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REVIEW

Costs of nursing procedures/interventions: an integrative literature review

Custos de procedimentos/intervenções de enfermagem: revisão integrativa da literatura

Gastos de procedimientos/intervenciones de enfermería: revisión integrativa de la literatura

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ABSTRACT

Objectives: to analyze the scientific production of nurses regarding the costs of procedures/interventions performed by nursing professionals. **Methods:** integrative literature review with a sample of 17 primary articles selected from the CINAHL, Scopus, EMBASE databases and the PubMed portal. **Results:** all studies were conducted in hospitals, with quantitative, exploratory-descriptive studies, considering the case study method, with the description of costs method adopted, and the number of Brazilian publications stood out (12; 70.58%). The calculation of direct costs was most common due to the absence/difficulty of accessing information in the studied hospitals. This made it impossible to obtain the indirect costs that would be necessary for the composition of the total cost. **Conclusions:** it was shown that studies about the cost of procedures/interventions are still scarce, often covering only the calculation of direct costs. Nurses need to develop studies on such costs using the same methodology in different contexts of health care.

Descriptors: Nursing; Nursing Care; Costs with Health Care; Cost and Cost Analysis; Services Direct Costs.

RESUMO

Objetivos: analisar a produção científica de enfermeiros sobre os custos de procedimentos/intervenções realizados por profissionais de enfermagem. **Métodos:** revisão integrativa da literatura com amostra de 17 artigos primários selecionados nas bases CINAHL, Scopus, EMBASE e no portal PubMed. **Resultados:** todos os estudos foram conduzidos em instituições hospitalares, com estudos quantitativos, exploratório-descritivos, na modalidade estudo de caso, com a descrição do método de custeio adotado, destacando-se o número de publicações brasileiras (12; 70,58%). Prevaleceu a apuração dos custos diretos devido à ausência/dificuldade de acesso a informações, nos hospitais estudados, que possibilitassem também a obtenção dos custos indiretos que seriam necessários para a composição do custo total. **Conclus**ões**:** evidenciouse que a produção de estudos sobre custeio de procedimentos/intervenções ainda é escassa, abrangendo, frequentemente, apenas a apuração dos custos diretos. Indica-se a necessidade de os enfermeiros desenvolverem estudos sobre tais custos adotando a mesma metodologia em diferentes contextos de atenção à saúde.

Descritores: Enfermagem; Cuidados de Enfermagem; Custos de Cuidados de Saúde; Custos e Análise de Custo; Custos Diretos de Serviços.

RESUMEN

Objetivos: analizar la producción científica de enfermeros sobre los gastos de procedimientos/intervenciones realizados por profesionales de enfermería. **Métodos:** revisión integrativa de la literatura con muestra de 17 artículos primarios seleccionados en las bases CINAHL, Scopus, EMBASE y en el portal PubMed. **Resultados:** todos los estudios han sido conducidos en instituciones hospitalarias, con estudios cuantitativos, exploratorio-descriptivos, en la modalidad estudio de caso, con la descripción del método de costeo adoptado, destacándose el número de publicaciones brasileñas (12; 70,58%). Prevaleció la apuración de los gastos directos debido a la ausencia/dificultad de acceso a informaciones, en los hospitales estudiados, que posibilitaran también la obtención de los gastos indirectos que serían necesarios para la composición del costo total. **Conclusiones:** se evidenció que la producción de estudios sobre costeo de procedimientos/intervenciones aún es escasa, abarcando, frecuentemente, apenas la apuración de los gastos directos. Se indica la necesidad de los enfermeros desarrollaran estudios sobre tales gastos adoptando la misma metodología en diferentes contextos de atención a la salud.

Descriptores: Enfermería; Cuidados de Enfermería; Costos de Cuidados de Salud; Costos y Análisis de Costo; Costos Directos de Servicios.

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INTRODUCTION

According to the World Health Organization (WHO), the United States of America, Marshall Islands, Liberia, Sierra Leone, and Tuvalu are the countries that spend the most on health, between 15.2% to 22.1% of their Gross domestic product (GDP). However, these countries do not have equal access when compared to Canada and the United Kingdom, despite the fact that they spend less[1]. In Brazil, total spending in this sector is 8% of the GDP, with 3.6% being public from sources and 4.4% private[2]. In this economic setting, administrators experience a major challenge for the survival of health organizations, being driven to seek new forms of management, making efficient use of resources compatible with the improvement of services to the population[3].

In view of the scarcity of resources, the increase in demand for health services of different complexities and the growing difficulties of financing of public and private sources, health professionals need to acquire specific knowledge on the theme "health costs".

In health organizations, nursing professionals consume a large amount of resources to enable the provision of services. Nurses are responsible for the management of human resources, especially because the nursing staff represents between 30% and 60% of the total staff of institutions. The nurses are also responsible for the material resources consumed in the entire care process[4]. They are considered important elements, since they assess the needs for material, physical, human and financial resources, analyzing the expenses of the units and participating in the budget planning[5].

Among health professionals, nurses, when providing direct and indirect care in different contexts, have knowledge that enables the promotion of cost-effective care, since they know how to take into account the costs involved[6]. Therefore, they must be able to act in the rationalization of resources, in the control of waste and in the optimization of results. Thus, assuming an effective role in the economic management of services[7]. It has been observed, in literature, that care management can reduce costs, improve patient satisfaction and better health outcomes[8-10].

Nurses can contribute to cost management by conducting studies that provide elements for the rationalization of the resource allocation process, the balance between costs and finances, and the increase in results, directing the redefinition of priorities and monitoring of productivity. From this perspective, this study was carried out considering that the development and publication of knowledge produced by nurses on the determination, evaluation and control/minimization of costs have the potential to provide information that helps the best applicability of resources, improving the quality of care and avoiding the occurrence of losses that may compromise the economic viability of the services offered by health institutions.

OBJECTIVES

To analyze the scientific production of nurses on the costs of procedures/interventions performed by nursing professionals.

METHODS

This is an integrative review[11] carried out to answer the guiding question: "What is the state of the art on the scientific publication of nurses on the costs of interventions/procedures performed by nursing professionals?"

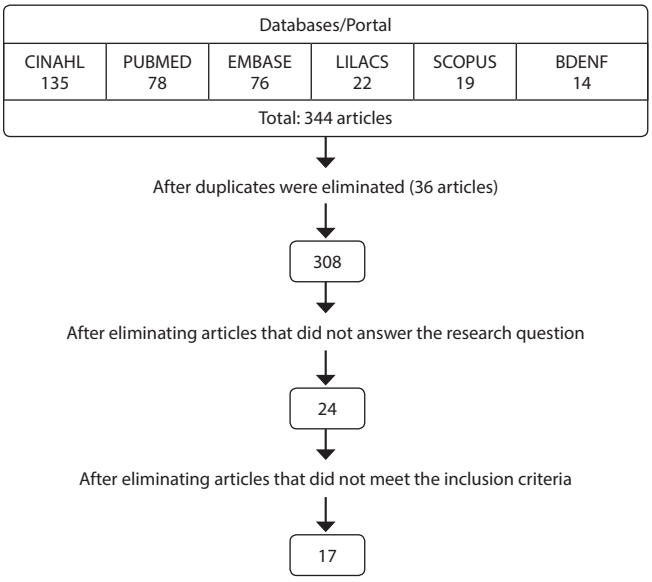
The PICO strategy, which stands for Patient, Intervention, Comparison and Outcomes, was used. The "P" - patients, were those undergoing nursing procedures/interventions; "I" - procedures/interventions performed by nursing professionals; "C" - no intervention for comparison was established; and "O" - costs of procedures/interventions[12].

In compliance with the methodological rigor required to conduct the integrative review, six steps[13] were carried out: identification of the theme and selection of the research question; establishment of criteria for inclusion and search for studies in the literature; definition of the information to be extracted from the selected studies; evaluation of studies included in the integrative review; interpretation of results and presentation of the synthesis of contents and knowledge.

Searches were conducted in the electronic databases CINAHL - The Cumulative Index to Nursing and Allied Health Literature; LILACS - Latin American and Caribbean Literature in Health Sciences; EMBASE; BDENF - Nursing Database; and on the PubMed portal, which includes MEDLINE. The keywords nursing care; nursing costs; cost and cost analysis; and economics, nursing were selected from terms indexed in the structured vocabulary DeCS (Health Sciences Descriptors) and in the indexing vocabulary of articles from PubMed, the Medical Subject Headings (MeSH terms).

The inclusion criteria were: published primary articles, published by nurses, in Portuguese, English and Spanish, fully available, during a five-year period (2013 to 2017), whose methodology evidenced the calculation of the costs of procedures and interventions performed by nursing professionals.

To detail the information collected from the articles, an instrument was used that collected the following information: identification of the original article (title, journal, year of publication); objectives; methodological characteristics; local; data collection process; type of costing; main results; conclusions and identification of limitations and/or bias.



Source: Flowchart of selection and identification of studies following the PRISMA recommendations[14]
Figure 1 – Flowchart of the article inclusion process - São Paulo / SP, Brazil, 2018

The initial research strategy identified 347 records. Of these, 36 were repeated, resulting in a total of 311. The articles that answered the research question were 21; and after the inclusion criteria, 14 documents were selected. Figure 1 shows the details of this process.

For the analysis and synthesis of the 17 articles, a synoptic table containing title, year and country and another one with objective(s), method, results and recommendations/conclusions were used[15].

RESULTS

As shown in Chart 1, 17 primary articles[16-32] (100%) comprised the sample of the present integrative review. All the studies analyzed were conducted in hospitals, having, among the authors, at least one nurse. Regarding the articles, they were published in Brazil (12; 70.58%) and in the United States of America (USA) (2; 11.76%), in the years 2015 (7; 41.17%), 2014 (5; 29.41%) and 2017 (4; 23.52%); no publication from 2013 was found.

Charts 2, 3, and 4 show that all articles presented clear, concise and well-defined objectives, and sought to identify/calculate the average direct cost of the procedure/intervention under study. Most analyzed publications originated from quantitative, exploratory-descriptive studies, in a case study modality. The diversity of objects whose cost was evaluated is evident: installation, maintenance and disconnection of the patient-controlled analgesia pump; outpatient chemotherapy treatment for women with breast cancer; installation and disconnection of hemodialysis in patients with central venous catheter; nursing interventions in patients undergoing total hip arthroplasty; implementation of a pressure ulcer prevention protocol; conducting and documenting the Nursing Process; mobilization of patients aiming at the prevention of pressure injuries and dressings for the treatment of these injuries; process of reprocessing double and single cotton fabric fields, which are part of the surgical LAP package; nursing procedure for major burns; among others.

Among the main outcomes of the articles that comprised the sample[16-32] (Charts 1, 2 and 3), the contributions highlighted were that the articles improve knowledge about: calculation and cost management; the importance of developing standard measurement methodologies to favor the comparison of the results of similar studies; and the need for studies to determine the indirect costs related to the assistance provided for the composition of the total cost.

Chart 1 - Characterization of the 17 primary articles included in the integrative review according to title, year, and country, São Paulo, São Paulo, Brazil, 2018

Title	Year	Country
Custo direto da instalação, manutenção e desligamento da bomba de analgesia[16]	2014	Brazil
Custo de procedimentos relacionados ao tratamento quimioterápico ambulatorial de mulheres portadoras de câncer de mama[17]	2014	Brazil
Custo da instalação e desligamento de hemodiálise em pacientes com cateter venoso central[18]	2014	Brazil
Determining the cost-effectiveness of hospital nursing interventions for patients undergoing a total hip replacement[19]	2014	USA
Measuring direct nursing cost per patient in the acute care setting[20]	2014	USA
Analysis of costs and benefits of transparent, gauze, or no dressing for a tunnelled central venous catheter in Canadian stem cell transplant recipient[21]	2015	Canada
Custo direto da condução e documentação do processo de enfermagem[22]	2015	Brazil
Custo direto da hemodiálise em unidade de terapia intensiva adulto[23]	2015	Brazil
Custo direto do reprocessamento de campos cirúrgicos de tecido de algodão: um estudo de caso[24]	2015	Brazil
Custos da implantação de um protocolo de prevenção de úlceras por pressão em um hospital universitário[25]	2015	Brazil
Elderly patients and nurses assessment of traditional bed bath compared to prepacked single units-randomised controlled trial[26]	2015	Denmark
Mobilização corporal para prevenção de úlceras por pressão: custo direto com pessoal[27]	2015	Brazil
Custo direto dos curativos de úlceras por pressão em pacientes hospitalizados[28]	2016	Brazil
Custo de procedimentos de enfermagem realizados com maior frequência ao grande queimado[29]	2017	Brazil
Custo direto da monitorização da hemodiálise convencional realizada por profissionais de enfermagem[30]	2017	Brazil
The cost-effectiveness of a patient centred pressure ulcer prevention care bundle: Findings from the INTACT cluster randomised trial[31]	2017	Australia
O custo do cateterismo vesical de demora nos pacientes internados na Unidade de Terapia Intensiva[32]	2017	Brazil

Note: USA - United States of America; INTACT - Introducing a Care bundle to prevent pressure ulcer in at-risk patients.

Chart 2 - Objective, synthesis of the design/sample, results and outcomes of the five articles published in 2014, São Paulo, São Paulo, Brazil, 2018

Objective	Design/sample	Results	Outcomes
To identify the average total cost (ATC) of installation, maintenance and shutdown of the patient-controlled analgesia pump (PCA) for infusion of morphine or fentanyl in pain management[16].	Quantitative, exploratory-descriptive research, in the form of case study/81 procedures.	The installation's ATC was R$107.91; maintenance was R$110.55; and termination, R$4.94. The materials that stood out the most were the PCA pump equipment (R$74.75 each) and the morphine solution bag (R$31.71 each).	The results obtained will support discussions on the need for monetary transfers from the Unified Health System to hospital units that carry out this antalgic therapy and will contribute to cost management and rational allocation of resources consumed.
To identify the ATC of procedures related to outpatient chemotherapy treatment for women with breast cancer[17]	Quantitative, exploratory-descriptive, with a case study design/60 horizontal observations; procedures related to chemotherapy treatment.	The ATC, per chemotherapy session, corresponded to R$1,783.01 (100%), being R$1,671.66 (93.75%) with drugs, R$74,98 (4.21%) with materials, R$28.49 (1.60%) with human resources and R$7.88 (0.44%) with solutions.	Knowledge of the costs associated with chemotherapy treatment procedures may support decision-making, aiming at reducing expenses and eliminating waste, without prejudice to the quality of the service provided.
To identify the ATC of the installation and disconnection of hemodialysis in patients with central venous catheters[18]	Quantitative, exploratory-descriptive research, in the form of a single case study/100 installations and 100 hemodialysis disconnections in 42 patients with central venous catheter.	The installation's ATC was R$80.10, and the termination, R$13.04, totaling R$93.14 per hemodialysis session. Material costs stood out: capillary dialyzer, arterial line, and venous line, costing R$36.15, R$3.77 and R$3.47 each, respectively.	The results make it possible to plan better the allocation of the resources involved and help management strategies aimed at economic efficiency.
To identify the types and values of nursing interventions and estimate the cost-effectiveness for the complications that patients experienced when undergoing total hip arthroplasty[19]	Data collection was carried out in three electronic databases of the hospital/254 patients admitted for total hip arthroplasty between 2006 and 2007.	Patients with more comorbidities were prone to receive hemotherapy, medications, incentive spirometry and hospitalization in a central care unit. The average direct cost was US$4,333, ranging from US$2,756 to US$7,332. About 48% of patients incurred costs between US$ 4,000 and US$ 4,999; 35% between US$ 3,000 and US $ 3,999.	Using appropriate methods, nurse managers can compare the cost-effectiveness of new nursing interventions or manage the supply of more cost-effective nursing interventions.
To measure the variability of direct nursing costs for similar patients and examine the characteristics of nurses assigned to different types of patients[20]	The data for measuring costs was collected from three databases of hospitalized patients from January 2010 to December 2012 in a medical/surgical unit of a large hospital.	The time required for nursing care ranged from 0.36 to 13 hours; and the daily cost per patient, from US$32 to US$ 1,455. The average direct nursing cost per day was US$ 96.48 (SD = US$ 55.73).	The use of standard measurement of nursing cost per patient can be compared between hospitals, informing the administrative decisions in the provision of nursing services.

Note: ATC - average total cost; PCA - patient-controlled analgesia pump; R$ - reais; US$ - dollar; SD - standard deviation. OBS: One dollar was R$3,31 in 2017.

Chart 3 - Objective, synthesis of the design/sample, results, and outcomes of the seven articles published in 2015, São Paulo, São Paulo, Brazil, 2018

Objective	Design/sample	Results	Outcomes
To assess the impact of three different nursing care strategies for the tunneled central venous catheter (CVC) exit site and compare the costs of each strategy[21]	Micro-costing to assess the costs and benefits of each CVC/432 exit location care strategy record (procedures) at a single health institution.	The transparent coverage required weekly care (US$ 51.79/week); the group without coverage, daily care (US$ 56.34/week); and the gauze dressing, every 48 hours (US$ 103.72/week).	The costs of supplies and labor for the gauze dressing were considerably higher, indicating that there are better financial benefits from discontinuing its use.
To identify the average direct cost (ADC) of the activities performed by nursing professionals in order to conduct and document the Nursing Process (NP) in the Medical Clinic Ward of a university hospital[22]	Quantitative, exploratory-descriptive research, in the form of a single case study/1.040 NP conducting and documenting activities.	The ADC of the patient's admission corresponded to R$ 55.57 (SD = 19.44); among the patient follow-up activities, the documentation of the Nursing Evolution represented the most impacting ADC (R$ 17.70, SD= 14.60); the ADC of descriptive notes corresponded to R$ 1.21 (SD= 1.21), and the ADC of the nursing team for work shift change was R$ 54.23 (SD= 28.95).	The study contributes to give visibility to the performance of nursing professionals in conducting and documenting the NP, by providing financial elements for consistent arguments regarding the resources suitable for its feasibility.
To identify the total ADC of conventional hemodialysis performed by nursing technicians on patients with acute kidney injury in an Adult Intensive Care Unit[23]	Quantitative case study research/57 conventional hemodialysis sessions for 23 patients with acute kidney injury.	The total ADC (R$ 434.83) was impacted by the costs of the "monitoring" stages R$ 205.58, "preparation of the machine and the extracorporeal circuit", R$ 120.96; and "internal disinfection and cleaning of the machine", R$ 42.10.	As the study was restricted to measuring only the direct cost. The measure of indirect costs is a major challenge to determine the total costs.

To be continued

Chart 3 (concluded)

Objective	Design/sample	Results	Outcomes
To identify the ACD for the process of reprocessing double and single cotton fabric fields, which are part of the surgical LAP package[24]	Quantitative, exploratory-descriptive research, in the form of a single case study/ the stages and activities of reprocessing were analyzed	The ACD with cleaning labor, assistants and nursing technicians and material for making a surgical LAP package totaled US$ 9.72. The "assembly and sterilization of the surgical LAP package" stage was the most representative (US$ 9.39); the ADC for materials suffered a strong impact from the costs of cotton fabric fields (US$ 7.99).	The knowledge obtained will support the nurse in discussions and in decision making about the economic feasibility of replacing reusable tissue fields with disposable ones.
To calculate the direct costs of implementing a pressure ulcer (PU) prevention protocol in a university hospital[25]	Quantitative, exploratory-descriptive study with a single-case study design/ the activities that comprise the following stages were mapped: elaboration, implementation and evaluation of the protocol.	Costs totaled US$ 60,857.38 (100%), with US$ 38,297.64 (62.93%) related to the direct labor of nurses, nursing technicians/assistants and secretary; and US$ 22,559.74 (37.07%) related to the acquisition of products, accessories, and equipment.	Health professionals need to value the financial aspects of care, understanding that managing them presupposes the increase of resources to guarantee access and equity to users associated with the maintenance of quality of care.
To compare: (1) bath duration and quality, (2) cost, (3) nurse satisfaction and (4) patient satisfaction with bed baths using traditional basin compared to bed bath with disposable utensils[26]	Randomized clinical trial, with a group of patients over 19 years of age, awake, conscious, able to speak and understand the local language and who needed to bathe in bed for two consecutive days.	The bath with disposable utensils lasted less (29 minutes) when compared to the bath using the traditional basin (36 minutes). The bath with disposable utensils cost 11.84 DKK; and the bath using the traditional basin, 11.87 DKK. In both, all nurses were satisfied with the cleanliness and the time spent; and all patients interviewed were satisfied.	In the case of baths with disposable utensils, the costs are lower, since less time is spent. If the calculation included machines (hot water and washing machine) and electricity, the costs of the basin method would have been even greater than baths with disposable utensils.
To calculate the average total cost (ATC) related to the direct labor of nursing professionals involved in mobilization activities of patients admitted to a university hospital aiming at the prevention of PUs[27]	Quantitative, exploratory-descriptive case study/656 preventive mobilizations for PUs prevention in inpatient units (medical, surgical, and intensive care).	The ATC for the medical clinic corresponded to R$ 5.38 for change of position, R$ 5.26 for positioning the patient in an armchair, R$ 5.55 for helping during walks in the medical clinic; for the surgical clinic, R$ 2.42 for changing position, R$ 2.30 for positioning in an armchair, R$ 2.96 for walking aid; in intensive care, R$ 8.15 for changing position, R$ 7.57 for positioning in an armchair, R$ 15.32 for walking aid care.	The results may support the cost management related to the human resources involved in the preventive care of patients at risk of developing PUs.

Note: CVC - central venous catheter; ADC - average direct cost; NP - Nursing Process; R$ - reais; US$ - dollar; SD - standard deviation; ATC - average total cost; Pus - pressure ulcers.

Chart 4 - Objective, synthesis of the design/sample, results, and outcomes of the five articles published between 2016 and 2017, São Paulo, São Paulo, Brazil, 2018

Objective	Design/sample	Results	Outcomes
To identify the average direct cost (ADC) related to the direct labor force (DLF) of nursing professionals and the consumption of materials and solutions when performing dressings for the treatment of pressure ulcers (PUs) in hospitalized patients[28]	Single case study with exploratorydescription/288 dressings for the treatment of patients with PUs.	The ADC for PUs dressings corresponded to US$ 19.18 (PUs-category I); US$ 6.50 (PUs-category II); US$ 12.34 (PUs-category III); US$ 5.84 (PUs-category IV); US$ 9.52 (PUs-unclassifiable) and US$ 3.76 (suspected deep tissue injury). The dressing of PUs-category I had the highest ADC (US$ 45.70), with the consumption of solutions and materials being the most impactful items (US$ 16.23; SD±12.97).	The determination of dressing costs for the treatment of different categories of PUs is vital for future estimates, being the basis of the budgeting and financing process for each unit/service in health institutions.
To identify the ADC of the procedures most frequently performed by nursing professionals in an Intensive Care Unit, for major burned patients[29]	Quantitative, exploratory-descriptive case study/883 observations relating to five most frequent procedures performed on critically ill major burn patients.	The ADC was US$ 0.65 for "control of vital signs"; and for "intravenous drug administration" it was US$ 10.00; US$ 5.90 for "measurement of diuresis"; US$ 0.93 for "capillary blood glucose testing"; and US$ 99.75 for "dressing". Regarding dressing, the ADC with material (US$ 57.69; SD= 122.12) had a strong impact on the total direct cost.	The knowledge developed can support decision-making, management, and assistance, as well as minimize the costs of the necessary materials.

To be continued

Chart 4 (concluded)

Objective	Design/sample	Results	Outcomes
To analyze the ADC regarding the participation of nursing professionals in the monitoring procedure for conventional hemodialysis, in three public teaching and research hospitals in the state of São Paulo[30]	Multiple case study with an exploratory-descriptive approach/657 procedures for "monitoring the hemodialysis session" in three hospitals (A, B and C).	The ADC for "monitoring the hemodialysis session" was higher at Hospital C (R$ 184.52), being 5.23 times higher than that of Hospital A (R$ 35.29) and 3.91 higher than Hospital B (R$ 47.22).	The study proposes a costing methodology that can be reproduced in different dialysis centers and for other dialysis procedures, directing the decision-making process in the efficient allocation of human resources.
To evaluate the cost-effectiveness of a patient-centered pressure ulcers (PU) care package compared to standard treatment[31]	Direct micro-costing study related to an PU prevention care package/317 patients whose outcomes were: diagnosis of new PU, hospital discharge or transfer.	The PU prevention care package costs US$ 144.91 more per patient compared to standard treatment. The biggest contributors to the increase in costs were "nurse time for repositioning" and "skin inspection". In the cost-effectiveness analysis, it was estimated that the package would cost US$ 3.296 per avoided PU.	The package may result in improvement of the clinical practice associated with the care of preventing PU in the hospital context, however it may not be cost-effective.
To assess the items of the direct cost of the long-standing bladder catheter (CB) evaluation in patients admitted to the Intensive Care Units (ICUs) with and without urinary tract infections (UTI)[32]	Multiple case study, with an exploratory-descriptive design/Two groups were observed: one of patients hospitalized in two ICUs (A and B) who used CB; and the other of nurses coordinating the ICUs.	Urine collection system (R$ 3.28); lidocaine hydrochloride (R$ 1.38) and Foley catheter (R$ 0.86) were the most expensive items. The nurse at ICU A received R$ 3.84 for performing the procedure, representing 40.74% less than the nurse at ICU B (R$ 6.48). The estimated time varied between 20 and 40 minutes. ICU B had a higher total cost in patients without UTI (R$ 13.26) and with UTI (R$ 257.07); ICU A had costs of R$ 10.62 and R$ 202.70, respectively.	The cost of passing CB, when associated with the treatment of UTI, totaled R$ 192.08 in ICU A and R$ 243.81 in ICU B. The UTI associated with the CB represents an important budgetary impact.

Note: ADC - average direct cost; DLF - direct labor; PIs - pressure injuries; R$ - reais; US$ - dollar; SD - standard deviation; PU - pressure ulcers; CB - log-term bladder catheter; ICUs - Intensive Care Units; UTI - urinary tract infections.

DISCUSSION

The studies analyzed addressed a great diversity of procedures/interventions to enable the provision of care, direct or indirect, performed by nursing professionals. Although most portray direct care procedures/interventions, it should be highlighted that indirect interventions are complementary to an efficient and effective care process, since care involves activities, processes, and decisions (direct or indirect) aimed at the individual, group or community in situations of health/illness[33].

Most Brazilian articles[16-18,22-25,27-30,32] corresponded to quantitative, exploratory-descriptive studies, in the case study modality. It is understood that the option for the case study is justified by the fact that this approach allows the investigation of contemporary phenomena, considering their real context; allows to evaluate multiple variables; and it can draw on different sources of evidence[34].

The case study consists of a systematic analysis of multiple forms of information that make it possible to reach an understanding of a given context and of those inserted in it, preserving significant, complex and integral characteristics of the events, clarifying a decision or a set of decisions taken and implemented as its defined results, leading to an expanded understanding of phenomena and situations[34].

Thus, case studies, like experiments, can be generalized into theoretical propositions, and not to populations or universes. As an experiment, they do not have a representative sample, and the researcher's objective is to expand and generalize theories (analytical generalization) and not to list frequencies (statistical generalization)[34].

All Brazilian articles[16-18,22-25,27-30,32] identified/calculated the monetary value of procedures/interventions in reais, through direct non-participant observation and the consumption of inputs (materials, medicines, and/or solutions) and the time (timed) spent by nursing professionals. Some of them[24-25,28-29] converted the values originally obtained in reais to US dollars in order to favor the comparison of their results with studies carried out internationally. Regardless of the currency used to fund nursing procedures/interventions, the studies indicated that the methodology adopted could be reproduced for different procedures/interventions and emphasized that nurses, when performing the appropriate allocation of human, material, or financial resources, lead to improvements in the management strategies aimed at the economic efficiency of the health institutions in which they operate.

Some articles identified the average total cost[16-18,27], but the authors obtained only the average direct cost. Most studies[16-18,22-25,27-30] indicated the determination of direct costs due to the lack of information, or difficulty in accessing it, in the contexts studied, which made it impossible to determine the indirect costs that would be necessary for the composition of the total cost (sum of direct and indirect costs)[35] of nursing procedures/interventions.

Direct costs are defined as monetary expenses applied to the production of a product/service in which there is a possibility of identification with the product or department. They refer to all those who can be identified and clearly quantified. Indirect costs, on the other hand, are those that need some apportionment criteria for their proper appropriation, as there is no direct reference to a procedure or service. They are related to the product,

but do not offer conditions for an objective measurement, and any attempt at allocation must be made through estimations, by apportionment[35].

Even though it was not possible to determine the total cost in most of the studies analyzed, the fact that nurses carry out studies on the theme "costs", especially in hospital contexts, represents a contribution to the advance in this area of knowledge.

In Brazilian studies, direct costs were the main approach of international researches, considering, in addition to the material resources consumed, the time spent by professionals in measuring the total cost. Two articles[19,31] addressed the cost-effectiveness/value of the study objects, expanding the discussion by comparing different possibilities of interventions/procedures and the best outcomes in care practice. Economic evaluation studies - for example, of cost-effectiveness - are used to support decision-making regarding the adoption of new technologies, verifying the relationship between costs and benefits resulting from health interventions that are being or may be performed in a given reality. Cost-effectiveness studies can also be understood as an instrument for analyzing the value of these interventions, since the method seeks to fill the gap between preferences and scientific evidence (objectivity, validity, reproducibility)[36].

All studies[16-32] analyzed were conducted in hospital contexts, most of them dealing with highly complex procedures since they are associated with high health costs. From a managerial perspective, managing hospital costs has become a fundamental instrument for the control of resources, allowing the identification of more effective strategic paths and opportunities to find more profitable activities, as well as those whose expenses need to be analyzed and controlled, or which are not economically viable[37].

Nursing professionals are in constant contact with patients. Thus, the nurse assumes an essential role in the management of costs and in the participation in the budget planning of health institutions, since they will be asked to manage human, material and financial resources, as well as to analyze the results of the assistance provided[6]. In this sense, it is considered essential that nurses, as managers of nursing care, even when they do not occupy formal managerial positions, invest in their training to develop studies that allow them to measure, analyze and control the costs of nursing procedures/interventions.

Ignorance about these costs makes any negotiation process impossible to adjust the price/cost ratio, hindering profits, returns, investments in infrastructure, educational and professional growth[38]. Therefore, studying the cost management of procedures/interventions leads, in addition to improving care, to the rational administration of human and material resources involved, albeit in finite quantities. Thus, it stands out that understanding and analyzing the costs of procedures/interventions is essential for managers and health professionals to effectively contribute to the proposal and adoption of measures that favor the financial sustainability of organizations[28].

Study limitations

The different methods used in studies to determine costs, as well as the lack of continuity in carrying out studies on the same procedure/intervention in different care contexts, proved to be a limitation for the comparative analysis of the main results obtained.

Contributions to the field of Nursing, Health or Public Policy

The present study synthesized the objectives, methods, results, and recommendations/conclusions of studies on scientific production in relation to the determination of the costs of nursing procedures/interventions, showing the advances and limitations of knowledge on the subject.

CONCLUSIONS

In this integrative review, 17 primary studies published by nurses were found and analyzed, whose objects of investigation were the costs of nursing procedures/interventions. Most were quantitative, exploratory-descriptive studies, in the case study modality, with the explanation of the method for calculating costs covering the cost of material resources and/or the time spent by professionals.

It was evident that the production of studies on the cost of nursing procedures/interventions is still scarce, being restricted to the calculation of direct costs in hospital contexts. There is a need for nurses to contribute to the production of knowledge about costs, and health organizations must overcome the challenge of generating and making available reliable information, that allows the determination of indirect costs in order to calculate the total costs procedures/interventions, of varying complexities, in different contexts of health service provision.

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