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# CUIDADO É FUNDAMENTAL

UNIVERSIDADE FEDERAL DO ESTADO DO RIO DE JANEIRO • ESCOLA DE ENFERMAGEM ALFREDO PINTO

RESEARCH

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## Caracterização dos pacientes em uso de drogas vasoativas internados em unidade de terapia intensiva

Patients' characterization in use of vasoactive drugs hospitalized in intensive care unit

Caracterización de los pacientes en uso de drogas vasoactivas internados en unidad de cuidados intensivos

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## ABSTRACT

**Objective:** to characterize the patients hospitalized in the intensive care unit (ICU) in the use of vasoactive drugs (VAD). **Method:** a retrospective study with a quantitative approach. The sample is comprised by 85 patients admitted to the ICU of a municipal hospital, in Fortaleza, Ceará. Data collection was conducted in March and April 2011 through consultation of the nursing report. **Results:** prevalence of female patients (55.3%), with age average of 70 years. The most common diagnosis was stroke (29.4%), followed by lung disease (23.5%). It is noteworthy that 89.4% required invasive mechanical ventilation, 98.9% used a nasogastric tube and 92.9% an urinary catheter, 92.9% used central venous access and 90.6% had antibiotic treatments. Regarding blood pressure, only 4.9% showed normal readings; noradrenaline was the most used VAD (67.1%), followed by dopamine (35.3%). Regarding evolution, 64.7% patients died. **Conclusion:** the patient in severe condition shows specificities in care that require particular knowledge of the nursing staff, in order to achieve a quality assistance.

**Descriptors:** Patients; Catecholamines; Intensive Care Units.

## RESUMO

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**Objetivo:** caracterizar o paciente internado em Unidade de Terapia Intensiva (UTI) em uso de drogas vasoativas (DVA). **Métodos:** estudo descritivo, retrospectivo, abordagem quantitativa, com 85 pacientes internados na UTI de um hospital municipal, em Fortaleza-Ceará. Coleta dos dados realizada em março e abril de 2011 pela consulta ao relatório de enfermagem. **Resultados:** 55,3% eram do sexo feminino, com média de idade de 70 anos. O diagnóstico mais comum foi o acidente vascular encefálico (29,4%), seguido das pneumopatias (23,5%); 89,4% necessitaram de suporte ventilatório invasivo, 98,9% usaram sonda nasogástrica, 92,9% sonda vesical de demora, 92,9 % utilizaram acesso venoso central e 90,6% fizeram uso de antibióticos. Quanto aos níveis pressóricos, apenas 4,9% apresentaram normalidade; a noradrenalina foi a DVA mais utilizada (67,1%), seguida da dopamina (35,3%); 64,7% evoluíram para óbito. **Conclusão:** o paciente grave apresenta especificidades que exigem conhecimento da equipe de enfermagem para uma assistência de qualidade.

**Descriptores:** Pacientes; Catecolaminas; Unidades de Terapia Intensiva.

## RESUMEN

**Objetivo:** caracterizar a los pacientes hospitalizados en Unidad de Cuidados Intensivos (UCI) que hacían uso de DV. **Métodos:** estudio descriptivo retrospectivo, cuantitativo, con 85 pacientes ingresados en la UCI de un hospital municipal, en Fortaleza, Ceará. Recolección de datos realizada en marzo y abril de 2011 consultando a los informes de enfermería.

**Resultados:** prevaleció el sexo femenino (55,3%) y media de edad de 70 años. El diagnóstico más frecuente fue accidente cerebrovascular (29,4%), seguido por neumopatías (23,5%); 89,4% requirieron ventilación mecánica invasiva, 98,9% utilizó sonda nasogástrica y 92,9% catéter urinario; 92,9% utilizó el acceso venoso central y el 90,6% tomaba antibióticos. En cuanto a [no conozco a expressão] la presión arterial, sólo el 4,9% la tenían normal, siendo la noradrenalina la DV más utilizada (67,1%), seguido por la dopamina (35,3%); 64,7% fallecieron. **Conclusión:** el paciente grave presenta particularidades importantes que exigen el conocimiento del equipo de enfermería para prestar asistencia de calidad.

**Descriptores:** Pacientes; Catecolaminas; Unidades de Cuidados Intensivos.

## INTRODUCTION

Intensive care unit (ICU) is an inpatient service for critically ill patients with decompensation on one or more organ systems, which require medical assistance and permanent nurse care. This unit provides support and intensive care with continuous monitoring, 24-hour surveillance, as well as specific equipment and technologies for the diagnosis and therapeutic treatment.<sup>1</sup>

The nurses working in ICU must have knowledge regarding the possible hemodynamic changes in patients, as well as the therapeutic modalities and nursing care essential to them.

From the identification of the worsening of the patient's condition, characterized by changes in sensory and other signs due to organ dysfunction, the nurse must work alongside the doctor and the other members of the nursing team to reverse or mitigate the severity of the situation of the patient.

Commonly used in severe patients that show significant hemodynamic changes, vasoactive drugs (VAD) are of unexceptional use in the ICU, thus the need of accurate knowledge of its pharmacokinetics and pharmacodynamics, from which derives the success or failure of its use.<sup>2</sup>

The introduction of vasoactive agents to the treatment of patients with serious perfusion disorders aims to rectify cardiovascular changes, in order to restore the supply of oxygen and nutrients to the tissues, rebalancing this supply to the metabolic demands.<sup>1</sup>

Knowledge about the pharmacological properties of these drugs by the nursing staff is essential, especially the nurse, because this is the professional responsible for the coordination of the team, with responsibility related to complications in its use.

The VAD represent very specific drugs that cause an ample range of effects in critically ill patients, thus, its use require actual knowledge by the person who will handle it, since any failure can cause harmful complications to the patient rather than its hemodynamic improvement. Many errors are likely to occur due to the need of further betterment regarding the indications, effects, adverse effects and preparation of these drugs.

Nursing practice in ICU, in which the administration of drugs is one of the most important activities, these errors occur and are not always valued by the nursing staff. Vasoactive drugs occupy an important place in the therapeutic armamentarium of patients in the ICU, and the exact knowledge of its mechanisms of action, dosages, and proper use is critical to its correct use.<sup>3</sup>

Patients using the VDA are hemodynamically unstable, due to complications of various diseases, being important the knowledge of their profile, which will enable the development of a targeted assistance to their specific needs.

Thus, the study aimed to characterize the patient hospitalized in ICU using VAD and the specific objectives are: to outline the clinical and epidemiological profile of the patient hospitalized in ICU submitted to the use of VAD; to identify the main diagnoses related to therapy with these drugs; and to collect data on the main vasoactive drugs used by the ICU patient.

## METHODS

Descriptive, retrospective study with a quantitative approach, developed in the ICU of a hospital in the municipal health network, located in Fortaleza, Ceará.

The population was all patients admitted to the ICU from January to November 2010 submitted to the use of VAD. The inclusion criteria were established as patients admitted to the ICU in the period and using at least one vasoactive drugs during their stay in the unit. Exclusion criteria were illegibility or gaps in information about the patient contained in the nursing report.

During this period, 156 patients were admitted to the ICU, 71 (45.51%) did not use vasoactive drugs and 85 (54.49%) used at least one drug during the period in the unit. Thus, 85 patients were part of the sample.

Data were collected in March and April 2011, using a structured questionnaire containing sociodemographic data and data related to the patient's medical history. Such information has been raised from the nursing report.

The results were organized into a database in Excel and subjected to statistical analysis, focusing on the absolute and relative frequency, being exposed in tables.

All ethical principles contained in Resolution 196/96, which recommends standards for research with human beings<sup>4</sup>, were followed. The project was approved by the Ethics Committee of Hospital São José Infectious Diseases, under the Protocol 05/2011, and the management of nursing reports was authorized by the ICU nursing coordinator, with guaranteed anonymity regarding the identity of the participants, and the use of data only for scientific purposes.

## RESULTS

The age group of the patients prevailed from 77 to 98 years old, 36 patients (42.3%) represented an average of 70 years old. More than half of patients, 47 (55.3%) were female. Among the diagnoses that determined the patient's stay in the ICU, the most prevalent was cerebrovascular accident (CVA), with 25 patients (29.4%), followed by lung disease with 20 (23.5%) and heart disease with 12 (14.2%). Complications in the immediate postoperative period (POI) and sepsis were also present in seven patients each (8.2%). Other diagnoses were identified, with 14 patients (16.5%), including liver disease, diabetes mellitus, meningoencephalitis, perforated duodenal ulcer, and rectal tumor exogenous intoxication, megaloblastic anemia, and brain tumor.

The use of invasive ventilator supports to patients, and the use of support for food was investigated in the study, as shown in Table 1.

**Table 1:** distribution of patients according to the use of invasive ventilator support and food support. Fortaleza 2011

Variables	N	%
<b>Invasive ventilator support</b>		
Endotracheal probe	46	54.1
Tracheostomy	30	35.3
None	09	10.6
<b>Food support</b>		
Nasogastric tube	77	90.6
Nasogastric probe	02	2.4
Total parenteral nutrition	05	5.9
None	01	1.1
<b>Total</b>	<b>85</b>	<b>100</b>

It is observed that 76 patients required invasive ventilator support, and 46 (54.1%) used an endotracheal Probe (EP) and 30 (35.3%) underwent a tracheostomy, probably after the use of EP for a certain period. It is important to note that only nine (10.6%) did not use this kind of support.

Regarding the food support, the vast majority of patients, corresponding to 77 (90.6%) used a nasogastric probe (NP), two (2.4%) used a nasogastric probe (NGP) and five (5.9 %) required total parenteral nutrition (TPN). Only one patient (1.1%) had no need for food support, being fed orally.

Other aspects of the study were the need for catheterization bladder delay by patients and urine volume as shown in Table 2.

**Table 2:** distribution of patients by the use of indwelling urinary catheter and urine output. Fortaleza 2011

Variables	N	%
<b>Use of indwelling urinary catheter</b>		
Yes	79	92.9
No	06	7.1
<b>Urine output</b>		
Satisfactory	34	40
Anuria	20	23.5
Polyuria	18	21.2
Oliguria	13	15.3
<b>Total</b>	<b>85</b>	<b>100</b>

Almost all patients (79, 92.9%) used the urinary catheter delay (UCD) to control diuresis, while six (7.1%) did not use it. As for the urine output, 40 (34%) had satisfactory debt. On the other hand, data showed some alterations in urinary output, anuria was identified in 20 patients (23.5%), polyuria in 18 (21.2%) and oliguria in 13 (15.3%).

Patients in the ICU, when using vasoactive drugs require the use of deep access. Thus, the number of patients needing this device was raised, as well as changes in blood pressure and blood sugar levels.

**Table 3:** distribution of patients according to the use of central venous access, blood pressure, and blood sugar levels. Fortaleza 2011

Variables	N	%
<b>Central venous access</b>		
Yes	79	92.9
No	06	7.1
<b>Blood pressure</b>		
Normal	04	4.7
Elevated	12	14.2
Low	45	52.9
Unstable	24	28.2
<b>Blood sugar levels</b>		
Normal	56	65.9
Elevated	27	31.8

Variables	N	%
<b>Central venous access</b>		
Low	02	2.3
<b>Total</b>	<b>85</b>	<b>100</b>

It was found that 79 patients (92.9%) used a central venous access (CVA), while only six patients (7.1%) did not use it. In the case of blood pressure levels, 45 (52.9%) showed reduction, and 24 (28.2%) showed instability, situations that may have indicated the need for the use of VAD. It is noteworthy that only four patients (4.7%) maintained their normal blood pressure levels. About blood glucose rates, 56 patients (65.9%) showed normal rates, 27 (31.8%) showed high rates and 2 (2.3%) showed low rates.

When observed the most VAD used, noradrenaline was highlighted being used by 57 patients, followed by dopamine with 30 and dobutamine with 26. The sodium nitroprusside was used by 16 patients and nitroglycerin by six. It is important to emphasize that most patients, 65 (76.4%) used at least one drug for 10 days, 17 (20%) between 11 and 30 days and one patient (1.17%) for more than 90 days.

Finally, it was explored the hospital stay of patients in the ICU and clinical outcome, described below in Table 4.

**Table. 4:** distribution of patients according to the period of stay in the ICU and the clinical evolution. Fortaleza, 2011

Variables	N	%
<b>Hospitalization</b>		
1 to 10	34	40.0
11 to 30	31	36.47
31 to 60	16	18.82
61 to 90	03	3.52
+ than 90 days	01	1.17
<b>Evolution</b>		
Death	55	64.0
Transfer of inpatient unit	24	28.2
Transfer to other institution	06	7.1
<b>Total</b>	<b>85</b>	<b>100</b>

The data shows that 34 patients (40%) remained hospitalized for ten days, followed by 31 patients (36.47%) between 11 and 30 days, and 16 (18.82%) between 31 to 60 days. Only one patient (1.17%) remained in the ICU for more than 90 days. It is noteworthy that the average number of days of hospitalization was 43.7. Most patients, 55 (64.7%) died. On the other hand, 24 (28.2%) were transferred to the inpatient unit of the institution and six patients (7.1%) to other institution.

## DISCUSSION

Concerning the age, the patients focused on the research were predominantly 77-98 years old, presenting an average

of 70 years old. This reality is linked to the fact that the elderly represent the population who gets ill and has higher risks of complications relating to the physiological changes of age, and complications of underlying diseases, which leads them to require intensive care.

The demand of the elderly for care in critical units tends to happen because the aging population, especially in developing countries, has been the subject of discussions in the areas of planning and health policies, given that the Brazilian statistical projections indicate that the elderly population will increase in the coming decades.<sup>5</sup>

As to gender, there was a predominance of females, corroborating the study on the functional impact of hospitalization of elderly patients.<sup>6</sup>

The most common medical diagnosis was stroke, followed by lung disease and heart diseases, which may be associated with the predominance of the elderly population, which presents risk factors for the development of these diseases, such as hypertension and diabetes mellitus.

It was identified in a survey on morbidity and mortality of hospitalized elderly in ICU that cardiovascular disorders (29.2%) and respiratory (21.5%) followed by neurological disorders (17.7%) justified the referral of patients to the ICU.<sup>7</sup>

More than half of patients used invasive mechanical ventilation during the hospitalization period in the unit, either by tube or by tracheostomy probe (TP).

The ventilator support is the breathing method that uses a mechanical generator to increase or fully meet or most of the air flow requirements of the patient, often used to treat patients with acute respiratory insufficiency or chronic worsened.<sup>1</sup>

It should be noted that all patients with TP (tracheotomy probe) necessarily require the use of support for nutritional therapy, as they will have a deficit of the swallowing function, which may explain the fact that most patients have used some means for feeding other than the oral route, including the NTP.

Nutritional therapy is a key part of the care provided to critically ill patients due to scientific evidence prove that the nutritional status directly affects the clinical outcome. The malnourished patient more easily evolves with infection, taking longer to heal, requiring greater care and remaining hospitalized longer in the hospital and the ICU.<sup>8</sup>

The feeding probe is provided to meet the nutritional requirements when oral intake is inadequate or is not possible, and the gastrointestinal tract is functioning normally. Parenteral nutrition is a method for providing nutrients to the organism by intravenous and is indicated when oral failure intake and hypercatabolic situations occur.<sup>9</sup>

Another important factor in the study was focused on the use of bladder catheterization delay and measurement of urinary output, it is noticeable that almost all the patients used SVD for strict control of diuresis. It is appropriate to point out that the critical patient is hemodynamically unstable and may have caused a reduction in renal blood flow, leading to

serious dysfunction of this body and thus changing the urine volume. However, there were no significant changes about urinary output.

The use of central venous access was also explored and was found that 92.9% of patients used it. The purpose of the central catheter is varied and involves the administration of fluids, blood, NPT, chemotherapeutic drugs, drugs that cause sclerosis of peripheral veins, hemodynamic monitoring and hemodialysis.<sup>8</sup>

Therefore, it should be noted that many patients in the ICU show instability in blood pressure or potential for alterations, related to a base pathology or its complications. Thus, it is important to maintain a larger size access due to the necessity of the use various drugs and the infusion of large volumes.

It is worth noting that vasoactive drugs must be administered through a central access because of their pharmacological properties. Noradrenaline, Dopamine and dobutamine must be administered through a central catheter, and the insertion site must be evaluated carefully, since, in the case of leakage of drugs, local necrosis can occur.<sup>10</sup> The infusion of these drugs must be carefully planned by the nursing staff, avoiding large fluctuations in plasma levels.<sup>11</sup>

Patients in intensive care may have serious instability of one or more major physiological systems or high risk of instability of these systems, in a way that fluctuations of blood pressure are fairly common. In this study, this fact is confirmed with the data obtained, as only 4.7% maintained their normal blood pressure levels.

Blood glucose levels of patients were evaluated, considering that some drugs can cause major changes in the body, for example, the possibility of alteration in blood glucose levels generated by the use of adrenaline.

Among the many effects of adrenaline, it raises the glucose concentrations in the blood as a result of increased gluconeogenesis and inhibition of insulin secretion.<sup>2</sup> Norepinephrine also has a component capable of changing glucose levels in the blood, as is the direct precursor of epinephrine. The catecholamines binding to the α two receptors, more specifically norepinephrine, cause the inhibition of insulin release in the body, which justifies the increase in blood glucose of the patient using this drug.<sup>10</sup>

Despite this statement, most patients had normal blood glucose levels, there has also been identified a rise in blood sugar levels (31.8%) and a small percentage of low levels (2.4%).

The vasoactive drug most used was noradrenaline, followed by dopamine and dobutamine, respectively, and the average use of these drugs were of 18 days.

Vasoactive drugs act directly on the cardiovascular system, presenting highly variable therapeutic response for each patient, which determines the period of its use. Thus, it is required of the nursing staff special attention and strict care during preparation and administration of these drugs.

There was a priority relationship between the use of norepinephrine in patients with hypotension, followed by dopamine. Patients with unstable blood pressure also used noradrenaline and dobutamine. Those who had their blood pressure increased used drugs such as sodium nitroprusside and nitroglycerin.

Norepinephrine is an adrenergic agonist of non-selective direct action, it is therefore, an important vasopressor used in hypotensive patients as long as they are not hypovolemic, and may be used in conjunction with dopamine in these cases. Dopamine is a metabolic precursor of norepinephrine also used in situations of hypotension, and according to the dose used, it can have positive inotropic effects or general vasoconstriction, similar to the effects of noradrenaline. Dobutamine, on the other hand, is a synthetic catecholamine capable of producing a very beneficial hemodynamic effect, it is also indicated for the treatment of hypotension associated with low cardiac output.<sup>10</sup>

Sodium nitroprusside is a nonselective nitrovasodilator with dose-dependent effect used in hypertensive crisis and congestive heart failure, causing a slight increase in heart rate and an overall reduction in myocardial oxygen demand. Nitroglycerin is also classified as a nitrovasodilator used in pressure situations that cause relaxation of most smooth muscle leading to a drop in systemic blood pressure.<sup>1</sup>

In the study, it was found that 40% of patients remained hospitalized between 1 to 10 days, with an average hospitalization of 43 days. About evolution, it was found that 64.5% patients died, resembling the previous study on the severity of patients admitted to the ICU; it was found that 32.7% of patients died.<sup>7</sup>

The severity of the disease presented by the patient directly influences their length of stay in ICU and his evolution. This may be combined with the profile of patients composed of elderly people with chronic diseases, which contributes to the complication and aggravation of the condition.

## CONCLUSION

The ICU is a place intended for treating critically ill patients who present hemodynamic instability, on the cause of that, these patients undergo invasive procedures that require various apparatus for life maintenance, as well as an intensive pharmacological treatment aiming at an effective recovery.

Regarding age, there was a predominance of elderly patients, which contributed to a significant rate of days of hospitalization as well as a higher prevalence of deaths. The most frequent diagnosis was CVA, as well as lung and heart disease, diseases common to the elderly.

Considering hemodynamic instability and, hence, reduced oxygen demand of the patients, the majority required invasive ventilator support, also leading to the use of NGP due to the impossibility oral feeding. Almost all used UCD, justified by the need for strict control of diuresis and

the possibility of significant renal complications leading to changes in your urine output, which associated with the use of vasoactive drugs such as noradrenaline is common.

The use of central venous access was noticed in almost all the patients, which is to stress the importance of care of the administration of vasoactive drugs because they can lead to complications if infused into peripheral access.

The vasoactive drug most used was noradrenaline, followed by dopamine and dobutamine, a fact directly related to changes in blood pressure levels of patients. The average use of these drugs was of 18 days, according to the response of the patient to the treatment.

The characterization of ICU patients, as well as the insight of the nursing team on them is critical to quality care, giving that this unit gathers a heavy arsenal of technology and complex procedures, requiring of the nurse an affinity with these situations. The VDA are widely used in this environment by actively participating in the regulation of vital bodily functions.

In some institutions the routine preparation of these drugs is a particular to the nurse, a fact that should be highlighted, as these drugs can cause major complications, requiring in-depth knowledge of their mechanism of action and adverse effects, as well as decision-making capacity guided by scientific knowledge.

It is expected that the study will contribute to the improvement and adoption of care by the nursing staff directed to the specificities of critically ill patients, thus contributing to reducing the incidence of complications and helping in the recovery of these patients.

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