Safety Culture: Clinical Characteristics and Prevention of Venous Catheter Infection in Critically Ill Patients

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Abstract: *To evaluate the clinical characteristics of critically ill patients and decision-making for safety culture in the face of the prevention of infections related to the use of venous catheters. Documentary study in 104 medical records of intensive care patients. A form was used with identification data, clinical characteristics, and actions associated with the catheter. Descriptive statistical analysis. Females predominated, aged > 60 years (45.7%), with Systemic Arterial Hypertension (42.0%), 91.3% used a type of central venous catheter, being semi-implanted (88.5%) using antibiotics (92.0%), due to lung disorders (40%) and genitourinary (33%). Catheters remained from 1 to 7 days (30.7%), 22.1% had suspected bloodstream infection with positive blood culture. It was concluded that the safety culture was identified with weaknesses in the prevention of infection. Elderly with chronic disease, under antibiotic, with catheter removal within 7 days, with suspected infection and positive blood culture, predominated.*

Keywords: Intensive Care Unit; Patient Safety; Catheter-Related Infections; Critical Care

1. Introduction

Patient safety is a subject widely discussed by health agencies. And this focuses primarily on adverse events (AE) that occur frequently in health services. When referring to patients in critical situations, they may be related to a flawed care process, to the increase in length of stay in the Intensive Care Unit (ICU), and to excessive workload [1],[2].

According to the National Health Surveillance Agency, patient safety can be defined as reducing the risks of causing unnecessary harm to patients to the minimum acceptable. In addition to considering the care strategies that the service can offer, professional knowledge, the technologies employed, among other factors [3].

While the safety culture can be defined as a set of values, attitudes, perceptions, competencies, and patterns of individual and group behavior that determine the style, proficiency, and commitment of managing a healthy and safe organization, replacing guilt and punishment with the opportunity to learn from failures and improve attention [4].

It is worth noting that professionals are inevitably able to make mistakes during the care provided. However, an ethical and transformative posture is expected, which primarily seeks the excellence of safe care provided to its clientele.

For this reason, we have been working to promote the culture of patient safety, to mitigate adverse events in hospitalized patients, through the motivation of learning and notification is considered an important tool for health surveillance and the management of health services. Among the most frequent AEs related to nursing care are: administration of intravenous drugs and fluids; patient fall; skin lesions and cases of infection related to health care, especially to bloodstream infections associated with the use of venous catheters [1],[5].

Bloodstream infections (BSI) are multifactorial and present the presence or absence of positive blood culture, systemic signs of infection, presence or absence of primary focus of origin, presence or absence of vascular access, type of access, involvement, and the possibility of removal, local signs of catheter infection [8].

Given the above, the BSI is understood as an important marker for the promotion of patient safety and the quality of nursing care provided to ICU patients. Therefore, a question arises: what are the clinical characteristics and strategies to favor the patient's safety culture in the face of the prevention of BSI related to the use of venous catheters?

The justification and relevance of this study come from the need for clinical characterization, identification of probable risk factors, and the use of strategies to mitigate damage and adverse events related to BSI using good practices and notifications to favor the patient's safety culture.

The objective was: to evaluate the clinical characteristics of critically patients and the strategies to favor the patient safety culture in the face of the prevention of BSI related to the use of venous catheters.

2. Methodology

This is a descriptive, documentary study of a quantitative nature, developed in a tertiary public hospital, of high complexity and reference in the areas of medical clinic, surgery, gynecology, obstetrics and neonatology, located in Fortaleza, Ceará, Brazil.

The population consisted of 408 medical records of adolescent, adult and elderly patients admitted to the ICU in 2017 at a State General Hospital in the city of Fortaleza-CE-Brazil. The sample was defined from the finite population calculation, considering: 408 medical records as total population, 95% significance; the proportion of 10%, since there is no exact number of the population to be attended and admitted to this unit and error of 5%. The final sample was consolidated in 104 medical records. The choice of medical records was randomly performed, according to their availability in the institution file. Medical records with incomplete data were excluded.

The collection was carried out between April and June 2018 through a form with identification data and the current hospitalization of the patient in the ICU (period, reason for hospitalization, underlying disease, use of a venous catheter (VC) being: peripheral (PVC), central (CVC) and Peripheral Insertion Central Catheter (PICC), catheter permanence time and blood culture collection). In addition, it was possible to identify findings of good practice strategies such as interventions/conducts in the records of medical records and in the indicator books of the said unit. This information is relevant to the implementation of the patient safety culture for the preventing Healthcare-associated Infections (HAI), especially to BSI by venous catheter.

The data were organized in the excel 2016 program and analyzed in the *Statistical Package for Social Sciences Program* - version 22 (SPSS, USA), using descriptive statistics and associations. The presentation of the same is arranged in tables. And the discussions were based on the literature pertinent to the theme.

Study approved by the Research Ethics Committee of the research institution under opinion no. 2,593,464.

3. Results

Considering the total number of medical records, it can be inferred, in Table 1, that the majority, 62.5% (N=65) of the patients were female, have an age group equal to or greater than 60 years with 45.2% (N= 47). The predominant occupation was 24.0% (N= 25 housewives. Residents of the state's capital 70.2% (N=73), with 54.8% (N=57) of the cases having been admitted to the hospital previously.

There were 67.3% (N=70) patients with some underlying pathology, with systemic arterial hypertension, with 42% (N=42), had diabetes 28% (N=28) and chronic obstructive pulmonary disease, with 8.0% (N=8).

Regarding the outcome of these patients, it is noteworthy that 69.2% (N=72) were discharged from the ICU and were referred to a specialized ward in the respective pathologies.

The most used central venous catheters were semi-implanted catheters, with 88.5% (N=92). Patients who were known to not need prolonged treatment or stay in the ICU for an indefinite period was opted for peripheral venous access, representing 8.6% (N=9). Peripherally inserted central catheters, although a safe and much less invasive option, was little used, totaling 2.9% (N=3), as shown in Table 1.

The blood vessels of choice for central catheter puncture predominated the subclavian vein with 73.1% (N=76), while the femoral vein had a lower incidence of punctures, with 1.9% (N=2). As the length of stay ranged from one to 21 days, predominantly from one to seven days in 30.7% (N=32) patients, with an average of 8-14 days.

Table 1: Clinical characteristics (underlying disease, previous hospitalization, need for CVC, and outcome) of health users hospitalized in the Intensive Care Unit. Fortaleza, Ceará. 2018

Características	f	%
Baseline Disease		
Yes	70	67,3
No	34	32,7
Previous hospitalization		
Yes	57	54,8
No	47	45,2
Outcome		
ICU discharge	72	69,2
Death	27	26,0
Transfer to another hospital	5	4,8
Types of venous catheter		
CVC semi-implanted	92	88,5
PICC	3	2,9
PVC	9	8,7
Blood Vessels of Choice		
Jugular	14	13,5
Subclavian	76	73,1
Basilica	3	2,9
Femoral	2	1,9
Peripheral	9	8,6
Catheter permanence time		
1 – 7 days	32	30,8
8 – 14 days	23	22,1
15 – 21 days	25	24,0
≥ 21 days	24	23,1

Blood Culture Collection		
Yes	23	22,1
No	81	77,9
Total	**104**	**100**

Source: Authors (2018)

Concerning blood culture collection, the unit makes use of a book of clinical health indicators that establishes the daily need for evaluation of the examinations and the clinical condition of the patient, to make assertive, safe, and effective decisions for the prevention of bloodstream infections.

For this, it was found that 22.1% (N=23) of patients with CVC had suspected BSI, all of which had at least one positive blood culture result and as decision-making and precepts of interventions: catheter removal and alteration of the therapeutic regimen in 5.0% (N= 5). However, in those with negative blood cultures (78.0%; N= 81), had as conduct: removed from the catheter (8.0%; N=8) and the other (70.0%; N=73) remained in catheter use until medical order.

Regarding the reasons for hospitalization, the records indicate that there is a diversity of pathologies, and it is common to detect more than one reason for hospitalization. However, it is worth mention Respiratory Disorders (40.0%; N= 42) and genitourinary (33.0%; N= 34), according to table 2.

Table 2: Reason for hospitalization of health users in the intensive care unit. Fortaleza, Ceará. 2018

Hospitalization Reason	n	%
Respiratory Disorders	40	38,46
Genitourinary Disorders	33	31,73
Cardiovascular and Circulatory Disorders	19	18,26
Chronic Diseases	16	15,38
Gastrointestinal Disorders	14	13,46
Liver and Biliary Disorders	11	10,57
Systemic Infection (Sepsis)	10	9,61
Obstetric Complications	9	8,65
Oncological Diseases	8	7,69
Neurological Disorders	5	4,8
Integumentary Disorders	5	4,8
Hormonal and Metabolic Disorders	2	1,92

Source: Authors (2018).

Entering one of the primary points of the research, it was found that 91.4% (N=95) of the patients had to use CVC during hospitalization, mainly due to the nature of the drugs necessary in the prescribed therapy according to each pathology.

To present this finding, table 3 shows the high prevalence of antibiotic use (92.0%; N= 96), sedoanalgesia (42.0%; N= 44), and vasoactive drugs (43.0%; N=45) due to the severity of cases and hemodynamic instability of patients, justifying the need for CVC and, consequently, representing a risk factor for bloodstream infections and the expansion of the need to incorporate with the team good practices for the implementation of guidelines and/or protocols directed to the patient's safety culture.

Table 3: Therapeutic indications for the use of CVC of health users in the Intensive Care Unit. Fortaleza, Ceará. 2018

Substances administered in CVC	n	%
Venous Hydration	104	100
Antibiotics	92	88,5
Sedoanalgesia	44	42,3
Vasoactive Drugs	43	41,3
Total Parenteral Nutrition	15	14,4
Blood Products	14	13,5
Diuretics	5	4,8
Anticonvulsants	2	1,9

Source: Authors (2018).

During data collection, it was verified the absence of protocols for notification or use of daily records of clinical indicators related to failures, AE and clinical manifestations, and/or signs of BSI related to the use of VC. There is also a precariousness of the records of activities, interventions and/or good practices for the prevention of injuries and/or complications related to BSI, which can configure little incentive of management in the face of the safety culture, especially about the notification of cases and the use of best-practice technologies, for example, *bundles*, and/or patient safety protocols.

It was possible to identify that in 100.0% (N= 104) of the medical records there were nursing records about the care of catheters, but it was considered timid and little detailed records regarding the process of evaluation and prevention of HAIs. In these were found nursing notes performed by technicians, such as records of vital signs, permeability venous catheter, and proper attachment of the bandage. As well as, records made by the nurses that contained: location of the insertion, presence/absence of phlogistic signs, permeability, types of drugs, if they made use of continuous infusion pump and flow when in use for venous catheter, cleaning of connections, and dressing change for catheter fixation.

4. Discussion

According to the results obtained, it was possible to verify a clinical profile similar to a study developed in the city of João Pessoa-PB, also in northeastern Brazil, which identified a predominance of elderly (71 and 80 years old), women, coming from emergency and with diagnoses related to cardiovascular diseases and evolution to hospital discharge [9]. Corroborating, therefore, the importance of identifying epidemiological and sociodemographic data of ICU patients, so that it is possible to devise strategies to improve care and, especially, to prevent complications and injuries during hospitalization.

Regarding the vein chosen for access, the present study identified that there was a preference for the subclavian vein. This predilection corroborates what the literature portrays since it represents a lower risk of BSI and lower risk of deep vein thrombosis when related to femoral and jugular veins. However, pneumothorax rates after subclavian vein puncture are known to be higher. Therefore, it is up to the team to select the vessel with the best risk-benefit and

that favors the damage related to the integrity of the damaged skin, as well as the risk of HAIs [10].

Regarding the variable length of stay of the patient's CV, there was an average of 8-14days, findings that are similar to the evaluation made with patients from Minas Gerais-Brazil, with an average of 11.5 days. Supporting, therefore, that preventive measures for BSI directly imply the effectiveness of the care provided, considering that, in addition to the rise in hospital costs, there are significant consequences that directly influence the clinical outcome of patients [11].

In addition to these findings, it is necessary to ensure good practices with the patient safety culture, using measures such as aseptic techniques in the insertion of catheters, maintenance of these devices, uses of training focused on the preparation of the skin for insertion of the CVC and Maintenance *Bundle* being reinforced the nursing notes, in addition to the supervision guidelines to familiarize the professionals to make the necessary adjustments in the face of cases of failures or AE [12], [13].

What has been observed in this study corroborates with other studies regarding the high rates of use of CVC to optimize the care provided to critical patients. Given the challenges found to prevent and control BSI rates, the need for qualification and professional training can be highlighted, it is essential to strengthen the Hospital Infection Control Commission (HICC) of the institution studied, so that it can act as a guide and articulator of actions and services that address the problem, to qualify the care of critically ill patients [10], [14].

According to the Nursing care identified in the records, it was possible to rely on a similar finding from other scholars when they mention care as identification of signs and symptoms suggestive of colonization and/or infection, care related to the insertion ostium, and maintenance of the device, including the use of antiseptics, coverings, and infusion of solutions to maintain permeability and prevention of infections [15].

As study limitation highlights the difficulty of data related to reporting of patient safety culture practices, BSI identification, especially related to the use of catheters. During data collection, there was a lack of standardization of the Nursing team's records regarding fundamental data such as the location of the catheter, the drugs, and substances administered by the catheter, and even the length of permanence of the same.

For this, there is a need to favor and motivate research that uses reliable records, complete records, and/or use of health technologies that provide the monitoring and control of HAIs rates, especially, to patients under critical care and with an incentive to good patient safety practices.

Conclusion

It is concluded with the evaluation of the clinical characteristics of patients under critical care that it is still necessary to work the patient safety culture with the use of protocols, indicators, non-blaming notifications of adverse events and injuries, especially in intensive care units regarding bloodstream infections associated with the use of catheter-related.

The potentialities of the service are summarized in the various attitudes based on the prevention of risk factors for bloodstream infection. As well as, the proper conduct through the results of laboratory tests or even the patient's clinic, such as the use of valid and reliable protocols or technologies for the standardization of care and reduction of damage and injuries related to the safety of patients in a critical situation.

Thus, it is suggested the use of the present study as a way of disseminating the data found in the clinical reality, to enable sensitization, culture change of professionals, managers and even contribute to the elaboration of patient safety strategies and reduction of risks and injuries related to HAIs especially those who use catheters to improve the quality of care.

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