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Cost of nursing most frequent procedures performed on severely burned patients

Custo de procedimentos de enfermagem realizados com maior frequência ao grande queimado

Costo de los procedimientos de enfermería realizados con mayor frecuencia al gran quemado

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ABSTRACT

Objective: to identify the mean direct cost (MDC) of the most frequent procedures performed by nursing professionals on severely burned patients in an Intensive Care Unit. **Method:** exploratory-descriptive quantitative single-case study. The MDC was calculated by multiplying time (timed) spent by nursing professionals in the performance of the procedures by the unit cost of direct labor, and adding the costs of material and medicine/solutions. **Results:** a MDC of US$ 0.65 (SD = 0.36) was obtained for "vital signs monitoring"; US$ 10.00 (SD = 24.23) for "intravenous drug administration"; US$ 5.90 (SD = 2.75) for "measurement of diuresis"; US$ 0.93 (SD = 0.42) for "capillary blood glucose monitoring"; and US$ 99.75 (SD = 129.55) for "bandaging". **Conclusion:** the knowledge developed can support managerial decision-making, contribute to the efficiency distribution of the resources involved and, when possible, provide cost-containment or cost-minimization strategies without impairing the quality of nursing care.

Descriptors: Burn Units; Burns; Nursing; Critical Care Nursing; Costs and Cost Analysis.

RESUMO

Objetivo: identificar o custo direto médio (CDM) dos procedimentos realizados, com maior frequência, por profissionais de enfermagem, em uma Unidade de Terapia Intensiva, aos pacientes grandes queimados. **Método:** pesquisa quantitativa, exploratório-descritiva, do tipo estudo de caso único. O CDM foi calculado multiplicando-se o tempo (cronometrado) despendido por profissionais de enfermagem na execução dos procedimentos, objeto de estudo, pelo custo unitário da mão de obra direta, somando-se ao custo dos materiais e soluções/medicamentos. **Resultados:** obteve-se o CDM de US$ 0.65 (SD = 0.36) para "controle dos sinais vitais"; US$ 10.00 (SD = 24.23) para "administração de medicamentos via intravenosa"; US$ 5.90 (SD = 2.75) para "mensuração de diurese"; US$ 0.93 (SD = 0.42) para "verificação de glicemia capilar"; e US$ 99.75 (SD = 129.55) para "curativo". **Conclusão:** o conhecimento desenvolvido pode fundamentar as tomadas de decisão gerenciais subsidiando a eficiência alocativa dos recursos envolvidos e, quando possível, indicar estratégias de contenção/minimização de custos sem prejuízos à qualidade da assistência de enfermagem.

Descritores: Unidades de Queimados; Queimaduras; Enfermagem; Enfermagem de Cuidados Críticos; Custos e Análise de Custo.

RESUMEN

Objetivo: identificar el costo directo promedio (CDP) de los procedimientos más frecuentes que realizan los profesionales de enfermería en una unidad de Terapia Intensiva al paciente gran quemado. **Método:** investigación científica cuantitativa, exploratoria y descriptiva, de caso único. El CDP se calculó multiplicando el tiempo (cronometrado) empleado por profesionales de enfermería en la ejecución de los procedimientos, objeto de estudio, por el costo unitario de la mano de obra directa, sumando el costo de los materiales y soluciones/medicamentos. **Resultados:** se obtuvo el CDP de US$ 0.65 (SD = 0.36) para el "control de las señales vitales"; US$ 10.00 (SD = 24.23) para la "administración de medicamentos intravenosos"; US$ 5.90 (SD = 2.75) para el "control de la diuresis"; US$ 0.93

(SD = 0.42) para el "monitoreo de la glucemia capilar" y US$ 99.75 (SD = 129.55) para "curativos". **Conclusión:** el conocimiento obtenido fundamenta la toma de decisiones gerenciales, auxiliando en la eficiencia de la distribución de los recursos involucrados e indica, también, estrategias de contención/minimización de costos sin perjudicar la calidad de la atención de la enfermería.
Descriptores: Unidades de Quemados; Quemaduras; Enfermería; Enfermería de Cuidados Críticos; Costos y Análisis de Costos.

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INTRODUCTION

In several countries, there is a considerable increase in the incidence of burns, so that necessary treatment has generated increasing costs that impact the management of hospital organizations[1-6].

In Brazil, there are only few units specialized in caring for burned patients and since most of them are in the Southeast Region, most treatments are performed in general hospitals[7]. According to the Ministry of Health (MH), only in the state of São Paulo, in February 2013, there were 862 hospitalizations related to burns, and in February 2014, 1052 hospitalizations were registered, which represented a mean hospitalization value of more than six thousand *Reais*[1] per patient[8].

A national research assessing the financial evolution of the burn sector, along with its legitimacy, financing and complexity, in the period from 2002 to 2010, indicated an increase in the treatments on Intensive Care Units (ICUs) from 9% to 14%. However, despite this increase, the urgent need for prevention policies and for a larger volume of investment to build new ICUs was emphasized in the research, since severe burns require prolonged hospitalization, intensive care and use of new technologies[9].

Technological advance has led to an expansion of treatment possibilities in face of the complexity of the assistance required by major burn patients and, consequently, there is an increase in the consumption of resources of limited availability. There is still a scarcity of studies on health costs, mainly regarding hospital costs of the procedures performed on severely burned patients in the Intensive Care Unit (ICU)[2,4-6]. In this context, nursing professionals stand out for using many resources, especially materials, since they develop their work process in uninterrupted contact with these patients for 24 hours.

A proper and safe nursing care cannot dismiss integration between management and nursing actions, and it requires constant updating and training to acquire new knowledge and develop skills that will help making decisions regarding the choice of medical and hospital supplies.

In health services, besides material, nurses also manage human and physical resources, consuming a large amount of financial resources. For this reason, they have been pushed to reduce consumption of material and personnel number without, however, properly assessment of the profile of the expenses, relating them to production and critically analyzing the costs[11]. Therefore, it is evident that nursing professionals need knowledge about the costs of procedures under their technical and legal responsibility, so that they can help manage costs and contribute to the financial sustainability of hospital organizations.

OBJECTIVE

To identify the mean direct cost (MDC) of the most frequent procedures performed by nursing professionals on severely burned patients in an Intensive Care Unit.

METHOD

Ethical aspects

The study was submitted to the approval of the Research Ethics Committees of the institution and the Hospital.

Design, location and period

This is an exploratory-descriptive quantitative research, single case study. A case study is a method that aims to understand a real-life phenomenon in depth, considering the context, adopting multiple sources of evidence and without using manipulation or control[12].

The research was carried out at the Burn ICU (BICU) of the Burn Unit (BU) of the *Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo* (HC-FMUSP). The BICU has four beds, with glass partitions to promote contact isolation between patients, and it is intended for caring for adult and pediatric patients of medium and high complexity. Data were collected in a 30 day period, between January and February 2015.

Sample, inclusion and exclusion criteria

The non-probabilistic convenience sample consisted of 883 observations regarding the five more frequently performed procedures in the BICU. These observations corresponded to the opportunities for direct non-participant observation of the procedures "vital signs monitoring", "intravenous drug administration", "measurement of diuresis", "capillary blood glucose monitoring" and "bandaging", performed by nursing professionals on severe burn patients admitted to the BICU, in the morning and afternoon. The procedures performed during the night were excluded from the study.

Study protocol

Initially, the nursing chief, nurses and nurse assistants and technicians at the BICU helped, through their clinical experience, to establish the most frequently performed procedures

1 *Reais* is the Brazillian currency. One dollar corresponds to R$ 3.11 reais according to the Brazilian National Bank.

and, after that, pointed materials, medications and solutions needed for the procedures, according to the procedure established in the unit. Then, data collection instruments previously validated by these professionals were constructed to support documenting the number of professionals involved, professional category, materials and medications/solutions consumed and time spent (timed) in the five most frequent procedures.

Direct cost was the methodological framework used, which is defined as all that can be identified and clearly quantified, with the objective measurement of consumption being the materials and direct labor (DL) used. [13]. DL refers to personnel who work directly in the product, provided that it is possible to assess the time spent and identify who performed the work, with no need of indirect appropriation or apportionment[14]. In hospital units, the direct costs are the direct labor and any input used in the caring process[11].

Calculation of the DL unit cost was based on mean salaries by professional category (basic salary, benefits, gratuities and social charges) provided by the Human Resources (HR) of the hospital. As the BICU had only two nursing assistants at the time of the study, the calculation was done through weighted mean of their salaries along with the salary of the nursing technician A workload of 30 hours per week was used, representing contract agreement of the majority of these professionals, considering only salaries paid by HC-FMUSP.

Unit costs of material were provided by the Purchasing Sector of the Material Division of HC-FMUSP, calculating the values based on the price paid for replacements in the last three months. Permanent equipment (multiparametric monitor, stethoscope, measuring cup) and consigned equipment (capillary blood glucose analysis instrument) were not considered in the calculation of costs.

All patients were in beds separated by glass partitions in order to prevent infections and promote contact isolation. Since the institutional protocol recommended hand hygiene before and after handling the patient as well as wearing a cap, face mask, isolation apron or disposable apron and gloves, the time spent for hand washing and the required scrubs were included in the calculation of the costs of the procedures studied.

In order to estimate the cost of the isolation apron the acquisition price (US$ 6.30) was divided by the maximum number of washes (approximately 40 times). After that, the washing cost was estimated multiplying weight (0.320kg) for US$ 0.80, the value paid by the institution per kilogram of laundry. The sum of these values (US$ 0.16 + US$ 0.26) resulted in a US$ 0.42 cost per unit.

Statistical analysis

Collected data were typed in Excel-Windows/XP® spreadsheets and submitted to statistical tests, and the variables were analyzed descriptively by the observation of minimum and maximum values of means, standard deviations, medians and modes.

Then, MDC was calculated by multiplying the time (timed) spent by nursing professionals by the unit cost of direct labor, then adding the cost of materials used in the procedures under study. The brazilian currency Real (R$), originally used for calculation, was converted to US dollar using the rate of US$ 2,88/R$ based on quotation from 02/27/2015 provided by Central Bank of Brazil. The results will be presented in tables and charts.

RESULTS

A total of 38.89% of the 18 nursing professionals observed were nurses and 61.11% were nurse technicians/assistants. From this, 72.3% were female and 27.7% were male. The age of the seven nurses ranged from 25 to 53 years, the minimum time of nursing practice ranged from 1 to 30 years, and time of practice in the BICU ranged from 1 to 17 years. All of them had a specialization degree in the adult ICU area. Regarding the age of the 11 technicians/assistants, there was a variation from 34 to 58 years, time of nursing practice ranged from 2 to 26 years and time of practice in the BICU ranged from 2 to 20 years. Among them, 18.18% were enrolled in a Nursing undergraduate course.

The unit cost of the nurses DL was US$ 1,580.40/120 hours, US$ 13.17/hour e US$ 0.22/minute and for nurse technicians/assistants it was US$ 881.27/120hours, US$ 7.34/hour and US$ 0.12/minute.

Thirteen patients, 69.23% male and 30.77% female, with a mean age of 37.36 years (SD = 19.54) with a minimum of 16 and a maximum of 87 years were included in the study. The majority (53.84%) had invasive mechanical ventilation through orotracheal intubation. The mean length of hospital stay in the ICU was 19.53 days (SD = 17.45%), ranging from three to 69 days, with mode of 27 and median of 15 days.

A total of 883 observations were made regarding the procedures "vital signs monitoring" (41.11%), "intravenous drug administration" (22.88%), "measurement of diuresis" (15.51%), "capillary blood glucose monitoring" (13.60%) and "bandaging" (6.90%).

The "vital signs monitoring" procedure presented a mean time of 2.23 (SD = 1.58) minutes, with a minimum of one and maximum of ten minutes. In each bed, there was a multiparameter monitor that provided body temperature, blood pressure, heart rate and respiratory rate, oximetry, and mechanical ventilation data (Fraction of Inspired Oxygen- FiO2, Positive End-Expiratory Pressure-PEEP, Saturation). The procedure was performed by a Nursing Technician/Assistant most of the time (91.40%). Table 1 shows that the MDC with material (US$ 0.44 - SD = 0.15) was the most representative in the total MDC of this procedure, with the consumption of 215 isolation aprons (US $ 0.42/unit) and 23 disposable aprons ($ 0.55/unit). The largest number of procedures observed (n = 363) in relation to the quantity of material consumed (n = 345) was due to the fact that in some cases the professional was already inside the room, properly scrubbed, when observed performing the procedure.

The duration of the "intravenous drug administration" procedure ranged from 3 to 35 minutes, with a mean of 10.58 (SD = 5.34) minutes. Most of the procedures (78.21%) were also performed by a Nursing Technician/Assistant. The MDC with medications/solutions (US $ 6.62 - SD = 24.30) presented the greatest impact on the total MDC, as presented in Table 2.

Table 1 – Cost distribution with personnel, cost with material and mean direct cost of the procedure-vital signs control, São Paulo, Brazil, 2015

Observations	n	Mean US$	SD* US$	Median US$	Minimum and maximum value US$	Mode US$
DL cost† Nurse‡	57	0.48	0.33	0.44	0.22 – 1.53	0.44
DL cost Nursing Technician/Assistant§	332	0.27	0.19	0.24	0.12 – 1.21	0.12
Nursing team cost	363	0.32	0.28	0.24	0.12 – 2.38	0.12
Material Cost	345	0.44	0.15	0.46	0.06 – 0.62	0.46
MDC || Total	363	0.65	0.36	0.65	0.12 – 2.91	0.70

*Notes: *SD: Standard deviation; †DL: direct labor; ‡DL Nurse: US$ 0.22; §DL Nursing Technician/Assistant: US$ 0.12; \|\| MDC: Mean direct cost.*

Table 2 – Cost distribution with personnel, cost with material, cost with medicine/solutions and mean direct cost of the procedure - intravenous drug administration, São Paulo, Brazil, 2015

Observations	n	Mean US$	SD* US$	Median US$	Minimum and maximum value US$	Mode US$
DL cost † Nurse‡	49	2.42	1.43	1.97	0.65 – 7.65	1.75
DL Cost Nursing Technician/Assistant §	191	1.33	0.80	1.21	0.36 – 7.53	1.10
Nursing team cost	202	1.85	1.53	0.12	0.36 – 11.92	1.10
Material cost	202	1.51	2.25	0.90	0.19 – 9.60	0.77
Medications/solutions cost	202	6.62	24.30	0.40	0.04 – 145.74	0.36
MDC || Total	202	9.98	24.23	3.23	1.00 – 349.34	3.61

*Notes: *SD: Standard deviation; †DL: direct labor; ‡DL Nurse: US$ 0.22; §DL Nursing Technician/Assistant: US$ 0.12; \|\| MDC: Mean direct cost.*

Table 3 – Cost distribution with personnel, cost with material, cost with medicine/solutions and mean direct cost of the procedure – measurement of diuresis, São Paulo, Brazil, 2015

Observations	n	Mean US$	SD* US$	Median US$	Minimum and maximum value US$	Mode US$
DL cost † Nurse‡	23	0.49	0.30	0.44	0.22 – 1.31	0.44
DL Cost Nursing Technician/Assistant§	117	0.22	0.15	0.24	0.12 – 1.46	0.12
Nursing team cost	137	0.27	0.22	0.24	0.12 – 1.46	0.12
Material cost	137	0.49	0.03	0.48	0.48 – 0.62	0.48
Medications/solutions cost	137	5.14	2.75	5.48	2.74 – 13.71	2.74
MDC || Total	137	5.90	2.75	6.08	3.21 – 14.43	3.46

*Notes: *SD: Standard deviation; †DL: direct labor; ‡DL Nurse: US$ 0.22; §DL Nursing Technician/Assistant: US$ 0.12; \|\| MDC: Mean direct cost.*

Propofol 10mg/ml (US$ 29.10/bottle-ampoule), present in 20.79% of the observations, was the most important item in the compostition of the MDC regarding medications/solutions and the intravenous infusion pump equipment (US$ 8.20/unit), used in 7.92% of the medications, was the item with highest cost in the MDC composition.

The procedure "measurement of diuresis" presented a mean time of 1.82 (SD = 1.05) minutes, with a minimum of one and maximum of 6 minutes. The number of personnel varied between one and two, more frequently one (97.08%) and 85.40% of the procedures were performed by a Nursing Technician/Assistant. The MDC with medications/solutions (US$ 5.14 – SD = 2.75) was the most representative in the total MDC obtained, as shown in Table 3.

Still regarding the procedure "measurement of diuresis" the isolation apron also corresponded to the most important item for the MDC of the materials, with 130 units used. The 70% ethyl alcohol solution (US$ 2.74/100 ml bottle) was the only item related to the MDC of the medications/solutions, being present in 100% of the observations, with quantities varying from one to five bottles, with a higher frequency of one bottle at each procedure.

The duration of the "capillary blood glucose monitoring" procedure ranged from one to seven minutes, with a mean of 2.90 (SD = 1.36) minutes, and the procedure was performed by Nurse technicians/assistants in 90% of the observations. Table 4 shows that the cost with the nursing staff's direct labor (US$ 0.48 - SD = 0.34) was the highest in the total MDC of this procedure.

The isolation apron (52 units) still was the most relevant item for the MDC with materials, followed by the capillary glucose test (US$ 0.09/unit).

Regarding the "bandaging" procedure, the mean time ranged from 7 to 264 minutes, with a mean of 72.52 (SD = 54.37) minutes. One or four nursing professionals participated in this procedure, and in 67.21%

Table 4 – Cost distribution with personnel, cost with material and mean direct cost of the procedure – capillary blood glucose monitoring, São Paulo, Brazil, 2015

Observations	n	Mean US$	SD* US$	Median US$	Minimum and maximum value US$	Mode US$
DL cost † Nurse‡	30	0.64	0.35	0.44	0.22 – 1.53	0.44
DL Cost Nursing Technician/Assistant§	108	0.35	0.15	0.30	0.12 – 0.73	0.24
Nursing team cost	120	0.48	0.34	0.36	0.12 – 2.04	0.24
Material cost	120	0.45	0.26	0.28	0.21 – 1.28	0.25
ADC || Total	120	0.93	0.42	0.88	0.33 – 2.31	0.46

*Notes: *SD: Standard deviation; †DL: direct labor; ‡DL Nurse: US$ 0.22; §DL Nursing Technician/Assistant: US$ 0.12; || MDC: Mean direct cost.*

Table 5 – Cost distribution with personnel, cost with material, cost with medicine/solutions and mean direct cost of the procedure – bandaging, São Paulo, Brazil, 2015

Observations	n	Mean US$	SD* US$	Median US$	Minimum and maximum value US$	Mode US$
DL cost † Nurse‡	28	26.00	24.90	21.00	1.75 – 115.50	19.79
DL Cost Nursing Technician/Assistant§	61	13.78	13.35	8.27	0.98 – 64.21	3.65
Nursing team cost	61	24.60	27.83	13.28	0.98 – 179.78	3.65
Material cost	61	57.69	122.12	21.30	1.85 – 667.29	—
Medications/solutions cost	61	17.46	22.24	6.96	0.16 – 114.78	4.68
MDC || Total	61	99.75	129.55	61.60	6.20 – 715.28	—

*Notes: *SD: Standard deviation; †DL: direct labor; ‡DL Nurse: US$ 0.22; §DL Nursing Technician/Assistant: US$ 0.12; || MDC: Mean direct cost.*

of the observations at least two professionals were present; Nurse technicians/assistants worked 98% of the time and nurses worked 42.62% of the time. According to Table 5, the MDC with material (US$ 57.69 - SD = 122.12) strongly impacted the total MDC.

It was verified that, even though the costs of 15cmx15cm Silicone Polyurethane Foam Dressing (US$ 24.32/unit), 15cmx15cm Silicone Polyurethane and Silver Foam Dressing (US$ 15.63/unit) and 20cmx20cm Transparent Hydrogel Dressing (US$ 11.30/unit) were higher in relation to the cost of Polyamide Dressing with Silver (US$ 9.72/unit), the quantities used contributed to the latter dressing being more representative in the composition of the MDC with material.

DISCUSSION

The mean age of the 18 nursing professionals (40.94 - SD = 9.73 years) and the mean time in nursing practice (11.33 - SD = 9.11 years) and in BICU practice (7.33 - SD = 6.48 years) are evidence of a team with experience in caring for severe burn patients under critical conditions.

The nurses and Nursing Technician/Assistants observed strictly complied with the measures recommended for the prevention of infections, demonstrating technical competence and commitment in the exercise of their duties. A study addressing the prevention and management of the occurrence of burn-related infections highlighted as strategies to reduce outbreaks of resistant microorganisms: hand hygiene, wearing proper scrubs, patient allocation in private beds and thorough cleaning of the area[15].

In the performance of the procedures, the number of personnel ranged from one to four, with higher frequency of one Nursing Technician/Assistant. This result displays the Brazilian reality in most health organizations, in which the number of nurses is lower than the number of Nursing Technician/Assistants. Therefore, the majority of the work journey of the nurses, in different work settings, is addressed for indirect nursing care interventions[16], comprehending mostly the management of nursing teams and of the care provided to patients, while nursing technician/assistants effective dedicate to the care process[17].

In the "vital signs monitoring" procedure, the MDC with material had the highest impact in the composition of the total MDC, representing 67.02%; the isolation apron and the disposable apron were the most representative items, since, for visualization and confirmation of the data in the multiparametric monitor, it was mandatory scrub to enter in the private area destined to the bed. Patients with invasive mechanical ventilation support (53.84%) required more time in the execution of the procedure due to the collection and documentation of data related to mechanical ventilation. It should be noted that approximately one-third of the severe burn patients present respiratory complications due to smoke inhalation, internal and/or external injuries[18], requiring careful monitoring of ventilation parameters.

In a Clinical Medical Unit, a study aiming to calculate the mean direct cost of procedures most frequently performed in high-dependency patients also identified the control of vital signs as one of the most frequent procedures (R$1.26 – SD = 0.48 for blood pressure/heart rate check and R$1.17 –SD = 0.46 for body temperature check)[19].

The procedure "administration of intravenous drugs" occurred mainly at the time of bandaging and bathing in the bed or making the bed, because there a demand for the use of analgesics and sedatives arises due to intense pain manifested by the patient or perceived by the professional. In 17.82% of the

observations, the duration was longer than 15 minutes, since the professional needed to wait for the arrival of controlled medications, which were not available in enough quantity in the ICU and were picked up by another professional in the pharmacy outside the unit.

Severely burned patients hospitalized in ICU demand higher cost of drug treatment regarding the use of analgesics, anxiolytics and sedatives[2]. In the "intravenous drug administration" procedure, the MDC with medications/solutions accounted for 66.33% of the total MDC and the medicine Propofol 10mg/ml stood out for its higher cost of US$ 29.10/bottle-ampoule. According to literature, Propofol promotes comfort to the patient in mechanical ventilation and is important to relieve pain[20]. Its action and rapid elimination make it a highly indicated drug for short duration sedation and, consequently, the first drug of choice for analgesia during invasive nursing procedures[21].

In critically ill patients, such as severely burned patients, measuring eliminated fluid is of paramount importance, since it can quickly lead to acute renal failure, with prescription of dialysis[22]. Regarding that, the third most observed procedure "measurement of diuresis" had total MDC altered by MDC with medications/solutions (87.22%), due to the use of at least one bottle of 70% ethyl alcohol (US $ 2.74/100 ml bottle) in all the observations, used to clean every measuring cup, exclusive per bed, according to BICU routine.

The MDC regarding the nursing team's DL in the procedure "capillary blood glucose monitoring" represented 51.11% of the total MDC, followed by MDC with material (48.99%). A research carried out in an adult ICU in Belo Horizonte in 2010 demonstrated that the nursing diagnosis "risk for unstable blood glucose level" appeared in 80% of the medical records audited over a year, highlighting the importance of glycemic control, since hyperglycemia is a common response in critically ill patients[23].

The procedure "bandaging" had the highest total MDC, with higher time variation (7 to 264 minutes). The shorter times referred to dressing wounds located in the hands of two patients submitted to skin graft that remained immobilized without exchanging other dressings for 48 hours. The procedure was mostly carried out with the presence of two professionals, representing the highest percentage of nurses' participation (42.62%), probably due to complexity and specifity of the treatments.

The participation of the nurse in this procedure is of paramount importance, since the large extensions of burns, with large amount of devitalized tissue and the possible associated immunodepression are factors that contribute to an increased risk of infections[24].

MDC with material (57.83%) had a high impact in the composition of the total MDC. The bandaging used were the most representative items due to the high unit value: 15cmx15cm Silicone Polyurethane Foam Dressing (US$ 24.32/unit), 15cmx15cm Silicone Polyurethane and Silver Foam Dressing (US$ 15.63/unit), 20cmx20cm Transparent Hydrogel Dressing (US$ 11.30/unit) and Polyamide Dressing with Silver (US$ 9.72/unit). The Silver Polyamide Dressing was the item that most contributed to this high MDC since it was used in larger quantity (170 units in 61 bandages).

Currently, there are still no ideal dressings to treat every wound, but a vast therapeutic arsenal capable of assisting in tissue repair is already a reality that is accompanied by pressure from the pharmaceutical industry for its use. Therefore, it is the responsibility of health professionals to choose between passive (inert) bandages and bandages with active principles. In cases of burn injuries, silver-based active bandages are more effective coverage because they require less changes and exhibit a prolonged antibacterial effect[25-26].

According to an international research carried out in 2010 in a burn ICU, the mean daily cost of using silver dressings (ACTICOAT 7 Antimicrobial Barrier Dressing) was AUD$ 120.77[2]. Converting the amount obtained in the "bandaging" procedure to the Australian currency, the value of US$ 99.75, which included personnel, material and medicine/solutions costs is of AUD$ 127.45, based on the quotation from 02/27/2015, provided by Central Bank of Brazil.

The high number of materials used in the care process generates a high annual cost to large hospital organizations and represents a significant amount in the budgets. Due to the constant increase in costs with material, health professionals, especially nurses, have been working to acquire knowledge to improve allocation and proper use of these materials[27].

Nurses' work processes in different health institutions comprehend diverse actions with varied complexities, including team supervision, educational processes aimed at professional qualification, and direct care to patients. It is worth noting that investments are needed in order to raise awareness on professionals regarding properly allocating costs, in a way that there is no waste of resources and without impairing the assistance provided[28].

Finally, in addition to acquiring knowledge regarding accounting, an essential factor for a successful cost management, nurses should develop and disseminate studies addressing their participation and the participation of nursing professionals in the implementation of strategies to control and contain or minimize costs, in order to cooperate to an improved communication among administrators, accountants and other health professionals..

Limitations of the research

This research presented limitations such as: a sample with low number of nursing procedures performed frequently in severely burned patients and the impossibility of calculation of the cost of permanent and consigned equipment.

Contributions to nursing, health or public policies

When studying care and management processes, nursing seeks to become increasingly efficient in health organizations, aiming to increase productivity and minimizing expenses, since resources are scarce and care costs are high.

CONCLUSION

Inpatient care for patients with burns is expensive due to human, material and structural resources required to make it viable. Knowledge regarding the financial aspects related to

this subject is still limited, especially regarding the costs of the procedures performed by nursing professionals on severely burned patients in critical conditions.

The five procedures studied were frequently performed by technicians/assistants, and the total MDC corresponded to US$ 0.65 (SD = 0.36) for "vital signs monitoring"; US$ 9.98 (SD = 24.23) for "intravenous drug administration"; US$ 5.90 (SD = 2.75) for "measurement of diuresis"; US$ 0.93 (SD = 0.42) for "capillary blood glucose monitoring" and US$ 99.75 (SD = 129.55) for "bandaging". It is expected that the calculation of the mean direct costs of the resources consumed in these procedures can help the nurses make decisions regarding management and care, contributing to the allocative efficiency, avoiding waste and, when possible, indicating strategies of containment/minimization of costs without prejudice to the quality of nursing care.

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