RESEARCH

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# Direct cost of development and documentation of the nursing process

*Custo direto da condução e documentação do processo de enfermagem*

*Costo directo de la conducción y documentación del proceso de enfermería*

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**ABSTRACT**

**Objective:** identify the average direct cost (ADC) of the activities performed by nursing professionals in the nursing process development and documentation at the medical clinic of a teaching hospital. **Method:** 1040 activities were observed and the ADC was calculated by multiplying the time spent by professionals by the unit cost of direct labor. **Results:** the ADC of patient admission was R$ 55.57 (SD = 19.44); among the activities of patient follow-up, the assessment phase documentation had the most significant ADC (R$ 17.70 - SD = 14.60); the ADC of descriptive records corresponded to R$ 1.21 (SD = 1.21) and the ADC of the nursing team for shift change was R$ 54.23 (SD = 28.95). **Conclusion:** the study promotes visibility of the work performed by nursing professionals in the development of the nursing process, providing financial data to ensure consistent arguments for proper resources to its feasibility.

**Key words**: Nursing Process; Documentation; Nursing Care; Costs and Cost Analysis.

**RESUMO**

**Objetivo:** identificar o custo direto médio (CDM) das atividades realizadas por profissionais de enfermagem visando à condução e documentação do Processo de Enfermagem na Unidade de Clínica Médica de um hospital universitário. **Método:** foram observadas 1040 atividades e calculado o CDM multiplicando-se o tempo despendido pelos profissionais pelo custo unitário da mão de obra direta. **Resultados:** o CDM da admissão do paciente correspondeu a R$ 55,57 (DP ±19,44); dentre as atividades de seguimento dos pacientes a documentação do Histórico de Enfermagem representou o CDM mais impactante (R$ 17,70, DP = 14,60); o CDM das anotações descritivas correspondeu a R$ 1,21 (DP = 1,21) e o CDM da equipe de enfermagem para passagem de plantão foi de R$ 54,23 (DP = 28,95). **Conclusão:** o estudo contribui para conferir visibilidade à atuação dos profissionais de enfermagem na condução do Processo de Enfermagem fornecendo elementos financeiros para argumentação consistente quanto aos recursos adequados à sua exequibilidade.

**Descritores**: Processos de Enfermagem; Documentação; Cuidado de Enfermagem; Custos e Análise de Custo.

**RESUMEN**

**Objetivo:** identificar el coste directo medio (CDM) de las actividades realizadas por los profesionales de enfermería en la conducción y documentación del proceso de enfermería en la Unidad de Clínica Médica de un hospital universitario. **Método:** se observaron 1040 actividades y se calculó el CDM multiplicando el tiempo dedicado por los profesionales por el costo de la mano de obra directa. **Resultados:** la admisión CDM paciente fue de R$ 55,57 (SD = 19,44); entre las actividades de seguimiento de los pacientes a la documentación de la evaluación fue lo CDM más impactante (R$ 17,70, SD = 14,60); el CDM de anotaciones descriptivas correspondió a R$ 1,21 (SD = 1,21) y el CDM del cambio de turno de enfermería fue de R$ 54,23 (SD = 28,95). **Conclusión**: el estudio contribuye a dar visibilidad a la labor de los profesionales de enfermería en la realización del Proceso de Enfermería proporcionando datos financieros coherentes a su viabilidad.

**Palabras clave**: Procesos de Enfermería; Documentación; Atención de Enfermería; Costos y Análisis de Costo.

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## INTRODUCTION

The nursing process, which may be considered a methodological model or a technological tool, is essential for the systematic performance of the professional practice, as it favors care and ensures the conditions required to its development and documentation[1].

It recommends that nursing care be based on patient assessment, providing data for proper decision making about care demands (diagnosis), objectives (outcomes) to be reached and best care (interventions) to fulfill those demands and achieve desirable results. Therefore, it is a tool to guide clinical decisions of nurses in terms of intellectual, cognitive and documental processes of the nursing practice[2].

The accurate documentation of clinical data and information of patients is essential for care continuity, to develop clinical knowledge, found judgments, ensure safety and manage nursing care[3]. In addition, detailed documentation provide systemized information to help the action of other professionals from the multidisciplinary team, enhancing patient care, to support studies that calculate and control costs of interventions and activities and to ensure proper charge and refund of these activities, preventing financial losses of healthcare organizations.

However, despite its importance in the work performed by health professionals, the effective documentation, which requires knowledge, instruments and logistics to fulfill current ethical, social, legal, and institutional requirements, is an objective to be continuously pursued, as it is usually not developed in real time and does not fully represent all interventions and activities developed.

In nursing, documentation should provide clear, concise and precise records of the service provided and significant events, in a chronological and organized manner, following the phases of the nursing process[4]. Therefore, there is no doubt about the importance of proper development and documentation of the nursing process, to ensure nursing care visibility and support assessment and continuous improvements. However, such activities require nurses, nursing technicians and nursing aides to spend a considerable time of their working hours generating costs that have to be clearly identified and analyzed.

The knowledge of costs for the activities performed by nursing professionals for the development and documentation of the nursing process is critical to making coherent decisions with the needs of patients and purposes of health organizations, supporting a rational and efficient distribution of (human, material, physical and financial) resources to prevent waste.

To ensure their survival, health organizations have been pushed to seek new management methods, facing the challenge of aligning the efficient use of resources with improved service to the population[5]. In this context, when deciding about the service priorities and what resources will be used, a nurse is part of an important decision for resource allocation[6], contributing with knowledge that supports hospital cost measurement and control.

Despite a recurrent search in different databases, no study was found that analyzes costs of nursing process development and documentation. Thus, this study was conducted to help develop knowledge on this subject and provide elements that help manage the costs of these activities.

## OBJECTIVE

To identify the average direct cost (ADC) of the activities performed by nursing professionals in the nursing process development and documentation in the medical clinic of the teaching hospital of the University of São Paulo (HU-USP).

## METHOD

A quantitative, exploratory, descriptive, single-case study was conducted in the medical clinic of the teaching hospital of the University of São Paulo. This project derives from the research *Custo das atividades realizadas a pacientes de alta dependência de enfermagem internados em unidade de clínica médica* (Cost of activities provided to highly-dependent patients hospitalized in a medical clinic), which has been approved by the Research Ethics Committee of the institution (protocol 990/10).

The case study method was selected because it allows for a better understanding of the contemporaneous phenomenon of real life, considering contextual conditions. The case study technique adopts multiple sources of evidence, without manipulation or control, to answer questions like "how" and "why" in a situation the investigator "has little control" over the facts[7].

The studied medical clinic has 41 beds to patients from adult emergency, outpatient, adult intensive care and other units of the institution. Most of these patients are older adults with chronic and degenerative diseases.

The nurses of this clinic have developed the nursing process for more than three decades to support nursing care, teaching and research, as they consider the nursing process favors health promotion, maintenance and recovery for individuals, families or communities[8]. They arrange patient admission and classify patients as highly-dependent care (HDC) (14 beds) and intermediate care (IC) (27 beds).

The nursing team distribution in shifts is organized in a monthly work schedule for three nurses, nine nursing technicians or aides in the morning shift (7am to 1pm); three nurses, eight nursing technicians or aides in the afternoon shift (1pm to 7 pm), and two nurses and seven nursing technicians or aides in the night shift (7pm to 7am).

To assist patients hospitalized in the HDC patients' rooms, one nurse and two nursing technicians or aides are assigned in the morning and afternoon shifts, and two nursing technicians or aides in the night shift, with the supervision of the nurse in charge of the odd ward of the hospital. To assist patients hospitalized in the HDC apartments, one nurse and three technicians or aides are assigned in each shift. Every nursing technician or aide is responsible for assisting two HDC patients and three IC patients.

The profile of patients hospitalized and classified as HDC are mostly older patients and/or patients with chronic diseases. A common characteristic among them is that they cannot eat, bath, perform hygiene, and move on their own, and they may require constant monitoring due to their mental confusion condition or other neurocognitive alteration[9].

After admitting a patient at the clinic, the nurse conducts the nursing history (interview and physical examination) and, provided with this information, fills questionnaires of an electronic documentation system of the nursing process that has been used by this clinic since 2009, called PROCEnf-USP. The questionnaires have categories with answers that can be tabulated and that automatically generate diagnostic hypotheses. After selecting the diagnosis that best fits the patient condition at the time of hospitalization, and with the support of this system, the nurse selects the respective nursing outcomes, interventions and activities[10].

PROCEnf-USP generates a report called Nursing Diagnosis/Progress/Prescription, which contains the diagnoses presented by the patient and the respective nursing activities selected to create the patient care planning[10]. This report is printed and it allows nurses to check the progress of nursing diagnoses of the patient and check prescription items performed by nursing professionals. Together with the printed documents related to the nursing notes, these items correspond to most of the nursing documentation[11].

This case study corresponded to the opportunities of direct observation of nursing process development and documentation activities performed by nursing professionals of the studied medical clinic, from October to December 2013, in the morning, afternoon and night shifts (even and odd wards). For this reason, spreadsheets were produced to document the category and number of nursing professionals involved and the time spent.

Cost analysis was conducted by collecting direct costs, defined as a monetary expense applied to the production of goods or services related to the product or department. Direct cost is an expense that can be measured, identified and clearly quantified[12]. In a hospital, direct costs are basically comprised of labor, materials and equipment directly used in the support process[13].

Direct labor refers to the employees or workers who work directly with a product or service provision, allowing to measure the time spent and identify those who performed the work. It involves salaries, social charges, vacation provisions and the 13th salary[12].

The unit cost calculation for direct labor was based on average salaries, by professional category, provided by the Financial Director of the teaching hospital of USP, considering the nursing staff working in the clinic in the study period. The average salaries were: nurse R$ 11,482.99, nursing technician R$ 6,686.09 and aide R$ 8,239.54. It should be noted that, since 2003, the Nursing Department of the teaching hospital of USP has recruited nursing technicians only, because at USP, there is no difference in the initial salary for a nursing technician or a nursing aide. Thus, in this study, nursing aides with greater length of employment at the institution presented a higher average salary due to related benefits.

Considering no distinction between the documentation activities performed by nursing technicians and aides, the weighted salary average was calculated for these categories: R$ 7,166.92. In the teaching hospital of USP, nursing professionals work 36 hours a week, so the direct labor costs/minute of a nurse and technician or aide were R$ 1.33 and R$ 0.83, respectively. Thus, the ADC was calculated by multiplying the time spent by nursing professionals by the unit cost of direct labor. The Brazilian currency (R$) was used in this calculation.

The convenience sampling totaled 1,040 observations of activities characterized as patient admission to the clinic (conducted by nurses), follow-up of hospitalized patients (conducted by nurses), clinical records (conducted by nurses and nursing technicians or aides) and shift change (conducted by nurses and nursing technicians or aides).

Data obtained were grouped and entered in Microsoft Excel® electronic spreadsheets and categorical variables were descriptively analyzed.

## RESULTS

During three months of data collection, 10 patient admissions conducted by nurses were observed, including interviews, physical examinations, documents in PROCEnf-USP: selection of diagnoses, outcomes and interventions, printouts and filling of Nursing Diagnosis/Progress/Prescription report.

Follow-up of hospitalized patients, a prerogative of nurses, had 115 observations of interviews and physical examinations, 47 documents in PROCEnf-USP and 106 Nursing Diagnosis/Progress/Prescription reports.

The clinical records included the observation of 250 descriptive notes and 266 nursing notes in printouts that contained charts, intake/elimination control, specific control (blood sugar) and inspection of medical and nursing prescriptions. Lastly, 246 shift changes were observed.

Table 1 shows the time spent by nurses of the clinic in patient admission.

At patient admission, the total mean duration of nursing history was 39.40 (SD = 14.61), with minimum time of 24.88 and maximum time of 76.64. The activity that demanded more time from the nurses was filling of PROCEnf-USP questionnaires, on average 23.19 minutes (SD = 8.51), ranging from 15.18 to 41.78 minutes.

According to Table 2, the ADC for patient admission was R$ 55.57 (SD = 19.44), and the cost of PROCEnf-USP documentation was R$ 30.85 (SD = 11.31), the most representative value.

Most follow-up activities (72.01%) for patients hospitalized in the clinic were observed in the odd ward, as it has HDC patients, as classified by nurses. According to Table 3, the longest mean time of duration (12.16 minutes, SD = 8.36) was again of nursing process documentation in PROCEnf-USP.

Table 4 shows that the ADC of R$ 17.70 (SD = 14.60) for PROCEnf-USP data entry for patient follow-up was the highest value, ranging from R$ 0.89 to R$ 86.45, mode of R$ 19.95.

Table 5 shows the mean time of duration and ADC for the activities referred to in this study as clinical nursing records. Although a lower number (n = 250) of descriptive notes was observed, it

**Table 1 -** Distribution of time, in minutes, spent in activities related to patient admission at the studied clinic, São Paulo, São Paulo, Brazil, 2013

| Activities | n | Mean | SD | Median | Min. value | Max. value | Mode |
|---|---|---|---|---|---|---|---|
| Interview | 10 | 8.89 | 5.20 | 7.06 | 4.63 | 20.98 | 7.20 |
| Physical examination | 10 | 3.80 | 4.16 | 2.04 | 0.92 | 15.00 | ----- |
| Nursing process document in PROCEnf-USP | 10 | 23.19 | 8.51 | 19.14 | 15.18 | 41.78 | ----- |
| Printed reports | 10 | 0.77 | 0.41 | 0.76 | 0.18 | 1.33 | 1.13 |
| Filling of Nursing Diagnosis/Progress/ Prescription reports | 10 | 2.75 | 1.22 | 2.75 | 1.05 | 4.95 | ----- |
| Total time | 10 | 39.40 | 14.61 | 35.83 | 24.88 | 76.64 | ----- |

**Table 2 -** Distribution of ADC for the activities related to the patient admission at the studied clinic, São Paulo, São Paulo, Brazil, 2013

| Activities | n | Mean | SD | Median | Min. value | Max. value | Mode |
|---|---|---|---|---|---|---|---|
| Interview – Cost of direct labor - Nurse (R$) | 10 | 11.82 | 6.92 | 9.39 | 6.16 | 27.90 | 9.58 |
| Physical examination – Cost of direct labor - Nurse (R$) | 10 | 5.05 | 5.54 | 2.71 | 1.22 | 19.95 | ----- |
| Nursing process documentation in PROCEnf-USP – Cost of direct labor - Nurse (R$) | 10 | 30.85 | 11.31 | 25.45 | 20.19 | 55.57 | ----- |
| Report print – Cost of direct labor - Nurse (R$) | 10 | 1.02 | 0.54 | 1.01 | 0.24 | 1.77 | 1.50 |
| Filling of Nursing Diagnosis/Progress/ Prescription report – Cost of direct labor - Nurse (R$) | 10 | 3.66 | 1.62 | 3.66 | 1.40 | 6.58 | ---- |
| Total | 10 | 52.40 | 19.44 | 47.65 | 33.09 | 101.93 | ----- |

*Note:*
*Cost/direct labor/minute - nurse: R$ 1.33*

**Table 3 -** Distribution of the duration, in minutes, of follow-up activities for patients hospitalized in the studied clinic, São Paulo, São Paulo, Brazil, 2013

| Activities | n | Mean | SD | Median | Min. value | Max. value | Mode |
|---|---|---|---|---|---|---|---|
| Interview/physical examination | 115 | 2.56 | 2.46 | 1.95 | 0.08 | 15.00 | 0.97 |
| Nursing process documentation in PROCEnf-USP | 47 | 12.16 | 8.36 | 13.13 | 0.67 | 32.50 | 15.00 |
| Filling of Nursing Diagnosis/Progress/ Prescription report | 106 | 4.41 | 3.41 | 3.28 | 0.25 | 16.50 | 3.00 |

**Table 4 -** Distribution of ADC for follow-up activities for patients hospitalized in the studied clinic, São Paulo, São Paulo, Brazil, 2013

| Activities | n | Mean | SD | Median | Min. value | Max. value | Mode |
|---|---|---|---|---|---|---|---|
| Interview and physical examination - Cost of direct labor - Nurse (R$) | 115 | 3.14 | 3.27 | 2.59 | 0.11 | 19.95 | 1.29 |
| Nursing process documentation in PROCEnf-USP - Cost of direct labor - Nurse (R$) | 47 | 17.70 | 14.60 | 17.46 | 0.89 | 86.45 | 19.95 |
| Filling of Nursing Diagnosis/Progress/ Prescription reports (R$) - Cost of direct labor - Nurse (R$) | 106 | 5.86 | 4.54 | 4.36 | 0.33 | 21.59 | 3.99 |

*Note:*
*Cost/direct labor/minute - nurse: R$ 1.33*

**Table 5 -** Distribution of mean duration and ADC for the activities of clinical records at the studied clinic, São Paulo, São Paulo, Brazil, 2013

| Activities | n | Mean | SD | Median | Min. value | Max. value | Mode |
|---|---|---|---|---|---|---|---|
| *Descriptive notes*[250] | | | | | | | |
| Duration (in minutes) | 250 | 1.45 | 0.98 | 1.18 | 0.13 | 6.68 | 1.00 |
| Cost (R$) | 250 | 1.21 | 0.82 | 0.98 | 0.11 | 5.54 | 0.83 |
| *Notes on charts, intake/elimination control, specific controls and inspection of prescriptions*[266] | | | | | | | |
| Duration (in minutes) | 266 | 0.80 | 0.43 | 0.70 | 0.13 | 2.82 | 0.50 |
| Cost (R$) | 266 | 0.66 | 0.36 | 0.58 | 0.11 | 2.34 | 0.42 |

*Note:*
*Cost/direct labor/minute - nurse: R$ 1.33;*
*Cost/direct labor/minute – nursing technician/aide: R$ 0.83*

corresponded to the longest duration of 1.45 (SD = 0.98), with ADC of R$ 1.21 (SD = 1.21) and mode of R$ 0.83.

Most observations (74.8%) related to the shift change were made in the odd ward of the clinic, with duration ranging from 3.00 to 35.00 minutes, mean of 11.38 (SD = 5.24), median and mode of 10.00 minutes.

The ADC of the nursing professionals in this activity was R$ 54.23 (SD = 28.95), with median and mode of R$ 51.50. The number of nursing professionals participating in a shift change ranged from one to three nurses and from two to five nursing technicians or aides, the most frequent scenario was with two nurses and three nursing technicians/aides. Thus, there was no significant variation in the ADC between the categories of nurses and nursing technicians/aides: R$ 28.82 and R$ 25.41, respectively.

## DISCUSSION

According to Tables 1 and 3, the longest means of duration (23.19 and 12.16 minutes), and the most expressive ADC indicated in Tables 2 and 4 (R$ 30.85 and R$ 17.70) were related to the activities of nursing process documentation in PROCEnf-USP, for both patient admission and follow-up of patients hospitalized in the clinic.

This result was expected, because the moment of documentation is not only about using information from the nursing history to answer questionnaires in PROCEnf-USP. This is a moment of critical consideration and clinical judgment to support nurses in decisions about the best diagnoses among the diagnostic hypotheses generated by the system, and based on them, select the required nursing interventions, considering the resources available to achieve the expected results.

During the daily follow-up of patients, the nurses compare data previously entered in the electronic system to data from a brief nursing history, focused on the health needs that have led to hospitalization. The nurse checks other sources of information, such as results of recent laboratory exams, and evaluates the relevance of maintenance, exclusion or inclusion of diagnoses and interventions, to keep a coherent individual care planning, which is critical to a successful nursing process.

Nurses are a key element in resource allocation, as they decide in their workplace about service priority and what resources should be used. In some private and public hospitals, nurses have an effective participation, evaluating the required material, physical, human and financial resources, and critically analyzing the workplace expenses, comparing planned and actual values, and participating in the budget planning for the following year[6].

Nurses who are health center managers are responsible for the management of resources of significant financial value, such as human resources for nursing, which, according to the health center characteristics, may represent between 30% and 60% of the total staff, as well as material resources used in all care process. For this reason, these managers have been pressured to reduce the number of staff and amount of materials without knowing the profile of expenses, relating them to production and analyzing their costs[13].

Authors have stated that in recent years the Brazilian reality has shown an intense movement towards the adoption of electronic systems for several administrative activities that support nursing processes, and computerized nursing process documents, requiring health professionals prepared to manage and follow changes to reach positive results in their work and patient health[14].

However, it should be noted that computerized documents can show the quality, effectiveness and value of interventions or activities performed by nurses only if databases, developed with standardized terminology recognized and accepted in the area of Nursing are built to ensure data accuracy and precision, in compliance with the society standards, professional practices, legal requirements and institutional policies[4].

In the evaluation of nurses from the studied clinic, when supporting decisions about diagnoses, outcomes, interventions and nursing activities, PROCEnf-USP encourages them to increase their nursing process knowledge and incorporate new technical and technological skills[15].

Manual or electronic documentation for the nursing process, as well as shift changes, are indirect care interventions, that is, actions performed far from patients, but for their benefit[16]. Studies[17-18] conducted in different hospitals reported

that most working hours of nurses have been dedicated to indirect care interventions.

In Brazil, due to the characteristics of nursing team members, social work division and according to legal determinations[19], nurses are in charge of care plan proposition, implementation, supervision and evaluation. However, there is no knowledge of indirect care costs. Thus, the absence of studies on the direct costs of nursing process development and documentation activities in the analyzed literature does not allow to extend this discussion.

The results of this study will allow to mobilize nursing professionals of the studied clinic, the context of this single-case study, in terms of duration and cost of nursing process development and documentation activities, helping nursing management develop strategies to improve the involved resources. Although these results are about a specific reality with an electronic document system for the nursing process, the study presents a method to calculate the cost of indirect care activities that may be reproduced in other nursing scenarios.

It is usually a common sense among health professionals that the adoption of computer systems is an important measure to reduce cost and improve administrative efficiency. However, a study conducted in the United States[20] showed that administrative costs are not significantly reduced with the implementation of computer systems, despite their positive effect on care quality.

Such findings show new investigations are required, in other nursing scenarios using computer systems for nursing process development and documentation, to calculate costs and check the possibility to correlate care quality and cost reduction when using computer documentation systems.

Of particular note, managers of health centers should develop knowledge to help them in the decision-making process and resource allocation, determining what resources are required for the level of production of nursing activities or support to their centers, considering quantitative, qualitative and financial aspects[21].

Studies that analyze costs allow to rationalize resource allocation, contributing to a balance between health service offering and viable costs. Therefore, the challenge of cost control, in both public and private sectors, has to be faced with the adoption of strategies that prioritize cost reduction without affecting service quality, characterizing a good administration of services and continuous efficiency. In this perspective, nurses are in a position of privilege for cost management due to their familiarization with this theme, due to their academic training and specific knowledge of nursing services[13].

## CONCLUSION

At the medical clinic of the teaching hospital of USP, 1,040 activities related to nursing process development and documentation were observed for three consecutive months, in the morning, afternoon and night shifts.

The ADC of patient admission was R$ 55.57 (SD = 19.44), and the cost of nursing history documentation in the PROCEnf-USP electronic system (R$ 30.85) was the most representative value.

Among patient follow-up activities, nursing history data recording with the ADC of R$ 17.70 (SD = 14.60) also represented the most significant value, ranging from R$ 0.89 to R$ 86.45, mode of R$ 19.95.

Regarding descriptive notes, the ADC was R$ 1.21 (SD = 1.21), mode of R$ 0.83, and the ADC of the nursing team in shift change was R$ 54.23 (SD = 28.95), median and mode of R$ 51.50. In this activity, two nurses and three nursing technicians or aides composed the most frequent configuration; thus, no significant variation in the ADC was observed between nurses and nursing technicians or aides: R$ 28.82 and R$ 25.41, respectively.

This study is an initial approach to direct cost calculation for nursing process development and documentation. In this perspective, it intends to ensure visibility to the autonomy and scientificity of nursing professionals, providing elements for a consistent argumentation in terms of proper resources to perform their actions.

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