



## ATTITUDE OF NURSES AND PREDISPOSITION TO OCCURRENCE OF ADVERSE EVENTS IN INTENSIVE CARE UNITS

### ATITUDE DOS ENFERMEIROS E PREDISPOSIÇÃO DA OCORRÊNCIA DE EVENTOS ADVERSOS EM UNIDADE DE TERAPIA INTENSIVA

### ACTITUDES DE LOS ENFERMEROS Y PREDISPOSICIÓN DE LA APARICIÓN DE EVENTOS ADVERSOS EN UNIDAD DE TERAPIA INTENSIVA

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#### ABSTRACT

**Objective:** to evaluate the attitudes of nurses towards conditions that may predispose to the occurrence of adverse events in the ICU. **Method:** exploratory, analytical, descriptive, cross-sectional study with quantitative approach performed in six high complexity ICUs of general and teaching hospitals using a convenience sample of 128 nurses. **Results:** nearly 48% of participants had low perception of risk factors that could predispose to the occurrence of adverse events. There was a significant difference in the attitude of nurses working in public and philanthropic organizations ( $p < 0.01$ ). **Conclusion:** the evidence of predominant low perception among specialists points to the need to include the discussion of adverse events and quality of nursing care in the program of undergraduate Nursing courses, and post-graduations in intensive care. **Descriptors:** Patient Safety; Nursing Care; Intensive Care Units; Adverse Events; Attitude.

#### RESUMO

**Objetivo:** avaliar as atitudes dos enfermeiros perante condições que podem predispor à ocorrência de eventos adversos em UTI. **Método:** estudo exploratório, analítico, descritivo, de corte transversal, de abordagem quantitativa, realizado em seis UTI de alta complexidade de hospitais gerais e de ensino, que utilizou amostra de conveniência, composta por 128 enfermeiros. **Resultados:** cerca de 48% possuíam uma baixa percepção dos fatores de risco que poderiam predispor à ocorrência de eventos adversos. Houve diferença significativa na análise da atitude dos enfermeiros que trabalhavam nas organizações públicas em relação às filantrópicas ( $p < 0,01$ ). **Conclusão:** a evidência dessa baixa percepção de forma predominantemente entre especialistas aponta para a necessidade de inclusão nos currículos de graduação em Enfermagem e pós-graduação em terapia intensiva da discussão sobre eventos adversos e a qualidade do cuidado de enfermagem. **Descritores:** Segurança do Paciente; Cuidados de Enfermagem; Unidades de Terapia Intensiva; Eventos Adversos; Atitude.

#### RESUMEN

**Objetivo:** evaluar las actitudes de los enfermeros sobre las condiciones que pueden predisponer a la aparición de eventos adversos en UTI. **Método:** estudio exploratorio, analítico, descriptivo, de cohorte transversal, de enfoque cuantitativo, realizado en seis UTI de alta complejidad de hospitales generales y de enseñanza que utilizó muestra de conveniencia, compuesta por 128 enfermeros. **Resultados:** cerca de 48% poseían una baja percepción de los factores de riesgo que podrían predisponer a la aparición de eventos adversos. Hubo diferencia significativa en el análisis da actitud de los enfermeros que trabajaban en las organizaciones públicas en relación a las filantrópicas ( $p < 0,01$ ). **Conclusión:** la evidencia de esa baja percepción de forma predominantemente entre especialistas apunta para la necesidad de inclusión en los currículos de graduación en Enfermería y post-graduación en terapia intensiva de la discusión sobre eventos adversos y la calidad del cuidado de enfermería. **Descriptors:** Seguridad del Paciente, Cuidado de Enfermera; Unidades de Cuidados Intensivos; Eventos Adversos; Actitud.

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## INTRODUCTION

When quality of care is defined as "the extent to which the care provided achieves the most favorable balance between risks and benefits"<sup>1</sup>, the possibility of failure is implied, represented by the risk of the occurrence of adverse events. This can be defined as "*unfavorable clinical occurrences that result in death, risk of death, hospitalization or prolongation of a pre-existing hospitalization, or significant, persistent or permanent disability*".<sup>2</sup>

Data from the World Health Organization indicate that health errors affect one in ten patients worldwide and that "the most important knowledge in the field of patient safety is the best way to prevent harm during treatment and care"<sup>3</sup>. The severity of clinical/surgical conditions and the hemodynamic instability of patients associated to the large number of invasive procedures expose individuals to a greater risk of adverse events.

Thus, quality of Nursing care in Intensive Care Units (ICU) is needed to guarantee patient safety. The occurrence of adverse events interferes negatively with the expected outcome. These events may compromise the patient's life, affect length of hospital stay, trust in the staff, and increase expenses related to care.

Some studies have used adverse event as indicator of outcome to evaluate the quality of ICU nursing care<sup>4-9</sup>. However, a better contextualization regarding aspects related to labor conditions and labor specialization (structure indicator) in addition to assistance/guideline protocols (process indicator) is necessary<sup>1</sup>, as well as the risks and benefits arising from the fallibility of the human being when providing care.<sup>10</sup>

Such fallibility may originate from different perceptions that nurses have about the structural conditions and care protocols in ICUs (processes), which may influence their attitudes and predispose to the occurrence of adverse events. In the context of this work, attitude consists in a disposition for a given action or omission that directly influences the quality of the care provided by the nurse in the ICU.<sup>11</sup>

Thus, the present study sought to answer the following question: what are the attitudes of nurses towards factors that may predispose to the occurrence of adverse events in ICUs?

## OBJECTIVE

- To evaluate the attitudes of nurses towards factors that may predispose to the occurrence of adverse events in ICUs.

## METHOD

An exploratory, analytical, descriptive, cross - sectional study with quantitative approach was carried out in six highly complex ICUs of general and teaching hospitals, specifically three public hospitals and three philanthropic hospitals located in the city of Salvador, Bahia. The choice of these ICUs was guided by the following criteria: predominant service to patients from the Unified Health System - SUS and patients who are clients of health insurance companies, and prominent attention to teaching and research.

The initial project of the study was population-based. The limited number of public and philanthropic ICUs in the city of Salvador which agreed to participate in the study, though, and also the multiple employment relationship of nurses working in these units, associated with the frequent impossibility of participating in the research, led to the need of using a convenience sample.

A Scale of Predisposition to the Occurrence of Adverse Events (SPAЕ) was used for data collection<sup>11</sup>. This scale was prepared to assess the level importance that nurses give to structure and process aspects (ideal level), as well as their perception of the existence of these aspects in their work environment (real level), which may compromise the quality of ICU nursing care (Figure 1), using adverse event (AD) as outcome indicator. A Likert-type scale containing five response levels was used, ranging from totally disagree to totally agree.

Dimension: Structure		Ideal	Real
1.	Standardization of solutions and dilution of drugs available		
Dimension: Process		Ideal	Real
2.	Identification of patients through bracelet and plaque in bed		

Figure 1. Example of SPAЕ items. Salvador (BA), Brazil.

The SPAE contains 46 items grouped in two dimensions (12 items in the structure dimension and 34 items in the process dimension). Its content was validated through analysis techniques of judges and semantic analysis, and the construct validity was checked through Component Analysis. The reliability of the SPAE was<sup>12</sup> based on the Cronbach's alpha, which indicated good reliability for both dimensions (structure = 0.796, process = 0.919)<sup>13</sup> by showing a good correlation (internal consistency) between the different items, based on results of the psychometric analysis.

The collection was performed through a survey, during the working hours of the professionals using a structured and self-applied instrument. Regarding the planning of data collection, instructions for completing the scale were given only after collection of socio-demographic data, in a way that would favor the correct interpretation of the assessment.

Because the SPAE consisted of two polytomic (graduated) and parallel (ideal and real) scales for each item, the first step was to ordering the items according to the two different scales. The next step was to build the variables dif\_est\_“x” (x= 1 to 12) and dif\_proc\_“x” (x= 13 to 46), for items of the structure and process scales, respectively, representing the difference of the results between the ideal and the real for each of the items of the approaches. In this way, the total scores could be obtained for each individual through the sum of the scores of each item.<sup>14</sup>

In order to standardize the procedures for correction, punctuation and attribution of meaning to the scores obtained<sup>15</sup> and to allow the comparison between scores of the same individual at different times or, among different people regarding a certain

characteristic, the SPAE was standardized. This methodological step involved the development of criteria to interpret the results obtained. This step made it possible to attribute meaning to the scores and allowed to determine the position that this meaning has in the trait measured by the test that produced such score.

In order to establish the performance standards (cut-off points) of the SPAE, an intra-group norm<sup>16</sup> based on the classical test theory (CTT) was used. To allow the assessment of individual performance in terms of group performance, three percentage ranges were defined. The mean value obtained by the difference between the ideal and the real scales (MEAN\_Dif\_est and MEAN\_Dif\_proc) was used to define percentage ranges. The analysis of the result of these variables determines the attitude of nurses (Atitude\_Enf) towards conditions that may predispose to adverse events.

Values associated to percentage ranges were then defined from the accumulated frequency of this variable. Therefore, values below the 50th percentile represent low perception about the conditions that may predispose to the occurrence of adverse events; values between the 50th and 75th percentiles indicate a fair perception, and values above the 75th percentile, a high perception (Figure 2).

Dimension structure		
Level	Percentile	Score
Low perception	< 50	<1.33
Fair perception	50 ≤ x ≤ 75	≥ 1.33 <2
High perception	x > 75	≥ 2
Dimension process		
Level	Percentile	Score
Low perception	< 50	< 1.41
Fair perception	50 ≤ x ≤ 75	≥ 1.41 < 1.91
High perception	x > 75	≥ 1.91

Figure 2. Percentage ranges of SPAE standardization. Salvador (BA), Brazil, 2015.

If a nurse obtains a score lower than 1.33 for the structure items in the assessment of attitude towards factors that may predispose to the occurrence of adverse events in ICUs, this shows that this nurse has a low perception of the structural conditions that predispose to

the occurrence of adverse events during nursing care in intensive care units. On the other hand, a professional who obtains a score equal or higher than 2 for this approach presents a high perception of these conditions and may contribute with proactive attitudes

that imply the adoption of a culture focused on patient safety in ICUs.

Analysis of variance (ANOVA) was used to analyze the relationship between the means of socio-demographic indicators and the mean of the difference between the ideal and the real scales for each item of the studied dimensions (Atitude\_Enf), followed by the Tukey test. This procedure also verifies the accuracy of results and tests the hypothesis of the research ( $H_1$ ) when determines the impossibility of its occurrence by chance. The next step was to use the *t test* to check the difference between the means of the interval variables in relation to the attitude of nurses, considering a level of significance of 0.01 ( $p < 0.01$ ).

The SPSS 18<sup>®</sup> was used to carry out all these tests. Results were presented in tables built in Microsoft Excel<sup>®</sup> and, later, contextualized based on the three possible approaches to quality assessment proposed by Avedis Donabedian.<sup>1</sup>

The research project was submitted for evaluation by the Ethics Committee of the Federal University of Bahia, Protocol n<sup>o</sup> 14/2011 - FR 412506, and was approved without restriction and all participants signed an Informed Consent (IC).

## RESULTS

Socio-demographic characterization of the 6 ICUs and of the 128 Nurses who participated in the study is presented in the Table 1.

Table 1. Socio-demographic characterization of nurses and ICUs. Salvador (BA), Brazil, 2015.

Nature of the ICU (n = 128)	%	Time elapsed after training (n = 128)	%
Public	49.2	1 to 2 years	8.7
Philanthropic	50.8	2 to 4 years	20.5
Sex (n = 128)	%	4 to 6 years	22.0
Men	9.4	6 to 8 years	20.5
Women	90.6	More than 8 years	28.3
Age (n = 128)	%	Academic training (n = 128)	%
20 to 30 years	33.6	Graduation	7.8
30 to 40 years	49.2	ICU Specialist	43.7
40 to 50 years	17.2	Residency in ICU	18.8
Employment bond (n = 128)	%	Specialization/incomplete residency in ICU	7.0
State Statutory	29.1	Other specialty	18.0
Federal Statutory	8.7	Master	4.7
Hired	52.8	Professional experience (n = 128)	%
Temporary	5.5	1 to 2 years	11.0
Hired and Statutory	3.9	2 to 4 years	20.5
Work shift (n = 128)	%	4 to 6 years	22.0
Morning (M)	7.9	6 to 8 years	15.7
Afternoon (A)	0.8	More than 08 years	30.8
Night (SN)	16.7	Professional fatigue (n = 128)	%
Morning and Afetrnoon (MA)	34.1	Slightly exhausting	14.2
Afternoon and Night	0.8	Very exhausting	85.8
Morning, afternoon and night	34.9		
Morning, night	4.8		
		Descriptive statistics (n = 128)	
	Mean	SD	Mean
Nurses per shift	4.03		Number of beds
Weekly working hours	38.43		6,08
			Number of bonds
			0,57

The analysis of attitude of nurses (Atitude\_Enf) regarding factors that may predispose to the occurrence of adverse events in ICUs revealed that 62 (48.8%) professionals had low perception in relation to the structure dimension, 29 (26%) had an fair perception and 32 (25.2%) had high perception. Regarding the process dimension, 61 (48%) professionals had low perception, 31 (24.4%) had fair perception and 35 (27.6%) had high perception.

The analysis of variance showed that attitude of nurses (Atitude\_Enf) was not significantly different between sexes regarding the structure ( $t [125] = 0.347$ ,  $p = 0.729$ ) and process ( $t [125] = 0.220$ ,  $p = 0.826$ ) dimensions. This was also observed in relation to the age group (structure:  $F [2.124] = 0.189$ ,  $p = 0.828$ , process:  $F [2.124] = 0.239$ ,  $p = 0.788$ ).

There were no significant differences in the attitude of nurses when compared the number

of employment bonds, in neither of the studied dimensions (structure:  $F [3.122] = 0.847$ ,  $p = 0.471$ , and process:  $F [3.122] = 0.996$ ,  $p = 0.397$ ). However, nurses in public organizations have a significantly higher *Atitude\_Enf* mean in the process ( $X = 1.81$ ,  $SD = 0.65$ ) and structure ( $X = 1.82$ ,  $SD = 0.67$ ) dimensions than nurses in philanthropic organizations (structure:  $X = 0.96$ ,  $SD = 0.57$ ,  $t [125] = 7.839$ ,  $p < 0.001$ , process:  $X = 1.02$ ,  $SD = 0.62$ ;  $T [125] = 7.037$ ,  $p < 0.001$ ).

There was a significant relationship between the nurses' working hours and the process dimension ( $F [7.118] = 4.347$ ,  $p = 0.001$ ), but the same did not happen with the structure dimension ( $F [7.118] = 1.845$ ,  $p = 0.085$ ). However, it was not possible to identify which groups differed because one group had less than two cases and, thus, there were no degrees of freedom to run the test.

The attitude of nurses was not influenced by time since graduation in the structure dimension ( $F [4.121] = 1.953$ ,  $p = 0.106$ ), but there were differences in the process dimension ( $F [4.121] = 2.600$ ,  $p = 0.039$ ). However, there was a higher average perception of nurses in the process dimension for the range of 4 to 6 years ( $X = 1.59$ ,  $SD = 0.61$ ) compared to 1 to 2 years ( $X = 0.90$ ,  $SD = 0.75$ ,  $p < 0.041$ ).

As for academic training, the attitudes of nurses (*Atitude\_Enf*) did not show significant differences in the structure dimension ( $F [5.121] = 1.881$ ,  $p = 0.102$ ), but there were differences in the process dimension ( $F [5.121] = 2.414$ ,  $p = 0.040$ ). However, it was observed that nurses who were masters had higher level of perception ( $X = 1.86$ ,  $SD = 0.52$ ) of risk factors than nurses with specialization ( $X = 0.73$ ,  $SD = 0.73$ ,  $p < 0.043$ ).

As for time working in the ICU, this variable caused no significant differences in the attitude of nurses in the structure dimension ( $F [4.121] = 3.839$ ,  $p = 0.006$ ), but caused differences in the process dimension ( $F [4.121] = 2.688$ ,  $p = 0.034$ ).

As for the stress of professionals who work in the ICU, no significant differences were seen in the structure dimension ( $t [124] = -0.222$ ,  $p = 0.825$ ) neither in the process dimension ( $t [124] = 0.700$ ,  $P = 0.485$ ).

## DISCUSSION

The mean number of beds per nurse found in the study was<sup>17</sup> two patients per nurse, a value above the recommendation of the IOM, but this value is below ten beds per nurse, defined by RDC n° 26 - 2012 as the minimum

requirement for operation of ICUs<sup>18</sup>. However, because of the complexity of Nursing care provided in ICUs, this resolution that changed the RDC n° 07 - 2010, which set the proportion of eight beds per nurse (RDC n°7), is no longer adequate for the real need of critically ill patients, jeopardizing the safety of patients under the care of the nursing staff.

The predominance of the hired workers as labor bond, despite the proportional distribution of the sample among public and philanthropic ICUs, points to the outsourcing of SUS in a highly complex sector that provides essential services to the population.

The time elapsed since graduation and the professional training of nurses reflect, besides personal investment in qualification, the market demand for specialized and experienced professionals. This fact can be perceived through the improvement in the attitude of the nurses towards risk factors, from the 4 years of graduation. Academic training also represented an improvement in the perception of nurses regarding aspects related to safety and nursing protocols in the ICU. However, this was not the case in relation to the structure dimension.

Moreover, the evidence that nurses with longer time elapsed after graduation and who had higher education (master) have a greater perception of risk factors is in line with both the expectations of regulatory organizations and the demand of the market for experienced and qualified professionals. These aspects of professional competence might be related to the time required for the acquisition, development and maturation of professional skills necessary for working in ICUs<sup>19,20</sup>, besides involvement with the organization's safety culture<sup>7,21,22</sup>. This results in the adoption of proactive attitudes in the care of critical patients, resulting in a safer ICU nursing care and consequent implementation of overall quality care.

Based on the analysis of the weekly working hours per job, associated to the average number of jobs, there is a weekly accumulation of hours that can exceed 60 hours per week. This represents a risk for development of the syndrome of professional exhaustion or *burnout*, with consequent increased risk for occurrence of adverse events<sup>23-25</sup>. Such weekly working hours likely imply working periods of 24 continuous hours on at least one day of the week. This goes in the opposite direction of the recommendation that state regulatory bodies should prohibit any combination of workloads superior to 12

hours a day in order to reduce the possibility of error caused by fatigue.<sup>17</sup>

This excessive workload is pointed out as one of the most important aspects of the nursing work that represent threats to patient safety. The fatigue caused by long working hours may cause effects on human performance. Such effects can be even compared to the effects of intoxication with<sup>17</sup> ethyl, and can trigger the occurrence of adverse events. These factors have been related to *burnout* and dissatisfaction that result in high turnover, increased mortality for complications (*failure to rescue*), higher incidence of infections and adverse events.<sup>23,26</sup>

The low perception of risk factors evidenced by nurses working in philanthropic entities differs from the expected result. These organizations invest in the construction of a safety culture, even in the accreditation process. Thus, it was expected that this investment would lead to a change in the attitudes of nurses who work there.

It is also worth noting that, despite the significant number of professionals with specialization or residency in ICU, this did not caused an increase in the perception of the factors (structure and process) that may predispose to the occurrence of adverse events. Factors such as "standardization of solutions and dilution of drugs"; "availability of different colored equipment according to purpose"; and "availability of catheters, probes and syringes with devices that prevent incorrect connection or accidental disconnection" were not perceived by nurses as measures that contribute to the reduction of the occurrence of adverse events<sup>27</sup>. Failure to recognize the importance of these factors and what they represent to the safety of the care provided to ICU patients can result in attitudes that compromise the quality of nursing care and expose patients to the occurrence of adverse events. This fact raises doubts on to what extent this theme has been worked during the training of these post-graduate studies in the State of Bahia.

In the present study, the number of bonds and the analysis of professional stress did not represent a determining factor in the attitude of nurses towards conditions that can compromise the quality of care in ICUs. However, although no significant difference was found in these analyses, it is notable the fact that only about 1/4 of these professionals had high perception of the factors that may predispose to the occurrence of adverse events in ICUs for the two dimensions studied

and that 85% of these professionals considered ICU work very exhausting.

## CONCLUSION

The study of the attitudes of nurses working in ICUs towards factors that may predispose to the occurrence of adverse events, considering the quality of care as a balance between risks/benefits and considering the fallibility of the human being, represents a new perspective in the use of the adverse event as outcome indicator. Thus, the quality of ICU Nursing care becomes the product of ideal working conditions (structure and process) derived from national and international recommendations for promotion of ICU patient care quality and safety, and attitudes of intensive care nurses towards conditions that may predispose to the occurrence of adverse events (outcome indicator).

The fact that the nurses studied had low perception of factors that may predispose to the occurrence of adverse events during ICU Nursing care in the two dimensions studied may result in an increased risk for the occurrence of such events. The low perception of nurses opposes the proactive attitude that, according to an international policy aimed at consolidating a safety culture and associated with the adoption of a systemic approach to error, can result in more effective defensive measures that hinder the occurrence of adverse events.

The evidence of this low perception in a sample formed predominantly by specialists points to the need to include the discussion of adverse events, safety culture and quality of nursing care in the curricula of undergraduate Nursing courses and .post-graduations in intensive therapy.

The small population size, which generated a limited sample size (n = 128), is identified as a limitation of this study. One of the possible reasons for the limited number of nurses was the fact that these professionals work in more than one of the studied ICUs, what is indicated by multiple employment bonds (mean: 1.69). Furthermore, the sample size was hampered by the refusal to participate of a large philanthropic hospital, which had a significant number of nurses.

The difficulty of finding hospitals in the city of Salvador, based on established criteria that systematically report and monitor the occurrence of adverse events, can also be considered another limitation of this study, since it is impossible to compare the index of

adverse events in the context of ICU Nursing care and the attitude of nurses towards factors that may predispose to the occurrence of such events.

In order to broaden the understanding of the attitude of nurses towards the aspects of the structure and processes that may trigger the occurrence of adverse events during ICU Nursing care, it is necessary to apply the instrument (SPAEE) in other ICUs of both public and private hospitals, which have or not participated in accreditation processes, as well as in other states of Brazil.

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