4-5]

Nevertheless, the formulation of a clear question, the definition of the search strategy, the selection of the criteria for inclusion and exclusion of articles and, above all, a careful analysis of the quality of the selected literature6, allowed to synthesize the knowledge produced and separate the pertinent findings of those irrelevant to the question investigated in this study.[7] Given this context, previous systematic reviews contribute to answering questions about the best evidence, as well as performing a critical evaluation of its applicability to the clinical routine.[8]

The data were collected from January to June 2013, the research question was elaborated through the PICO (Patient/Problem, Intervention, Comparison, Outcomes) strategy considered as a fundamental element to construct the question and the search for evidence.[9]

In order to do so, the following question was made: Should medications (P), which include IM (I) injections, cause harm to patients such as hematoma, drug eruption and acute pain (O)? It was decided to omit the definition of C (Comparison) due to the absence of a specific element to define it.

Table 1 - Presentation of the descriptors related to the elements of the strategy named PICO.

ELEMENTS	DESCRIPTORS
P	Intramuscular injections
I	Drug administration routes
C	-
O	Hematoma and acute pain and drug eruption

Source - Descriptors in Health Science. *Biblioteca Virtual em Saúde*, 2013.

The use of the PICO strategy avoids the unnecessary searches, emphasizes the research objective and allows the increase of the retrieval of evidence in the databases where they occurred to search for the research.[9]

The review came from renowned sources and a great reference in the area of nursing fundamentals, dating back to 1993 as the starting point for this search, where we have the third reprint of the sixth edition of the "Manual of Nursing Techniques "By Professor Elvira De Felice e Souza, who is the fifth Brazilian work, first published in 1957, on the foundation line.[10] The five books[13-14,17-18-19] of nursing fundamentals with contents on the administration of medicines consulted in this research are available in the Anna Nery Nursing School. The virtual bases were: the *Biblioteca Virtual em Saúde (BVS)* in its electronic databases: *Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS)* [Latin American and Caribbean Literature in Health Sciences], PubMed (National Library of Medicine), Medline (Medical Literature Analysis and Retrieval System on-line), *DEDALUS* (Bibliographic Database from the *USP*), Health Evidence Portal and SciELO Libraries (Online Electronic Scientific Library) and Cochrane (Cochrane Database of Systematic Reviews).

Table 2 - Selection of the articles based on the descriptors' association.

Descriptors	Database/ Virtual libraries	Results	Selected data
Intramuscular injections	LILACS	228	21
	PUBMED	28,787	-
	MEDLINE	28,162	-
	DEDALUS	11	3
	SciELO	98	7
	PORTAL DE EVIDÊNCIA	758	9
	COCHRANE	3,621	-
Drug administration routes and acute pain	LILACS	0	-
	PUBMED	925	0
	MEDLINE	135	1
	DEDALUS	0	-
	SciELO	0	-
	PORTAL DE EVIDÊNCIA	11	0
	COCHRANE	13	0
Drug administration routes and hematoma	LILACS	1	0
	PUBMED	976	0
	MEDLINE	6	1
	DEDALUS	0	-
	SciELO	1	0
	PORTAL DE EVIDÊNCIA	1	0
	COCHRANE	0	-
Vias de administração de D Drug administration routes and drug eruption	LILACS	0	-
	PUBMED	2,067	-
	MEDLINE	13	0
	DEDALUS	0	-
	SciELO	0	-
	PORTAL DE EVIDÊNCIA	0	-
	COCHRANE	1	0
Intramuscular injections and drug administration routes	LILACS	3	1
	PUBMED	891	0
	MEDLINE	625	6
	DEDALUS	0	-
	SciELO	0	-
	PORTAL DE EVIDÊNCIA	8	0
	COCHRANE	83	0
Drug administration routes and intramuscular injections and acute pain	LILACS	0	-
	PUBMED	35	3
	MEDLINE	0	-
	DEDALUS	0	-
	SciELO	0	-
	PORTAL DE EVIDÊNCIA	0	-
	COCHRANE	0	-

Descriptors	Database/ Virtual libraries	Results	Selected data
Drug administration routes and intramuscular injections and hematoma	LILACS	0	-
	PUBMED	2	2
	MEDLINE	0	-
	DEDALUS	0	-
	SciELO	0	-
	PORTAL DE EVIDÊNCIA	0	-
	COCHRANE	0	-
Drug administration routes and intramuscular injections and drug eruption	LILACS	0	-
	PUBMED	118	8
	MEDLINE	0	-
	DEDALUS	0	-
	SciELO	0	-
	PORTAL DE EVIDÊNCIA	0	-
	COCHRANE	0	-

Source – Research performed in both the databases and the *Biblioteca Virtual em Saúde*, *Rio de Janeiro* State, 2013.

From the search of the databases and virtual libraries, a total of 62 selected articles were obtained, of which 32 were excluded because they did not allow their full acquisition by the Bibliographic Switching System (COMUT), generating limitations to the study. Therefore, the initial cut was 30 studies. It was verified the repetition of 5 articles in databases and libraries. They were excluded, then totalizing a sample of 25 studies.

The 25 selected articles were analyzed and categorized by two reviewers, researchers in the area of care fundamentals, as validated and already used in studies of the same follow-up, in which it identifies the article, study site, type of publication, methodology and evaluates methodological rigor.[11] After stratification, only 16 articles fully met the eligibility criteria.

The inclusion criteria included: descriptors present in the abstract, articles available in full with adherence to the subject studied. The exclusion criteria were: articles outside the time frame from 1993 to 2012 that did not comply with the topic.

RESULTS

For discussion and analysis we obtained 16 studies represented by the letter (S).

Table 3 - Synoptic chart of the sample.

Study (S)	Title/Author	Journals/ Year/ Databse	Study type	Goal	Results
S1	Subcutaneous or Intramuscular? Confronting a Parenteral Administration Dilema. (Prettyman,J.)	Medsurg Nursing (2005) (Medline)	Descriptive	Not informed	In IM injection it is more likely to reach blood vessels than subcutaneous (SC) injections. The choice of site of IM or SC injections is determined, in part, by the patient's muscle mass.
S2	Lokale bivirkninger ved parenteral administrasjon av legemidler. (Bjånes,T.K.)	Tidsskr Nor Legeforen (2011) (Pubmed)	Descriptive	Not informed	Knowledge of the IM technique reduces risks of adverse events.
S3	Administração de Medicamentos Injetáveis por via Intramuscular: Conhecimento dos Ocupacionais de Farmácias. (Rangel,S.M; Cassiani,S.H.B.)	Revista da Escola de Enfermagem da USP (2000) (Medline)	Survey	- Identifying and evaluating the level of knowledge of occupational pharmacy operating in establishments in *Ribeirão Preto-SP*.	Hand washing as the first activity prior to IM administration. Only knowledge of the deltoid and gluteal regions for IM admnidtration.

Study (S)	Title/Author	Journals/ Year/ Databse	Study type	Goal	Results
S4	An Experimental Study on the Use of Manual Pressure to Reduce Pain in Intramuscular Injections. (Chung,J.W.Y.; NG,W.M.Y.; Wong,T.K.S.)	Journal of Clinical Nursing (2002) (Portal de evidência)	Experimental study	- Determining whether applying manual pressure could reduce the pain associated with IM injections.	Performing manual pressure prior to IM administration showed a decrease in pain.
S5	Needle Temperature Effect on Pain Ratings After Injection. (Bartell,J.C. et al)	The Clinical Journal of Pain (2008) (Portal de evidência)	A double-blind randomized controlled study	- Determining if the administration of IM injections using cold needles would decrease the pain of the patients; - Checking if the use of cold needles has any effect on the immune response of vaccines.	The use of cold needles resulted in fewer bruises at the site of injection, but the incidence of pain and erythema was similar.
S6	Complicações Locais Pós-injeções Intramusculares em Adultos: Revisão Bibliográfica. (Cassiani,S. H.B.;Rangel, S.M.)	Revista da Faculdade de Medicina de Ribeirão Preto (1999) (Dedalus)	Descritive survey	- Verifying the studies the medical and nursing areas, which on the subject, complications after IM injections.	The most commonly reported adverse reaction was pain. The safest site for IM administration is the ventrogluteal region.
S7	Antissepsia na Administração de Injetáveis: Necessidade ou Ritualismo? (Ferreira,A.M., et al)	Revista Enfermagem UERJ (2009) (Lilacs)	Literature review	- Describing studies that involved the topic.	Each health service should establish its routine need for antisepsis.
S8	Aplicação de Medicamentos por Via Intramuscular: Análise do Conhecimento entre Profissionais de Enfermagem. (Godoy,S.; Nogueira,M.S.; Mendes,I.A.C.)	Revista da Escola de Enfermagem da USP (2004) (Lilacs)	Descritive quantitative	- Identifying which regions are most cited for the application of drugs by IM; - Identifying the method they use to delimit the four regions indicated for application of medicines by IM route; - Identifying knowledge about complications and contraindications for the use of regions used for application; - Checking if the region ventro-gluteal (VG) is used for this purpose.	Lack of professional knowledge of terminologies and complications from IM administration.
S9	Ensaio Clínico Randomizado para Avaliação de Dor e Hematoma em Administração de Medicamentos por Via Subcutânea e Intramuscular: há Necessidade de Troca de Agulhas? (Lamblet,L.C.R. et al)	Revista Latino-Americana de Enfermagem (2011) (Scielo)	Randomized clinical assay	- Comparing pain intensity through numerical scale with IM and SC injection with retractable fixed needle syringe and needle exchange technique; - Comparing for hematoma formation after administration of subcutaneous insulin injection with retractable fixed needle syringes and conventional technique.	It is recommended to use a retractable fixed needle in the application of IM and subcutaneous injections.
S10	Avaliação dos efeitos Inerentes à Administração Intramuscular de Vacina nas Regiões Deltóideo e Vasto lateral em Crianças. (Felipe,A.O.B., et al)	Pediatria (São Paulo) (2011) (Lilacs)	Descritive, observational and quantitative	- Detecting the local effects inherent to the administration of IM vaccine in the muscles deltoid and vastus lateralis; - Describing the association between the appearance of the effects and the administration technique IM performed.	In the standardized technique, local effects predominated in the region and in the non-standardized region were in the vastus lateralis region.

Study (S)	Title/Author	Journals/ Year/ Databse	Study type	Goal	Results
S11	Eventos adversos Pós-vacina Dupla Adulto em Trabalhadores da Construção Civil. (Ferreira,A.M., et al)	Revista Enfermagem UERJ (2010) (Lilacs)	Prospective observational study with quantitative analysis	- Assessing the occurrence of adverse events on the site of application of the double adult vaccine without the of prior antisepsis.	There were no local post-vaccination adverse events.
S12	Proposta de um Modelo de Delimitação Geométrica para a Injeção Ventroglútea. (Meneses,A.S.; Marques I.R.)	Revista Brasileira de Enfermagem (2007) (Scielo)	Quasi-experimental study design and being of the type non-equivalent control group	- Presenting the geometric delimitation technique for the application of IM injection in the region VG; - Comparing the precision of the traditional IM injection technique in the VG region with the geometric delimitation technique.	The geometric model is the most adequate way to delimit the area of the VG region.
S13	Lesão do Nervo Axilar Causada pela Injeção Intramuscular no Deltóide: Relato de Caso. (Meirelles H.; Filho,G.R.M.)	Revista Brasileira de Ortopedia (2004) (Lilacs)	Case study	- Demonstrating how a simple IM drug application in the deltoid can lead to an injury that compromises upper limb function due to axillary nerve paralisy.	The IM injection in the deltoid can bring complications, not being the site of first choice.
S14	Distribuição do Nervo Cutâneo Lateral da Coxa na Área de Injeção Intramuscular. (Rocha,R.P., et al)	Revista Associação Médica Brasileira (2002) (Lilacs)	Descritive	- Studying the location, distribution, route and relationship of the lateral cutaneous nerve of the thigh with the recommended area for the practice of IM administration, relating them to pain.	In the lower portion of the middle third of the thigh lower third, no significant nerve branches are visualized.
S15	A New Method to Reduce Pin-prick Pain of Intra- muscular and Subcutaneous Injections. (Romanò,C.L.; Cecca,E.)	Minerva Anestesiolo-gica (2005) (Portal de evidência)	Experimental	- Describing a new and simple method that uses a non-painful way, through a tactile simulation at the injection site, reducing pain related to the needlestick in IM and SC injections.	Multi-pin pressure during an IM or SC injection reduces pain.
S16	Does Drawing up Technique Influence Patients' Perception of Pain at the Injection Site? (Rock,D.)	Australian and New Zealand Journal of Mental Health Nursing (2000) (Portal de evidência)	Experimental	Not informed	The volume administered is the main component of pain classification in the IM technique.

Note: The titles and journals' names were kept as in their original language.

In order to support the clinical diagnosis decisions, interventions and results, it is necessary to seek for evidences. **Figure 1** classifies the studies with regards to the evidence's recommended strength.

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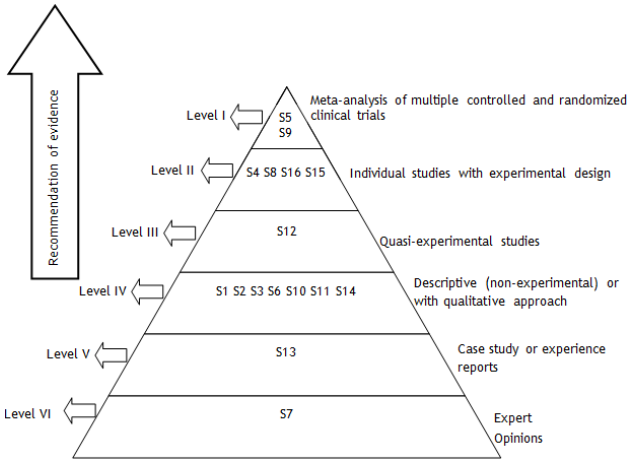
Figure 1 - Classification with regards to the evidence's recommended strength.[5]



DISCUSSION

Differences were observed between the analyzed articles and the foundation books[13-14,17-18-19] in relation to the definition of needle sizes and calibers, variation in the way of delimiting the ventrogluteal region, antisepsis before IM administration and application time pressure prior to IM administration.

The consonants found are related with the knowledge and definition of the anatomical frameworks by the nursing professionals, volume to be administered, caliber and angulation of the needles, rotation, aspiration of the syringe contents after insertion of the needle into the muscle mass, formation of abscess and hematoma, and application of pressure after the execution of the technique in screen.

Differences

Size and caliber of the needle

In order to perform the IM technique, the needles used must have a size and size of 25 X 8,0.[12] Nevertheless, it has been verified that the needle sizes vary from 19 to 25 mm, with from 2.5 to 7.5 cm in length.[13]

Sites used

During the administration of medications in the ventrogluteal region, angulation of 90°[13-14] should be used, however, it was verified that the insertion of the needle could be at any angle allowing risks for an iatrogenic event due to puncture site distortion, this delimitation does not always keep proportional relations between the hand of the person applying the injection and the size of the patient's hip.[15]

Local antisepsis

A controversial and widely discussed clipping within a single study,[16] in which it recommends to each health service to establish its routine concerning the need or not of antisepsis of the skin prior to the administration of medications.

This fact differs from that recommended in the foundation books,[13-14,17-18-19] which in their totality indicates the performance of antisepsis.

Pressure use

Compression at the puncture site where IM administration occurred with dry cotton is required to provide hemostasis.[12,19]

Time pressure application

When using manual pressure for 10 seconds prior to injection, a significant reduction in pain intensity was observed.[18]

Nonetheless, the literature that grounds the IM administration technique recommends in-situ compression after application of the drug to provide hemostasis and better absorption of the drug. Presenting disagreement with one of the fundamentals books,[19] because the indicated pressure is before the application of the medications to minimize the pain.

Similarities

Anatomical frames

The nurse must know the anatomical landmarks and the location of the nerves and blood vessels in order to avoid complications at the injection sites.[13-14,17-18-19-20-21-22-23]

Therefore, it is imperative that practitioners become aware of the correct forms and locations for IM drug applications, being assured of the recommended amount of milliliters to be administered to avoid complications and provide comfort to the patient.

Volume to be administered, caliber and angulation of the needles

Higher injection volumes (2 to 5 ml) can be administered via the IM route and larger caliber needles are used when the drug solution is very thick, the longer being used in medium-sized adult clients.[13,21]

During administration of IM medication the correct angulation is 90°, if this angle is not respected, complications may occur at the site of application.[12-13-14,17-18-19-23]

Locations used

For the administration of IM medications in the anterolateral thigh region, it is necessary to use the lower portion of the middle third of the thigh because it is a less innervated region.[13-14,24]

It should be noted that this area is classically chosen because it does not have anatomical structures that can be injured during the procedure.

The ventrogluteal region was mentioned as being the safest for administration of IM medications.[13-14-15] Nevertheless, we have observed in practice that many practitioners did not advocate this region.

It is possible to verify the routine use of the deltoid muscle for IM injections, but this site should be the last selection site for injections.[13-14,25-26]

Site caster

When administering the IM injections it is necessary to perform the rotation of the application site during injection sequences.[12,14]

Due to the consonance presented above, it is relevant that health professionals perform the rotation in order to avoid complications arising from successive IM administrations in the same place.

Drug aspiration

The authors[13-14,17,19,27] mentioned the importance of aspiration of the syringe contents after insertion of the needle into the muscle mass to assess possible injury to the blood vessel.

The consonance presented above reinforces that it is indispensable to carry out the traction of the plunger before injecting the drug in order to check the injury of some blood vessel.

Complications

The only consonance observed in relation to complications was the formation of abscess and hematomas, as one of the possible complications of the IM technique.[18,21]

To avoid the formation of bruises, nurses should apply pressure at the injection site after administration of drugs.[19,21]

To avoid complications, it is necessary to perform hand washing, selection and classification of the best injection site and correct volume to be injected.[14,17,18-19,21,28]

A complication cited after performing the IM technique was muscle fibrosis followed by muscle contraction due to technical failure, which included not plucking the plunger before injecting the medication, failure in antisepsis and the irritant properties of the drugs.[25]

Because it is a transcutaneous method, the introduction of IM medications requires care, given that the type of medication can be irritating; the dose incompatible with the muscular structure of the place of introduction of the medicinal product; the age of the patient; the caliber and length of the needle. The choice of the application site should prioritize the one where there is a lower risk of complications.

Points under discussion in scientific articles and not reported in books

One of the adverse reactions observed after the MI technique is a pain at the site of injection that can be reduced by pretreatment with local anesthetic cream.[29] The foundation books[13-14,17-18-19] do not mention this method, which aims to even more patient comfort.

The use of cold needles was also treated in IM administration by promoting a reduction of bruising at the injection site.[29] Experimental studies are required to either confirm or refute this preposition.

The replacement of the needle aspiration of the drug with another for IM administration is justified by muscle tissue irritation, changes in needle bevel edging and consequent increase in the patient's sensation of pain, and also the risk of contamination of the aspiration needle by the health professional during their manipulation.[30-31]

During the administration of IM injections a plastic device is used, with oval with multiple pins and small hole in the center, it is placed on the skin of the patient at the injection site by applying a force, the needle is inserted in the center of the device until it reaches the patient's skin, allowing pain reduction.[32]

The foundation books[13-14, 17-18-19] do not demonstrate the use of technologies as observed in the above study. It becomes relevant to carry out additional studies to find evidence applicable to the use of this device.

Points under discussion in the fundamentals books and not addressed in the analyzed articles

The application of hot compresses before and/or after the application of the medications, aiming to minimize the pain, and keep the syringe stopped while the needle is inserted in the tissue to avoid tissue injury.[17]

The use of procedure gloves, because if the blood goes out of the injection site the professional will be protected from contact with the blood of the client.[13-14]

Therefore, the EBP contributes by encouraging the formation of research groups focused on the search for the best evidence and encourages teachers to propagate to students to search beyond the foundation books by searching for articles in the most accessed databases.

CONCLUSIONS

Based on the evidences presented, in order to obtain the safe and correct form during the IM technique it becomes necessary to adopt the following approach: hand hygiene; correct use of needles according to customers' muscle mass in 90 degree angulation; knowledge of anatomical landmarks; skin antisepsis; traction of the plunger before injecting the medicament; consider the volume administered according to the patient's age and site of application; caster embracing when medications are used frequently; application of manual pressure after IM administration to cause hemostasis and prior to injection to decrease pain; prioritize the ventrogluteal region; use of retractable fixed needle; deltoid as the site of last choice; use of technologies aimng to minimize pain.

When we administer drugs through the IM route, we are breaking the first barrier of protection, which is the skin. Hence, it is necessary to use the correct technique based on the best evidence to minimize the appearance of adverse effects due to inadequate IM technique.

The EBP is a fundamental and relevant methodological approach in the search for subsidies for the clinical practice of nurses, being the essential tool in the conduct of scientific investigations.

Therefore, it is important to elucidate an important gap in the production of knowledge in the existence of experimental and controlled studies, characterized as strong evidence, mainly led by the nursing professionals. Nonetheless, it is considered that future clinical and multicenter research will contribute consubstantially to incorporating the best and effective evidence for daily decision-making process.

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