

VASOACTIVE DRUGS: KNOWLEDGE OF THE NURSING TEAM

DROGAS VASOATIVAS: CONHECIMENTO DA EQUIPE DE ENFERMAGEM

DROGAS VASO-ACTIVAS: CONOCIMIENTO DEL EQUIPO DE ENFERMERÍA

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Objective: to evaluate the knowledge of the nursing team about the administration of vasoactive drugs. **Method:** descriptive, cross-sectional and quantitative study, carried out with 119 nursing professionals in seven intensive care units. A sample characterization card was used to collect data, and an instrument with 14 multiple-choice questions was developed to evaluate the knowledge about the preparation, installation and maintenance of vasoactive drug infusion. The instrument was applied in the months of June and July of 2015. In the analysis of the means of the answers obtained in the evaluations, a score equal or superior to 5.0 was considered satisfactory. **Results:** the averages were 6.6 (± 1.6 SD) for nursing assistants, 6.7 (± 1.6 SD) for nursing technicians and 7.8 (± 1.0 SD) for nurses. **Conclusion:** the nursing team of the studied units has knowledge about the administration of vasoactive drugs.

Descriptors: Patient Safety. Vasoactive drugs. Intensive care unit. Nursing. Knowledge.

Objetivo: avaliar o conhecimento da equipe de enfermagem sobre a administração de drogas vasoativas. Método: estudo descritivo, transversal e quantitativo, realizado com 119 profissionais de enfermagem em sete unidades de terapia intensiva. Para a coleta de dados, foi utilizada uma ficha para caracterização da amostra e foi desenvolvido um instrumento contendo 14 questões de múltipla escolha que avaliavam o conhecimento sobre o preparo, a instalação e a manutenção da infusão das drogas vasoativas. O instrumento foi aplicado nos meses de junho e julho de 2015. Na análise das médias das respostas obtidas nas avaliações, foi considerada satisfatória uma nota igual ou superior a 5,0. Resultados: as médias foram de 6,6 (dp $\pm 1,6$) para os auxiliares de enfermagem, 6,7 (dp $\pm 1,6$) para os técnicos de enfermagem e 7,8 (dp $\pm 1,0$) para os enfermeiros. Conclusão: a equipe de enfermagem das unidades estudadas possui conhecimento sobre a administração de drogas vasoativas.

Descritores: Segurança do Paciente. Drogas Vasoativas. Unidade de Terapia Intensiva. Enfermagem. Conhecimento.

Objetivo: evaluar el conocimiento del equipo de enfermería sobre la administración de drogas vaso-activas. Método: estudio descriptivo, transversal y cuantitativo, realizado con 119 profesionales de enfermería en siete unidades de terapia intensiva. Para la recolección de datos, fue utilizada una ficha para caracterización de la muestra y fue desarrollado un instrumento conteniendo 14 preguntas de múltiple elección que evaluaban el conocimiento sobre la preparación, la instalación y la mantenimiento de la infusión de las drogas vaso-activas. El instrumento fue aplicado en los meses de junio y julio de 2015. En el análisis de las medias de las respuestas obtenidas en las evaluaciones, fue considerada satisfactoria una nota igual o superior a 5,0. Resultados: las medias fueron de 6,6 (dp $\pm 1,6$) para los auxiliares de enfermería, 6,7 (dp $\pm 1,6$) para los técnicos de enfermería y 7,8 (dp $\pm 1,0$) para los enfermeros. Conclusión: el equipo de enfermería de las unidades estudiadas posee conocimiento sobre la administración de drogas vaso-activas.

Descriptorios: Seguridad del Paciente. Drogas Vaso-activas. Unidad de Terapia Intensiva. Enfermería. Conocimiento.

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Introduction

In 1999, the Institute of Medicine of the United States published the book "To Err is Human", which reported an estimative of 44 to 98 thousand annual deaths resulting from health care-related errors. These numbers have called the attention of the media and the population to issues on patient safety⁽¹⁾. As a consequence, the World Alliance for Patient Safety was launched in 2004 and developed programs and guidelines to contribute to strategies that could change the world scene with regard to patient safety within health institutions⁽²⁾.

In Brazil, in 2010, the Regional Council of Nursing of São Paulo and the Brazilian Network of Nursing and Patient Safety developed a booklet listing the ten main steps that professionals must follow to avoid undesirable outcomes at patient care: correct identification, correct catheter and probe connections, clean and safe care, safe surgery, safe administration of blood and blood components, patient involvement with the own safety, prevention of falls, prevention of pressure ulcers, effective communication, and safety in the use of technology⁽³⁾.

In 2013, the Brazilian Ministry of Health and the National Health Surveillance Agency instituted the National Patient Safety Program, which aims to contribute to the qualification of health care in all health facilities throughout the national territory. To achieve this, they developed six protocols aimed at improving the care-related processes: patient identification, pressure ulcer prevention, safe surgery, hand hygiene practice, prevention of falls and safety in prescription, use and administration of medications⁽⁴⁾.

It is observed that the administration of drugs has been approached by different organs and instances due to the high degree of complexity of the actions and the sequelae that can be caused in cases of mistakes in this process⁽⁵⁻⁷⁾. In order to avoid the occurrence of these events, the duties and responsibilities of professionals must be formally described and understandable to all those involved in the process, as the administration of medicines

requires that professionals have knowledge of basic principles, so that they may exercise this activity effectively⁽⁸⁾. Continuing training of these professionals is essential to ensure the quality and safety of patient care⁽⁹⁾.

Vasoactive drugs (VAD) are among the most widely used medications in Intensive Care Units (ICUs), since they help patients to correct hemodynamic instability. Inadequate administration of these drugs may lead to serious and often irreversible side effects⁽¹⁰⁾. These events are directly related to the management, individual and team work processes, the environment and the accomplishment of tasks⁽¹¹⁾.

Considering that medication errors are currently one of the main adverse events with hospitalized patients⁽⁷⁾ it is essential that nursing professionals has a broad view of its responsibility when it comes to preparing, administering and maintaining medication⁽¹²⁾, the objective of the present study is to evaluate the knowledge of the nursing team about the administration of vasoactive drugs.

Method

The study has descriptive and cross-sectional nature and quantitative approach and was carried out in seven ICUs from three health institutions in the countryside of the state of São Paulo, Brazil. The institution A is private and large and has a mixed ICU, i.e. Neonatal ICU (NICU) and Pediatric ICU (PICU), with 14 beds, and two Adult ICUs (AICU) – one general and one specialized – with 10 beds each. The institution B is public, a reference in maternal and child care in the municipality and the region, and has a medium-sized NICU with 10 beds, a PICU with 6 beds and a general AICU with 6 beds. The institution C is private and small and has only one general AICU with 6 beds.

Professionals who met the following inclusion criteria were invited to participate in the study: to belong to the nursing team, whether a nurse, nursing technician or nursing assistant, and to

work in one of the units described for more than three months. Professionals who were on leave and on vacations were excluded. All eligible professionals (170) were invited to participate in the study and the final sample was composed of 119 nursing professionals.

For data collection, a sample characterization card and an instrument with 14 multiple-choice questions were used. The characterization form evaluated personal (age, gender, marital status) and professional data (function, time of professional experience, unit of work, work shift, working time in the institution, working time in the unit and two questions about participation in training on vasoactive drugs).

The instrument was created by the researchers and had 14 questions regarding the concept, preparation, installation, maintenance and effects of infusion of VAD. Specific questions about the action and preparation of dopamine, dobutamine, noradrenaline and sodium nitroprusside were included because the most widely used VAD were. Nitroglycerin was not considered because

it is not used in approximately 90% of the studied units. For each question, the participant could choose between four alternative answers, but only one was correct.

For validation, the instrument was submitted to content validation by calculating the Content Validity Index (CVI), which represents the percentage of judges' agreement with the evaluated content and has a minimum recommended value of 0.80⁽¹³⁾. To do this, the instrument was validated by a committee composed of five judges: a master nurse specialized in pediatrics, three master nurses and specialized in adult intensive care, and one PhD specialized in adult intensive care.

In the evaluation of the CVI, 100% of approval by the judges was obtained for the questions 1, 4, 5, 6, 13 and 15; 80% for the questions 9, 10, 11 and 12; 60% for the questions 2, 7 and 8; and 40% for the questions 3 and 14. For this reason, the questions 2, 3, 7, 8 and 14, which had a CVI of less than 0.8, were modified as described in the Chart 1.

Chart 1 – Modifications made in the data collection instrument after the judges' evaluation
(to be continued)

Question	Original version	Version after the judges' evaluation
2	How do vasoactive drugs, depending on their specifics, act in the body? a) They <i>increase</i> blood pressure b) They <i>decrease</i> blood pressure c) They <i>improve</i> the contraction force of the heart	What are the effects of vasoactive drugs on the body? a) They <i>can increase</i> blood pressure b) They <i>can decrease</i> blood pressure c) They <i>can improve</i> the contraction force of the heart
3	If the infusion of a vasoactive drug is abruptly interrupted <i>to prepare a new dose</i> , this <i>can cause</i> hemodynamic instability in the patient. <i>These changes can be</i> : a) <i>Elevation</i> of blood pressure b) <i>Decrease</i> of blood pressure	If the infusion of a vasoactive drug is abruptly interrupted, this <i>can cause</i> hemodynamic instability in the patient, <i>these changes can be</i> : a) <i>Alteration</i> of blood pressure b) <i>Alteration in the contraction force of the heart</i>
7	What is the action of Noradrenaline in the body?	What is the main effect of Noradrenaline in the body?
8	What is the effect of Sodium nitroprusside (NIPRIDE) on the body? a) <i>Vasodilator</i> , used as antihypertensive b) <i>Vasoconstrictor</i> , used as antihypertensive	What is the effect of Sodium nitroprusside (NIPRIDE) on the body? a) <i>Potent vasodilator</i> , used as antihypertensive b) <i>Potent vasoconstrictor</i> , used as antihypertensive

Chart 1 – Modifications made in the data collection instrument after the judges' evaluation
(conclusion)

Question	Original version	Version after the judges' evaluation
14	<p>Patient keeps central venous access of double lumen type, <i>but</i> is receiving continuous infusion of <i>various</i> vasoactive drugs, sedative agents and <i>has medical prescription of several intravenous drugs</i>. <i>What is the correct way to administer the prescription?</i></p> <p>a) Temporarily interrupt the infusion of vasoactive drugs and <i>perform the medications through this route</i></p> <p>b) Maintain the infusion of vasoactive drugs through the double lumen catheter and <i>use one of the routes</i> to perform medications and volume expansions</p>	<p>Patient keeps central venous access of double lumen type, is receiving continuous infusion of vasoactive drugs, sedative agents and <i>several intravenous medications with scheduled administration regimens</i>. <i>What is the correct way to administer the prescribed medications in this patient?</i></p> <p>a) Temporarily interrupt the infusion of vasoactive drugs and <i>perform the medication through the central venous access</i></p> <p>b) Maintain the infusion of vasoactive drugs through the double lumen catheter and <i>use the other route</i> to perform medications and volume expansions</p>

Source: Created by the authors.

At the end of this procedure, the instrument was submitted to a pre-test with ten professionals (nurses, nursing technicians and nursing assistants of a AICU that was not part of the study sites of this research), in order to detect errors, evaluate if the questions and answers were understandable and also the practical aspects of the application, such as the average time required to complete the instrument. As a result of this step, an average time of 10.5 minutes was found for filling the instrument, and no change was suggested by participants. The final version of the instrument is in the Appendix A of this article. In the clarity aspect, 90% agreed with the easiness to understand the questions of the instrument and 100% referred easiness to select the answers.

Data collection was performed by one of the researchers in the months of June and July of 2015. For the accomplishment of this step of the research, the names of the professionals of each institution were obtained by consulting the work schedules provided by the nursing managers. Participants were individually approached in the units in which they carried out their activities. The objectives of the research were explained, and those who agreed to participate signed the Informed Consent Term (ICT). After signing

the term, the participants received an envelope containing the characterization form and the instrument to evaluate the knowledge about administration of VAD. The researcher stood next to the participants, waiting for them to respond to the questionnaires, to make sure participants would make any consultation.

Data were tabulated in the Excel for Windows 8® software and analyzed by a statistical professional in the *Statistical Package for Social Sciences* (SPSS) version 20.0. For data analysis, the absolute and relative frequencies of categorical variables and measures of position and dispersion of continuous variables (mean and standard deviation) were calculated.

Considering that it is necessary to obtain an average of 5.0 or more for approval in most colleges and technical schools in Brazil, this was the criterion adopted as a cut-off point to classify knowledge as satisfactory (equal or higher To 5.0) or unsatisfactory (less than 5.0).

The Mann-Whitney and Kruskal-Wallis tests were used to compare the mean scores obtained in the participants' evaluation on categorical variables. The Spearman correlation test was used to correlate the means of the scores with continuous variables. The significance level of 5% ($p < 0.05$) was adopted for statistical tests.

The research complied with national and international standards of research ethics involving human subjects and obtained approval from the Ethics Committee (CAAE 43079515.6.0000.5412).

Results

The sample consisted of 119 nursing professionals, mostly female (111 – 93.3%),

nursing technician (84 – 70.6%) and working in the AICU (60 – 50.4%). The mean age of the participants was 36.4 years (SD = 10.5 years), time of professional experience of 7.5 years (SD = 6.1 years), working time in the institution of 4.2 (SD = 5.6 years) and in the unit of 2.3 years (SD = 3.5 years). The other variables are shown in Table 1.

Table 1 – Distribution of characterization variables of the sample. Jundiaí, São Paulo, Brazil, 2015. (N=119)

Variables	n	%
Marital status		
Married	61	51.3
Single	39	32.8
Divorced	12	10.1
Separated	1	0.8
Widow/widower	1	0.8
Other relationships	5	4.2
Working shift		
Morning	32	26.9
Afternoon	24	20.2
Night	60	50.4
Intermediate or temporary	3	2.5
Function		
Nursing assistant	7	5.9
Nursing technician	84	70.6
Nurse	8	6.7
Specialist nurse	20	16.8
Working unit		
General ICU	45	37.8
Especialized ICU	15	12.6
Neonatal ICU	45	37.8
Pediatric ICU	14	11.8

Source: Created by the authors.

Table 2 shows the scores obtained by the different professional categories in the evaluation of knowledge about VAD administration.

Table 2 – Distribution of the mean and standard deviation of the scores obtained by professional category in the evaluation on VAD administration. Jundiaí, São Paulo, Brazil, 2015. (N=119)

Professional category	Mean	Standard deviation
Nursing assistant	6.6	1.6
Nursing technician	6.7	1.6
Nurse	7.8	1.0

Source: Created by the authors..

Regarding the questions about presentation, preparation, installation and maintenance of vasoactive drugs, the results are described in Table 3.

Table 3 – Distribution of participants' correct answers to the questions of the instrument. Jundiaí, São Paulo, Brazil, 2015. (N=119)

Questions	Correct answers	
	n	%
How should a vasoactive drug be administered?	117	98.3
What is the main effect of Noradrenaline in the body?	109	91.6
What is the presentation of Nipride?	89	74.8
What is the presentation of Dopamine?	88	73.9
If the infusion of a vasoactive drug is abruptly interrupted to prepare a new dose, this can cause hemodynamic instability in the patient. These changes can be:	85	71.4
What is the presentation of Noradrenaline?	85	71.4
What is the effect of Dobutamine on the body?	84	70.6
How do vasoactive drugs, depending on their specificities, act in the body?	83	69.7
What is the presentation of Dobutamine?	82	68.9
Patient keeps central venous access of double lumen type and receives continuous infusion of vasoactive drugs, sedative agents and several intravenous medications with scheduled administration regimens. What is the correct way to administer the prescribed medications in this patient?	78	65.5
What are the three expected effects of Dopamine in the body?	77	64.7
What are vasoactive drugs?	73	61.3
What is the effect of sodium nitroprusside (Nipride) on the body?	71	59.7
Sodium nitroprusside (Nipride) is a drug that requires some care in the preparation and administration.	43	36.1

Source: Created by the authors.

Of the total number of professionals involved in the research, 85 (71.4%) stated that they had not received training on vasoactive drugs prior to the start of their ICU activities and 72 (60.5%) reported having received no training on the subject even after starting their activities.

In the correlations of the scores obtained by participants on the variables studied, the only significant differences were related to time of professional experience ($p = 0.033$), working time in the institution ($p = 0.006$) and in the unit ($p = 0.043$).

Discussion

As in other studies conducted with ICU nursing professionals, the results of this research also indicated predominance of women, which is compatible with research on the profile of ICU professionals in the North, Northeast, West and Southeast regions of the country (14). The supremacy of the female gender in nursing is typical of the profession itself, justified by its historical formation process⁽¹⁵⁾.

It was found that most nursing professionals were nursing technicians, followed by nurses and nursing assistants. These results differ in part from a research outlining the profile of Brazilian nursing, which revealed that the largest contingent of nursing professionals corresponds to nursing assistants, but the Brazilian legislation⁽¹⁶⁾ in force recommends that nurses and nursing technicians only should compose ICU teams. Therefore, finding assistants performing their functions in these units is a fact that generates surprise and deserves attention.

When comparing the results found with those of other researchers, similarities were identified with regard to the majority of nurses having post-graduation. This finding may be linked to the fact that technological advances and high complexity of the demand, as well as the increasing availability of undergraduate nursing courses in Brazil, has contributed to increase the availability of these professionals in the labor market⁽¹⁷⁾.

All professional categories reached averages greater than 5.0, demonstrating that they have

satisfactory knowledge about the evaluated subject. Considering that VAD are very specific drugs used in severe and hemodynamically unstable patients, usually within an intensive and highly invasive care environment, professionals who handle these medications are expected to have an effective knowledge of their indications, actions, adverse effects, preparation and administration, so that they provide more individualized and, above all, qualified assistance⁽¹⁰⁾. Considering the above, a reflection must be considered: when thinking about the complexity of patients and intensive care settings, should not greater averages than those obtained have been found?

Considering that nursing professional categories perform functions with different levels of complexity, it is expected that nurses present better performance in the evaluation of knowledge when compared to other categories, especially considering that the test applied was exactly the same for all participants^(10,18).

Regarding the administration of VAD, it was found that most of the professionals in the sample had not received training before or after starting their activities in the ICU. However, it was observed that in 13 of the 14 questions evaluated, the majority of the sample achieved correct results, which shows that the experience time assists in the acquisition of knowledge. In spite of this, employer institutions should be committed to continuous training⁽¹⁹⁻²⁰⁾.

The qualification of professionals through specific training promotes the acquisition of motor and intellectual skills, as well as greater development of strategies and attitudes, making them more competent and effective in performing their tasks in the environment⁽²¹⁾, as well as providing a evidence-based care that contributes to improved quality of care and patient safety.

It should be emphasized that further research must be carried out in order to compare several intensive care units and try to establish cut-off scores that correspond to the minimum knowledge necessary for a safe operation within ICU settings.

Conclusion

The results allowed concluding that the nursing team of the present research has satisfactory knowledge about the process of administration of vasoactive drugs.

The relevance of this study comes from the provision of an instrument that can be used to guide training strategies of nursing teams, both in the integration processes of newly integrated professionals and in permanent education programs, as a way of implementing evidence-based care that best guarantees the safety of professionals and patients during the administration of vasoactive drugs.

Collaborations

1. conception, design, analysis and interpretation of data: Orlando de Jesus Rodrigues Júnior and Renata Cristina Gasparino;
2. writing of the article and relevant critical review of intellectual content: Orlando de Jesus Rodrigues Júnior and Renata Cristina Gasparino;
3. final approval of the version to be published: Renata Cristina Gasparino.

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Appendix A - Instrument for assessment of knowledge on administration of vasoactive drugs

1. What is a vasoactive drug?
 - a) These are medicines that have an effect on the cardiological system

- b) These are medicines that have an effect on the pulmonary system
- c) These are medicines that have an effect on the peripheral vascular system
- d) All are correct
2. What are the effects of vasoactive drugs on the body?
- a) They can raise blood pressure
- b) They can lower blood pressure
- c) They can improve the contraction force of the heart
- d) All are correct
3. If the infusion of a vasoactive drug is abruptly interrupted, this can cause hemodynamic instability in the patient. These changes can be:
- a) Change in blood pressure
- b) Change in the contraction force of the heart
- c) Change in the heart rate
- d) All are correct
4. How should a vasoactive drug be administered?
- a) Through a macro drop device
- b) Through a micro drop device
- c) Through infusion pump
- d) All are correct
5. What are the three possible effects of Dopamine in the body?
- a) Increases splenic circulation, increases blood pressure, decreases the contraction force of the heart
- b) Increases splenic circulation, does not alter blood pressure, increases the contraction force of the heart
- c) Increases splenic circulation, increases blood pressure, increases the contraction force of the heart
- d) All are correct
6. What is the action of Dobutamine on the body?
- a) Increases cardiac output and supply of oxygen to tissues
- b) Decreases cardiac output and increases supply of oxygen to tissues
- c) Increases cardiac output and decreases supply of oxygen to tissues
- d) All are correct
7. What is the main effect of Noradrenaline in the body?
- a) Increases blood pressure
- b) Decreases blood pressure
- c) Decreases heart rate
- d) All are correct
8. What is the action of sodium nitroprusside (Nipride) on the body?
- a) Decreases cardiac output and supply of oxygen to tissues
- b) Potent vasodilator, used as antihypertensive
- c) Potent vasoconstrictor, used as antihypertensive
- d) All are correct
9. What is the presentation of Dopamine?
- a) Ampoule containing 2 ml
- b) Ampoule containing 4 ml
- c) Ampoule containing 10 ml
- d) Ampoule containing 20 ml
10. What is the presentation of Dobutamine?
- a) Ampoule containing 2 ml
- b) Ampoule containing 4 ml
- c) Ampoule containing 10 ml
- d) Ampoule containing 20 ml
11. What is the presentation of Noradrenaline?
- a) Ampoule containing 2 ml
- b) Ampoule containing 4 ml
- c) Ampoule containing 10 ml
- d) Ampoule containing 20 ml
12. What is the presentation of sodium nitroprusside (Nipride)?
- a) Ampoule containing 2 ml
- b) Ampoule containing 4 ml
- c) Ampoule containing 10 ml
- d) Ampoule containing 20 ml
13. Sodium nitroprusside (Nipride) is a drug that requires some care in the preparation and administration. In this case, check the correct alternative

a) It must be diluted in SS and the infusion should be maintained under photo sensitivity protection

b) It can be diluted in SS or GS and infused under photo sensitivity protection

c) It must be diluted in GS and infused under photo sensitivity protection

d) It can be diluted in SS or GS and infusion can be maintained without photo sensitivity protection

14. Patient keeps central venous access of double lumen type and receives continuous infusion of vasoactive drugs, sedative agents and several intravenous medications with scheduled administration regimens. What is the correct way to administer the prescribed medications in this patient?

a) Maintain the infusion of vasoactive drugs through the double lumen catheter and the medications through peripheral access

b) Temporarily interrupt the infusion of vasoactive drugs and perform the medications through central venous access

c) Maintain infusion of vasoactive drugs through one of the dual lumen catheter channels and use the other route to administer the medications and perform volume expansions

d) Maintain the infusion of vasoactive drugs through the dual lumen catheter and perform medications simultaneously through the same route, as it will not change the infusion of the drugs being infused by a continuous infusion pump