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Teaching blood pressure measurement among hypertensive patients: educational strategy with low-fidelity simulator

Enseñanza de la medición de la presión arterial en pacientes hipertensos: estrategia educativa con simulador de baja fidelidade

Ensino da medida da pressão arterial entre hipertensos: estratégia educativa com simulador de baixa fidelidade

ABSTRACT

Objective: To evaluate practical knowledge about the technique of indirect blood pressure measurement performed by hypertensive patients at home before and after educational intervention with a low-fidelity simulator. Methods: Quasi-experimental study, of the before and after type, carried out in a Family Health Strategy Unit, from January to July 2016. The convenience sample consisted of 30 hypertensive patients, over 18 years old, who used an articulated wooden doll as a low-fidelity simulator to reproduce the steps of indirect blood pressure measurement at home. Results: After the educational strategy, the hypertensive patients had a higher proportion of correct answers in relation to the preparation of the environment, preparation of the patient and positioning of the body. Conclusion: the use of a low-fidelity simulator had a positive impact on promoting knowledge about the technique of indirect blood pressure measurement at home.

DESCRIPTORS: Arterial Pressure, Blood Pressure Determination, Education, Nursing, Teaching Materials, Simulation Techinique.

RESUMEN

Objetivo: Evaluar los conocimientos prácticos sobre la técnica de medición indirecta de la presión arterial realizada por pacientes hipertensos en su domicilio antes y después de la intervención educativa con un simulador de baja fidelidad. Métodos: estudio cuasiexperimental, del tipo antes y después, realizado en una Unidad de Estrategia de Salud de la Familia, de enero a julio de 2016. La muestra de conveniencia estuvo conformada por 30 pacientes hipertensos, mayores de 18 años, quienes utilizaron un muñeco de madera articulado como un simulador de baja fidelidad para reproducir los pasos de la medición indirecta de la presión arterial en casa. Resultados: Luego de la estrategia educativa, los pacientes hipertensos tuvieron una mayor proporción de respuestas correctas en relación a la preparación del ambiente, preparación del paciente y posicionamiento del cuerpo. Conclusión: El uso de un simulador de baja fidelidad tuvo un impacto positivo en la promoción del conocimiento sobre la técnica de medición indirecta de la presión arterial en el hogar.

DESCRIPTORES: Presión Arterial, Determinación de la Presión Sanguínea, Educación en Enfermería, Materiales de Enseñanza, Simulación.

RESUMO

Objetivo: Avaliar o conhecimento prático sobre a técnica da medida indireta da pressão arterial realizada por pacientes hipertensos no domicílio antes e após intervenção educativa com simulador de baixa fidelidade. Métodos: Estudo quase-experimental, do tipo antes e depois, realizado em uma Unidade de Estratégia de Saúde da Família, no período de janeiro a julho de 2016. A amostra de conveniência foi composta por 30 hipertensos, maiores de 18 anos, que utilizaram um boneco articulado de madeira como simulador de baixa fidelidade para reproduzir as etapas da medida indireta da pressão arterial no domicílio. Resultados: Após a estratégia educativa os hipertensos apresentaram maior proporção de acertos em relação ao preparo do ambiente, preparo do paciente e posicionamento do corpo. Conclusão: o uso de um simulador de baixa fidelidade teve impacto positivo na promoção do conhecimento sobre a técnica de medida indireta da pressão arterial no domicílio.

DESCRITORES: Pressão Arterial, Determinação da Pressão Arterial, Educação em Enfermagem, Materiais de Ensino, Simulação.

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INTRODUCTION

Arterial Hypertension (AH) is a chronic non-communicable disease and the main risk factor for the development of cardiovascular diseases. It is estimated that the disease affects 36 million people in Brazil, with control rates that do not exceed 35%. (AH) is a chronic non-communicable disease and the main risk factor for the development of cardiovascular diseases. It is estimated that the disease affects 36 million people in Brazil, with control rates that do not exceed 35%. [1]

The indirect measurement of blood pressure (BP) outside the office environment is recommended as a strategy for the diagnostic elucidation of AH and for the monitoring and control of pressure figures; it can be performed by the patient or person trained to do so, with validated and calibrated equipment, in a systematic and normative way. [2]

The Brazilian Guidelines on Arterial Hypertension – 2020 recommend that the indirect BP measurement procedure should be performed with a standardized technique, in a calm environment and at a pleasant temperature.[1] The patient must make sure that he has an empty bladder, that he has not practiced physical activity in the last hour, has not ingested alcohol or caffeine and that he has not used tobacco or tobacco in the last 30 minutes. Prior to the measurement, you should position yourself comfortably and relaxed in the chair, rest your body for 5 minutes, keep your legs uncrossed, your feet flat on the floor, your palm facing upwards and your arm free of clothing and at the height of the heart. [1]

Although performing the procedure at home is strongly recommended by national and international guidelines, the scarcity of studies on patient knowledge regarding the technique of indirect BP measurement highlights important gaps in health education and the need to develop and implement effective interventions, which can guarantee the proper execution of the technique and the attainment of reliable BP values. [3] It is noteworthy that the knowledge and understanding of the population about their disease is not always satisfactory, which is a point of difficulty for adherence to treatment or insertion of the user in their care plan, in order to avoid worsening and complications. It is up to health professionals, through teaching strategies, to propose activities that expand the knowledge of users. [4]

The use of simulation, as an integral part of active teaching-learning methodologies, has shown positive results in improving patients' knowledge about their disease, increasing therapeutic adherence, promoting quality of life and improving clinical outcomes. [3,5-7]

The low-fidelity simulator is a static prototype, less realistic, capable of partially representing the human anatomy and allowing the replication of the desired technique. When used as an educational strategy, it can collaborate with the acquisition of knowledge, the development of skills and the improvement of self-confidence in carrying out procedures. Simulators have been widely used in the training of professionals and students in the health area, as well as in the education of patients with chronic diseases who need to monitor their health condition and perform procedures at home. [8-10]

It is believed that the implementation of educational strategies using a low-fidelity simulator can contribute to improving the knowledge of hypertensive patients about the procedure for indirect BP measurement at home. This study aimed to evaluate the theoretical and practical knowledge about the technique of indirect blood pressure measurement performed by hypertensive patients at home before and after educational intervention with a low-fidelity simulator.

METHODS

This is a quasi-experimental study, of the before-and-after type, which evaluated the practical knowledge of patients with AH about the procedure of indirect BP measurement at home before and after the implementation of an educational intervention with a low-fidelity simulator. The convenience sample consisted of hypertensive patients over 18 years of age, approached by the main researcher of the study in the waiting room of the health center, at the time before the medical appointments. Patients who had already participated in any other teaching strategy on BP measurement, regardless of their habit of measuring blood pressure at home, were excluded.

The study was developed in a Family Health Strategy Unit, located in the city of Ribeirão Preto, in the state of São Paulo, from January to June 2016. Approved by the Ethics Committee for Research with Human Beings, at the University of São Paulo at Ribeirão Preto College of Nursing, under opinion 0971/2008, according to Resolution 466/2012 of the National Health Council.

In the study protocol, a data collection form, developed by Santos, AS 2014, [11] was used for the socio-demographic and clinical characterization, already used in another study aimed at the residential measurement of BP, consisting of the following items: gender, age, education, profession, marital status, habit of measuring BP, place where the measurement is performed (at home or health service) and reported medical diagnosis of AH. The evaluation of the indirect measurement of BP was carried out through the questionnaire entitled "Practical knowledge about the indirect measurement of blood pressure" developed and validated by Machado, JP 2014. [12] This questionnaire aims to measure the knowledge of the indirect measure of BP among health professionals; it is composed of 49 items, with 14 items focused on patient preparation and environment, 8 items on the patient's position, 16 items on the indirect BP measurement procedure and 8 items on the recording of BP values. It is a validated tool that includes all the steps necessary to perform the procedure correctly and evaluates the participant through three answer options: yes, no and not applicable. Items three (3), six (6) and 10 to 23 were selected for this study, as they are related to the steps "patient preparation and environment" and "patient position", considered essential to perform the technique at home (Chart 1).

Chart 1. Description of items 3,6 and 10-23 of the questionnaire "Practical knowledge about indirect measurement of blood pressure" [12]

PREPARO DO PACIENTE E AMBIENTE
3. Prover ambiente calmo e silencioso
6. Orientar o paciente para não conversar durante a medida
10. Certificar-se de não haver bexiga cheia
11. Certificar-se de não haver prática de exercícios físicos 60 minutos antes
12. Certificar-se de não haver ingestão de bebidas alcoólicas 30 minutos antes
13. Certificar-se de não haver ingestão de café ou alimentos 30 minutos antes
14. Certificar-se de não haver fumado 30 minutos antes
POSIÇÃO DO PACIENTE
15. Manter pernas descruzadas
16. Manter os pés apoiados no chão quando sentado
17. Manter dorso recostado na cadeira
18. Manter corpo relaxado
19. Remover roupas do braço para colocar o manguito
20. Posicionar o braço na altura do coração
21. Manter o braço apoiado
22. Manter a palma da mão voltada para cima
23. Manter o cotovelo ligeiramente fletido

The low-fidelity simulator consisted of a wooden dummy type, available for online purchase, with a size of 51 cm and articulation in the shoulders, elbows, hands, back, hips, knees and feet, also composed of a circular base of the same material, which serves as a support, also included in the simulation. (Figure 1) The choice of this doll was due to its low cost and easy transport to the health unit where the intervention was applied. The wooden dummy's joints allowed it to be positioned on a wooden chair with a height compatible with the support of the feet on the floor, legs uncrossed and the palm facing upwards.

To carry out the simulation, it was decided to develop an oscillometric device and a cuff made of fabric and Velcro, which allowed for the involvement of 40% of the length and 80% of the width of the doll's arm. For the simulation of the device, A4 paperboard and white glue, manufactured material of its own elaboration, were used. (Figure 1). Illustrative boards were also created containing information on the preparation of the environment and the patient prior to the performance of the BP measurement technique – keep the environment calm, have an empty bladder, rest for at least five minutes, wait 30 minutes when you have performed physical activity or having consumed beverages with caffeine or alcohol. (Figure 2)

Figure 1- Low-fidelity simulator, in the shape of an articulated wooden puppet. Ribeirão Preto, 2016

Figure 2 – Illustrative plates containing information about the preparation of the environment and the patient prior to the BP measurement technique. Ribeirão Preto, 2016.

The educational intervention was designed by the study researchers and validated by five experts in AH and indirect measurement of BP, who evaluated the strategy developed in terms of its semantics, syntax, appearance and content. The validation of the strategy took place during a research meeting, when the experts evaluated the study objectives, compliance with the strictness of the BP measurement protocol and the manufactured product (wooden doll, wooden chair, fabric BP device , tissue cuff and illustrative plates) for eligibility and clarity.

The patient was invited to participate in the study and, if accepted, underwent an educational intervention, lasting approximately 20 minutes; period in which he was instructed about the objectives, risks and benefits of the study, and asked to sign the Informed Consent Form (ICF). The individual approach took place during the pre-consultation at the cardiology clinic, where he was asked about the self-reported diagnosis of AH, the habit of measuring BP at home and whether he had already undergone any educational intervention at the unit. The participant who met the study inclusion criteria was asked about their sociodemographic data and asked to demonstrate how they performed the positioning of their body and arm during the BP measurement procedure at their home using the low-fidelity simulator. The participant was also asked to choose the illustrative plates that he/she deemed necessary for the preparation of the environment before taking the BP measurement.

The educational intervention was designed by the study researchers and validated by five experts in AH and indirect measurement of BP, who evaluated the strategy developed in terms of its semantics, syntax, appearance and content.

In the pre-intervention period, the data collection instrument was completed by the main researcher of the study while observing the positioning of the doll and the participant's choice of illustrative plates. After this step, a verbal orientation guided by the data collection checklist and carried out by previously trained researchers was exposed to the study participants. The intervention was conducted together with the prototype positioning and explained item by item for the entire sample. Such intervention strictly followed the recommendations of the Brazilian Guidelines on Home Blood Pressure Monitoring (HBPM) and the Brazilian Guidelines on Hypertension. [1,2] In the post-intervention period, the scenario was dismantled and the researcher evaluated the participant using the same steps as the pre-intervention procedure.

The data obtained in the data collection instrument were entered into a database, entered into the Microsoft Office Excel program with double typing, and analyzed in the SPSS program, version 22. Descriptive variables were analyzed using absolute and relative frequencies, and the McNemar test was used to compare participants' knowledge before and after the educational intervention. The significance level adopted was 5% (α= 0,05).

RESULTS

The study included 30 patients diagnosed with AH, mean age of 58 years, mostly female (76,7%), with different levels of education and predominance of incomplete elementary school (50,0%). Table 1 shows the characteristics of the participants regarding gender, education and the habit of measuring BP.

Table 1- Characterization of participants regarding gender, education and habit of measuring blood pressure (N= 30), Ribeirão Preto, Brazil, 2016.

CHARACTERISTICS OF PARTICIPANTS	N	%
Sex		
Female	23	76,7
Male	7	23,3
Education		
Complete Elementary School	3	10,0
Incomplete Elementary School	15	50,0
Complete High School	4	13,3
Incomplete High School	8	26,7
Habit of measuring BP		
Yes	27	90,0
No	3	10,0

N= number of participants; BP: Blood Pressure

Table 2- Frequency of correct answers by participants in items 10-14 of the questionnaire "Practical knowledge about the indirect measurement of blood pressure", in the pre- and post-intervention periods (N=30), Ribeirão Preto, Brazil, 2016.

QUESTIONNAIRE ITEMS	PRE-INTERVENTION		POST-INTERVENTIONS		P VALUE*
	N	%	N	%	
Provide calm and silent environment	18	60,00	26	86,67	0,008
Advise not to talk during the measurement	22	73,33	28	93,33	0,016
Make sure there is no full bladder	18	60,00	26	86,67	0,021
Make sure there is no physical exercise 60 min before	21	70,00	27	90,00	0,070
Make sure there is no alcohol intake 30 minutes before	13	56,67	27	90,00	0,000
Make sure there is no ingestion of coffee or food 30 min before	12	40,00	26	86,67	0,000
Make sure they haven't smoked 30 minutes before	12	40,00	28	93,33	0,000

* Note: P value McNemar test

Table 3- Frequency of correct answers by participants in items 15-23 of the questionnaire "Practical knowledge about the indirect measurement of blood pressure", in the pre- and post-intervention periods (N=30), Ribeirão Preto, Brazil, 2016.

QUESTIONNAIRE ITEMS	PRE-INTERVENTION		POST-INTERVENTIONS		P VALUE*
	N	%	N	%	
Keep legs uncrossed	27	90,00	30	100,00	0,250
Keep their feet flat on the floor when sitting	21	70,00	28	93,33	0,016

Table 2 shows the frequency of correct answers by participants in the pre- and post-intervention periods, when evaluated on the "patient preparation and environment" stage.

Table 3 shows the frequency of correct answers by the participants, in the pre- and post-intervention periods, when evaluated on the "patient position" stage.

The results showed that none of the study participants performed the steps of the procedure with 100% correct answers before the educational intervention. Of the 27 participants who reported the habit of measuring BP outside the office environment, six performed the procedure properly, with 100% correct answers, in the post-intervention period.

DISCUSSION

This study aimed to assess the practical knowledge of hypertensive patients about the procedure of indirect BP measurement at home, before and after the implementation of an educational intervention with a low-fidelity simulator.

Obtaining reliable BP values through indirect measurement involves essential steps that guide the procedure to be performed in a standardized and safe manner, as recommended by national and international guidelines. [1,2,13] Evidence from the literature has shown that both students and health professionals, with long training and practical experience, face difficulties in carrying out the procedure due to the mechanization of care and lack of knowledge and skills about the technique. [8,14-16] Educational interventions that use teaching-learning strategies have been developed, in care and academic environments, in an attempt to overcome the weaknesses found in the implementation of the measure. The results of these interventions showed that the use of educational games and a realistic simulation environment contributed to the development of technical skills, to the establishment of safe practices and to the promotion of

Keep their backs leaning on the chair	11	63,33	27	90,00	0,000
Keep the body relaxed	8	26,67	28	93,33	0,000
Position the arm at heart level	6	20,00	27	90,00	0,000
Keep your arm supported	8	26,67	27	90,00	0,000
Keep the palm facing up	15	50,00	27	90,00	0,000
Elbow flexed	12	40,00	28	93,33	0,000

* Note: P value McNemar test

professional knowledge. [11,12] When analyzing the patient's knowledge about AH, regardless of education level, studies revealed that hypertensive patients know essential information about the disease and the reference values for the control of blood pressure figures, however, they are unaware of the complications and problems of AH, as well as its implications for cardiovascular health. [17,18]

The measurement of BP at home is intended to contribute to the monitoring and control of AH. The acquisition of automatic oscillometric devices has been increasingly recommended for residential use, since these devices are portable, easy to use, low cost and can be easily found in pharmacies, medical-surgical supply houses and virtual stores. Oscillometric devices have pre-programmed algorithms that automatically calculate BP values accurately, in addition to allowing the storage of BP and heart rate values in consecutive measurements. The use of such devices for health monitoring among the elderly has been increasing lately, even though there is no training for its better use and obtaining reliable values. [11-19]

The results of the present study showed that the knowledge of hypertensive patients about the indirect BP measurement procedure significantly improved after the application of the educational intervention, in all variables analyzed, referring to "patient preparation and environment" and "patient position ". It is believed that the use of a low-fidelity simulator has allowed greater interest by the subjects in the teaching-learning process, given the easy handling of the wooden doll, the possibility of technique repetition and the approach of the technique with aspects of reality.

The acquisition of automatic oscillometric devices has been increasingly recommended for residential use, since these devices are portable, easy to use, low cost and can be easily found in pharmacies, medical-surgical supply houses and virtual stores.

Health education is the field of several experimental and quasi-experimental studies, which propose to compare the effect of interventions with different teaching-learning strategies and methods, such as: educational videos, telephone monitoring, educational booklets, educational games, software and health apps. Teaching through simulation is a teaching-learning strategy that encourages decision-making in the face of situations experienced by the user, expanding contact and knowledge with the problem at hand. The transmission of knowledge to patients has a high impact when associated with educational strategies that include the active methodology, as they show positive effects to increase users' confidence in conflict resolution and knowledge acquisition. [11,20,21]

The results presented in this study proved that the implementation of an educational strategy using a low-fidelity simulator can improve the knowledge of hypertensive patients regarding the correct performance of the residential BP measurement. Furthermore, they can contribute to the control of SAH, thus helping to prevent the health of its users. [17,22]

CONCLUSION

The implementation of an educational strategy using a low-fidelity simulator proved to be effective in promoting practical knowledge about the technique of indirect BP measurement at home among hypertensive patients. The limitations of this research are related to the small number of participants and the use of a convenience sample from a single health center, which makes it impossible to generalize the results obtained. Furthermore, the research is cross-sectional and does not allow for further assessment of

the practical knowledge acquired by patients. In this context, we suggest the development of experimental, prospective studies, with representative samples, using simulators that can be used in different healthcare environments.

It is believed that the application of innovative teaching-learning strategies, with low cost and easy transport, can contribute to health education, self-care management and the control of blood pressure values among hypertensive patients. ■

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