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Nursing care adverse events at an intensive care unit

Eventos adversos na assistência de enfermagem em uma unidade de terapia intensiva

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ABSTRACT

Objective: The understanding of adverse events may simplify the inquiry regarding the quality of nursing care, presuming a foregrounding role in evaluating health services. The aim of the study was to identify adverse events in nursing care in an intensive care unit.

Methods: Data were collected using an appropriate form known as problem-oriented record (POR) over a 10-month period; patients were monitored throughout their intensive care unit stay.

Results: Over the study period, 550 adverse events were recorded as follows: 26 concerned the “five rights” related to drug administration; 23 to non-administered medication; 181 to inappropriate medication records; 28

to failure in infusion pump assembly; 17 to not performed inhalation; 8 to incorrect handling of needles and syringes; 53 to not performed nursing procedures; 46 to incorrect handling of therapeutic and diagnostic devices; 37 to alarms/warnings of devices used incorrectly; and 131 to failure in data recording by nurses.

Conclusion: The occurrence of adverse events in the care given to patients by the nursing team are significant indicators that disclose the quality of nursing care. Therefore, these events should be analyzed to support in-service training of the nursing staff.

Keywords: Nursing, team; Errors of medication; Patient care/nursing; Safety/standards; Quality of health care; Intensive care

INTRODUCTION

The basic principle of Health care institutions' basic principle is to provide their clients with goods and services with a minimum or total absence of risks and failures that may jeopardize the patient's safety.⁽¹⁾ However, there are conditions predisposing to adverse events, such as technological progress without adequate personnel training, acting out of the correct professional range of actions, lack of motivation, lack of nursing care systematization and documentation, delegation of care without appropriate supervision, and work overload.⁽²⁾

The study of human errors is recent, and the healthcare professional reports on the subject usually involve shame, fear of punishment, in addition to its association with lack of attention, motivation and sufficient training, and thus, there is a tendency for concealment. Yet, when this occurs attention focuses on identifying the guilty party, losing the opportunity to better understand and treat, and particu-

larly to prevent new episodes.⁽³⁾

The nursing professional suffered the consequences of this kind of event, either from work overload or administrative or legal sanctions.⁽⁴⁾ It is important that a professional reports the incident so that appropriate measures can be taken as soon as possible.⁽⁵⁾ Healthcare professionals, as any other human beings, are susceptible to errors. However, adverse events cannot be identified when professionals protect one another or conceal these situations.⁽²⁾ Errors should deserve a critical and investigative attention, in order to verify the deficiencies to be resolved and benefit not only the team, but especially the client.⁽⁶⁾

Several terms are used as adverse event synonyms: nursing errors; occurrences, reactions, iatrogenic events, complications, diseases and errors. However, all are defined as unwanted effects, non-intentional, harmful or prejudicial to the patient, involving his/hers safety, as a consequence or not of professional error.⁽⁷⁻⁸⁾

The protection offered by safe care to the patient is a responsibility of each professional and is also driven by greater society demands.⁽⁶⁾ Although the human factor is involved in the adverse events and work environment, structural elements and activities may also be involved in the origin of errors.⁽¹⁾

Adverse events in the intensive care unit (ICU) must be analyzed, taking into account that a critically ill patient is more susceptible to errors. Further, they should be analyzed in order to identify structural problems, human resources, materials, devices and work procedures to support errors-prevention measures in the hospital environment.⁽⁸⁾

ICU adverse events relate to technological and scientific advance, characterized by several equipment and use of new diagnostic and therapeutic technologies, specific care measures, added to a larger group of professionals involved in the care.⁽⁷⁾

ICU patients are more vulnerable to adverse events, and more susceptible to nosocomial infection. A study at the Harvard Medical School, in Boston found that more than, 20% of the patients admitted to an ICU had at least one adverse event.⁽⁹⁾ They deserve a detailed investigation, due to the patient's requirements for nursing care and complexity of care in this unit.⁽¹⁰⁾

Care evaluation is an important tool for the control of healthcare procedures. The expected quality is to meet patients and family members expectations. The ICU is expected to assure the best results

for the patient's clinical status and disease severity, thus reducing to a minimum, the procedures potential complications.

The quality of assistance is seen as a target to be reached, and requires control in order to evaluate nursing actions. To analyze care given by a sector, the establishment of measurable parameters must be settled involving the implementation and the use of some quality indicators.

Reporting and acceptance of adverse events facilitate the investigation of nursing care quality, as there are important errors for healthcare service evaluation. Thus, the objective of this study was to identify adverse effects in an ICU nursing care.

METHODS

This is a descriptive, quantitative research performed in an adult ICU with twenty beds, at a general hospital in the São Paulo state North-western region, a reference for treatment of high complexity patients. This unit has unique features, as it is a sector taking care of health insurance and private patients, with a large area divided into individual units, with six beds in the hemodynamics unit, three in the metabolic unit, three in the neurology unit, five individual rooms and three isolation rooms.

In this study, an adverse effect was defined as any troublesome, non-intentional effect, harmful or prejudicial to the patient, endangering his/her safety, consequent or not of the involved professional's fault.⁽⁷⁻⁸⁾

During data collection, the ICU nursing team was comprised of nine treating nurses, one supervisor and 53 nursing assistants/technicians distributed in the morning (6:30 AM – 12:30 PM), afternoon (12:30 PM – 6:30 PM) and night (6:30 PM – 6:30 AM) shifts.

The nurse/bed ratio shift is 1:10, and assistants/technicians 1:2. Nurse assistants/technicians pay integral attention to the patient guided by a nurse's prescription and are supervised and oriented by a nurse. Training on the job is done whenever necessary, along with the Permanent Education Centre of the Institution.

For this study, a data collection tool was prepared and implemented by the ICU's nursing management, supervisor and nurses, named "occurrence log", with 42 items. These items were divided into 4 parts. The first part is related to patient's hygiene

and comfort. It consisted of twelve items: oral cavity, hair, trichotomy, nails, and bed in order, clean and dry patient, decubitus change, egg box mattress, skin hydration, supportive pillows, moving patient, and anatomical foot positioning.

The second part is related to physical safety with four items: patient's accommodation, bed side rails, limb restriction and patient's weight. The third is related to good practices for both hospital infection control and prevention. It consisted of twenty two items as follows: raised head, ventilator circuit identification, circuit change, presence of condensate in the circuit, ambu bag protection, central catheter dressing, central catheter insertion, fluid infusion line identification, diet line identification, lines appearance, taps appearance, taps cone luer protection, peripheral puncture fixation, peripheral puncture preservation, humidity, puncture persistence, urinary bladder catheter fixation, collector bag below the urinary bladder level, urine collection bag hanging by the bed, correct drain position, drainage bottle position, and tracheal tube fixation.

The fourth part regarding the protocol control consisted of four items: sedation, nutrition, ventilator tidal volume, and fraction of inspired oxygen. This occurrence log was adapted from the nursing care quality research and care evaluation process in a school hospital, presented by the Universidade de São Paulo, in 2004.⁽¹¹⁾ Care standardizations implemented by nursing for ICU auditing service were also considered.

The instrument validation pointed out two subjective validity types: the appearance and the contents. The appearance shows if the instrument is suitable for the measurement objective, and is performed by an experts group or a juror's panel, that basically checks the items clarity, easy readability and understanding, and the instrument's presentation. Contents are evaluated about: if the instrument has sufficient scope and is representative of the focused contents, and if each item is related to what should be measured.⁽¹²⁾

The instrument was validated both from the appearance and contents points of view by four fourth year nurse students of the Faculdade de Medicina de São José do Rio Preto, along with teachers at the unit developing nursing management courses in specialized units.

The jurors were given precisely and individually guidance to perform this instrument valida-

tion. Thus, the experts judged the instrument and basically verified the items clarity, easy readability, understanding and presentation. Criticism and suggestions from the jurors were generally related to lack of clarity of some items, allowing double interpretation.

It is important to emphasize that this instrument is used in intensive care units as routine work after the nursing care audit was implemented in the institution, and is completed by nurses authorized by the hospital's nursing services management.

After approval by the Faculdade de Medicina de São José do Rio Preto (FAMERP)'s Ethics Committee, Protocol 1359/05, Opinion 031/2005, the ICU nurses were instructed regarding the study, focusing on the importance of cooperation, the relevance of data accuracy, the educational aspect of the research and requested signature of the informed consent form. All unit nurses, as well as the researcher who was part of the group, consented to participate and recorded the adverse events adhering to the structured script, based on the occurrence log.

The inclusion criteria for this study were the adverse events reported on the occurrence log regarding all patients staying in the unit during the data collection period, related to the "five rights" of medication (correct drug, patient, via, dose and time), procedures, incorrect handling of therapeutic artifacts, and diagnosis and nursing notes, from September 2005 to June 2006.

Patients were monitored regarding adverse events during hospitalization, and one patient could have more than one event. The exclusion criterion was less than 24 hours ICU stay (deaths or discharges), or insufficient time for reporting.

We should clarify that the measures taken by the institution in case of adverse events reported followed the usual service procedures, with no relationship to the study objectives. The data were tabulated and presented as figures and percentages.

RESULTS

During the data collection period, the ICU averaged 17 patients daily, about 64 admissions monthly, with an average stay of eight days, highlighting that there were chronic patients with up to two months stay, and postoperative patients with only two days. Regarding patient characteristics, 52.3% of the admitted patients were male and 47.7% fe-

male, and the predominant age was above 60 years, with 55.0%. During the study period, the unit recorded 576 admissions, 63.0% for clinical and 37.0% for surgical care.

Regarding affections, from 576 admissions, 132 were related to nervous system illnesses; 109 digestive, 91 respiratory, 73 cardiovascular, 71 osteo-muscular, 41 endocrine, metabolic and nutritional system, 40 genitourinary, 14 blood and immune disorders, two skin and three exogenous poisoning. From the 576 admissions during the study period, 550 adverse events were recorded, involving the patients in general, according to table 1.

Table 1 – Drug- and nursing procedures-related errors – number and percentage

Drug- and nursing procedures-related events	N	%
Incorrect drug record	181	63.95
Incorrect data record	131	49.07
Incorrect drug administration	94	33.22
Nursing procedure not performed	53	19.85
Diagnostic and therapeutic artifacts incorrect handling	46	17.23
Incorrect use of devices	37	13.85
Others	08	2.83
Total	550	100

Among the 550 adverse events, 26 were related to the “five rights” of drug administration (right patient, drug, dose, via, and time), 23 to non-administered drugs, 181 to inappropriate drug recording, 28 to infusion pump installation errors, 17 to not performed inhalation, and eight to incorrect handling of syringes and needles; 53 to non-performed nursing procedures; 46 to incorrect handling of therapeutic and diagnostic artifacts; 37 to device alarms incorrectly used; and 131 to nursing note failures.

A total of 283 drug-related adverse events was identified, 26 related to the “five rights” in drug administration, and most importantly related to the drug dosage involving 50.0% (13 occurrences); 23 drugs were not given; 181 were not appropriately recorded, and 104 were not recorded on the fluid balance sheet, and 77 were not checked on the medical prescription.

Moreover, regarding infusion pump drugs and syringe, 28 occurrences were recorded. During inhalation, 17 failures were observed, nine of them not performed due to lack of a circuit suitable for the patient’s ventilator. Eight occurrences were

mentioned but not individually described, related to incorrect syringe and needle handling, incorrect drug dilution and others.

Regarding nursing procedures, 53 were not performed, involving 20 dressings and 16 regarding standard precautions and multi-resistant agents dissemination prevention, and other diversified procedures. Concerning incorrect handling of therapeutic and diagnostic artifacts of the 46 occurrences, 20 were related to accidental central access removal and of these, 15 with double-lumen.

Regarding tube removal, a total of 20 cases was recorded, two of Foley bladder catheter and 18 gastric, and four were removed by the nursing service because of obstruction. There were two accidental endotracheal extubations, which were considered severe occurrences, as they can entail complications as glottis edema and respiratory failure.

Regarding devices, 37 occurrences were recorded regarding alarms, 16 non-operational, 18 with incorrect parameters and three with low volume. For data recording, there were 131 events, most of them involving failure to record, particularly in the specific ICU fluid balance sheet, as 100 related to the absence of records on the “gain” portion in relation to fluids and diets.

DISCUSSION

The higher incidence of adverse events occurred during the first thirty days of the data collection. We believe the team had a growing awareness of the importance of error prevention because of monitoring. The ICU nursing care adverse distribution effects were mostly related to drug administration and nursing records errors, consequently, leading to an important range of errors for record evaluations, hindering nursing care audits – both internal and external.

In practice, when an institution’s internal audit service requests the ICU nurse to correct nurse notes due to incomplete file, this is added work that takes time which could be used in care activities.

In drug administration, there was a predominance of missing correct records (checking the medical prescription and notes on the fluid balance). In a study on iatrogenic occurrences in seven ICUs, it was found that 40.7% were related to tubes, drains and catheters, followed by medication errors, 27.4%.⁽¹⁾ In another study on ICU drug administra-

tion, the authors found that of the 52 errors, 12 (23.08%) were due to dose omission, 11 (21.15%) for wrong drug and 09 (17.31%) for wrong dose.⁽⁴⁾

The key for error reduction is to simplify procedures, reducing the number of steps and standardizing the system, from electronic medical prescription, without abbreviations, with standardized times, pharmacy drug distribution always supervised by a pharmacist, preferably as single doses, and even drug administration protocols.⁽¹³⁾ Drug administration errors can cause losses/harm such as adverse reactions, temporary and permanent injuries or even patient death, depending on the occurrence severity.⁽¹⁴⁾

The main causes of drug administration errors are: illegible medical handwriting, professional overload or distraction due to interferences (cardiorespiratory arrest, orotracheal intubation), in addition to professionals' tiredness and stress.⁽¹⁴⁾ In another study, the same adverse events predisposing factors were mentioned, in a different order: professional lack of attention, illegible medical prescription and work overload.⁽¹⁵⁾

With a number of new drugs reaching the market, their administration has become a very complex task, requiring professionals to be increasingly responsible and conscientious, not only with technical knowledge, but also pharmacologic, anatomic and physiologic. The authors believe that the most important action for drug administration mistake prevention is continued education.⁽¹⁴⁾

Drugs preparation and administration should be accurately performed, with no mistakes, thereby effective nursing supervision is the means to minimize occurrences.⁽¹⁶⁾ Professionals involved in medication should have the knowledge and clear understanding of the error concept, so they can identify conditions that favor errors.⁽¹⁷⁾

Regarding non-performed nursing care procedures, dressing was predominant, followed by universal (standard) precaution and isolation, where people were not appropriately dressed. Regarding incorrect diagnostic and therapeutic artifacts handling, the predominance was of alarm-related issues, which had incorrect parameters, were non-operational or with the volume below the recommended. A lack of records or incomplete nursing records was also noted as well as mistaken or incomplete fluid balance calculations.

During the development of a technique for handling diagnostic and therapeutic devices, the trader

can cause damage to the continuity of care, such as the output accidental obstruction or incorrect positioning of catheters, cannulae, tubes and drains.⁽¹⁸⁾

All ICU procedures are considered essential for the patient. Therefore, it is extremely important that they are accurately performed. However, it is known that there are techniques that are not performed, sometimes due to emergency situations in the unit such as cardiorespiratory arrest and intubation. Regarding dressings, for instance, those not performed were a small number or under-recorded (20) in comparison to the total number of dressings during the data collection time (about 20 daily; 600 monthly, 6,000/10 months) were a small number or under-recorded.

Another relevant intensive care unit procedure is to keep the bed head raised, particularly in intubated patients, aiming to reduce aspiration pneumonia. Although it is a simple care measure and so important, it was found that in some beds the head was lower than 30 degrees. Furthermore, among nursing procedures it was noted that central venous pressure (CVP) and vital signs verification were not performed.

The ICU nursing care deserves special attention, since when performing a technique, the professional's care when handling so many therapeutic and diagnostic artifacts may jeopardize continuity of care, in the case of accidental removal, obstruction or incorrect positioning of catheters, tubes and drains.⁽¹⁹⁾

The research on peripheral intravenous catheter-related adverse events in children according to different kinds of dressings showed that of the 150 evaluated samples, 75.3% of the catheters were removed because of adverse events, including infiltration, obstruction, phlebitis, accidental removal, and folded catheter; and 24.7% removed at hospital discharge.⁽²⁰⁾ In an adverse event study, of the 113 occurrences recorded, the majority was related to catheter, endotracheal tube, tubes, and drains (40.7%), followed by drugs (27.4%), devices (18.6%), procedures (11.5%) and others (1.8%).⁽⁷⁾

In another study by the same author, of 2,000 evaluations, 80 occurrences were recorded, 27.0% of which were related to pressure sores, followed by 24.0% endotracheal tube handling, 20.0% to blood catheters handling, 13.0% to drug administration process, 10.0% to tubes handling, 5% to drains and 1.0% to devices.⁽⁶⁾ Most of the ICU adverse events are related to drug administration procedures, during routine or emergency care.⁽⁹⁾

A research on care result indicators: An analysis of the adverse events during hospitalization AT a private hospital, IN SAO PAULO CITY, involving an ICU and semi-intensive unit, and a regular ward found that the predominant adverse events were related to nasogastric tube (57.6%), followed by patient falls (16.6%), and drug administration errors (24.8%).⁽²¹⁾

In addition to adverse event issues, it is important to highlight that an ICU is not a healthy place for professionals to work, particularly for the nursing team.⁽²²⁾ This unit is a place of constant stress where professionals have distressing experiences, as emergencies become routine.⁽²³⁾ The cumulative and progressive stress may add mental distress, affecting the health and work organization.⁽²⁴⁾ Consequently, these issues may lead to adverse events.

When studying adverse events in ICU nursing care, it is important not underestimate the sub-recording for fear of medical-legal sanctions and punishment. The errors should be seen as a challenge to the nursing professional striving for nursing care quality for critically ill patients. However, mere identification of these errors is not sufficient; their prevention is paramount for patient safety.

CONCLUSION

Of the 550 ICU nursing care adverse events, the most frequent were related to drug administration (51.4%), followed by nursing records (24.0%), therapeutic and diagnostic artifacts (15%) and unperformed procedures (9.6%), with an average of 55 occurrences monthly, with the higher incidence within the first 30 data-collection days.

The existence of adverse events in the ICU nursing care is a matter of concern because they evidence

the quality of care. However, after identification, they should be analyzed to clarify possible causes to orient reflections and continued team education, for error prevention and reduction.

RESUMO

Objetivo: A compreensão dos eventos adversos facilita a investigação da qualidade da assistência e auxilia na avaliação dos serviços de saúde. O objetivo deste estudo foi identificar os eventos adversos na assistência de enfermagem em uma unidade de terapia intensiva.

Métodos: Os dados foram coletados em um impresso próprio, denominado ficha de ocorrências, por um período de dez meses, no qual os pacientes foram monitorados durante o período de internação na unidade.

Resultados: Foram registrados 550 eventos adversos sendo: 26 relacionados aos cinco certos na administração de medicamentos, 23 à medicações não administradas, 181 às anotações inadequadas da medicação, 28 à falhas na instalação de drogas em bomba de infusão, 17 à não realização da inalação, 8 ao manuseio incorreto de seringas e agulhas, 53 aos procedimentos de enfermagem não realizados, 46 ao manuseio incorreto de artefatos terapêuticos e diagnósticos, 37 aos alarmes dos equipamentos utilizados de maneira incorreta e 131 à falhas nas anotações de enfermagem.

Conclusão: A existência de eventos adversos no cuidado prestado pela enfermagem são indicadores importantes que evidenciam a qualidade da assistência na unidade de terapia intensiva. Portanto, os eventos adversos devem ser utilizados para subsidiar a educação permanente da equipe de enfermagem.

Descritores: Equipe de enfermagem; Erros de medicação; Assistência ao paciente/enfermagem; Segurança/normas; Qualidade da assistência à saúde; Cuidados intensivos

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