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INDICATORS OF HEALTHCARE RESULTS: ANALYSIS OF ADVERSE EVENTS DURING HOSPITAL STAYS

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This quantitative, retrospective study aimed to characterize adverse events (AE) in Intensive Care Units (ICU), Semi-Intensive Care Units (SCU) and Inpatient Units (IU), regarding nature, type, day of the week and nursing professionals / patient ratio at the moment of occurrence; as well as to identify nursing interventions after the event and AE rates. The study was performed at a private hospital in the city of São Paulo, Brazil. Two hundred twenty-nine AE were notified. The predominant events were related to nasogastric tubes (NGT) (57.6%), followed by patient fall (16.6%) and medication errors (14.8%). The nursing professionals /patient ratio at the moment of the event was 1:2 for the ICU, 1:3 for the SCU and 1:4 for the IU. A similar distribution was observed for the other days of the week. The nursing interventions were: repositioning the NGT (83.2%) and communication of the occurrence to the physician in case of medication errors (47.6%) and falls (55.2%). The highest AE rate was related to NGT.

DESCRIPTORS: *sentinel surveillance; nursing; indicators*

INDICADORES DE RESULTADOS PARA LA ASISTENCIA: ANÁLISIS DE SITUACIONES ADVERSAS DURANTE LA HOSPITALIZACIÓN

Estudio cuantitativo, retrospectivo que determinó las características de las situaciones adversas (SA) en la Unidad de Cuidados Intensivos (UCI), Unidad de Cuidados Semi-intensivos (UCS) y Servicio de Hospitalización (SH), en cuanto su naturaleza, tipo, día de la semana y la relación numérica trabajador / paciente. Asimismo, se identificó las intervenciones de enfermería y se calculó la tasa para SA. Realizado en un hospital privado de la ciudad de São Paulo. Se notificaron 229 SA, predominando los relacionados con la sonda nasogástrica (SNG) (57,6%), caídas (16,6%) y administración de medicamento (14,8%). La relación trabajador / paciente por día fue de 1:2 en UCI, 1:3 en UCS y 1:4 en SH. Las intervenciones de enfermería frente a estas situaciones fueron la recolocación de SNG (83,3%), la información al médico tanto en los casos de errores de medicación (47,6%), como en caídas (55,2%). La mayores tasas fueron observadas para los casos de SNG.

DESCRIPTORES: *vigilancia de guardia; enfermería; indicadores*

INDICADORES DE RESULTADOS DA ASSISTÊNCIA: ANÁLISE DOS EVENTOS ADVERSOS DURANTE A INTERNAÇÃO HOSPITALAR

Estudo quantitativo, retrospectivo, objetivou caracterizar eventos adversos (EA) nas Unidades de Terapia Intensiva (UTI), Semi-Intensiva (USI) e de internação (UI) quanto à natureza, tipo, dia da semana e relação funcionário/paciente no momento da ocorrência; identificar as intervenções dos enfermeiros após o evento e as taxas de EAs. Foi realizado em um hospital privado do município de São Paulo. Foi notificado o total de 229 EAs. Predominaram eventos relacionados à sonda nasogástrica (SNG) (57,6%), seguidos por queda (16,6%) e administração de medicamentos (14,8%). A relação funcionário/paciente, no momento do evento, era de 1:2 na UTI, 1:3 na USI e 1:4 na UI. Houve distribuição semelhante de ocorrências nos diferentes dias da semana. As intervenções de enfermagem foram recolocações da SNG (83,3 %) e comunicação da ocorrência ao médico nos casos de erros de medicação (47,6%) e queda (55,2%). A maior taxa de EAs foi relacionada à SNG.

DESCRIPTORES: *vigilância de evento sentinela; enfermagem; indicadores*

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INTRODUCTION

The focus of service quality in industries and particularly in hospital aims to offer their clients services with total quality, free from risk and damage, thus providing safety and satisfaction to the client/patient⁽¹⁾. According to this point of view, it has been observed that errors in hospital healthcare not only go against this principle but may cause damage to clients/patients, as well as to service providers⁽²⁾.

To reduce problems in healthcare, a quality assurance program in institutions is recommended to guarantee a high degree of excellence by measuring and evaluating structural components, goals, processes and results, followed by the changes needed to improve the service⁽³⁾.

For the Ministry of Health (MS), the quality of the services is a differentiating element in the process of meeting the clients' expectations regarding healthcare services. With this perspective, it published, together with the Pan-American Health Organization (PAHO), the Minimal Standards of Nursing Healthcare for health prevention, promotion and recovery, aiming to guide the quality and control of healthcare actions⁽⁴⁾.

Also, with the objective of healthcare service quality improvement, Hospital Evaluation Programs have gained strength in the past decades. They consist of an external evaluation system that verifies the concordance of the structure and healthcare processes adopted with the set of previously established standards. In Brazil, the National Evaluation Organization (ONA) offers the Brazilian Manual of Hospital Evaluation, an instrument that works as a guideline for institutions to establish high-quality healthcare standards⁽⁵⁾.

In this context of service evaluation, in which nursing healthcare is included, the result indicators that constitute important management instruments are included. Without them, it would be impossible to evaluate quality objectively⁽⁶⁾. Defined as either quantitative or qualitative representations of results, several indicators are used in hospitals. The most traditional ones include death rate, length of hospital stay, readmission rates, hospital infection rates, surgical complications and percentage of cesarean sections⁽⁷⁾. Although these data are relevant, as a result of the demands posed by hospital evaluation programs, other indicators have been incorporated as guidelines to monitor and evaluate quality, including rates of adverse events.

Adverse events (AE) are undesirable but preventable occurrences, damaging or harmful in nature, which jeopardize the safety of the patient under the care of the health professionals⁽⁸⁾.

In hospital institutions, nurses' involvement in healthcare errors can be found in several situations, such as: medication errors, patient falling, extubation, burns during procedures, hemorrhages due to the disconnection of drains and catheters, among others⁽⁹⁾.

Several studies, performed in different hospital units, have explored the AE phenomenon, considering its characteristics and consequences for the patients⁽¹⁰⁻¹²⁾.

In critical units, several authors have investigated these events and their respective consequences for the patients, highlighting, among their findings, AE with tubes, drains and catheters⁽¹³⁾, medication errors⁽¹¹⁾, patient fall⁽¹⁰⁾, unplanned extubations⁽¹⁴⁾, pressure ulcers⁽¹⁴⁾ and hospital infections⁽¹²⁾. Also, the actions nurses perform immediately after these events in emergency units have been investigated⁽¹⁵⁾.

Based on the above, it can be verified that, despite increasing interest in exploring such events, evidence about the use of these indicators in different hospital units is still insufficient. That is why the present study was proposed, aiming to:

- characterize the adverse events occurred with adult patients during their stay in Intensive Care Units, Semi-intensive Care Units and Inpatient Units regarding nature, type, day of the week and employee/patient ration at the moment of occurrence;
- identify nursing interventions immediately after the adverse event occurs;
- calculate the rate of adverse events during the patients' stays in different hospital units.

METHOD

This is a quantitative, descriptive, retrospective and cross-sectional study.

The data were collected from the AE notification forms of the Intensive Care Units (ICU), Semi-intensive Care Units (SCU) and Inpatient Units (IU) at a tertiary, private hospital in the city of São Paulo, with 250 beds, evaluated as level 2 by ONA, which uses a computerized system for AE notification.

The monitoring of such events is inserted in a non-punitive context, with orientation and

encouragement for professionals to voluntarily report errors, having the security of hospital patients as its main goal.

Aiming at the systematic monitoring of such events, besides professionals' voluntary registry every day at 5:00 PM, nurses from the Commission of Hospital Quality collect the remaining necessary information to calculate adverse event rates, such as: amount of intubated patients in the day, amount of patients with venous catheters, tubes, tracheal tubes, etc.

The sample was composed of all patients over 18 years old submitted to clinical or surgical treatment, admitted in the period from March to June 2006, who suffered some type of AE related to medication, falling, endotracheal tube or tracheostomy procedures, tubes and central venous catheter, during their stay in the hospital units.

Data Collection

The following definitions were adopted for this study.

Adverse event was defined as an undesirable but preventable occurrence, which may cause damage to the safety of the patient under the responsibility of healthcare professionals⁽¹⁶⁾.

As for medication errors, these were defined as preventable AEs, occurring in the phases of medication preparation and administration, including the following types: omission of doses, incorrect doses, incorrect concentration, incorrect medication, incorrect dosage, incorrect technique, incorrect way of administering, incorrect speed, incorrect time, incorrect patient and medication past expiration dates⁽¹⁷⁾.

Regarding falling, the adopted definition was "a sudden and unexpected change in the position of the body in which the static mechanism of body fixation fails, and the voluntary or reflexive answer to correct this imbalance is inadequate"⁽¹⁸⁾.

To collect the data, an instrument named "Adverse Event Report" was used, consisting of demographic and clinical data (age, gender, reason for admission, date, time and place: ICU, SCU or IU), the types of AE related to medication (omission of doses, incorrect doses, incorrect concentration, incorrect medication, incorrect dosage, incorrect technique, incorrect way of administering, incorrect speed, incorrect time, incorrect patient and medication

past expiration dates), fall (from bed, from chair, from stretcher and from heights), central venous catheter (obstruction, overflowing, disconnection, incorrect fixation, unplanned removal, bleeding, clamping, among others), nasogastric tube (obstruction, unplanned removal, incorrect fixation, incorrect placement among others), the nursing interventions performed immediately after the AE and the nursing professional-to-patient ratio at the moment of the event.

As procedures for data collection, after being approved by the Research Ethics Committee at the University of São Paulo School of Nursing (CEP-EEUSP), the project was submitted to the hospital, requesting authorization to perform the study.

After the acceptance of the institution, the cooperation of nursing member of the Hospital Commission of Quality was requested to grant access to the system of AE registers occurred in February, March, April, May and June 2006. The researchers collected the data within the hospital facility in July and August 2006, using data from the computer and paper-based system, when necessary.

For the result analysis, the data were inserted into a spreadsheet and analyzed with descriptive statistics, with results being presented in absolute and percentile values, in tables and figures.

RESULTS

In the study period, i.e. from March to June 2006, 229 AE were reported in the three Hospital Units analyzed, which affected 229 patients (one AE per patient). In this sample, most patients were male (56.3%). The same distribution was predominant per unit, respectively 47.3%, 23.2% e 29.5% at ICU, SCU and IU. The average age of the patients was 72.3 years old (+17.4), and the median was 76 years old.

Table 1 – Distribution of patients, victims of AE, according to age and hospital unit. São Paulo, 2006

Age	ICU (%)	SCU (%)	IU (%)	Total (%)
≤ 60 years old	26 (51.0)	9 (17.6)	16 (31.4)	51 (100.0)
61 years old	77 (43.2)	41 (23.0)	60 (33.7)	178 (100.0)
Total	103 (44.9)	50 (21.8)	76 (33.2)	229 (100.0)

Table 1 shows that the highest amount of AE registers occurred with ICU patients (44.9%), followed by IU (33.2%) and SCU (21.8%). Considering the

three units, patients over 61 years old (77.7%) suffered AE more often in this order: 43.26% at the ICU, 33.71% at the IU and 23.0% at the SCU.

Regarding the reasons for hospital admission, 85 (37.1%) of patients at the three units had cardiovascular diseases, followed by 58 (25.3%) with respiratory diseases.

Characterization of the AE and nursing interventions immediately after occurrence

Table 2 – Distribution of the AE according to its nature and the hospital unit. São Paulo, 2006

AE Nature	ICU (%)	SCU (%)	IU (%)	Total (%)
Nasogastric tube	69 (52.3)	39 (29.6)	24 (18.2)	132 (100.0)
Falling	3 (7.9)	1 (2.6)	34 (89.5)	38 (100.0)
Medication errors	15 (44.1)	8 (23.5)	11 (32.3)	34 (100.0)
Central venous catheter	12 (57.1)	2 (9.5)	7 (33.3)	21 (100.0)
Endotracheal tube / tracheostomy	4 (1.0)	0 (0.00)	0 (0.0)	4 (100.0)
Total	103 (44.9)	50 (21.8)	76 (33.2)	229 (100.0)

Table 2 shows that, during the study period, the AE related to the nasogastric tubes (132 – 57.6%), falling (38 – 16.6%) and medication errors (34 – 14.8%) were predominant.

The analysis according to the unit, however, shows peculiarities. It is observed that, at the ICU and SCU, the AE with nasogastric tubes, medication errors and central venous catheter events were predominant. At the IU, patient falls were prevalent, followed by events with nasogastric tubes and medication errors.

Figure 1 shows data about the types of medication errors found, in order to identify the types of occurrence, considering each of the notified AE.

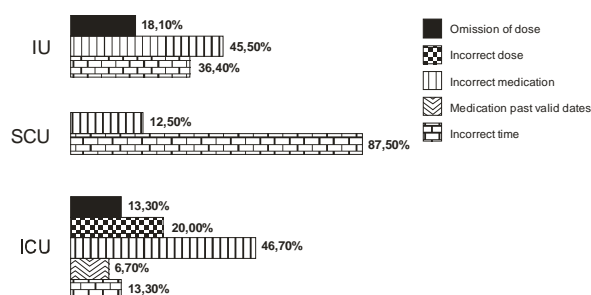


Figure 1 – Distribution of the types of medication errors, according to inpatient units. São Paulo, 2006

The data in Figure 1 show that, at both the ICU and IU, the predominant error was administering wrong medication (46.7% and 45.5%, respectively), while incorrect times for medication administration were predominant at the SCU, with 87.5%.

As for the interventions performed immediately after the occurrence of these events, the main action was communication of the event to the physician (47.6%), followed by the administration of the correct medication (44.12%).

About the “falling” events, differently from ICU and SCU, the highest occurrence was found at the IU, with falling from height as the most common occurrence (78.4%).

Also, in the cases of falling, the main nursing action performed was communication of the event to the physician (55.26%), followed by a physical exam and placing the patient on the bed again (15.8%).

Regarding the AE related to the nasogastric tube, with a higher frequency in this study, its distribution according to type is as follows.

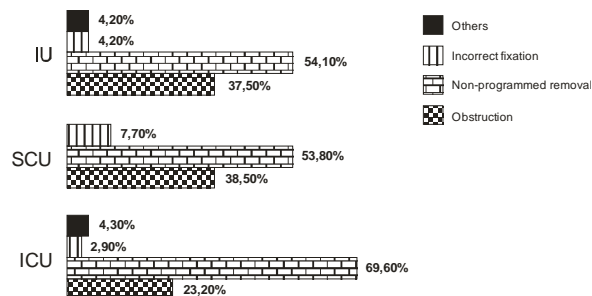


Figure 2 – Distribution of the types of adverse event with an NGT according to the inpatient unit. São Paulo, 2006

It is observed in the Figure 2 that the unplanned removal of the tube comprises most of these events at each of the units, i.e. 69.6% at ICU, 53.8% at SCU and 54.10% at IU, followed by the obstruction of the tube with decreasing frequencies at SCU (38.5%), IU (37.50%) and ICU (23.20%).

As for the interventions performed immediately after these AE, most of the actions consisted in reinserting the tube (83.3%).

With the purpose of investigating the AE according to the days of the week, occurrences were registered on all days of the week at the three different units: 24.89% on Thursday, 19.21% on Tuesdays and 16.59% on Wednesday. The frequency of events was minimal or inexistent on Saturdays.

Regarding the distribution of professionals per patient, according to the occurrence of AE, events

mostly occurred when the nursing professional/patient ratio was 1:2 at the ICU, 1:3 at the SCU and 1:4 at the IU.

Table 3 – Occurrence rates of adverse events. São Paulo, 2006

Adverse events	ICU (%)	SCU (%)	IU (%)
Nasogastric tube	2.31	3.94	1.09
Central venous catheter	0.29	0.18	0.22
Endotracheal tube/ Tracheostomy	0.28	-	-
Medication error	0.25	0.28	0.08
Falling	0.05	0.03	0.24

Data from table 3 shows that the AE rates, considering the total amount of patients exposed to the procedures were higher with nasogastric tubes, especially at the SCU, when compared to the other units.

DISCUSSION

The results referring to age, gender and reasons for admission in this research are similar to other studies on AE regarding predominance of the male gender (56.3%)^(11,14), age over 61 years (77.7%) and admission due to changes in the cardiovascular system (37.1%), followed by the respiratory system (25.3%)^(11-12,14).

Regarding the characterization of the AE according to nature, the predominance of events related to the nasogastric tube (132 – 57.6%) was verified, which is in agreement with findings from other studies about AE in ICUs and Inpatient Units, showing a higher demand for attention by the nursing team in handling and care with this device⁽¹²⁻¹³⁾.

Also, interesting peculiarities of the type and place of events with nasogastric tubes should be discussed. It is observed that the unplanned removal of the tube comprises most of these events, with higher frequencies at ICU (53.8%) and SCU (54.20%). Hence, it can be assumed that the severity of these patients not only demands a higher amount of devices, but also the handling of this equipment by the nursing team, which makes them a source of risk for the occurrence of AE.

After the nasogastric tube AE, falling (38 – 16.6%) and medication errors (34 – 14.8%) predominate, respectively, at the IU and ICU. Studies on this theme are similar to the results found⁽¹²⁻¹³⁾.

As for a higher frequency of falls at the IU, they can be justified because the patients, who are not under surveillance all the time, stand up to see to their own basic needs. Considering the serious complications falls can entail for patients' physical and emotional integrity, besides financial consequences for the institution, the AE related to falling have been considered an expressive indicator of results, which contributes to a new focus on quality of care and patient safety.

About the types of medication errors, studies find different results and a large variety in the typology of the errors, reflecting the inherent complexity of this activity^(11,14-15).

The higher occurrence of these errors at the ICU can be supported by complex medication therapies. When associated to the severity of illness of the patients, it deserves maximum attention from nursing professionals.

Regarding the nursing interventions performed immediately after the event, such as the reinsertion of the nasogastric tube (83.3%) and the communication of the falls (55.26%) and medication errors (47.6%) to the physician, some assumptions can be suggested. Since they know the risks of serious consequences a medication administration or fall event could cause, the nurses readily communicate it to the doctor, trying to prevent aggravations for the patients. On the other hand, the accidental removal of a nasogastric tube can be safely corrected just with its reinsertion.

The distribution of nursing professionals per patient in this study shows that with a ratio of one employee for every two patients at the ICU, adverse events happened more frequently at this type of unit. Thus, it can be conjectured that staff allocation should be mainly guided by the severity of patient and nursing workload in order to assure excellence in nursing practice at the bedside.

Finally, result indicators like AE are fundamental tools of quality to appoint aspects of care that could be improved, making healthcare free from risks and errors and, therefore, safer.

CONCLUSIONS

Among the 229 AE occurred from March to July 2006:

- AEs with NGT (57.6%), falls (16.5%) and medication errors (14.8%) were predominant;
- The predominant nursing interventions after medication error and fall were the communication of the event to the physician (47.0% and 76.4%);
- In the AE cases with NGT, the predominant intervention was reinsertion of the tube (83.33%);

- The AE occurred most often on Thursdays (24.89%), Tuesdays (19.21%) and Wednesdays (16.59%)
- The nursing professional/patient ratio was 1:2 (ICU), 1:3 (SCU) and 1:4 (IU) at the moment of AE;
- The highest AE rate was related to NGT in all units.

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