








NURSING TEAM CARE ACTIONS FOR SAFE PERIPHERAL INTRAVENOUS PUNCTURE IN HOSPITALIZED ELDERLY PEOPLE

CUIDADOS DA EQUIPE DE ENFERMAGEM NA PUNÇÃO INTRAVENOSA PERIFÉRICA SEGURA EM IDOSOS HOSPITALIZADOS

CUIDADOS DE ENFERMERÍA EN LA CANALIZACIÓN DE LA VÍA VENOSA PERIFÉRICA SEGURA EN ANCIANOS HOSPITALIZADOS

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ABSTRACT

Objective: to describe the nursing team care actions for safe peripheral intravenous puncture in hospitalized elderly people. **Method:** qualitative research conducted in a general public hospital in the inland of Bahia, in the year 2014. Semi-structured interviews were conducted with nine nursing professionals from the medical clinic, based on a previously prepared script. The interviews were analyzed using the content analysis method. **Results:** the following analytical categories emerged: 1. Consideration about the aging process; 2. Clinical condition and preparation of the elderly person for peripheral venous access; 3. Selecting the site for peripheral venous access; 4. Selecting the intravascular device. **Conclusion:** safe peripheral intravenous puncture is related to prior assessment of the clinical conditions of the elderly person, site selection and selecting an intravascular device. The care actions provided by the professionals are not systematized or standardized, which may contribute to the occurrence of adverse events.

Keywords: Nursing Care; Patient Safety; Aged; Catheterization, Peripheral.

RESUMO

Objetivo: descrever os cuidados da equipe de Enfermagem na punção intravenosa periférica segura em idosos hospitalizados. **Método:** pesquisa qualitativa conduzida em um hospital geral público no interior da Bahia no ano de 2014. Realizaram-se entrevistas semiestruturadas com nove profissionais de Enfermagem da clínica médica, a partir de roteiro previamente elaborado. As entrevistas foram analisadas utilizando-se o método da análise de conteúdo. **Resultados:** emergiram as categorias analíticas: 1. Consideração sobre o processo de envelhecimento; 2. Condição clínica e o preparo da pessoa idosa para o acesso venoso periférico; 3. Seleção do local para o acesso venoso periférico; 4. Escolha do dispositivo intravascular. **Conclusão:** a punção intravenosa periférica segura está relacionada à avaliação prévia das condições clínicas do idoso, seleção do local e escolha do dispositivo intravascular. Os cuidados realizados pelos profissionais não são sistematizados ou padronizados, o que pode contribuir para a ocorrência de eventos adversos.

Palavras-chave: Cuidados de Enfermagem; Segurança do Paciente; Idoso; Cateterismo Periférico.

RESUMEN

Objetivo: describir los cuidados de enfermería en la canalización de vía venosa periférica segura en ancianos hospitalizados. **Método:** investigación cualitativa llevada a cabo en 2014 en un hospital general público del interior de Bahía. Se entrevistaron a nueve profesionales de enfermería de clínica médica siguiendo un cuestionario semiestructurado. Las entrevistas se analizaron según el método del análisis de contenido. **Resultados:** se definieron las siguientes categorías analíticas: 1. Consideraciones sobre el proceso de envejecimiento; 2. Condición clínica y preparación del anciano para la canalización de vía venosa periférica 3. Selección del sitio de

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acceso venoso periférico; 4. Selección del dispositivo intravascular. **Conclusión:** la canalización de vía venosa periférica segura depende de una evaluación preliminar de las condiciones clínicas del anciano, de la selección del sitio de inserción del cateter y de la selección del dispositivo intravascular. Las prácticas asistenciales de los profesionales no están sistematizadas ni tampoco estandarizadas, lo cual puede contribuir a que ocurran eventos adversos.

Palabras clave: Atención de Enfermería; Seguridad del Paciente; Anciano; Cateterismo Periférico.

INTRODUCTION

Population aging has important repercussions, such as changes in the morbidity and mortality profile, with incidence of chronic non-transmittable diseases, which leads to an increasing demand for health services, an increase in elderly hospitalization and, consequently, the accomplishment of nursing care actions for this group.

Thus, it is important for the nursing team to know the peculiarities related to the elderly population, in order to provide safe care, especially regarding peripheral venous access (PVA), performed in more than 70% of the patients in hospital institutions.¹

In this context, the nursing team is closely related and responsible for practicing intravenous therapy (IVT),² since those are the professionals who perform most of the actions for preparing, executing and following-up the therapy, including peripheral intravenous puncture (PIP).

However, such practice requires important care actions, as it can lead to adverse events such as phlebitis, infiltration, extravasation and infections,³⁻⁵ even in elderly patients, as shown in a study that addressed the occurrence of phlebitis in PVA as one of the adverse events occurring in a geriatric hospital unit.⁶

Therefore, nursing professionals need to plan and monitor the PIP process and the maintenance of PVA in the elderly person to promote safe, injury-free care and to minimize complications that may come to occur during catheter insertion and use.⁷

In addition, the *Programa Nacional de Segurança do Paciente* (PNSP)⁸ aims, among others, to promote and support the implementation of initiatives aimed at the safety of health system users, to involve them and their families in these initiatives, to broaden society's access to information, and to systematize and disseminate knowledge on the subject.

Despite the several factors that exist in a complication related to PVA, such as the patient's clinical condition, advanced age, drugs in use, among others, there is also a relationship between nursing care actions and such complications, with the need for such care actions to be performed from evidences, using guidelines.⁹

Numerous studies^{9,10} signalize reduction in adverse events associated with PIP, based on an educational intervention with nursing professionals, followed by the implementation of bun-

dles – a concept disseminated by the Institute of Health Improvement to represent a set of measures based on combined and integrated scientific evidences that result in the best possible care,¹¹ considering the importance of these professionals in the proactive and preventive attitudes related to such procedure.

knowing the risk factors associated with PVA and the particularities of the care for the elderly in IVT, having skills for the individualized evaluation of the elderly, performing care actions with the puncture site and intravenous devices, such as following the appropriate puncture technique, carefully selecting the catheter to be inserted, performing an adequate fixation, and sanitizing your hands before manipulating the catheter are important measures, intended to avoid adverse events.¹²

In this context, the aging population and the demand for hospitals by elderly people justify this study, which imposes the following question: what care actions are to be considered by the nursing staff to perform a safe PIP in the hospitalized elderly person? In this way, the objective was to describe nursing team care actions in safe PIP in hospitalized elderly.

Thus, the nursing team protagonism in this procedure comprises from its execution, monitoring and removal, and the need to propitiate visibility to the theme and to investigate this team's knowledge for training.

MATERIAL AND METHOD

A descriptive and exploratory study, with a qualitative approach, performed at the Clinical Medical Unit of a large general public hospital in the inland of Bahia. The nursing team in this unit is composed of seven nurses and 29 nursing technicians and, in each period, two nurses are escalated and, on average, three nursing technicians are escalated. The unit has 40 beds distributed in 14 wards, where 37% were occupied by elderly people during data collect period.

Nursing professionals that met the inclusion criteria: working at least six months in the unit, directly assisting the inpatients, took part in the study. Professionals that were absent at the collect period, which occurred on January and February, 2014, were excluded.

Semi-structured individual interviews were carried out, which lasted, on average, 30 minutes, based on a script divided into two parts: the first part contained identification data and professional experience and the second part included guiding questions based on the care actions for planning and implementing PIP and for preventing adverse events. The interviews were performed in a reserved room in the hospital, recorded in audio and later on transcribed.

Theoretical data saturation was used as the criterion for completing the interviews, when the provided information would add little to the already obtained material.

Content analysis was used for analyzing the testimonies,¹³ through pre-analysis; material exploitation of result treatment; inference and interpretation. The findings were later confronted with the scientific evidences on the subject in the delineation of the three analytical categories.

The research complied with Resolution 466 of 2012, of *Conselho Nacional de Saúde* (CNS), and was approved by the Ethics Committee of *Escola de Enfermagem da Universidade Federal da Bahia*, by means of Opinion No. 417/266. Anonymity of the participants was guaranteed, replacing their names with the initial letter of the professional category (“*enfermeiro*” – E, “*técnico de enfermagem*” – TE).

RESULTS

The sample consisted of nine female gender nursing professionals (two nurses and seven nursing technicians) when theoretical data saturation was reached. Age varied between 25 and 49 years old and working time in the unit varied between six months and 16 years. All had studied a discipline on elderly people care in their training and six already had previous professional experiences in healthcare for the elderly.

Three thematic categories emerged after reading the testimonies: consideration about the aging process, clinical condition and preparing the elderly person for PVA; location selection for PVA; and selecting the intravascular device.

CONSIDERATION ABOUT THE AGING PROCESS, CLINICAL CONDITION AND PREPARING THE ELDERLY PERSON FOR PVA

The participants highlighted aspects related to the aging process and the clinical conditions of the elderly person, in order to obtain PVA.

We have to be careful with the skin, which is more sensitive. (E1)

There are elderly people with very sensitive skin. Even upon touching, when pressing the tourniquet, this causes such a hematoma. Turgence is already diminishing, and also elasticity. (TE4)

Another aspect which was noted was the peculiarity of the venous network on the elderly patient, related to the insertion of PVA.

[...] you must take into account that this is more difficult. [...] the skin is more hardened and the vein is more resistant. (TE1)

It is as if the veins disappeared, they become dehydrated. So sometimes we puncture in one site, but we do not find blood, we puncture another site, but no blood. Because the old man's veins run away. They are very malleable. (TE4)

In addition to paying attention to the anatomical and tegument's physiological aging and the venous network aging, participants considered the patient's clinical condition before obtaining the PVA.

I find it important to assess the elderly's condition, hydration and nutrition state. So, first we have to study the patient, see what he has to offer us. (E2)

I easily notice if the old person is hydrated, if the skin is integral. Then, we make local asepsis and try to observe this vein a lot. (TE4)

In relation to the existence of edema, anterior venous punctures and skin lesions in the elderly person at the time of planning a PVA, the interviewees reported:

We visualize the best site, if there are any injuries, skin lesion. Generally, the elderly here have many skin lesions from dryness [...]. We receive many elderly people from intensive care and sometimes they are already well-managed. (E1)

Before the puncture, if the patient has a limb with edema, weakened, with several previous perforations without success, I do not think it is feasible to go there and do the puncture again. (TE6)

It was also considered to accomplish the preparation of the elderly person to obtain the PVA, through dialogue and fear consideration.

We need to have more patience and also more affection. Do not squeeze too much, that sort of thing. Talk first because they get scared. Care is greater for being elderly, for having that kind of life that is already more suffered, for the many problems that they have been having. (TE1)

I think it is always good to talk with the patient! To humanize, to clarify them about the necessity for such procedure, because it is always an invasive, painful thing. So, this aspect too, regarding the issue of preparing the elderly. Explain the need for the procedure and its importance. (E2)

SELECTING THE SITE FOR PERIPHERAL VENOUS ACCESS

The first options to choose the puncture site were the veins of the forearm and the back of the hand, followed by the veins located in the arm and ulnar fossa.

We are going to try this part of the forearm, the most we can, and the hand, then we go to the arm. Leave this part here of the joint (ulnar fossa) in the last case. (TE4)

The choice of the site was also related to the mobility of the elderly. Not with the intention of offering more autonomy, but to avoid the accidental withdrawal of the PVA, new punctures, facilitate the work of the nursing team and reduce the elderly's stress.

Because if they make any move, it can pull out the access, then, there will be another puncture. He may also be stressed at the time we will puncture the vein. So, we try to avoid this to the maximum. (TE2)

[...] puncture in a site where they can have mobility, so that they do not lose it easily. Place it at a site other than the fold to facilitate mobility. (TE5)

On the back [of the hand], that is the best site. Because in the case of the elderly, they are usually fed by family members, so they do not move a lot. (TE7)

Another aspect which was considered was the visibility of the vein.

[...] generally it is usually more on the hand, at the fingers, where we find easy access, we are making the puncture. (TE4)

SELECTING THE INTRAVASCULAR DEVICE

Among the care actions to obtain the PVA, the choice of the intravascular device to be used was part of planning the technique.

People have to see the kind of material they will use on the elderly, the jelco®. (TE3)

Check the jelco® as for the size, caliber. (TE6)

Participants reported that, for the choice of catheters, they considered, among other things, the nature of the intravenous solution to be infused.

Choosing the right catheter, or sometimes when you are using only serum, you do not need to put that very large a catheter. (TE1)

The jelco® 22 is very thin. So, for example, putting antibiotics does not keep much time, it is practically 24h. There you have to do another puncture. (TE4)

[...] what this venous network can support, so that we do not take a route that would be viable and due to lack of sensitivity in selecting the caliber, in what I will infuse, sometimes, we end up losing that access, for lack of discernment when looking at how I am going to insert that there. (E2)

Another cited aspect was the relation of the catheter with the length, caliber and vein tortuosities, to avoid transfixation of the vessel upon puncturing. Participants also considered puncturing the most ample vein, to guarantee more working time.

The question of the equipment is the caliber you will use. Sometimes you put on too thin a caliber, then one needs to puncture a new one every time. Or you put too large a caliber, then it goes out and loses access. There has to be good sense, technique and, at the same time, discernment. (E2)

Sometimes, you do not need to puncture with a very large caliber catheter into a vein that is thin. (TE1)

We look closely at the vein caliber issue, the size of the route that the jelco® will do. It is no use getting a very large jelco® and a curved vein. (TE4)

From the reports, lack of pre-established parameters in the choice of the peripheral intravenous device to obtain the PVA was observed.

Note the size of the jelco®, because this is important. There are people who put some 18 caliber on the elderly with no need. (TE2)

We try a jelco® of a higher caliber, for the patient to be more hydrated, for example, a jelco® 20. When it does work, we put a 22, which is of a lower caliber. Even though the 22 does not conserve the vein very much, then you have to change it always. (TE4)

DISCUSSION

Elderly people have certain characteristics related to the senescence process – such as loss of epidermis support, colla-

gen and elastin deficiency, decreased elasticity of the vascular network, dryness, muscle strength loss, with mobility limitation, among others¹⁴ – and the senility process, when associated with chronic diseases, very often present. These changes need to be considered by nurses in the practice of IVT for a quality and harmless care.

In this context, the study's participants showed attention to some characteristics of this population, which may hinder the progression of the intravascular device during PIP. In this way, they evaluate the conditions of the skin and the vascular network, considering them as an indicator that demands more care, to avoid problems during the procedure.

Therefore, the peculiarities for this population should be observed, because factors such as comorbidities, capillary fragility, and loss of water in the body composition, malnutrition, and reduction in the subcutaneous tissue or confusion conditions may make it difficult to obtain the PVA. In addition, changes in the immune system, skin and decreased fat and muscle mass increase exposure to lesions and infections at the insertion site.¹⁵

It is worth emphasizing that skin integrity in the elderly may be compromised, since it is more susceptible to injuries caused even by light mechanical forces, such as friction and trauma, aggravated by the decrease in pain sensation and perception, with an elevation of its threshold.¹⁴

In addition, because the venous wall becomes thicker or even there is a deposition of calcium or plaque, it may be difficult to introduce the catheter into the vein. In addition, venous circulation may be stagnant, resulting in slowness for venous distention and blood return upon puncturing (flashback diminished); therefore, care should be taken to advance the catheter without transfixing the vessel or causing lesions, hematomas, infiltrations and/or extravasations.^{14,16}

An important care action during PIP and its maintenance in the elderly person is to stabilize the skin and vein in order to facilitate the procedure, reducing possible painful sensation¹⁷ and also the risk of losses. Sensitive skin is more prone to be damaged and the PIP procedure, if not performed with proper care, may come to generate adverse events in the tegument. In addition, it is necessary to look for the fixation of these devices, the use of transparent dressings that do not attack the fragile skin is recommended to such purpose.¹⁸

Regarding pain, which can occur due to skin lesions, several attempts to puncture frail skin or edemas, international authors have recommended the use of sonophoresis (Sono-Prep®), followed by the application of the EMLA® anesthetic, five minutes before cannulation.¹⁹ However, these studies have been conducted focusing on children. And no evidence regarding its benefit for the elderly population was found, a fact that refers to the need for more studies.

Using a tourniquet is not advisable in patients with fragile veins and skin who are at risk of bleeding and who have impaired circulation due to the possibility of bruising. When used, it should be a single-use, latex-free and positioned on top of clothing for maximum comfort, for a maximum of three minutes, and should be removed during preparation of the devices for PIP.^{16,20}

In addition, the elderly person may show cognitive and sensory deficits such as hearing and vision impairment, and therefore some recommended strategies are: to speak clearly, slowly and directly to the patient with a sensory deficit, not to use unfamiliar terminology, to address him by his name, to explain each step of the process calmly, to reinforce cooperation and to remember that the presence of the relative may be important to reassure the elderly person.⁷

The choice of a puncture site influences patient's comfort and autonomy to perform daily living activities, as well as the occurrence of complications and the length of stay for the intravascular device. It should be emphasized that the current recommendations are that the device be constantly evaluated and that changing should occur if there is a clinical indication (pain, edema, induration, change in color or temperature, fluid leakage or purulent drainage).²⁰

Thus, it is recommended that PIP be performed, preferably, on the most distal portions of the limbs and, if necessary, to perform new punctures in more proximal locations, alternating the limbs. It is also necessary to select areas with greater amount of subcutaneous tissue and bone support, considering the conservation and integrity of the vessel for future intravenous therapy.¹⁶ In this study, it was observed that the sites mentioned for PVA varied, predominating those inserted in the forearm's veins and the hand's back veins.

However, the risk for thrombophlebitis is significantly greater at sites punctured on the hand's back compared to those placed on the forearm.²¹ Flexural sites such as the ulnar fossa region should also be avoided, as increased local oncotic pressure may lead to venous collapse.^{7,17,20}

The importance of contributing to maintaining elderly people's autonomy during hospitalization is also emphasized. Therefore, it is advisable to choose a location for the PVA that does not restrict range of motion and allows for using the hands.^{7,17} It is also worth noting that using venoclysis may represent a risk for falls, according to the Morse scale.²²

Another aspect considered by the interviewees was vein's visibility. Despite the difficulties in setting up the PVA in the elderly and in other situations, it is recommended to use vascular ultrasonography at the bedside, to identify the vessel to be punctured more easily, thus avoiding diverse unsuccessful puncture attempts and, often, the central venous puncture as an alternative,²³ although this feature is not yet viable in many institutions, including the one that served as *locus* for this research.

In addition to selecting the puncture site, it is also necessary to choose the intravascular device to be used for PIP, focusing on aspects such as: patient's condition, age and diagnosis; vein integrity, size and location; type and duration of prescribed treatment; infusion history of the patient; patient preference for location, as appropriate; capacity and resources to take care of the device.⁷

The Brazilian *Agência Nacional de Vigilância Sanitária* (ANVISA), with quality of evidence II, points out that one should consider therapy duration, viscosity, fluid components and PVA's conditions,²⁴ as observed by the study's participants who, among other aspects, consider the nature of the intravenous solution to be infused for selecting the catheters.

It is emphasized, with an AI level of evidence, that needle-made catheters should be restricted to situations such as blood sampling, for administering single doses or *bolus* of drugs and should be withdrawn soon after the administration ends, as they increase the risk for vein damage and infiltration. On the other hand, needle-made catheters are easy to insert, more stable, allow more mobility for the patient and can therefore be inserted for a longer time.^{7,20,24}

As this study was carried out in a Clinical Medical Unit, where the hospitalized elderly people were often using IVT for a long time, only needle-made catheters, popularly known as *jelco*®, were available for peripheral venipuncture, from one sole manufacturer and in their different calibers.

Regarding this aspect, the approached nursing team demonstrated preference for using smaller calibers for administering large volume parenteral solutions and larger calibers for the infusion of antibiotics. However, they did not emphasize the chemical characteristics on the drugs when reporting on the relationship of antibiotic and the risk for catheter obstruction, since it should be considered that not all antibiotics can potentiate the occurrence of this event.²⁵

Thus, the type of drug is an important criterion that guides the choice of venous access,²⁶ and one should pay attention to vesicant, irritant and high osmolarity solutions, such as potassium chloride, chemotherapeutic agents, among others.^{20,24} Thus, the information on drugs with potential to produce tissue damage should be available for use by the nursing team, based on protocols and permanent education, in order to guide their safe use and the implications in clinical practice, such as adverse events like infiltrations and extravasations.

Regarding the recommendations for using peripheral catheters, one of them mentions using the smallest possible caliber to support the prescribed therapy, conscious of the need for adequate hemodilution of intravenous infused drugs.^{7,12} For the elderly person, catheters 22 and 24 are generally recommended.^{7,20}

Another important factor which was cited was the relation between the catheter length and the veins' length and tortuos-

ity since that, if the catheter's tip, when inserted, encountered the internal wall of the vein, it will contribute to the irritation of the vascular endothelium and, even, to transfixing the vessel.

In this case, there will also be some influence on the hemodilution of the infused drugs, because the closer the catheter wall is to the tip of the catheter, the less blood will dilute the drug before it contacts the inner vessel's layer. Therefore, the dilution's effect is greater when the catheter's lumen tip is located at the exact center of the vessel's lumen.²⁵

In order to discuss and implement the IVT's security practices, the leaders of the organizations should be engaged in developing a patient-oriented safety culture and in organizing a multidisciplinary team to lead these discussions in order to analyze and evaluate each existing process, in search for improvements.

CONCLUSIONS

The aspects considered by the nursing team to obtain a safe PVA in the hospitalized elderly person are focused on the peculiar characteristics of aging, clinical condition, ideal site for inserting the PVA and selection of the catheter, according to the solution type to be infused. Such care actions, however, were carried out with no systematization or standardization, often opposing scientific recommendations and evidences, which may imply the occurrence of adverse events among hospitalized elderly people.

The results reveal the need for continuing education and good practices based on the best knowledge evidences about the aging process and principles of the National Patient Safety Program.

In addition, it is emphasized that a limitation for accomplishing this study was the scarcity of references about IVT in the elderly person in the national and international literature, in order to better confront the found results.

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REFERENCES

1. Dansk MTR, Johann DA, Vayego AS, Oliveira GRL, Lind J. Complicações relacionadas ao uso do cateter venoso periférico: ensaio clínico randomizado. *Acta Paul Enferm.* 2016[cited 05 July 2017];29(1):84-92. Available from: <http://www.scielo.br/pdf/ape/v29n1/1982-0194-ape-29-01-0084.pdf>
2. Moreira APA, Escudeiro CL, Christovam BP, Silvino ZR, Carvalho MF, Silva RCL. Use of technologies in intravenous therapy: contributions to a safer practice. *Rev Bras Enferm.* 2017[cited 08 July 2017];70(3):595-601. Available from: http://www.scielo.br/pdf/reben/v70n3/pt_0034-7167-reben-70-03-0595.pdf
3. Dychter SS, Gold, DA, Carson, D, Haller, M. Intravenous therapy: a review of complications and economic considerations of peripheral access. *J Inf*

- Nurs. 2012[cited 29 June 2017];35(2):84-91. Available from: https://journals.lww.com/journalofinfusionnursing/Abstract/2012/03000/Intravenous_Therapy__A_Review_of_Complications_and.3.aspx
4. Washington G, Barrett B. Peripheral phlebitis: a point-prevalence study. *J Inf Nur.* 2012[cited 08 July 2017];35(4):252-8. Available from: http://journals.lww.com/journalofinfusionnursing/Abstract/2012/07000/Peripheral_Phlebitis__A_Point_Prevalence_Study.9.aspx
 5. Austin ED, Sullivan SB, Whittier S, Lowy Uhlemann AC. Peripheral intravenous catheter placement is an underrecognized source of staphylococcus aureus bloodstream infection. *open forum infectious diseases.* 2016[cited 15 July 2017];3(2):1-4. Available from: <http://ofid.oxfordjournals.org/content/3/2/ofw072.full.pdf+html>
 6. Szlejf C, Farfel JM, Curiati JA, Couto Junior EB, Jacob Filho W, Azevedo RS. Medical adverse events in elderly hospitalized patients: a prospective study. *Clinics (São Paulo).* 2012[cited 28 Nov 2018];67(11):1247-52. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3488980/>
 7. Infusion Nursing Society. Policies and procedures for infusion Nursing of the older adult. 2^a ed. Norwood, MA: Infusion Nursing Society; 2013.
 8. Ministério da Saúde (BR). Portaria nº. 529. Institui o Programa Nacional de Segurança do Paciente (PNSP). Brasília: Ministério da Saúde; 2013. Available from: http://bvsm.sau.gov.br/bvs/sau/legis/gm/2013/prt0529_01_04_2013.html
 9. Palese A, Ambrosi E, Fabris F, Guarnier A, Barelli P, Zambiasi P, et al. Nursing care as a predictor of phlebitis related to insertion of a peripheral venous cannula in emergency departments: findings from a prospective study. *J Hosp Infect.* 2016[cited 07 July 2017];92(3):280-6. Available from: <https://www.sciencedirect.com/science/article/pii/S0195670115004624>
 10. Mestre G, Berbel C, Tortajada. Successful multifaceted intervention aimed to reduce short peripheral venous catheter-related adverse events: a quasiexperimental cohort study. *Am J Infect Control.* 2013[cited 14 July 2017];42(6):520-6. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23084473>
 11. Silva AG, Oliveira AC. Impacto da implementação dos *bundles* na redução das infecções da corrente sanguínea: uma revisão integrativa. *Texto Contexto Enferm.* 2018[cited 2018 Nov 20];27(1):1-13. Available from: http://www.scielo.br/scielo.php?pid=S0104-07072018000100500&script=sci_abstract&lng=pt
 12. Oliveira DFL, Azevedo RCS, Gaíva MAM. Guidelines for intravenous therapy in elderly: a bibliographic research. *J Res Fundam Care.* 2014[cited 20 July 2017];6(1):86-100. Available from: http://www.seer.unirio.br/index.php/cuidadofundamental/article/view/2610/pdf_1051
 13. Bardin L. Análise de conteúdo. 5^a ed. Lisboa: Edições 70; 2016.
 14. Tobin DJ. Introduction to skin aging. *J Tissue Viability.* 2016[cited 2017 July 20];26(1):37-46. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27020864>
 15. Duarte YAO. Peculiaridades da terapia intravenosa em pessoas idosas. *Editorial –INSforme.* 2011[cited 12 July 2017];05(10):1-4. Available from: http://www.insbrasil.org.br/ins/public/downloads/INSForme_Fevereiro_10.pdf
 16. Avelar AFM. Inserção de cateteres intravenosos periféricos. In: Harada M JCS, Pedreira MLG. *Terapia intravenosa e infusões.* São Caetano do Sul, SP: Yendis Editora; 2011. p. 179-201.
 17. Oliveira DFL, Azevedo RCS, Gaíva MAM. Diretrizes para terapia intravenosa na pessoa idosa: pesquisa bibliográfica. *RPCFO.* 2014[cited 27 Nov 2018];6(1):86-100. Available from: <http://www.redalyc.org/html/5057/505750621032/>
 18. Souza AC. Assistência de enfermagem relacionada aos cateteres periféricos em idosos: visão da enfermagem. *J Health Sci Inst.* 2013[cited 2017 Mar 07];31(4):373-7. Available from: https://www.unip.br/presencial/comunicacao/publicacoes/ics/edicoes/2013/04_out-dez/V31_n4_2013_p373-377.pdf
 19. Kim D, Choi S, Kwak Y. The effect of SonoPrep® on EMLA® cream application for pain relief prior to intravenous cannulation. *Eur J Pediatr.* 2012[cited 2017 Mar 17];171(6):985-8. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22350285>
 20. Gorski L, Hadaway L, Hagle ME, McGoldrick M, Orr M, Doellman D. Padrões de práticas em terapia infusional. *J Inf Nurs.* 2016[cited 2018 Nov 18];39(15):1533-458. Available from: <https://library.ins1.org/p36fpe/15>
 21. Cicolini G, Bonghi AP, Labio LD, Mascio RD. Position of peripheral venous cannulae and the incidence of thrombophlebitis: an observational study. *J Adv Nurs.* 2009[cited 2017 July 20];65(6):1268-73. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/19374679>
 22. Urbanetto JS, Creutzberg M, Franz F. Morse Fall Scale: translation and transcultural adaptation for the portuguese language. *Rev Esc Enferm USP.* 2013[cited 2017 July 17];47(3):569-75. Available from: <http://www.scielo.br/pdf/reeusp/v47n3/0080-6234-reeusp-47-3-00569.pdf>
 23. Salleras-Duran L, Fuentes-Pumarola C, Bosch-Borràs N, Punset-Font X, Sampol-Granes FX. Ultrasound-Guided peripheral venous catheterization in emergency services. *J Emerg Nurs.* 2016[cited 2018 Nov 28];42(4):338-43. Available from: <http://www.sciencedirect.com/science/article/pii/S0099176716000507>
 24. Agência Nacional de Vigilância Sanitária-Anvisa. *Medidas de prevenção de Infecção Relacionada à Assistência à Saúde.* Brasília (DF): Anvisa; 2017.
 25. Larue GD, Martin P. The impact of dilution on intravenous therapy. *J Inf Nurs.* 2011[cited 2019 Jan 27];34(2):117-23. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21399457>
 26. Modes PSSA, Gaíva MAM, Rosa MKO, Granjeiro CF. Cuidados de Enfermagem nas complicações da punção venosa periférica em recém nascidos. *Rev Rene.* 2011[cited 2018 July 17];12(2):324-32. Available from: http://www.revistarene.ufc.br/vol12n2_html_site/a14v12n2.htm