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Pressure Ulcer: Statistics Analysis of an Electronic Database

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Abstract

An information system is analyzed on defining quality indicators for pressure ulcer which is recommended by the American Nursing Association. Objective: Analyzing statistically a large sized hospital electronic database of São Paulo City. Methods: Descriptive retrospective study, sample frame of convenience of 51,414 hospital discharges. Results: Predominance of female sex 60%; average age 52 years old and length of stay of 4 days. Pressure ulcer occurred in 1% of the sample frame. The statistical analysis pointed out the age and hospitalization time as significant for the appearing of pressure ulcer. The chance rate of occurrence is 10 times higher for patients aged 65 years old compared to the ones of <65 years old (p<0.001). When permanence is over 4 days the chance is 18 times higher of developing pressure ulcer compared to patients whose permanence was up to 3 days (p<0.001). Final considerations: This study proved the worth of an electronic database about clinical practice in planning and managing nursing assistance; validating the indicator and consequently improving quality.

Keywords:
medical informatics, decubitus ulcer/nursing, decubitus ulcer/prevention and control, quality indicators

Introduction

The comparative analysis results indicators in health care constitutes an important tool for monitoring the performance of service providers, and the contribution of each professional in the attending process. Therefore, many studies have been developed to define indicators which would be specific for showing quality in nursing service.[1] The American Nursing Association (ANA) has developed a project for defining specific indicators for nursing. These nursing indicators intend to capture nursing care and its results, and the impact on nursing practice. Accordingly, the following indicators are recommended by ANA: pressure ulcer, patient's fall, patient's satisfaction on pain management, patient's satisfaction on educational information, patient's satisfaction with nursing care, patient's satisfaction with general care, and staff mix of nurses, technicians and nursing assistants, total of hours of nursing care per patient per day, nursing staff satisfaction.[1]

The use of information technology has contributed to facilitate and provided agility to the evaluation of health services and consequently the nursing services.[2] It can be said that information technology in health services evolved from a situation where the computer was used for simple and isolated tasks to integration of information level, whose objective is integrating through a single system, the diverse recording points and using them into the service, creating great data banks that have often been used on the evaluation of health services performance.[3]

These database avail patients' clinical data about the care they received while in hospital, so this work intends to analyze a pressure ulcer monitoring database which is one of the indicators recommended by ANA. Pressure ulcer is an impact phenomenon that occurs in many health services, affects all ages, has a high cost and causes much human suffering for it affects individuals' life quality.

Cuddigan reports that the incidence of pressure ulcer has an extension from 2% to 29%.[4] The treatment costs of an ulcer can vary from US$ 2,000 to US$ 70,000 according to Gallagher.[5]

Pressure ulcer can be defined as particular areas of skin damage and surrounding tissues. This damage can be caused by pressure, cut and/or friction, combined with effects of intrinsic and extrinsic factors. Among the intrinsic factors stand out the age, nutritional state, tissue pervasion, use of some medicines and chronic degenerative diseases; and among the extrinsic factors the pressure, shear, friction and humidity.[6,7] Although it is known this is a multi-factorial phenomenon, nursing has the unique opportunity of performing on these extrinsic factors preventing its occurrence.

Therefore this study has the objective of analyzing the pressure ulcer monitoring data contained in an electronic data base of a large hospital of São Paulo City.

Material and method

A retrospective descriptive study was accomplished through the analysis of data collected from an electronic system about pressure ulcer, about all hospital discharges from June 2002 to December 2004.

In this hospital all admitted patients are assessed for pressure ulcer risk through the Norton[8] table, which evaluates

five criteria (physical state, mental state, activity, mobility and incontinence and scores from 1 to 4, classifying the risk in: low, moderate and high. Once the risk is assessed, the nurse starts to use practice guidelines for pressure ulcer prevention. The patient is re-evaluated whenever clinical condition changes or every 48 hours.

The criterion for classification of pressure ulcer stage used in this hospital is derived from the National Pressure Ulcer Advisory Panel[7], which classifies pressure ulcer in 4 stages. Stage I corresponds to altering on integral skin color under pressure; in Stage II there is loss of thin skin layer, involving epidermis, dermis or both; Stage III is characterized by signifying loss of skin, involving cellular subcutaneous and adipose tissue damage or necrosis, which can extend to fascia, but does not surpass it; and stage IV is characterized by significant skin loss, with extensive destruction and necrosis of cellular subcutaneous tissue, or muscle, bone, tendon or particular capsule damage.[9]

During the period in hospital, the nurse prescribes and records the provided service to the patient, so at the discharge it is filled in a summary of evaluations and the outcomes of care are described in a proper form called Nurse's Discharge summary. On this sheet it is also noted the moment of risk assessment: at admittance, during hospitalization and presence of pressure ulcer at admittance.

Since 2002 the data from these summaries feed the information system. The risk assessment data, presence and classification of the ulcer are fed into the information system. Each patient has a single hospital record number and at each hospital attendance it generates a passage number which can be internal (admitted patient), external (office appointments and/or exams), emergency (emergency room). This study only analyzed the passages of admitted patients.

Place of study

The study was accomplished in a large hospital of São Paulo City, which has 87,000m2 built area distributed in four buildings, with 460 beds, 30 surgery rooms and 53 ICU beds; the Diagnosis and Treatment Support Service assists more than 220 thousand patients per year. It is classified as a large sized hospital and of high complexity with kidney, liver, marrow, cornea, skin and bone transplants.

In search of solutions for health matters, the hospital started a quality program in 1989. Currently it has various quality certifications and it was the pioneer in the Crediting of the Joint Commission International and the implementation of normative requirements of ISO 9002 among other.

Population

The population was composed by all hospital discharges within 01/ Jun/ 2002 and 31/ Dec / 2004 generating a total of 57,487 discharges; however, mistakes were found on the nurse's discharge summary feeding into the information system. For this reason an audit was necessary and a validation of records on 1,220 data (2.1% of total) and loss of 252 data (0.4%) which had mistakes on hospital records and passage numbers. After these audits a convenient sample was selected for this study, considering only adult patients aged equal or over 18 years old, who were assessed for pressure ulcer risk and had outcomes of clinical practice in the database. Therefore, the sample obtained was of 51,414 hospital discharges, which were analyzed and characterized by age, sex, hospitalization time, presence of pressure ulcer risk, classification of pressure ulcer risk and International Classification Diseases (ICD).

Results

The study analyzed 51,414 hospital discharges of both sexes, with ages between 18 and 103 years old, with length of stay between 0 (admission and discharge on the same day) and 1,346 days.

In the distribution of sample by sex there was predominance of the female sex 60% and 40% of male sex. For this sample, the starting age chosen was 18 years old and the maximum age found was of 103 years old, the average was 52 years and the median 50 years. The age range from 18 to 59 years old corresponded to 66% of the patients, and the age range above 60 years old corresponded to 34%.

For the distribution of sample by days of hospitalization it was considered the patients with zero day of length of stay, that is, when the date of admission was equal to the day of discharge; therefore the period of hospitalization varied from zero to 1,346 days. The average of hospitalization was of 4 days and the median of 2 days, and the highest percentage of patients 79% had a length of stay of until 4 days and only 21% stayed over 4 days.

The general sample frame 21% (10,521) patients had pressure ulcer risk assessed during the hospitalization period, distributed as follows: 12% at admittance and 9% during hospitalization; and the distribution concerning pressure ulcer risk classification for patients who had the risk assessed was 9% high risk, 24% moderate risk and 67% low risk according to table 1.

Table 1 - Distribution of patients with assessed risk according to risk classification

Classification Pressure Ulcer Risk	n	%
High risk	1060	9
Moderate	2751	24
Low risk	7673	67
Total	11484	100

The occurrence of pressure ulcer in the general sample was of 1% of the total; the distribution concerning the stage in the general population was of 0.63% stage I, 0.25% stage II, 0.11% stage III and 0.05% stage IV.

The distribution of total sample per diagnosis shows predominance of five ICD chapters, Chapter XV (Pregnancy, Childbirth and Puerperium) 12.7%, Chapter XI (Digestive System Diseases) 12.2%, Chapter II (Neoplasms (Tumors)) 11.3%, Chapter IX (Circulatory System Diseases) 11.2%, Chapter XIV (Genitourinary System Diseases) 9.2%.

Sorting the patients who presented PU it was verified that 50% of the patients are predominantly distributed in three diagnosis chapters: Chapter X (Respiratory System Diseases) 21%, Chapter IX (Circulatory System Diseases) 16%, Chapter II (Neoplasms (Tumors)) 13%.

Discussion

There is a consensus about the multi-factorial causes for the pressure ulcer event. The present work made it possible to test some of these factors in order to verify if they had statistic significance applied to this population.

Patients have a variety of intrinsic factors which deserve consideration. Age seems to be one of them. Analyzing the data in this study, it was verified that the chance ratio of developing pressure ulcer for a patient aged 65 is 10 times higher compared to a patient aged < 65 years old ($p<0.001$) as displayed on table 2.

Table 2 – Distribution of patients with and without ulcer per age group

	Age Group					
	< 65 anos		≥ 65 anos		Total	
Event	n	%	n	%	n	%
Ulcer	103	0,3	389	2,7	492	1,0
Without ulcer	36945	99,7	13838	97,3	50783	99,0
Total	37048	100	14227	100	51275	100

This finding is confirmed in the literature which reports that elder patients present a great risk related to the skin change that occurs within this age group.[10] Age is also related to other factors as immobility, activity limitation, incontinence (hydration and humidity) and nutritional damage, which have been consistently reported as predisposing factors.[9]

Another factor that presented significant results was hospitalization time. It was noticed that patients with permanence > 4 days have a chance ratio 18 times higher to develop PU compared to the ones whose permanence was up to 3 days $p< 0.001$ as shown on table 3.

Table 3 – Distribution of patients with and without ulcer per hospitalization time

	Hospitalization Time					
	< 4 days		≥ 4 days		Total	
Evento	n	%	n	%	n	%
Ulcer	58	0,2	434	2,8	492	1,0
Without ulcer	35570	99,8	15213	97,2	50783	99,0
Total	35628	100	15647	100	51275	100

This factor may be related to these patients' diagnosis since 21% of them had diagnoses related to Respiratory System Diseases, 16% Circulatory System Diseases and 13% Neoplasms (Tumors), diseases which have a hospital permanence superior to 4 days; of 5 days for Respiratory System Diseases, 6 days for Circulatory System Diseases and 5 days for Neoplasms (Tumors), at the studied hospital.

It was also verified that the use of a pressure ulcer risk assessment is useful in order to identify the higher risk population, that is, the population who developed ulcer 99% and 1% respectively had or not ulcer risk assessment. The patients who had risk assessment have a chance ratio 358 times higher of developing PU compared to the patients who have not had the risk assessed ($p<0.001$). This finding is confirmed in the literature which describes the reliability and validity of pressure ulcer risk assessment.[11]

Analyzing the data related to ulcer stage classification it could be verified that from the total of ulcer assessed they were positioned as: stage I 61%, stage II 24%, stage III 10% and stage IV 5%. It is important to notice that 26% of the identified ulcer was present at patient's admittance. Evaluating only the patients who developed ulcer during hospitalization the distribution was: 62% stage I, 24% stage II, 09% stage III and 04% stage IV.

Table 4 – Distribution of patients with ulcer per ulcer stage classification

PU Stage Classification	n	%
E-I	248	62
E-II	97	24
E-III	37	9
E-IV	17	4
Total	399	100

This classification not only helps selecting proper treatment, but also predicting prognostic.[12] The quality indicator measured at the studied hospital is the ratio between number of new cases of assessed pressure ulcer and the population's total number with assessed risk,[1] incidence was 4%. Tracking pressure ulcer incidence provides a more exact panorama of success and efficiency on risk assessment and prevention, and the policies which identify those people who developed it at a determined time and assistance location.[9] The prevalence of ulcer on this same population was 1%. In the literature the most wide-ranging were accomplished on hospitalized populations and the results show an incidence that varies from 2.7% to 29.5% and a prevalence between 4 and 69%, depending on the population studied.[13] In the United Kingdom (UK), in a district general hospital, new cases of PU strike 4% to 10% of admitted patients. [9,14]

It is understood that assistance quality improvement is certainly an activity which should be carried out in a continuous basis in order to perfect the offered assistance. This is an interactive process which requires a sense of duty from the whole organization. The evaluation of the information database about pressure ulcer proved valuable since this analysis may allow quality improvement implements like patient's more intense monitoring when staying longer than 4 days and aged 65 years old or over.

This analysis can also serve as a feedback to the assisting nurses who generate the data for the information system, validating this information and aggregating value to it in establishing the planning and management of quality nursing care.

Validating the quality indicator, starting from an information system guarantees the establishment of assisting protocols based on pertinent information to this population and consequently training the team related to pressure ulcer.

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