

# PROTOCOL FOR BLOOD PRESSURE MEASUREMENT IN LOWER LIMBS

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## PROTOCOLO DE AFERIÇÃO DA PRESSÃO ARTERIAL EM MEMBROS INFERIORES

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## PROTOCOLO DE MEDICIÓN DE LA PRESIÓN ARTERIAL EN LOS MIEMBROS INFERIORES

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**Objective:** to report the experience of building a standard operating procedure on the technique of checking blood pressure in the lower limbs. **Method:** this is a descriptive study, using an experience report design, that took place during the Supervised Nursing Curricular Training Program in an inpatient unit of a hospital in the countryside of the state of Rio Grande do Sul in 2017. **Results:** the standard operating procedure was developed among the undergraduate students and nurses to standardize safe activity performance, including the necessary materials, patient position, and action guide. **Conclusion:** the creation of a standard operating procedure by nursing students allowed the construction of a protocol with the correct blood pressure measurement technique in the lower limbs, and will contribute significantly to clinical practice.

**Descriptors:** Protocols. Arterial Pressure. Lower Extremity.

*Objetivo: relatar a experiência de construção de um procedimento operacional padrão sobre a técnica de verificação da pressão arterial em membros inferiores. Método: estudo descritivo, tipo relato de experiência, que ocorreu durante o Estágio Supervisionado Curricular de Enfermagem em uma unidade de internação de um hospital localizado no interior do Rio Grande do Sul, em 2017. Resultados: o procedimento operacional padrão foi desenvolvido entre os acadêmicos e as enfermeiras com o objetivo de uniformizar a execução da atividade de forma segura, incluindo os materiais necessários, posição do paciente e guia de ação. Conclusão: a criação do procedimento operacional padrão pelos acadêmicos de Enfermagem possibilitou a construção de um protocolo com a técnica correta de aferição da pressão arterial em membros inferiores e contribuirá significativamente para a prática clínica.*

**Descritores:** Protocolos. Pressão Arterial. Membros Inferiores.

*Objetivo: narrar la experiencia de construcción de un procedimiento operativo estándar sobre la técnica de verificación de la presión arterial en miembros inferiores. Método: estudio descriptivo, de tipo relato de experiencia, realizado durante la Pasantía Curricular Supervisada de Enfermería en una unidad de internación de un hospital*

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*del interior de Rio Grande do Sul, en 2017. Resultados: el procedimiento operativo estándar se desarrolló entre los estudiantes y las enfermeras con el objeto de uniformizar la ejecución de la actividad de manera segura, incluyéndose los materiales necesarios, posición del paciente y manual de aplicación. Conclusión: la creación del procedimiento operativo estándar por parte de los estudiantes de Enfermería permitió la construcción de un protocolo con la técnica correcta de medición de la presión arterial en miembros inferiores, que contribuirá significativamente con la práctica clínica.*

*Descriptores: Protocolos; Presión Arterial; Extremidad Inferior.*

## Introduction

Professional nursing practice was legally instituted with the approval of Law No. 7.498/86. Since then, nurses have been assigned the important role of coordinating and delivering patient care<sup>(1)</sup>. In order to provide care with quality and efficiency, nurses must develop a systematic nursing care process, which is called nursing process (NP).

To develop all stages of the NP, thorough data collection is imperative, consisting of history taking and physical examination, being a valuable instrument for nursing care. This instrument allows the nurse to define nursing diagnoses, which provide subsidies for the planning of adequate and individualized nursing care, according to the needs of each patient<sup>(2-3)</sup>.

During physical examination, the vital signs check technique is performed. Among them, blood pressure (BP) is the measurement of the pressure exerted by the blood on the walls of the arteries. A precise BP measurement is essential for assessing the patient's physiological and emotional conditions, as well as for the diagnosis of arterial hypertension, because its elevation is usually a sign of cardiovascular disease<sup>(4)</sup>. BP measurement is an essential physiological standard in the diagnostic evaluation; one of the most accomplished procedures in the daily life of health institutions, mainly by the nursing team, either in routine care or in emergency situations<sup>(5)</sup>.

Among the methods described in the literature to determine BP, the indirect method, with the auscultatory technique, is the procedure that is most used by health professionals. In usual clinical practice, the technique is performed in

the upper limbs, more specifically placing the sphygmomanometer on the arm and listening to the Korotkoff sounds in the brachial artery. This is the site of choice indicated in national and international publications that address the theme<sup>(6-7)</sup>.

According to the VII Brazilian Hypertension Guideline, failure to perform BP measurement procedure may lead professionals to fail to notice functional and/or structural changes in target organs, such as the heart, brain, kidneys and blood vessels, as well as consequently increased risk of fatal and non-fatal cardiovascular events for the patient<sup>(7-8)</sup>. This guideline corroborates a study that showed failures in the performance of the technique, and lack of theoretical knowledge of the nursing team in the BP measurement<sup>(9)</sup>.

These guidelines do not include the step-by-step assessment of BP of the lower limbs, despite being recommended:

SBP [systolic blood pressure] of lower limbs should be assessed whenever BP measured in the upper limbs is high. This assessment may be performed with the patient lying down with the cuff placed in the calf region, covering at least two-thirds of the distance between the knee and the ankle. SBP measured in the lower limb may be higher than in the arm due to the distal pulse amplification phenomenon. If SBP of the leg is lower than the SBP measured in the arm, there is a suggestion for the diagnosis of coarctation of the aorta<sup>(7:53)</sup>.

However, there are some situations that make it impossible to measure BP in the upper limbs, such as venous access, intravenous therapy, local surgery, edema, injury, fractures, arteriovenous shunt, graft, bilateral mastectomy or amputation. There may also be a need to evaluate for peripheral vascular disorders or cases of medical recommendation for evaluation

of BP in the lower limbs, indicating measurement in the posterior and popliteal arteries<sup>(6)</sup>.

In 1967, the study evaluated 30 patients and recorded mean BP values in the brachial, popliteal and posterior tibial arteries. It was proved that the measurement on the leg was more satisfactory than on the thigh, because of the better correlation with the brachial values, the possibility of using the standard size cuff, and the supine position, that is more comfortable for the patient<sup>(10)</sup>.

Blood pressure measurement, regardless of the measurement site, allows directing individual therapeutic behaviors, monitoring, and identifying risk factors associated with arterial hypertension. Because of its importance, it should be stimulated and performed by health professionals in all patient evaluations.

During training, difficulties were observed in blood pressure measurement, due to the lack of standardization of the procedure, especially in situations that contraindicated the measurement in the upper limbs, such as radical mastectomy, or quadrantectomy with axillary dissection, or cases of upper limb amputation. In these cases, it was necessary to measure BP, and the nursing team showed doubts regarding the correct technique for measuring BP in the lower limbs.

In view of the above, the following question emerged: Does the nursing team perform the technique of BP measurement in lower limbs according to standardization in the literature?

This study aims at reporting the experience of building a standard operating procedure (SOP) on the technique for measuring blood pressure in the lower limbs.

## **Method**

This is a qualitative, descriptive study, using an experience report design on the construction of an SOP on BP measurement in lower limbs, carried out in a clinical hospitalization unit of a medium-sized hospital that has a service agreement with the Universidade Regional Integrada do Alto Uruguai e das Missões, in Rio Grande do Sul, Brazil, from May to June 2017.

This report emerged from the practical activities developed in the discipline Supervised Hospital Training I, which takes place in the ninth semester of the undergraduate nursing course of the above-mentioned university. Supervised Hospital Training I is a discipline with a 420-h workload, which seeks interaction between the theory of the disciplines that make up the course syllabus, and the practice developed in the training. It should be emphasized that the activities proposed by the discipline are permeated by management actions of nursing services and care actions. Thus, an interface of this proposal is present in this report.

The construction of an SOP based on a relevant theoretical basis<sup>(6-7,10)</sup> was carried out, with the participation of nursing undergraduate students, the professor of the discipline, nurses and the nursing team. After the construction was completed, the procedure was presented to the nursing team in a conversation.

A literature review search was conducted in national and international databases from the Portal of Scientific Journals of the Virtual Health Library. The period from 2008 to 2018 (to date) was delimited for collection. For the descriptor "Blood pressure and lower limbs" 138 publications were found; with the descriptors "Blood Pressure and Lower Limbs" and "Protocols", 4 were found, but none were related to the creation and/or implementation of protocols for measuring blood pressure in the lower limbs. Thus, the authors had no elements to make up the degree of evidence.

## **Results**

In order to add value to the training, the guideline provided to the students at the beginning of this activity suggests that situations that allow the planning and performance of a care practice are observed. Undergraduate students are encouraged to experience reality, and to look critically at care and administrative situations that arise.

After the initial adaptation period, there was an exchange of ideas with the nursing

team, especially with the nurses, about the situations and needs detected and their degree of priority regarding the intervention. Thus, after a consensus about the problem, the review and description of the BP measurement technique in the lower limbs was chosen.

During the training period, it was observed that some patients who required this technique were admitted to the clinic, due to their medical condition, as well as the insecurity and lack of uniformity in the performance of the procedure for measuring BP in the lower limbs by the team. Then, some strategies were reflected on and discussed to reduce the risks of improper performance of this technique.

Therefore, the purpose was to standardize the actions related to BP measurement in the lower limbs, considering filling a gap represented by the absence of material that would support the procedure. For the SOP construction,

references on the subject were sought, involving the organization of stages of planning and performance of the action chosen.

A cycle of meetings with nurses and the nursing team was started for the construction of the SOP, to ensure its applicability to the reality of the sector. The entire process of building the SOP lasted approximately two months. SOP was presented to the team on June 20, 2017, in a round of conversation, in which careful reading of the material produced and the correct performance of the technique were encouraged. At that time, the importance of reviewing the basic techniques for checking vital signs, as well as the specific points that make up SOP in its entirety were discussed. Two SOPs were created: the first, with the use of the posterior tibial artery; and the second with the popliteal artery. Both are described in full in Figures 1 and 2 as it follows.

**Figure 1** – Standard operating procedure for checking blood pressure in lower limbs - posterior tibial artery. Santo Ângelo, Rio Grande do Sul, Brazil – 2017 (continued)

**Activity:** Blood pressure measurement in lower limbs - posterior tibial artery

**People in charge:** Nurse, nursing technician, and nursing aide

**Materials:** Sphygmomanometer, stethoscope, cotton and alcohol 70%.

**Patient position:** Keep the patient in the supine position, with arms and legs extended along the body.

**Guide to action:**

clean hands;

gather the material and take it to the patient;

explain the procedure to the patient;

position the patient in the supine position;

wrap the lower third of the patient's leg with the cuff;

position the cuff 5 cm above the malleolus (bony prominence) of the lower third of the leg;

leave the marker on a visible position;

locate, with the index and middle fingers, the posterior tibial artery;

position the stethoscope, holding its diaphragm on the posterior tibial artery;

close the air valve and inflate;

open the valve slowly and observe the pressure gauge;

**Figure 1** – Standard operating procedure for checking blood pressure in lower limbs - posterior tibial artery. Santo Ângelo, Rio Grande do Sul, Brazil – 2017 (conclusion)

record the point at which the first Korotkoff sounds are heard (systolic pressure) and the point at which the last Korotkoff sound (diastolic pressure) was heard;  
let the rest of the air escape quickly;  
remove the cuff and leave the patient comfortable;  
collect the material;  
perform antisepsis of stethoscope eartips with cotton and alcohol 70%;  
clean hands;  
write down the result.



Source: Created by the authors, based on sources consulted<sup>(6-7,10)</sup>.

**Figure 2** – Standard operating procedure for measuring blood pressure in lower limbs - popliteal artery. Santo Ângelo, Rio Grande do Sul, Brazil – 2017 (continued)

**Activity:** Blood pressure measurement in lower limbs – popliteal artery

**People in charge:** Nurse, nursing technician, and nursing aide

**Materials:** Sphygmomanometer, stethoscope, cotton, and alcohol 70%.

**Patient position:** Keep the patient in the supine position, with arms and legs extended along the body.

**Guide to action:**

clean hands;  
gather the material and take it to the patient;  
explain the procedure to the patient;  
position the patient in the prone position;  
wrap the patient's thigh with the cuff;  
leave the marker on a visible position;  
locate, with the index and middle fingers, the popliteal artery;  
position the stethoscope, holding its diaphragm on the popliteal artery;  
close the air valve and inflate;

**Figure 2** – Standard operating procedure for measuring blood pressure in lower limbs - popliteal artery. Santo Ângelo, Rio Grande do Sul, Brazil – 2017 (conclusion)

open the valve slowly and observe the pressure gauge;  
 record the point at which the first Korotkoff sounds are heard (Systolic Pressure) and the point at which the last Korotkoff sound (Diastolic Pressure) was heard;  
 let the rest of the air escape quickly;  
 remove the cuff and leave the patient comfortable;  
 collect the material;  
 perform antisepsis of stethoscope eartips with cotton and alcohol 70%;  
 clean hands;  
 write down the result.



Source: Created by the authors, based on sources consulted<sup>(6,10)</sup>.

## Discussion

The development of teamwork and communication is essential for the improvement of the work process, taking into account the importance of all the procedures performed during patient care, which may, in some situations, not occur correctly due to factors such as lack of knowledge on the part of the professional or problems such as communication noise, which consequently interfere in the continuity, quality and performance of the work or in the satisfaction of the patients' needs<sup>(11)</sup>. Communication is also an important tool in obtaining information for making decisions related to care<sup>(12)</sup>. Communication is present in all activities developed by the nursing team and, when carried out assertively, directs to the resolution of the challenges that arise in the work.

Like communication, education permeates the nursing work process, to involve professionals in educational activities. They stand out as strategies to promote the quality of care, allow safe performance and provide new information to achieve better professional performance and personal growth. It is important to always remember that the nurse is responsible for the education and training of the team and should detect flaws in care, to manage them<sup>(11)</sup>.

The Ministry of Health, through Ordinance no. 198, dated February 13, 2004, instituted the National Policy of Permanent Health Education, with the intention to train and empower health professionals to meet the population's expectations, through training actions, based on theoretical and practical basis, to improve care for users of the Unified Health System (SUS)<sup>(13)</sup>.

Currently, permanent education is considered an important tool in the construction

of professional competence, and contributes to the work organization and development. Competencies are actions built in an articulated way, which favor knowledge, skills, values, and attitudes aimed at improving health services<sup>(14)</sup>.

Quality in health service delivery makes hospital services safe, restores patient's health, and enables problem-solving. For the user to be able to enjoy quality services, a management/care system that seeks to recognize the needs of the users and keep their health, guaranteeing their safety, is necessary<sup>(15)</sup>.

The concern with patient safety consists in providing tools for professionals to reduce the occurrence of adverse events. It is necessary to improve the communication process among the teams, generate a movement of engagement and discussion of events, planning of actions, interventions in care practice, and the construction of a culture of safety. All these measures are important for the transformation of the scenario in health institutions, with a view to promoting assertive procedures<sup>(16)</sup>.

In order to guarantee quality, care process organization, and patient's safety, a systemic representation of an SOP that describes each sequential step of the procedure to be performed is important to ensure the expected and satisfactory result of the task. This instrument also has the function of giving bases, and supporting professionals in their activities<sup>(17)</sup>.

Standard operating procedure accomplishment induces repeated actions by different professionals with some guarantee of the same result. However, because professionals are unique, with particular abilities, attitudes, and feelings, they do not always act with exactly the same means in activities with the same purpose, due to the contexts of work<sup>(18)</sup>. Nonetheless, non-standardization of procedures and the absence of norms and routines in nursing care may point to a disorder of the service due to different forms of professional behavior<sup>(19)</sup>. Thus, standards are defined to establish service delivery and quality improvement. Standardized care represents a service based on theory for the best practice; it

drives organizations to the safe development of their processes, and achievement of results.

Continuing education makes it possible to ensure comprehensive care and continuity of safe patient care. This can be achieved through actions to implement assistance protocols, standardization of procedures, mapping of processes, and the establishment of flows<sup>(20)</sup>. Considering what is stated in the literature, the real need to carry out educational actions with the nursing team regarding the importance of BP measurement was confirmed and, above all, the correct way to measure, and the creation of an SOP to standardize BP measurement technique in the lower limbs.

Considering the design adopted, the bias of temporality (cause-effect) stands out as a limitation of the study. Future evaluation research is important. The study contributed, through the training experience, to the perception of the need to review existing techniques, more specifically BP measurement in the lower limbs, which are little used in the daily routine. Nevertheless, it also refers to the need to rethink other little-used techniques, and to promote programs of permanent education in health that discuss more the meaning of aligning concepts and developing protocols.

## Conclusion

The possibility of reporting the academic experience in the process of standardization of the BP measurement technique in lower limbs contributed to the development of skills and abilities in care. Improvement based on experiences is paramount to guarantee patient safety through a work that excels in organization, systematization, and quality.

To ensure quality services for patients, it is imperative that their needs are recognized, and that care standards are defined and adopted, seeking to ensure their satisfaction, which requires the presence and performance of the nurse.

It was assumed that continuing education actions with the nursing team to ensure that care



is standardized and correct, is an assertive path for safe care.

The creation of this SOP allowed the construction of a protocol with the correct blood pressure measurement technique in the lower limbs and will contribute significantly to clinical practice. It is expected that this SOP contributes to the work of the nursing team in face of the daily demands, and to strengthen the need for permanent team education. To the undergraduate students, it allowed for meaningful learning, through an active methodology, using prior knowledge, allowing their autonomy to research and create, in a collaborative movement, and applied to the practice as future professionals.

Finally, it is important that nurses observe the team's weaknesses regarding the techniques, because they are opportunities for in-service education, being able to identify demands and needs that need theoretical and practical improvement.

### Collaborations:

1. conception, design, analysis and interpretation of data: Eduarda Batista Kreuning, Maria Cristina Meneghete and Vivian Lemes Lobo Bittencourt;

2. writing of the article and relevant critical review of the intellectual content: Sandra Leontina Graube, Rosane Teresinha Fontana, Francisco Carlos Pinto Rodrigues and Vivian Lemes Lobo Bittencourt;

3. final approval of the version to be published: Maria Cristina Meneghete, Francisco Carlos Pinto Rodrigues and Vivian Lemes Lobo Bittencourt.

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