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Incidence of pressure injury and nursing care time in intensive care

Incidência de lesão por pressão e tempo de assistência de enfermagem em terapia intensiva

Incidencia de lesiones por presión y tiempo de atención en enfermería en atención intensiva

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ABSTRACT

Objectives: To correlate the incidence of pressure injury (PI) with the average time of nursing care in an intensive care unit (ICU). **Method:** Epidemiological, observational, retrospective study, carried out in the ICU of a university hospital. Data were collected by consulting the PI incidence and the average nursing care time from ICU databases between 2010 and 2014. Measures of central tendency and variability, and Pearson's correlation coefficient were used for data analysis. **Results:** The average incidence of PI between 2010 and 2014 was 10.83% (SD = 2.87) and the average time spent in nursing care for patients admitted to the ICU was 15 hours (SD = 0.94). There was no statistically significant correlation between the incidence of PI and the nursing care time (r = -0.17; p = 0.199), however, the results suggested an overload on the nursing team. **Conclusion:** This study confirms the importance of implementing and reassessing the effectiveness of preventive care protocols for PI, in addition to warning about the work overload of nursing in assisting critically ill patients.

DESCRIPTORS: Incidence. Intensive care units. Nursing care. Pressure ulcer. Workload. Enterostomal therapy.

RESUMO

Objetivos: Correlacionar a incidência de lesão por pressão (LP) com o tempo médio de assistência de enfermagem em unidade de terapia intensiva (UTI). **Método:** Estudo epidemiológico, observacional, retrospectivo, realizado em uma UTI de um hospital universitário. Os dados foram coletados pela consulta aos bancos de dados de incidência de LP e tempo médio de assistência de enfermagem entre 2010 e 2014. Utilizou-se medidas de tendência central e variabilidade, e coeficiente de correlação de Pearson para análise dos dados. **Resultados:** A média de incidência de LP entre 2010 e 2014 foi de 10,83% (DP = 2,87) e o tempo médio de assistência de enfermagem despendido aos pacientes internados em UTI foi de 15 horas (DP = 0,94). Não houve correlação estatisticamente significante entre incidência de LP e o tempo de assistência de enfermagem (r = -0,17; p = 0,199), porém os resultados sugeriram sobrecarga da equipe. **Conclusão:** Este estudo confirma a importância da implementação e reavaliação da eficácia de protocolos de cuidados preventivos para LP, além de alertar sobre a sobrecarga de trabalho de enfermagem na assistência aos pacientes críticos.

DESCRITORES: Incidência. Unidades de terapia intensiva. Cuidados de enfermagem. Lesão por pressão. Carga de trabalho. Estomaterapia.

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RESUMEN

Objetivos: Correlacione la incidencia de úlceras por presión (UP) con el tiempo promedio de atención de enfermería en la Unidad de Cuidados Intensivos (UCI). **Método:** Estudio epidemiológico, observacional, retrospectivo, realizado en la UCI de un hospital universitario. Los datos se recopilaron consultando las bases de datos de incidencia de UP y el tiempo promedio de atención de enfermería entre 2010-2014. Se utilizaron medidas de tendencia central y variabilidad, y el coeficiente de correlación de Pearson para el análisis de datos. **Resultados:** La incidencia promedio de LP entre 2010-2014 fue de 10.83% (DE = 2,87) y el tiempo promedio dedicado a la atención de enfermería para pacientes ingresados en la UCI fue de 15 horas (DE = 0,94). No hubo correlación estadísticamente significativa entre la incidencia de UP y el tiempo de atención de enfermería (r = -0.17; p = 0.199), sin embargo, los resultados sugirieron una sobrecarga del equipo. **Conclusión:** Este estudio confirma la importancia de implementar y reevaluar la efectividad de los protocolos de atención preventiva para UP, además de advertir sobre la sobrecarga del trabajo de enfermería en la atención de pacientes críticos.

DESCRITORES: Incidencia. Unidades de cuidados intensivos. Atención de enfermería. Úlcera por presión. Carga de trabajo. Estomaterapia.

INTRODUCTION

Patient safety is discussed worldwide. Studies on this topic highlight that one of the adverse events that most affect hospitalized patients is the pressure injury (PI)[1]. Pressure injuries cause pain and discomfort, increase length of hospitalization and morbimortality, lower the quality of life of the patient and his family, generate high costs to health institutions and increase the workload of the nursing team. They are considered avoidable adverse events, called "key indicators", to measure the quality of nursing care and the level of patient safety in a hospital environment[1–3].

The National Pressure Injury Advisory Panel (NPIAP) defines PIs as lesions affecting the skin and/or underlying tissues that are usually located on a bone prominence, caused by intense pressure or a combination of pressure and shear, which may be related to the use of medical devices and other artifacts[4,5]. The NPIAP classifies PIs in four stages (from 1 to 4); unstageable PI; deep tissue PI; there are also medical device related PI, which are classified in the same way as other PIs; and PIs in mucous membranes that are not classified due to the anatomy of the tissue[4,5].

There are several risk factors related to the patient, the care process and the institution itself that contribute to the development of PIs. Critical patients admitted to intensive care units (ICU) are considered more vulnerable and present even higher risks for the development of these lesions due to immobility in bed, sedation, clinical instability with the need for vasoactive drugs and invasive interventions[6].

Pressure injuries are one of the most prevalent adverse events and incidents in the ICU, with incidence rates ranging from 8.8 to 25.1% worldwide[3,6,7]. National studies show incidence rates between 13.6 and 59.5%[2,8].

The incidence of PI indirectly reflects the quality of care provided, as well as it is used as a parameter in the evaluation of strategies and preparation of protocols for prevention. Thus, the incidence of PI has been adopted as an indicator of quality in service and nursing care by several health institutions[3].

Considering the risk factors related to care and organizational issues, such as health care management, that contribute to adverse events, including PI, the workload and human resources in nursing are highlighted. Although there are disputes about how much the nursing workload increases the risk of PI, it is worth noting that little has been discussed about this topic in the literature[3,9].

Studies show the importance of considering the nurse–patient coefficient and the management of nursing workload to integrate a set of PI prevention actions, providing quality of care and cost reduction of the actions provided[3]. Thus, the training of the health care team in the early identification of intrinsic and extrinsic factors is of paramount importance in the care of critically ill patients[10,11].

Considering PI as an adverse event that puts at risk the patient's safety, quantifying and analyzing the incidence of PI in the ICU, as well as evaluating the correlation between the incidence of PI and the time of nursing care spent with these patients, it is relevant as it collaborates in the evaluation of the dimension of the

problem and in the elaboration of nursing interventions for prevention of PI, aiming at the quality of care, since the nursing workload in the care of PI has been little addressed in the literature, especially the national literature.

Therefore, this study aimed to identify the incidence of PI and the mean time of nursing care spent in ICU patients and correlate the incidence of PI with the mean time of nursing care spent in ICU patients.

METHODS

This is an epidemiological, observational, retrospective, quantitative study, performed in the ICU of a university hospital. The unit has a total of 12 beds, four of which are for patients in isolation. It is a general, teaching hospital, located in the city of São Paulo, considered as a reference service of medium complexity and that integrates the Brazilian Unified Health System (SUS, *Sistema Único de Saúde*).

Data collection was performed by consulting databases in Microsoft Excel software, recorded by the head of ICU nursing according to the equations determined by the Manual of Nursing Indicators[12], in the period from January 2010 to December 2014, where information regarding the welfare quality indicator "incidence of PI" is stored. Data on the monthly incidence of PIs are recorded in the spreadsheets of the database. Spreadsheets were also consulted regarding the mean time of nursing care spent in the ICU.

The data was collected in 2016. By the end of 2014, updated recommendations for PI prevention and treatment were published and disseminated by NPIAP, the European Pressure Ulcer Advisory Panel (EPUAP) and the Pan Pacific Pressure Injury Alliance (PPPIA)[7]. With the publication of new guidelines for prevention and treatment of PI, the prevention protocol used in the institution that was built on the 2009 NPIAP and EPUAP guidelines[13] would undergo updates. Thus, the choice of the period for data collection was from 2010 to 2014. It is noteworthy that studies on the incidence of PIs in ICU were conducted at the institution until 2009[14].

The data obtained were quantitatively analyzed using descriptive statistics, with measures of central tendency and variability using SPSS software version 20.0. The correlation analysis between the welfare quality indicator "incidence of PI" and the mean time of nursing care was performed using the Pearson correlation coefficient and the results were considered statistically significant when $p \leq 0.05$.

This research was approved by the Ethics and Research Committee (ERC) of the proposing institution by opinion no. 1.235.310/CAAE 47336615.2.0000.5392 and by the ERC of the University Hospital by opinion no. 1.293.623/CAAE. 47336615.2.3001.0076.

RESULTS

Tables 1 and 2 present, respectively, the average values of PI incidence and the mean values of time of nursing care from 2010 to 2014.

Table 1. Average monthly and annual PI incidence in ICU. São Paulo, 2020.

Variables	2010	2011	2012	2013	2014
January	7.7	22.8	26.3	-	9.1
February	14.6	13.9	13.3	7.7	1.8
March	12.8	8.3	11.3	11.1	1.6
April	8.5	12.8	17.1	12.5	15.8
May	10.0	10.0	8.1	14.6	6.9
June	17.3	7.7	10.6	14.9	2.5
July	20.0	16.6	11.1	11.5	5.2
August	13.9	13.9	6.4	8.1	6.2
September	15.5	6.9	8.1	10.8	6.5
October	9.1	16.6	13.7	13.6	3.7
November	9.1	8.3	10.8	3.4	5.4
Dezember	9.4	3.3	15.4	19.1	3.9
Annual avarage	12.3	11.8	12.7	11.6	5.7
Standard Deviation	3.9	5.4	5.3	4.2	3.9
Minimum	7.7	3.3	6.4	3.4	1.6
Maximum	20.0	22.8	26.3	19.1	15.8

The average incidence of PI considering the period from 2010 to 2014 was 10.83% (SD = 2.87), with the lowest average incidence of 5.7% (SD = 3.9) in 2014 and the highest average incidence of 12.7% (SD = 5.3) in 2012. It is noteworthy that, occasionally in January 2012, the highest average incidence of PI reached 26.3%, while the lowest average reached 1.6% in March 2014.

Table 2. Mean values of time of nursing care in an adult intensive care unit, according to month and year. São Paulo, 2020.

Variables	2010	2011	2012	2013	2014
January	13.5	14.0	14.9	13.6	14.8
February	13.0	15.2	15.9	15.0	15.6
March	13.7	16.0	15.5	16.9	16.0
April	13.0	15.6	14.9	14.5	15.2
May	14.0	16.3	13.8	14.5	14.0
June	13.6	15.7	15.0	15.8	15.2
July	13.2	15.8	15.8	14.6	15.9
August	14.1	14.2	15.6	13.7	17.9
September	14.1	14.7	14.7	14.0	14.3
October	14.7	17.1	16.7	16.5	15.7
November	15.2	14.2	16.0	16.7	13.4
Dezember	14.5	15.4	16.4	15.1	16.5
Avarage	13.8	15.3	15.4	15.1	15.4
Standard Deviation	0.7	0.9	0.8	1.1	1.2
Minimum	13	14	13.8	13.6	13.4
Maximum	15.2	17	16.7	16.9	17.9

The mean time of nursing care to ICU patients was 15 hours (SD = 0.94), with the lowest mean in February and April 2010 (13 hours) and the highest mean (17.9 hours) in August 2014.

By correlating PI incidence with time of nursing care, a negative and weak correlation was obtained (r = -0.17; p = 0.199). A negative correlation shows a negative linearity between the variables, i.e., it allows the inference that the incidence of PI decreases as the time of nursing care increases (Fig. 1). However, values of "r" up to 0.30 are considered weak correlation and of little clinical applicability, even when statistically significant.

DISCUSSION

Scientific evidence points to high rates of PI incidence in hospitalized patients, especially in the ICU, due to the numerous risk factors to which they are exposed[3,10]. In the world scenario, a systematic review and meta-analysis study identified a cumulative incidence of 10.0 to 25.9% (CI 95%). In the studies of this review in which skin inspection was performed to identify PI, the accumulated incidence was from 9.4 to 27.5% (CI 95%) and in the studies that excluded stage 1, the incidence was from 0.0 to 23.8% (CI 95%)[15].

In a study developed with 335 patients admitted to ICUs of hospitals in Spain, accompanied for a maximum of 32 days, an incidence rate of 8.1% of PI was identified[17]. In Saudi Arabia, 84 ICU patients were evaluated over a 30-day period and a 39.3% incidence of PI was found[1]. A retrospective study developed in two hospitals in Iran, with a sample of 643 patients, the incidence of PI was 8.9%[6].

Considering the incidence of PI described in national scientific papers, a multicenter, prospective study developed at a university hospital in Paraná, Brazil, which included 10 general ICUs and evaluated 332 patients admitted during 31 days, found an incidence of 13.6%[8]. Another study developed with 77 patients in the ICU of the Hospital Universitário de Vitória/ES, evaluated over a four-month period, identified that the incidence of PI was 22%[2]. A retrospective cohort study of 766 patients from nine ICUs of two university hospitals located in the city of São Paulo identified an incidence of PI of 18.7%[3].

The data obtained in this study expressed that the average annual incidence of PI, considering the period

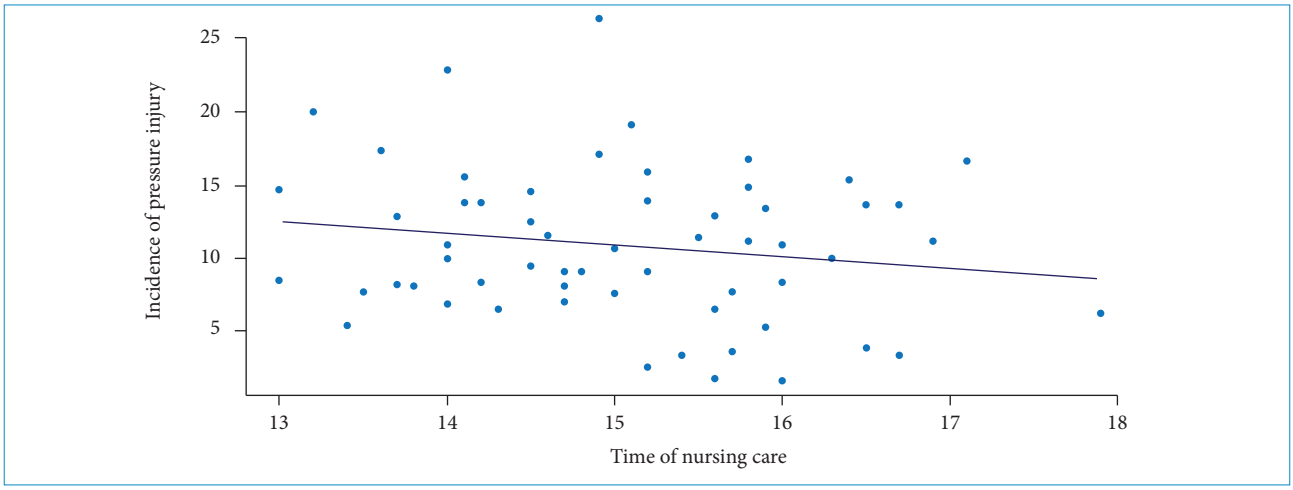

Figure 1. Dispersion of the incidence of pressure injury over time of nursing care. São Paulo, 2020.

from 2010 to 2014, was 10.83%, with 2014 showing the lowest average annual incidence of PI (5.7%, SD = 3.9), and the highest annual average (12.7%, SD = 5.3) was observed in 2012. When considering the monthly incidence, the highest averages, with values above 20%, occurred in January 2011, when an PI incidence of 22.8% was identified and in January 2012 with 26.3%.

In 2005, the first study investigating the incidence of PI in several units was carried out over a period of three consecutive months in the same hospital where this study was conducted. From this investigation, the incidence of 41% of PI in the ICU[18] was identified. Based on this data, a PI prevention protocol was implemented in the institution by the Enterostomal Therapy Nursing Study Group. The prevention protocol was built based on the NPIAP, EPUAP guidelines of 2009[13]. In addition, the incidence of PI is now considered an indicator of quality in the institution[12].

In 2012, the second study evaluated the incidence of PI after the implementation of the prevention protocol, and the incidence identified in the ICU was 23.1%, highlighting an important reduction in its incidence, which showed that the protocol implemented had a positive impact on the prevention of new cases[14]. In the present study, it was found that the incidence of PI gradually decreased over the years, the maximum value being 26.3%, observed punctually in January 2012. Therefore, the need for greater attention to prevent new cases is evident, so that the incidence continues to decrease through the support of the institution's administration, in the provision of material and human resources, and in the active involvement of professionals[3,19–21].

As for the time of nursing care to the patient in the institution, the average from 2001 to 2005 was 15.4 hours/day[22]. Between 2008 and 2009, the average time was 14 hours/day[23]. The average between 2010 and 2014 was 15 hours/day (SD = 0.94), ranging from 13.8 to 15.4 hours/day, with the lowest average with 13 hours in February and April 2010, and the highest average with 17.9 hours in August 2014.

Regarding the values established by the Brazilian Federal Nursing Council (Cofen, *Conselho Federal de Enfermagem*), according to Cofen Resolution 543/2017, the average time of nursing care to ICU patients is 18 hours[24]. Therefore, it can be observed that the average hours of nursing care spent to patients in the ICU of the university hospital in question, in all months from 2010 to 2014, were lower than those indicated by Cofen[24], which may suggest work overload of the nursing team.

With different results to those found in the present study, a survey carried out in 11 ICUs of three hospitals located in the city of São Paulo, two public hospitals and one private hospital, identified an average time of nursing care higher than the values recommended by Cofen, with 18.86 hours (public hospital A), 21 hours (public hospital B) and 19.50 hours (private hospital)[25].

When analyzing the correlation between PI incidence and time of nursing care, no statistical significance was found, i.e., time of care cannot be considered determinant for the patient to present PI, since they are inversely proportional.

In another study carried out in the same ICU in 2011, with the objective of analyzing the time of care by the nursing team and checking its correlation with care quality indicators, it was evidenced that there was a statistically significant correlation between nursing care time and the accidental extubation incidence indicator, which decreased as the time of nursing care spent by nurses increased. Regarding the nursing indicator "incidence of PI", the authors also identified a negative and weak correlation, without statistical significance ($r = -0.162$; $p = 0.450$)[23].

Brazilian studies evaluated nursing care time from the nursing activities score (NAS); one of them, developed in 2012 with 766 patients in nine ICUs of two university hospitals, found that the odds ratio (OR) of PI development increased 1.5% for each point recorded in the NAS. Thus, the nursing workload was identified as a predictor of PI[3]. The other study conducted in 3 ICUs of a large university hospital located in the city of São Paulo, from November 2007 to April 2008, identified that NAS acted as a protection factor, because its odds ratio was < 1 (OR = 0.916; CI 95% = 0.855–0.98). Thus, patients with high nursing workload were less likely to develop PI[16].

Critically ill patients have several associated risk factors, either individual, clinical and therapeutic, which predispose them to the development of PI[10,15]. In this study, the time spent in care of critically ill patients was not considered determinant for the development of PI. However, the different values found in the literature about the time of nursing care can be explained by the

characteristics of patients, ICUs and hospitals. Moreover, this indicator has greater impact together with other factors such as: age range, nutritional status, long periods submitted to humidity, mechanical ventilation, use of vasoactive drugs, hemodynamic instability and restriction of movement, so that the emergence of PI is more predictive[10]. It is noteworthy that such factors were not evaluated in this study.

CONCLUSION

The results of this study identified a decrease in the incidence of PI compared to previous studies conducted in the same institution, which can be attributed to the efficacy of the implementation of the prevention protocol in the ICU and the effectiveness of the continuous adaptations of such measures, making the cases of PI increasingly smaller. There was no statistical significance in the correlation between PI incidence and the time of nursing care. However, the results suggested a work overload of the nursing team, as the average hours of nursing care spent on critically ill patients in all months from 2010 to 2014 were lower than those indicated by Cofen (18 hours).

The results of this work show that new studies should be carried out, as there is a shortage of literature on the nursing workload and the occurrence of PI in its various classifications. It is noteworthy that this study used retrospective data from only one ICU with twelve beds; thus, prospective studies with larger samples, involving other hospitals and ICUs and with longer follow-up time are necessary to reinforce evidence of the relationship between nursing workload and PI development.

Finally, this study confirms the importance of implementing preventive care protocols for PI and reassessing their efficacy. In addition, it warns about the workload of nursing, aiming at a safe and qualified assistance to critically ill patients.

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AUTHOR'S CONTRIBUTION

Conceptualization, Nogueira PC and Ali YCMM; Methodology, Nogueira PC, Garcia PC and Ali YCMM; Writing – Review and Editing, Souza TMP, Ali YCMM and Nogueira PC; Supervision, Nogueira PC and Ali YCMM.

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