

Process of prepare and administration of medications subcutaneously: knowledge of nursing team

Preparo e administração de medicamentos por via subcutânea: os saberes da equipe de enfermagem

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ABSTRACT

Objectives: to analyze the knowledge of the nursing team about the process of preparation and administration of medications subcutaneously and to relate them to good practices and scientific evidence. **Method:** descriptive, exploratory cross-sectional study. A questionnaire containing general and specific questions about subcutaneous administration was applied to 70 nursing professionals from a University Hospital of Rio de Janeiro. **Results:** Significant results indicated that professionals report measures to prevent infections, such as hand hygiene before and after the procedure (n = 65; 92.8%), tray and vial disinfection (n = 64; 91.4%) and do not perform site rubbing after administration (n = 49; 70%). **Conclusion:** The majority of nursing professionals have corrected knowledge about the preparation and administration of the drugs subcutaneously, showing adherence to good practices and scientific evidence.

Keywords: Injections, Subcutaneous; Drug Administration Routes; Nursing Care

RESUMO

Objetivos: analisar o conhecimento da equipe de enfermagem sobre o processo de preparo e administração de medicamentos por via subcutânea e relacioná-los às boas práticas e evidências científicas. **Método:** estudo descritivo, exploratório de tipologia transversal. Foi aplicado um questionário contendo questões gerais e específicas sobre administração subcutânea a 70 profissionais de enfermagem de um Hospital Universitário do Rio de Janeiro. **Resultados:** Os destaques significativos apontaram que os profissionais informam realizar medidas para prevenção de infecções, tais como higienização das mãos antes e, após o procedimento (n=65; 92,8%), desinfecção da bandeja e do frasco-ampola (n=64; 91,4%); informam não realizar a aspiração do êmbolo antes da administração do medicamento (n=34; 48,6%) e não realizam a fricção do local após administração (n=49; 70%). **Conclusão:** Os profissionais de enfermagem, em sua maioria, possuem conhecimento correto sobre o preparo e administração dos medicamentos por via subcutânea, apresentando aderência com as boas práticas e evidências científicas.

Palavras-chave: Injeções Subcutâneas; Vias de Administração de Medicamentos; Cuidados de Enfermagem.

NOTA

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INTRODUCTION

The drug therapy consists of a multidisciplinary process that starts from the prescription of the drug, followed by the dispensation, preparation, administration of the therapy and monitoring, also known as stages of the medication system, which correspond to a great part of the procedures performed during the daily life in the nursing care⁽¹⁾.

All professionals involved in the medication system have the responsibility of working to provide safe drug therapy and minimize harm to the patient, based on scientific recommendations and evidence. When dealing with the medication system, the nursing team acts directly performing the preparation, administration of medications and monitoring⁽¹⁾.

The process of drug administration is attributed to the stage of greater occurrence of errors, however, the risks can occur in different stages^(1,2). A notification report from the United States Pharmacopeia (USP) stated that one of the most frequent errors that caused harm to or harm to patients was that of the route of administration. Therefore, it is of great relevance that when verifying the route that the drug should be administered, the professional should pay attention to the particularities of the same⁽³⁾.

The need to address the process of preparation and administration of subcutaneous drugs is a commonly performed intervention in the hospital setting and be used to perform drugs with a high potential for the occurrence of adverse events, as in the case of heparins and insulins classified as High Surveillance Medicines (HSM).

The term MAV refers to drugs that have a greater potential to cause serious and even fatal harm when an error occurs in the course of its use⁽⁴⁾. Adverse events related to the use of these drugs, such as hypoglycemia and hemorrhage, bring the need for a closer look and the adoption of safe practices during drug therapy, especially regarding the processes of prescription, preparation and administration of such drugs.

Subcutaneous administration of drugs consists of insertion of the fluid into the loose connective tissue under the dermis and is chosen with the objective of slow drug absorption, since this tissue has lower blood flow compared to the intramuscular route. It is considered as effective as intravenous administration, as the drug reaches the bloodstream, even more slowly, and can reach its site of action. It has the advantage of not having a first-pass hepatic effect, which maintains its bioavailability, and is less invasive. In addition, it is a safe, economical and simpler route⁽⁵⁾.

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METHOD

This is a descriptive exploratory cross-sectional study; whose research scenarios were clinical and surgical hospitalization units of a university hospital located in the city of Rio de Janeiro.

For the data collection, a questionnaire was developed composed of two sections: professional characterization of the researched population; and technique of preparation and administration of medicaments by subcutaneous route. The instrument was submitted to the evaluation of 9 reviewers: 2 doctors and 1 master's in nursing with specialty in the area of interest, 3 nurses, 1 doctorate and 3 masters.

The Cronbach's Alpha test ($\alpha = 0.87$) was shown to be consistent in the correlation between the items of the instrument.

Of the universe of 419 nursing professionals, 174 were distant in the period of the research for labor licenses and vacations, remaining 245 professionals able to participate in the research. For the sample calculation, we used the formula $n = N \cdot Z^2 \cdot p \cdot (1-p) / Z^2 \cdot p \cdot (1-p) + e^2 \cdot N - 1$ (n: calculated sample, N: population, Z: normal variable, p: real probability of the event, and: sample error), with sampling error (E) of 10% and confidence level of 95%, obtaining the casuistic = 70.

The selection of the participants was based on the non-probabilistic, consecutive sampling process, composed of individuals that were accessible in a period and that met the entry criteria (minimum 6 months of activity in the institution).

The instrument was applied in the period between March and September 2016, and thirty (30) minutes were available to the participants to fill in adequate physical space, after the application of the Informed Consent Term.

For the data analysis, the Excel® 2007 program was used, in which the results were submitted to a descriptive statistical analysis. To test the normality of the distribution of variables, the Kolmogorov-Smirnov test was performed with significance level > 0.05 (p-value = 0.117),

This study is integrated with the Research Project titled: "Good practices applied to patient safety: A study on drug administration". Approved by two Research Ethics Committees, Anna Nery Nursing School and the Federal University of Rio de Janeiro under the no. 336,436

- CAAE no. 17589513.0.0000.5238, and because it is a study with human beings, it is in National Health Council (CNS) Resolution 466/2012.

RESULTS

Academic and professional characterization of participants

Of the 70 participants, 42 (60%) are technicians or nursing assistants and 28 (40%) are nurses. Regarding the time of professional activity, 34 (48.6%) work for a period of more than 10 years, and 31 (44.3%) of professionals are trained for a period of more than 10 years. Thirty-four (48.6%) of the participants have more than one employment relationship.

Subcutaneous drug preparation and administration technique in the light of safe practices

In this section, the main measures to minimize damage related to infection incidence, such as: hand hygiene, disinfection of the procedure tray and the ampoule vial to be used, are described, as described in Table 1.

In the actions for the preparation of medications, 65 (92.8%) participants reported performing hand hygiene before and after the procedure, 64 (91.4%) reported performing both the disinfection of the procedure tray and the ampoule vial.

Other measures are used to contribute to drug safety. The use of labels for identification was reported by 64 (91.4%) of the participants, who include data such as

TABLE 1 – Distribution of nursing professionals' responses related to care during the preparation and administration of medications by the subcutaneous route. Rio de Janeiro, RJ - Brazil. 2016.

Care related to the preparation and administration of medications subcutaneously	Absolute frequency (Fa) (n=70)	Relative frequency (Fi) (100%)
Accomplishment of measures to minimize damages related to the incidence of infection		
Hygiene of hands before and after procedures		
Yes	65	92,8
No	05	7,2
Disinfection of the tray		
Yes	64	91,4
No	06	8,6
Disinfection of the ampoule bottle		
Yes	64	91,4
No	06	8,6
Care taken before and after subcutaneous administration		
Identification of labeled medicines		
Yes	64	91,4
No	02	2,9
Uninformed	04	5,7
Realização de antissepsia da pele		
Yes	65	92,8
No	01	1,5
Uninformed	04	5,7
Solutions used for antiseptis (n = 65)		
Alcohol 70%	39	60
Chlorhexidine alcohol	26	40
Carrying out at places of application		
Yes	60	85,7
No	02	2,9
Uninformed	08	11,4
Use of the same needle for preparation / administration of the drug		
Yes	09	12,9
No	52	74,2
Uninformed	09	12,9
Aspiration of the plunger before administration		
Yes	28	40
No	34	48,6
Uninformed	08	11,4
Friction of site after administration		
Yes	09	12,8
No	49	70
Uninformed	12	17,2
Criterion used to select needle length and application angle		
Weight	30	42,8
Standardized	27	38,6
Others	13	18,6

Source: Produced by the authors, Rio de Janeiro 2016.



patient name, location (ward and bed) and time the drug should be administered and are fixed in the wrappers and / or ampoules / fracs of the medicinal products.

Regarding the technique and care during administration of the drug subcutaneously, 65 (92.8%) reported performing antisepsis of the skin at the site to be administered, of these, 39 (60%) use 70% alcohol as an antiseptic agent. About the concept of application rotation, 60 (85.7%) of the participants have the understanding about this practice, as presented in Table 1.

Of the 70 participants, 30 (43%) believe that the patient's weight is the criterion of choice of needle size and its insertion angle, 27 (38.6%) believe that the choice follows size and standard angle, regardless of the characteristics of the devices and the patient, and 13 (18.6%) believe they have other criteria, such as age. Regarding the exchange of the needle for preparation and administration of the drug, 52 (74.2%) use different needles for the two moments.

Regarding care during and after the administration of subcutaneous medications, 34 (48.6%) participants report not performing aspiration of the plunger before administering the drug and 49 (70%) participants do not carry out the rubbing of the site after administration the same.

DISCUSSION

The medication process is prone to occurrence of incidents, leading the patient to stay longer in the hospital environment, which means greater exposure to the risk of errors and increased health care costs. The World Health Organization (WHO) says that the costs of medication errors are around USD 42 billion a year, and these errors are avoidable. Nurses must act in a safe manner, mainly in the preparation and administration processes for which they are responsible for monitoring in order to promote patient safety⁽⁶⁾.

It was evidenced that most of the participants exercised the professions of technician and auxiliary of nursing. The professionals trained for more than 10 years corresponded to 44.2%, and 48.5% of the total participants practiced for a period of more than 10 years. In addition, 48.5% of the participants had a double employment relationship. Such characteristics may give practitioners more practical experience, especially about tacit knowledge. Nevertheless, it is necessary that such professionals be encouraged to update and expand their knowledge, since the technological advances and the incorporation of new scientific evidence in the health area, occur rapidly and in a continuous way, fomenting the importance of meeting the norms and current recommendations, thus contributing to quality and safety of care⁽⁷⁾.

Safe care has been addressed as one of the world's major concerns. In 2017, the global challenge for patient

safety has raised the challenge of safe drug-related care, which has been central to the issue of patient safety, primarily because of the high potential for risk, severity and recurrence of harm to the patient. Since the nursing team is an important role in the preparation and administration of medications, it is necessary to constantly train professionals to carry out these practices and that they are based on scientific evidence⁽¹⁾.

The preparation of the medicament refers to the manipulation of the medicament, according to its prescription and dispensation. It involves prior knowledge about the drug (pharmacokinetics, pharmacodynamics, possible drug interactions, among others), conferring on what was prescribed with what will be prepared, performing dilution calculations where necessary, and identifying and choosing appropriate devices and equipment for administration, as well as the need for the ability to handle them⁽¹⁾.

It is important to emphasize the use of measures that reduce the possibility of contamination or reduce the microbiological load of the materials used in the preparation of medicines. Thus, it is recommended to carry out the technique in an aseptic manner, aiming to prevent the occurrence of Infections Related to Health Care - IRAS⁽¹⁾. From the recommendations pointed out in the study, 64 (91.4%) participants reported disinfecting the tray and vial used to prepare the medicine.

Graziano and collaborators⁽⁸⁾ conducted an experimental, randomized, univariate study that evaluated the efficacy of alcohol use at 70% for the disinfection of contaminated surfaces, concluding that this solution can be used as a disinfectant agent with or without previous surface cleaning, which ensures greater agility in performing the procedure and refutes the claims that 70% alcohol would be inactivated by organic matter or that it has the properties of fixing organic matter on the surfaces where it is applied.

Regarding hand hygiene before and after the procedure, 65 (92.8%) of the professionals performed it as recommended in the literature. Hand hygiene is an important measure for the prevention of infections. The WHO recommends its accomplishment in five moments: before the contact with the patient, before the aseptic procedure, after risk of exposure to body fluids, after contact with the patient and after contact with areas close to the patient. It is also recommended that the sanitizing be carried out in a step-by-step manner and that in practice friction is carried out. Water and soap may be used for washing, or alcoholic preparation in antiseptic gel. The use of soap and water is recommended when hands are visibly soiled⁽⁹⁾.

In order to ensure safety when preparing and administering the medicinal products. Sixty-four (91.4%) participants refer to using identification labels as strategy.

It is recommended to use prepared identification labels containing information such as the patient's name, medicine, dose and route of administration. In addition, it is recommended that the drug be prepared and administered by the same professional, and that the practice of double-checking or checking⁽¹⁾.

After preparation of the medicaments, the procedure is followed. Some measures such as the check of 9 items that must be correct: patient, medication, route, dose, schedules, registration, medication compatibility, patient orientation and drug refusal right; can be used in this step to prevent errors and ensure patient safety⁽⁵⁾.

From the precautions before administration, one must choose the place where the drug will be administered and for this it is important to take into account the location of the last application. The participants in the studies were questioned about the rotation of application, where 59 (84.4%) correctly answered what the rotation meant and emphasized their need for each administration.

Kalra and collaborators⁽¹⁰⁾ say that the lateral region of the arm and thighs and the periumbilical region are the places commonly used to administer drugs subcutaneously, by the easy access to the loose connective tissue. The importance of site selection is emphasized, as it may interfere with the rate of absorption, which occurs more rapidly in the abdomen and is slower in the arms, thighs, hip areas and buttocks, respectively.

The arms are the most favorable place of administration, since this region has less blood vessels, reducing the pain sensation and bringing less discomfort to the patient when compared to other areas. The abdomen is probably the most used site due to the presence of the thicker subcutaneous layer. Although these sites are the preferred ones, it is recommended to perform the rotation of application and use of short and sharp needles in order to prevent the occurrence of lipohypertrophy, tissue irritation and pain, caused mainly by trauma caused by the needle during administration and performance of the technique improperly^(10,11). The application rotation can be performed by changing the laterality or the recommended location for each application.

Skin antisepsis also contributes to safety in the drug delivery process. It is recommended that the skin be prepared prior to administration and that the chosen area be cleaned in order to minimize the risk of infections. A study by Sexson and collaborators⁽¹²⁾ points out that using soap and water to clean the room is only necessary if it is visibly dirty. If the skin is clean, there is no need for antisepsis of the skin with alcohol, but since it is a common practice, it is recommended that friction be performed in the region with 70% alcohol. It is necessary that the region is dry before administration to ensure adequate inactivation of the bacteria present on the surface of that skin⁽¹²⁾.

The study participants were asked about the criteria used to choose the size of the needle and the insertion angle to be used. There was a discrepancy between the answers, 42.8% chose the needle for the patient's weight, 38.6% used a standardized needle size and 18.6% used other criteria, showing nonconformity in the application of needle selection professionals.

The correct choice of the needle to be used and its angulation are important factors for the prevention of adverse events, since it is necessary that the drug reaches the subcutaneous tissue for effectiveness of the drug action. The recommended angle for insertion of the needle along this path is 90 ° in view of the amount of subcutaneous tissue and the length of the needle, and variations from 45 ° to 90 ° may occur^(12,13).

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Regarding the exchange of the needle for the preparation and administration of the drugs, it was evidenced in the present study that 74.2% of the participants used different needles for both occasions, however a Brazilian experimental study⁽¹⁴⁾ refutes this practice. Pereira and collaborators⁽¹⁴⁾ conducted an experimental research in two moments (ultrastructural analysis of needles and double-blind trial to assess the perception of discomfort in subcutaneous therapy) and concluded that the use of the emerging technique - which provides for the use of the same needle for both the preparation/aspiration and the administration of drugs - over conventional technique (which advocates the exchange of needles between the preparation steps and the can be standardized because it has a lower cost with the purchase of spare needles, reduced manipulation of the syringe and possible reduction of the risk of drug contamination; reduction of the sharps generated and simplification of the technique.

In addition, it was found that the use of smaller gauge needles (0.25 x 6 mm and 0.25 x 8 mm) had less structural alteration at the moment of insertion of the needle into the vial and the perception of patient discomfort in the act of insertion into the skin is less⁽¹⁴⁾. Therefore, the proper choice of needle length is an important contributory factor for the safety of the path chosen⁽¹¹⁾.

It is further recommended that the subcutaneous tissue be pooled to form a fold, in order to favor administration into the target tissue⁽¹¹⁾, which should be released only when the needle is removed. The needle should be withdrawn 10 seconds after the end of administration to minimize the chances of leakage of the administered

content⁽¹³⁾. Thus, the length of the needle and the angle taken to proceed with administration are determined by the amount of subcutaneous tissue of the chosen site.

Of the study participants, 34 (48.6%) reported not performing aspiration of the plunger prior to fluid delivery. A study by Hovelmann and collaborators⁽¹¹⁾, in 2017, rule out the need to retract the plunger from the syringe prior to administering the drug to ensure that the needle is not in a vessel, this is because the subcutaneous tissue is poorly vascularized and a blood vessel is unlikely to be punctured.

Most of the participants, 49 (70%), reported not to carry out the friction of the place where the drug was administered, which corroborates with what the literature recommends. It is evidenced that this area should not be massaged later, as it may cause tissue injury in the case of heparin and alter the absorption time in the case of insulin, medicines commonly administered subcutaneously⁽¹¹⁾.

CONCLUSION

The nursing team actively participates in the stages of drug preparation and administration. The medication process is considered one of the activities that most require of the nurse and other team members during their work day and is prone to errors and damages to the patient, which may lead to an increase in the hospital

environment and related costs to health care. In this way, it is up to the nursing to act in a safe manner and based on scientific evidence, in order to ensure patient safety and mitigate errors.

There is evidence of the positive performance of the research participants in the preparation of subcutaneously administered drugs, with emphasis on the prevention of infections, such as: hygiene of the hands before and after the procedure, disinfection of the tray and ampoule vial, and not performing massage in the application area after administration. In contrast, the study demonstrated that the scientific evidence associated with needle size, angle of application, needle exchange for preparation and administration, and aspiration of the plunger prior to drug administration were dissonant.

From the analysis of the results, it can be observed that the professionals have knowledge about the process of preparation and administration of the subcutaneous drugs, having satisfactory results, when compared to the recommendations of the evidence. We recommend conducting future research on observational methodology related to the preparation and administration of medications subcutaneously in order to verify if the practice of care corroborates with the knowledge of the nursing professionals presented in this study.

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