

## Retirada não planejada de dispositivos invasivos e suas implicações para a segurança do paciente crítico

Unplanned removal of invasive devices and their implications for the safety of the critical patient

La retirada no planificada dispositivos invasivos y sus implicaciones para la seguridad del paciente crítico

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This research has had its own funding. Article produced from the monograph entitled as follows: Unplanned removal of invasive devices and their implications for the safety of the critical patient, *Universidade do Estado do Rio de Janeiro*, 2016.

### How to quote this article:

Pereira LMV; Almeida LF; Franco AS; et al. Unplanned removal of invasive devices and their implications for the safety of the critical patient. *Rev Fund Care Online*. 2018 abr/jun; 10(2):490-495. DOI: <http://dx.doi.org/10.9789/2175-5361.2018.v10i2.490-495>

### ABSTRACT

**Objective:** Herein, our goal has been to analyze the unplanned removal of invasive devices in an intensive care unit. **Methods:** It is a descriptive, retrospective, documental study with a quantitative approach. The data were collected from the records of insertion and removal of tubes, catheters and drains, installed in patients under critical health state. Simple statistics was used for data analysis. This research has been approved by the Research Ethics Committee from the *Hospital Universitário Pedro Ernesto*, under the *CAAE: 55182716.8.0000.5259*. **Results:** The enteric catheter for feeding was highlighted among those devices withdrawn in an unplanned manner (42%). The reasons for the unplanned removal of the devices were, as follows: removal by the patient (33%), obstruction (30%) and accidental loss (21%). **Conclusion:** The results were similar to those described

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in the literature and should serve as a basis for planning actions directed towards safer assistance.

**Descriptors:** Critical care, patient safety, equipment and provisions, nursing.

## RESUMO

**Objetivo:** Analisar a retirada não planejada de dispositivos invasivos em uma unidade de terapia intensiva. **Métodos:** Estudo descritivo, retrospectivo, documental com abordagem quantitativa. Os dados foram coletados a partir do registro da inserção e retirada de tubos, cateteres e drenos, instalados em pacientes críticos. Para análise, utilizou-se a estatística simples. Pesquisa aprovada pelo comitê de ética em pesquisa do Hospital Universitário Pedro Ernesto, CAAE: 55182716.8.0000.5259.

**Resultados:** O cateter entérico para alimentação se destacou dentre aqueles dispositivos retirados de forma não planejada (42%). Os motivos pelos quais ocorreu a retirada não planejada dos dispositivos foram: retirada pelo paciente (33%), obstrução (30%) e perda acidental (21%). **Conclusão:** Os resultados encontrados foram semelhantes aos descritos na literatura e devem servir de base para o planejamento de ações direcionadas para uma assistência mais segura.

**Descritores:** Cuidados Críticos, Segurança do paciente, Equipamentos e provisões, Enfermagem

## RESUMEN

**Objetivo:** Analizar la eliminación planificada de productos invasivos, en una unidad de cuidados intensivos. **Métodos:** estudio documental retrospectivo descriptivo con un enfoque cuantitativo. Los datos fueron recolectados a partir de lo registro de la inserción y la eliminación de tubos, catéteres y drenajes, instalado en pacientes críticamente enfermos. Para el análisis, se utilizaron las estadísticas sencillas. De investigación aprobado por el Comité de Ética en Investigación del Hospital Universitario Pedro Ernesto, CAAE: 55182716.8.0000.5259. **Resultados:** El catéter para la alimentación entérica se destacaban entre las tomadas de los dispositivos de manera no planificados (42%). Las razones por las que la retirada no fue dispositivos previstos fueron retiradas por el paciente (33%), obstrucción (30%) y la pérdida accidental (21%). **Conclusión:** Los resultados fueron similares a los descritos en la bibliografía y debe ser la base para la planificación de acciones orientadas a una atención más segura.

**Descritores:** Cuidados Críticos, la seguridad del paciente, equipos y suministros, Enfermería

## INTRODUCTION

The patient admitted to the Intensive Care Unit (ICU) is considered critical and demands highly specialized care from the multidisciplinary health team. These care are offered with the use of technologies such as invasive devices that offer life support and hemodynamic monitoring. The most commonly used devices in the ICU are the following: orotracheal tube, tracheostomy cannula, central venous catheter, peripheral venous catheter, arterial catheter, enteric catheter, bladder catheter (Foley type) and drains.

The installation of these devices is a medical decision. Nevertheless, the nursing team, in its uninterrupted care and constant vigilance, actively participates in the continuity

of the therapy implemented. As part of nursing care, the prevention of complications due to the use of this type of technology, which is widely used in ICU,<sup>1</sup> should be discussed due to the significant avoidable morbidity and mortality and additional expenses.<sup>2</sup>

Regarding the consequences of their unplanned removal, we can mention, for instance, injuries and increased length of stay in the unit, costs generated for the institution with treatment of injuries and infections, prolongation of hospitalization, adequate planning of nursing care and minimizing care-related risks.

In the ICU scenario, the care risk seems to be closely linked to the practice due to the whole technological apparatus, the severity of the patients, a large number of procedures, a greater number of professionals, among others. Especially when it comes to ICUs from university hospitals, which in addition to the quantitative of professionals sized by legislation, a very large number of residents of all specialized ICU teams. The high complexity of intensive care and the clinical conditions of patients make the care system vulnerable and risky.<sup>3</sup>

Given this context, this study aimed to analyze the unplanned removal of invasive devices in an ICU.

## METHODS

It is a descriptive, retrospective, documental study with a quantitative approach, which was performed in a general adult ICU from a university hospital, located in *Rio de Janeiro* city. The unit studied has 10 active beds, one of them destined for respiratory isolation. The nursing team works on a 12 x 60 hour shift. The sector has 01 nurse in each day or night shift, 02 day-by-day different nurses, 01 nursing manager, 07 nurses doing the first year of residency and 08 nurses doing the second year of residency. Three nursing faculty take turns and supervise an average of 4 undergraduates in 4 days of the week, usually during the morning. As for the nursing technicians, each team (day and night) counts on average with 5 workers, in addition to 2 day-by-day different nursing technicians.

The study was submitted to the technical evaluation of the Ethics in Research Committee of the institution where the research was carried out in March 2016 and was approved in April 2016 under the CAAE: 55182716.8.0000.5259, Legal Opinion No. 1.517.676. Since it was a study with documentary analysis, it was not necessary to use the Free and Informed Consent Term applied to research involving human beings according to the Resolution No. 466/12 from the National Health Council.<sup>4</sup>

Data were collected through a form with closed questions regarding the invasive devices used, length of stay, reason for withdrawal (planned or not) and the work shift in which the occurrence occurred. In order to do so, we have analyzed the forms filled out by nurses of the sector, when there was installation and removal of invasive devices.

Data from the following devices were included: orotracheal tube, tracheostomy cannula, central venous catheter, peripheral venous catheter, arterial catheter, enteric catheter, bladder catheter (Foley type) and drains. We have excluded data on invasive devices that are not commonly used in the unit such as epidural catheter and intracranial catheter.

The data were collected from May to August 2016, and referred to the devices installed in the patients admitted to the sector during the years of 2014 and 2015. After the collection phase, the data were tabulated and analyzed through simple statistics (absolute and percentage).

## RESULTS

There have been analyzed 360 printouts that contained the records of invasive devices installed in patients. There have been found 1,492 records and excluded 392 of the sample, for not containing some information such as the date of insertion or removal, or justification for withdrawal of the device. The records related to 1,084 invasive devices were then analyzed. 414 (40%) invasive devices were removed in an unplanned way.

**Table 1** - List of devices removed in an unplanned manner

Device	Removed in an unplanned manner			
	Yes		No	
	N	%	N	%
Enteric catheter	173	42	58	7
Peripheral venous catheter	89	21	81	12
Central venous catheter	51	12	200	30
Bladder catheter	30	7	82	12
Arterial catheter	28	7	96	14
Orotracheal tube	22	5	96	14
Tracheostomy cannula	11	3	31	5
Drains	10	2	26	4
Total	414	38	670	62

Source: Research data, 2016.

Regarding the work shift, 57% of the devices were withdrawn in an unplanned manner over the Day Service (DS). Concerning the 8 types of devices analyzed, only the central venous catheter was removed in an unplanned manner more times over the Night Service (NS).

**Table 2** - Distribution of invasive devices taken by unplanned removal in relation to the work shift

Device	Work shift			
	Yes		No	
	N	%	N	%
Enteric catheter	101	42	78	45
Peripheral venous catheter	47	20	36	20
Central venous catheter	24	10	27	15
Bladder catheter	18	7	12	7
Arterial catheter	21	9	07	4
Orotracheal tube	12	5	10	6
Tracheostomy cannula	8	3	3	2
Drains	8	3	2	1
Total	239	<b>57</b>	175	42

Source: Research data, 2016.

The reasons for unplanned removal are shown in **Table 3**.

**Table 3** - Reasons for unplanned removal of invasive devices

Reasons	N	%
Removal by the patient	137	33
Obstruction	124	30
Accidental loss	87	21
Externalization	62	15
Damaged device	17	04

Source: Research data, 2016.

## DISCUSSION

The most frequently unplanned device in the unit investigated in the years 2014 and 2015 was the enteric catheter for feeding and corroborates with a study that evidences high incidences of loss of feeding probes in intensive care when compared with other devices also evaluated as vascular catheters and tracheal tubes, with percentages around 40%-69.6% and rates of 44-73/1,000 patients/day.<sup>5</sup>

The authors state that these results represented close values when compared to the literature, with an annual rate of 33 events per 1,000 patients per day with feeding tube and incidence of 56% (141/253) of unplanned withdrawal of the feeding tube. The trend brought by these studies is confirmed when the present study shows that the unplanned removal of the enteric catheter was 42%.

Still considering the enteral nutrition and the catheter used for this practice, the same study states that the incidence of enteric catheter loss resulting from unplanned output and obstruction is an indicator of outcome. The maintenance of its permeability, fixation, administration of diets and medications, is linked to nursing care. The authors also claim that the loss of devices used in intensive care such as tubes, probes and catheters (objects of the present study) is

frequent, and besides being able to be caused by the patient, they also pass through nursing care.

It is important to note that when the unplanned removal was caused by the patient, it was not possible to identify during the data collection the reason for which the event occurred. That is, it was not possible to know if the patient was poorly sedated, in hyper or hypoactive delirium, agitated or other reason that could justify withdrawal. This requires a direct qualitative evaluation in the medical records of each patient who presented an unplanned removal of an invasive device caused by the patient.

Although we do not observe a high percentage for accidental extubation in this study, we take into account the expressive use of mechanical ventilation in ICU and the frequency of studies found about the topic, and also the relevance of this incident to the patient. We highlight the contribution of a study that proposes a preventive guide for accidental extubation. The guide is based on four situations in which the nursing team is present: bathing in the bed, change of position, exchange of cannula fixation and transport of the patient.<sup>1</sup>

The authors consider that the complications are greater in those patients in whom the accidental extubation was due to the nursing care, in other words, they happened in one of those moments and culminate in the increase of the work of the team and postponement of the discharge of the patient. Except for the exchange of fixation, all other reasons listed in the guide are a justification for the unplanned removal not only of orotracheal tubes and tracheostomy cannula, as well as other devices also mentioned in the present study.

Although no significant difference has been found, the results also have shown a greater unplanned output of the devices during DS, which is contrary to a pre-established concept that during NS the surveillance is lower. This result can be explained by the greater number of people and teaching activities during the day. Moreover, a study reveals that environmental factors such as noise and heat (due to a greater number of professionals and students acting in the unit), psychological as anxiety and stress of the professionals also contribute to the occurrence of errors.<sup>6</sup>

The same author shows that the workload is one of the most important stressors among ICU nurses, interfering with the results of care. This statement is fully applicable to the reality of the ICU where this study was carried out. During the clinical practice, the greater number of procedures and routines during DS were observed, which helps to explain why the unplanned output of the analyzed devices associated with the workload and stress of the daytime staff increased. Nonetheless, professionals need to be aware of good health practices, especially in direct critical patient care, during both work shifts.

Another study emphasizes the researches that show that the training of professionals could be an important preventive strategy related to patient safety, since the lack of experience or skill also stands out among the individual

factors associated with the occurrence of adverse events or incidents.<sup>7</sup> Since the unit under study is part of the context of a university hospital and receives daily teachers, students, residents or has fresh trained professionals, it is relevant to engage into constant training practices towards all health staff in order to avoid adverse events.

In a study, the authors report that there is a positive correlation between records and quality of care. Therefore, nursing care can be evaluated through registries, which reflect the quality of the care and the productivity of the work.<sup>8</sup> Based on the records, still in the same study, one can permanently build better care practices, besides implementing actions aimed at improving operating results.

Although the nurses recognize the importance of written communication for patient continuity of therapy, they are unable to implement this practice in their daily practice. Often, nurses' lack of time to perform nursing records is a consequence of the lack of priority of this task in their work.<sup>9</sup> Also, the non-prioritization of records may be the result of the workload aforesaid.

It is possible that a reformulation in the current form and a later validation by the team itself, will bring a greater appreciation to the adequate record of each invasive device removal, whether it is planned or not. Also, the training of the registry can contribute to the improvement of this activity.

The *Resolução da Diretoria Colegiada (RDC)* [Collegiate Directory Resolution] No. 36 defines patient safety as an acceptable reduction of the risk of unnecessary harm associated with health care.<sup>10</sup> The concept established goes beyond the relationship between the professional at the bedside and the patient, as an author believes when affirming in his unsafe health care results in significant avoidable morbidity and mortality, additional expenditures on maintaining health systems and are of major concern today.<sup>2</sup>

Following the same reasoning, some authors bring their article found in the literature where it was identified that the amount spent with hospital admissions is 200.5% higher in the occurrence of adverse events than in the hospitalizations without these events, besides the time of hospitalization was an average of 28.3 days or more. Added to this are findings of another author specifically related to the devices used in critical patient care that concluded that the total costs assessed for devices removed (tubes, probes, drains, and catheters) are around \$7,606 and the cost of the same total assessed by event is around \$181.<sup>4</sup>

Adverse events ultimately help to identify the error and quantify it, as they cause harm, affecting on average 10% of hospital admissions. Managing it is important to note that adverse events are largely directly related to failures in the system, and not particularly to professional disregard or incompetence.<sup>11</sup> Consequently, it is essential that the units and the quality sector of the respective institutions to partner in order to spread the patient's safety culture, and that measures aimed at reducing the adverse effects of health care might be adopted.

## CONCLUSION

According to the study's purposes, the devices removed in an unplanned manner were identified, where the catheter for enteral feeding was the most withdrawn. There was confirmation of this trend in the literature findings.

This study made it possible to see that the work shift did not seem to influence the non-elective removal of the devices studied, since there was no significant difference between the shifts.

The reasons identified for the unplanned removal correspond to those described in the literature, except for a damaged device. Nonetheless, the quantitative obtained in this study, regarding this reason for the unplanned removal of invasive device, was small and did not interfere significantly with the analysis performed.

Given the results, one piece of data caught our attention during data collection: the number of records related to invasive devices that could not be analyzed because they were incomplete. These records had no date of insertion, or withdrawal or justification for removal of the device. This was a limitation of the study, and it was concluded that it is necessary to endorse along with the health team the importance of the records of actions carried out and communication between professionals.

It is suggested the systematic use of instruments related to quality indicators, daily and regularly demonstrated through statistical data to the health team. In this way, the responsibility for registering and maintaining intrusive devices remains shared.

It is also interesting that the registration and control of the invasive devices should be digitized. Therefore, the analysis can be done with a shorter time period, besides facilitating the quick data acquisition. Thus, planning for actions that aim to reduce unplanned withdrawals from invasive devices might be more objective and specific.

Another possibility would be the creation of a "Team" responsible for the maintenance and evaluation of the invasive devices. In this way, it is sought to identify early adverse events related to this type of technology and to implement preventive measures aimed at reducing its occurrence.

Conclusively, we endorse that the dissemination of the patient's safety culture seeks to prevent any kind of adverse event, contrary to punitive logic. Therefore, health institutions must invest in personal development, then enhancing the ability to assess the environment for potential hazards, so that deficiencies and ways to eliminate, reduce or control those hazards can be identified.

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Received on: 17/11/2016

Reviews required: 09/03/2017

Approved on: 20/03/2017

Published on: 10/04/2018

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