Incidence of pressure ulcer and nursing interventions*

Incidência de úlcera por pressão e ações de enfermagem

Incidencia de úlcera por presión y acciones de enfermería

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ABSTRACT

Objectives: To estimate the cumulative incidence (IC_{up}) and density incidence (DI_{up}) of pressure ulcer (PU) and to describe the implementation of nursing interventions in two hospitals in the State of Bahia before (phase 1) and during an educational intervention (phase 2). **Methods**: A prospective design was used. The sample consisted of inpatients of medical/surgical units. Data were collected through skin integrity assessment, reviewing of medical records, interviewing patients, family members, and health care team. **Results**: The cumulative incidence before and during the educational intervention was 31.4% and 13.6% in hospital 1, and 21.4% and 15% in hospital 2, respectively. The density incidence in hospital 1 before and during the educational intervention was 14.3 days and 43.5 days, respectively. The density incidence in hospital 2 before and during the educational intervention was 31.3 days and 37 days, respectively. **Conclusion**: There was a statistically significant reduction of density incidence in hospital 1. Preventive nursing interventions were effective in both before and during the educational intervention in both hospitals.
Keywords: Pressure ulcers/epidemiology; Quality assurance nursing care; Nursing care

RESUMO

Objetivos: Estimar a incidência cumulativa (IC_{up}) e a densidade de incidência (DI_{up}) de úlcera por pressão (UP) e descrever a ocorrência de ações de enfermagem em dois hospitais do Estado da Bahia, antes (fase 1) e durante (fase 2) intervenção educativa. **Métodos**: Estudo de coortes prospectivo com pacientes médico-cirúrgicos, utilizando avaliação da integridade cutânea, consulta a registros no prontuário, e entrevista com paciente, família e equipe. **Resultados**: IC_{up}, fase 1 e fase 2 foi, respectivamente, no hospital 1 de 31,4% e 13,6%, e no hospital 2, de 21,4% e 15%; DI_{up} aponta tempo médio de exposição para aparecimento de UP no hospital 1 de 14,3 dias na fase 1 e de 43,5 na fase 2; no hospital 2, de 31,3 dias na fase 1 e 37 na fase 2. **Conclusão**: Redução estatisticamente significante da DI_{up} no hospital 1; cuidados de enfermagem preventivos para UP comprometidos em ambos os hospitais nas duas fases.
Descritores: Úlcera por pressão/epidemiologia; Avaliação da qualidade dos cuidados de enfermagem; Cuidados de enfermagem

RESUMEN

Objetivos: Estimar la incidencia acumulativa (IC_{up}) y la densidad de incidencia (DI_{up}) de úlcera por presión (UP) y describir la ocurrencia de acciones de enfermería en dos hospitales del Estado de la Bahia, antes (fase 1) y durante (fase 2) la intervención educativa. **Métodos**: Se trata de un estudio de cohortes prospectivo realizado con pacientes médico-quirúrgicos, utilizando una evaluación de la integridad cutánea, consulta a registros en la historia clínica, y entrevista con el paciente, la familia y el equipo. **Resultados**: IC_{up}, fase 1 y fase 2 fue, respectivamente, en el hospital 1 de 31,4% y 13,6%, y en el hospital 2, de 21,4% y 15%; DI_{up} apunta un tiempo medio de exposición para la aparición de UP en el hospital 1 de 14,3 días en la fase 1 y de 43,5 en la fase 2; en el hospital 2, de 31,3 días en la fase 1 y 37 en la fase 2. **Conclusión**: Reducción estadísticamente significativa de la DI_{up} en el hospital 1; cuidados de enfermería preventivos para UP comprometidos en ambos hospitales en las dos fases.
Descriptores: Úlcera por presión/epidemiología; Evaluación de la calidad de los cuidados de enfermería; Atención de enfermería

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INTRODUCTION

Pressure ulcer (PU), both in patients receiving home care and those admitted to hospitals is still an important problem for health and nursing care because it affects quality of life, increases hospital stay on an average of 7 days[1], and increases costs[2-3].

According to the document Safe Practices for Better Healthcare: a Consensus Report from the National Quality Forum (NQF) from 2003, risk assessment from a certain patient to develop PU at admission and during hospital stay is included among the 30 safety practices that should be applied to health worldwide[4].

The occurrence of pressure ulcers in admitted patients is due to several factors related to patients, to the environment and to care processes[5].

Among the critical determiners for PU is the intensity and prolonged pressure on tissues, and the skin and adjacent structures tolerance to stand it. These aspects are related to: patients' mobility, understood as the ability to move, keep or sustain certain body positions; the ability to remove pressure from skin/body areas to enable circulation; and to sensorial perception which implies the level of awareness and the individuals' ability to feel painful stimulus or discomfort and to react to them by changing their body position or asking for help to turn[6-7].

Skin tolerance to pressure is influenced by external factors such as: skin exposure to excessive dampness, friction and shear, and by internal factors such as: poor nutrition, old age and decrease in arteriolar pressure[6, 8].

To identify risk factors, risk assessment scales are applied, tested and validated, among them there are Norton and Waterlow and Braden scales[2, 3, 6].

Some of the nursing actions considered as preventive measures for PU development are: mobility and adequate positioning and repositioning of patients; skin care with appropriate hygiene techniques, use of moisturizing cream; indication and use of support surfaces (type of mattress); supervision of nutritional conditions and fluid intake, among others[5, 8].

Studies point out that in intensive care, the incidence of PU ranges from 1% to 56 %[7, 9]; whereas in care institutions for acute patients, general hospitals and surgical units, the incidence ranges from 2% to 29.5%[10-12].

In Brazil, studies in intensive care units estimated PU incidence between 10.62% and 62.5%[8, 13-15]. In general clinic the estimated incidence was 42.6% and in surgical units it was 39.5 %[13].

The international literature shows that the introduction of PU prevention protocols and of education programs decreases its incidence. In a hospital where stays were long, after educational intervention, the incidence was reduced from 23% to 5 %[16] and, in an Orthopedic unit

it decreased from 55% to 29 %[17].

The objectives of the present article were to estimate the cumulative incidence (*CIup*) and incidence density (*DIup*) of pressure ulcer (PU) and to describe the occurrence of nursing actions in two hospitals of the state of Bahia, before (phase 1) and during (phase 2) educational intervention.

METHODS

Type of study

Prospective cohort study with patients admitted in medical-surgical units developed in 2001 (phase 1) and 2002 (phase 2), in two hospitals located in the state of Bahia, which had at least 10 nursing workers with no formal and regular technical qualification, performing nursing care and taking part in a qualification process, the *Projeto de Profissionalização dos Trabalhadores da Área de Enfermagem* (Project for Professionalization of Nursing Workers -PROFAE).

PROFAE is an initiative of the Ministry of Health it was introduced nationwide in 2000, with resources from loans given by the Inter-American Development Bank, the National Treasury and the Worker's Support Fund and technical cooperation of the United Nations Educational, Social and Cultural Organization. The purpose of the project was to promote technical qualification of the nursing work force to increase quality of public and private health services. Lasting for approximately a year, it adopted the model of competences and work was the matrix of the teaching-learning process. The pedagogical proposal encompassed: the capacities, the work activities and the context in which activities are performed, thus trying to increase qualification in the following dimensions: technical-specialized and ethical-political, communi-cational and inter-relational[18]. Until 2005, PROFAE trained around 173,544 nursing workers with formal technical qualification (attendant and other similar names, it complemented the education of 73,973 nursing technicians and also, gave pedagogical capacity building to 13,150 nurses teaching at the course[19].

Place: Hospitals selected (1 and 2) are philanthropic hospitals, with agreement with the Single Health System (SUS) and cared for low and medium complexity patients, in the specialties of general practice, Obstetric and Gynecologic and Pediatric surgery.

Hospital 1 presented respectively in 2001 and 2002, 163 and 166 active beds and occupancy rate was 72.8% and 80.4%. Medical-surgical units, which were the field of the present investigation, had 94 beds (2001) and 100 beds (2002). Nursing staff in 2001 was 89 workers, 59 were working in the medical surgical units studied, three were nurses, 47 nursing assistants/technicians and

9 attendants; in 2002, of the 107 nursing workers, 71 worked in the units selected, there were: six nurses, 56 assistants/technicians, and 9 attendants. Nursing supervision was performed both by nurses and nursing assistants and technicians, since the nursing staff did not allow continuous follow-up in the 24 hours of nursing work. The institution was not developing continuous education programs. In the second phase of the study, in the medical surgical units, a professional had finished technical qualification by PROFAE and four were in the capacity building process.

Hospital 2 had 220 beds in 2001 and 225 beds in 2002, with occupancy rates of 67.8% and 69.9%, respectively. Beds allocated in the medical-surgical units in 2001 were 138 and in 2002 it was 143. AS for nursing personnel, of the total staff in 2001 of 117 workers, 77 worked in medical-surgical units, five were nurses, 33 were nursing technicians/assistants and 39 were attendants; in 2002 of the total of 128 workers, 78 worked in the units studied, 5 were nurses, 61 were nursing assistants/technicians and 12 were attendants. In this hospital there was neither nursing supervision nor continuous education. In phase 2, in the units studied, there were 19 professionals qualified by PROFAE and seven were receiving qualification.

In both hospitals, the predominant nursing care was functional care.

The following operational definitions were adopted in the present study:

Case definition

PU localized injury to the skin, with tissue necrosis, it usually occurs when soft tissue is compressed between a bony prominence and hard surfaces for a long period of time[20]. They can be classified as stages I, II, III and IV, according to depth, extension and level of tissue damage[7]. Stage I PU is characterized by nonblanchable erythema of intact skin, the heralding lesion of skin ulceration. In individuals with darker skin, discoloration of skin, warmth, edema, or hardness may also be indicators of PU presence[21].

Defining nursing actions to prevent PU. The actions investigated were: turning patients every two hours and every four hours; clean and dry patients after incontinence episode; intake of fluid from 1500 to 2000ml/day; minister a diet and use skin moisturizer every day and an adequate mattress (water, air, or egg crate).

Subjects of the research

Patients eligible for the study were those meeting the following inclusion criteria: absence of PU at the time of admission, agree to take part in the study and presence of at least one of the following risk factors, as recommended by the literature[3,6]: impaired physical mobility, change in nutritional status according to Body Mass Index assessment (below 20 Kg/m2 and / or above 25 Kg/m2)[22], fecal/urinary incontinence understood as problem to control excretion; the skin is constantly wet by urine and feces, and altered sensory perception defined as difficult to communicate; altered notion of time and space; decrease or absence of the ability to respond significantly to pressure due to discomfort (does not moan or change position) due to the decrease in the level of awareness or sedation.

Samples of patients were selected in the first Day of admission, from October 2nd to November 13th 2001, called phase 1 of the study, forming a cohort of patients in each hospital studied. For phase 2, developed from October 20th to December 07th, 2002 another cohort of patients was formed (one for each hospital).

For data collection specific instruments (forms) were designed and tested to record the following information: patient's name, age, main diagnoses, admission date, type of risk factor for PU, date of ulcer occurrence, date of discharge, date of death, date of transference to other unit, change in patients' position, moisture, diet ministration, presence of a mattress – air and/or water and/or egg crate; patients were cleaned/dried after incontinence episode[5] Forms were given together with a manual with objective, accurate and detailed description of the field to be filled out.

The following data collection techniques were adopted: systematic direct observation of patients with a script that enable to assess skin integrity of the body parts where PU usually occur[8], checking nursing records on patients' charts; and, interview with questions that identified if patients had received preventive care for PU in the last 24 hours. Interview was performed with patients, when they could not provide information, relatives and /or nursing professional present at the time of collection were asked to provide the information.

Field researchers, nurses and senior nursing undergraduate students received previous theoretical and practical training for four days through audiovisual material and assessment of skin integrity of patients in admission units. When they were able to identify the presence or absence of PU, as well as the stage of the lesion, they were considered able to apply the instruments.

Procedures

Daily in the study period, researchers checked with the responsible department of the institution, the patients admitted in the medical-surgical units and identified those that met the inclusion criteria to form the study sample.

Patients included in the sample were assessed daily by the Field researcher based on the instruments adopted. Data collection finished when PU occurred,

when patient died, was discharged, transferred to another institution or up to 30 days after inclusion in the study.

Data analysis

For the present article, the incidences were estimated in two ways. The *cumulative incidence (CI$_{up}$)* was calculated by dividing the absolute number of new PU cases by the number of patients at risk for PU x 100, whereas *incidence density (ID$_{up}$)* was obtained by the division of the absolute number of new PU cases observed in the period divided by the sum of periods of patients' exposure. The time of individual contribution finished with the occurrence of PU, hospital discharge, death and transference from the unit. *IDup* expresses the power of morbidity or mean time necessary for a case to occur.

To perform comparison of data obtained in phase 1 and phase 2 statistical tests were performed: median test, Person's Chi-square test and fisher's exact test. Differences reaching á <5% were considered as significant.

The research Project has been approved by the Ethical Research Committee of a public nursing university of the state of São Paulo. The research has been approved by the board of the hospitals. After patients learned about the objectives of the research and agreed to take part, they gave their written consent. The same procedure was done for relatives and nursing professionals when information had on the nursing care received had to be obtained.

RESULTS

Sample characteristics

In phase 1 of the study 35 patients were studied in hospital 1 and 14 in hospital 2; in phase 2, 44 patients in hospital 1 and 40 in hospital 2.

Table 1 presents data referring to variables that characterize the sample studied.

Regarding age, there were no statistically significant differences between patients from the two hospitals (p=0.22), although patients from hospital 1, during phase 2, were younger than those from hospital 2 in the same phase (p=0.04).

Diagnoses of Cerebral Vascular Accident (CVA) was predominant in hospital 1 both in phase 1 and 2; in hospital 2, the same diagnoses was predominant in phase 1, however, in phase 2, there are two more frequent diagnoses, CVA and Congestive Heart Failure. There was no statistically significant difference between phase 1 and phase 2, both in hospital 1 (p=0.25) and in hospital 2 (p=0.261) regarding frequency of CVA diagnoses.

In both hospitals, in the two study phases, the most frequent risk factor was impaired physical mobility. In phases 1 and 2, in hospital 2, there was a high percentage of patients with urinary/fecal incontinence; in phase 2,

Table 1 Characteristics of the sample of patients observed in the study for PU incidence, according to hospital studied and phases. Bahia, 2001-2002

Variables	Hospital 1		Hospital 2	
	1st phase (years)	2nd phase (years)	1st phase (years)	2nd phase (years)
Age				
Percentiles				
0-25	16-52	13-39.5	44-73	24-57.5
25-50	52-71	39.5-60.5	73-79	57.5-72.5
50-75	71-82	60.5-71.5	79-88	72.5-87
75-100	82-99	71.5-87	88-90	87-95
Median	71	60.5*	79	72.5
Diagnoses (%)				
Cerebral Vascular Accident	48.6	34.1	28	17.5
Congestive Heart Failure	8.6	2.3	16	17.5
Diabetes Mellitus	5.7	4.5	0	5
Accidents	14.3	0	0	0
Systemic Blood Hypertension	0	4.5	0	7.5
Inferior limbs lesion	5.7	4.5	4	2.5
Cancer	2.9	2.3	4	2.5
Malnutrition	2.9	6.8	8	0
Others	11.3	41	40	47.5
Total	100	100	100	100
PU risk factor (%)				
Impaired physical mobility	100	> 90	100	> 90
Altered Sensory Perception	50	43.2	64.3	27.5
Inadequate Body Mass Index (below 20Kg/m^2 and/ or above 25 Kg/m^2)	40	47.5	50	87.5
Fecal and /or urinary incontinence	70	20.4	28.6	42.5

* (P=0.04)

in the same hospital the proportion of the inadequate Body Mass Index increased.

Mean admission time for both phases in the two hospitals was 6 days with no statistically significant difference (p=0.69).

Incidence for pressure ulcer

In hospital 1, phase 1, of the 35 patients followed up, 11 presented PU(IC_{up},31.4%); in phase 2, of the 44 patients, 6 presented PU (IC_{up}, 13.6%).

In hospital 2, phase 1, 3 of the 14 patients followed-up developed PU (IC_{up},21.4%); and, in phase 2, of the 40 patients, 6 presented PU (IC_{up}, 15%). For the two hospital studied, there were no statistically significant differences at IC_{up} between the two phases.

The ID_{up} in hospital 1, phase 1, decreased significantly from 0.07 to 0.023 ulcers per person/day in phase 2 (CI95% = -0.09 to -0.001). In turn, in hospital 2, change in ID_{up} from 0.032 to 0.027 ulcers per person/day was not significantly.

These values may be translated in terms of mean time (in days) of patients' exposure to the occurrence of PU, as demonstrated on Table 2.

Table 2 - Mean exposure time (in days) for PU occurrence in patients observed, according to hospital studied and phases. Bahia, 2001-2002

Hospital	Mean exposure time for PU occurrence (days)	
	1st phase	2nd phase
1	14.3	43.5
2	31.3	37.0
General	**18.5**	**40.0**

Hospital 1 presented a significant increase in mean time of exposure for the occurrence of PU in phase 2, whereas in hospital 2, this exposure time was long in both phases with no significant changes.

For those patients who developed PU, medial global time elapsed from admittance and PU occurrence was 3 days in phase 1 and 3.8 days in phase 2, for hospital 1; and, 8 days in phase 1 and 7 days in phase 2 for hospital 2 with no statistically significant changes.

Nursing actions to prevent PU

Regarding nursing care preventive actions for PU, results are presented on Table 3.

For the category turning patients every two hours, hospital 1 presented significant worsen in this type of care (p=0.005), one of each two patients was turned in the 33% recommended for phase 1 and, in phase 2, half of the patients were not turned. For hospital 2 there were no statistically significant differences between phases 1 and 2 (p= 0.07), in phase 1 half of the patients were turned in the 29% of the recommended ones and in phase 2, this type of care was not taken for half of the patients followed-up, showing that in both phases, in the two hospitals, this care category is quite compromised.

For turning patients every four hours there was a statistically significant worsen in hospital 1 (p=0.002). One out of two patients received this type of care in phase 1 for 36.5% of what was expected and, in phase 2, this care was not performed. In hospital 2, both in phase 1 and 2, half of the patients followed were not turned. Performance pattern presented in this care is unsatisfactory in the two hospitals in both phases.

Regarding the care category Clean and dry patients after incontinence episodes statistically significant differences were not observed in both hospitals between the two phases. However, in hospital 1, phase 2, half of the patients received care up to 100% of what was expected, whereas in hospital 2, in the same phase, one out of two patients received this type of care in up to 65% of what was predicted.

For Prescribed diet ministration statistically significant differences were not found either between the two phases. In hospital 1, both in phase 1 and phase 2, half of the patients received care in up to 100% of what was expected. In hospital 2, in phase 1, half of the patients received a diet in up to 100% of what was expected, in phase 2, this care was provided to half of the patients in up to 77% of what was recommended.

For Intake of fluid from 1500 to 2000 ml/day in hospital 1, phase 1, half of the patients did not receive fluid; in phase 2, one in every two patients received care

Table 3 - Median values (%) of nursing care actions, according to care category, hospitals studied and phases. Bahia, 2001-2002

Care category	Hospital 1		Hospital 2	
	1st phase (%)	2nd phase (%)	1st phase (%)	2nd phase (%)
Turning patient every 2 hours	33.0	-	29	-
Turning patient every 4 hours	36.5	-	-	-
Clean and dry patient after incontinence episode	75.0	100.0	100	65
Prescribed diet ministration	100.0	100.0	100	77
Intake of fluid of 1500 to 2000 ml/day	-	80.5	52	45
Daily use of skin moisturizer	-	-	-	-

in 80.5% of the expected cases and, in this case, there was a statistically significant improvement in the performance of this care (*p=0.001*). For hospital 2, phase 1, 52% of the care predicted was performed with half of the patients; in phase 2, half of the patients received care in up to 45% of what was expected. Although no statistically significant differences have been observed between the two phases, the performance of hospital 2 for this type of care in the two phases is compromised.

Care categories Daily use of skin moisturizer and use of proper mattress were little performed in both hospitals in the two phases of the study.

DISCUSSION

In the present article, for the first time in the national literature the incidence of PU is measured in non-tertiary hospitals that care for a population that depends on the National Health System (SUS). We could see if there were changes in these units before and after their nursing workers had received technical and educational training.

Statistically significant differences at IC_{up} in the two hospitals and in the two phases were not found after educational intervention, a result similar to that found in a Brazilian study conducted in an intensive care unit of a teaching hospital, before and after educational interventions, where the incidence of PU was 62% and did not change[8].

In the international literature, a prospective controlled trial in Sweden with patients with hip fracture without PU at admission found a statistically significant decrease in PU incidence from 55% to 29%, after the introduction of a PU educational program for nurses[17].

Regarding ID_{up}, there was decrease only in Hospital 1, however, this result cannot be compared to the literature since studies using this measure were not found.

ID_{up} decrease in hospital 1 can be due to several reasons, some of them are: changes in patients' conditions such as age, presented risk factor, number of risk factors at the time individuals were included in the study, nursing working context (supervision and adequate number of staff), although the sample did not allow for multivariate adjustment.

There is another discrepancy in our study. The rates found in hospitals in Bahia are smaller than those found in the Swedish study and in the other Brazilian study[8,17]. Possibly this is due to differences in the methodology. Patients observed in Bahia were classified, according to the level of complexity, as minimal and intermediate care, where a lower PU occurrence is expected compared to ICU patients or patients with hip fractures, whose clinical conditions, especially physical mobility are an important risk factor for PU.

Mean time for PU occurrence in the two hospitals, both in phase 1 and 2 is similar to the time mentioned in the literature, according to which PU incidence usually occurs in the first week after admission[23-24]. Similar results were found in other studies. In a neurological intensive care unit after 6.4 days of hospital stay, PU occurred in 12.4% of the patients[9]. In an intensive care unit from a teaching hospital in Brazil, before education interventions, mean time between admission and occurrence of PU was 4 days, and after interventions it was 4.4 days[8].

In the Netherlands, in two major hospitals, every week 6% of the patients staying in hospital for over 5 days present PU[25].

The result observed in the variable Turning patients every two hours is similar to a study developed in the intensive care unit of a Brazilian teaching hospital, where, before educational intervention, of the 15 patients presenting PU only 13.3% were turned every 2 hours and, after intervention, none of the 15 patients who presented PU received this kind of preventive care[8].

Two studies conducted in geriatric units in Belgium demonstrated that in one of them, the group of patients with a 2-hour turning regimen and turning to supine position every 4 hours presented a 16.4%, PU levels II to IV incidence whereas the control groups who were turned every 4 hours presented a 21.2%, incidence with no statistically significant difference between the two groups[26]; in another study, among the 14.3% patients who were turned every 2 hours, and the 3% who received this care every 4 hours presented statistically significant differences[27].

For the other care categories Clean and dry patients after incontinence episode, Prescribed and administered diet, Intake of fluid from 1500 to 2000 ml/day, Daily use of skin moisturizer and Use of adequate mattress, there were no studies in the literature whose methodologies enabled comparisons. However, even though they were referred to as preventive care for PU[6] the nursing team of the two hospitals did not perform them, showing that quality of care is compromised.

The samples obtained did not enable multivariate analysis because they assessed factors associated with changes in PU incidence, thus reducing the ability to state the reasons for changes in incidence in hospital 1. On the other hand, the incidences documented here which were had never been done for patients in hospitals caring for SUS patients in the interior of Brazil, will enable for a more adequate sampling planning for further studies. Samples from this study were maintained by research teams for about 45 days in the interior of Brazil at a significant cost. The task now is to increase studies in non-teaching hospitals with bigger samples at less excessive costs.

CONCLUSION

The assessment of PU occurrence in hospitalized patients and the nursing care received has been little investigated in our country.

ID_{up} changes in the category Intake of fluid of 1500 to 2000ml/daily, occurred in hospital 1 which had, in addition to the educational process, supervision and an adequate number of people working. Thus, we conclude that educational intervention, on its own, was not enough to change PU incidences and the performance of preventive PU care by nursing workers.

Although proper professional performance demands permanent education of workers in health services, the compromised quality of nursing care for PU preventive care demonstrated in the present study raises the question whether educational processes can, on their own, improve quality of care in hospitals which have adverse conditions in terms of personnel, supervision and continuous education. In this sense, permanent education proposals introduced in health services demand changes in the physical structure, in working conditions, in nursing management, and in health management, to ensure quality of care processes.

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