

# Methods and Indicators for Results Evaluation of Hospital Pharmaceutical Services: a scoping review

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Submitted: 21-12-2022 Resubmitted: 13-02-2023 Accepted: 14-02-2023

Peer review: blind reviewer and Maria Rita Garbi Novaes

## Abstract

**Objectives:** To identify methods and indicators applied to the evaluation of the results of hospital pharmaceutical care (AFH). **Methods:** A scoping review was carried out, considering the PRISMA recommendations. The search was carried out in the EMBASE, MEDLINE and LILACS databases. The analysis sought to explore the methods and indicators employed, and to identify the quality dimensions investigated. **Results:** Of 418 articles analyzed, six were included in the study. All employed quantitative methods and the indicators used analyzed the evolution, acceptability, efficiency and optimization of pharmaceutical care. **Conclusion:** It is concluded that studies evaluating the results of AFH are still scarce and that there is a lack of knowledge, especially regarding indicators of effectiveness, lack and equity of care in this area. However, simple, easy-to-apply and low-cost indicators have been identified that can be used in the evaluation of AFH regarding its passage, acceptability, efficiency and optimization.

**Keywords:** Health Evaluation, Quality Management in Health, Result Indicators, Pharmaceutical Services

## Métodos e Indicadores para Avaliação de Resultados da Assistência Farmacêutica Hospitalar: uma revisão de escopo

## Resumo

**Objetivos:** Identificar métodos e indicadores aplicados à avaliação dos resultados da assistência farmacêutica hospitalar (AFH). **Métodos:** Realizou-se uma revisão de escopo, considerando as recomendações PRISMA. A busca foi feita nas bases de dados EMBASE, MEDLINE e LILACS. A análise buscou explorar os métodos e indicadores empregados, e identificar as dimensões da qualidade investigadas. **Resultados:** De 418 artigos analisados, seis foram incluídos no estudo. Todos empregaram métodos quantitativos e os indicadores utilizados analisaram a efetividade, aceitabilidade, eficiência e otimização do cuidado farmacêutico. **Conclusão:** Conclui-se que os estudos de avaliação de resultados da AFH ainda são escassos e que há uma lacuna de conhecimento, especialmente quanto aos indicadores de eficácia, legitimidade e equidade do cuidado nessa área. Entretanto, foram identificados indicadores simples, de fácil aplicação e baixo custo, que podem ser utilizados na avaliação da AFH quanto à sua efetividade, aceitabilidade, eficiência e otimização.

**Palavras-Chave:** Avaliação em Saúde, Gestão de Qualidade em Saúde, Indicadores de Resultados, Assistência Farmacêutica.

## Introduction

A relevant health care component involves access to and rational use of medications, which requires patients to receive the appropriate medication for their clinical situation, in doses that meet their individual needs, for the appropriate time, and at the lowest cost both for them and for their community<sup>1</sup>. For these conditions to be met, a broad set of services needs to be performed, including the acquisition, storage, distribution and dispensing of medications, as well as the monitoring and evaluation of their use, acquisition and dissemination of information about

them and permanent education of the health team members, aiming to contribute to people's health protection, promotion and recovery<sup>2</sup>. These services were called pharmaceutical services<sup>3</sup> by the Pan American Health Organization (PAHO) and are nationally known by the term "Pharmaceutical Assistance"<sup>4</sup>.

In Brazil, Pharmaceutical Assistance is understood as a health care area that involves comprehensive activities with a multiprofessional and intersectoral character, aimed at the organization of actions and services related to medications, especially regarding the patient and the community to promote their health<sup>5</sup>.



Since the late 1990s, many advances in this area have been made in the country, induced by the international agenda promoted by the PAHO and the World Health Organization (WHO), aiming at the structuring of services and the implementation of national policies<sup>3,6</sup>. In line with this agenda, in 1998, the Ministry of Health formulated the National Medications Policy (*Política Nacional de Medicamentos*, PNM)<sup>7</sup> and, in 2004, the National Health Council approved the National Pharmaceutical Assistance Policy (*Política Nacional de Assistência Farmacêutica*, PNAF)<sup>8</sup>.

The focus of the actions of these two policies, with regard to health care, was centered on pharmaceutical assistance in outpatient health care (aimed at the care of outpatients), with the objective of ensuring the population's access to essential medications and rational use of these products<sup>7,8</sup>. In the PNM, the concern to train the professionals responsible for the coordination of activities related to pharmaceutical assistance in the municipalities was also explicit, given the decentralization process of health actions and services to these entities in the Unified Health System (*Sistema Único de Saúde*, SUS)<sup>5</sup>.

Despite the advances in the implementation of these two policies, little priority was given to the organization of hospital pharmaceutical assistance (aimed at hospitalized patients) or to the implementation of actions that show a strong commitment to the quality of services in these two health care areas. According to Donabedian<sup>9</sup>, health care quality depends on two factors: 1) the health care science and technology (which involves the structure for offering services); and 2) application of the health care science and technology (which covers the process of its performance). Also according to this author, the results, which are changes (both desirable and undesirable) in individuals and populations attributable to health care, can be evaluated in seven quality dimensions: efficacy, effectiveness, efficiency, optimization, acceptability, legitimacy and equality.

In Brazil, two major evaluative research studies of pharmaceutical assistance were carried out in the 2000s. The first one aimed at knowing aspects of the structure and process of hospital pharmacies<sup>10</sup>, with further discussion on the evaluation of these units in other studies: in a literature review on the activities of the Brazilian hospital pharmacy<sup>11</sup> and a national diagnosis on the same topic<sup>12</sup>. In the second research, issues related to the structure and processes of policy and regulation in the pharmaceutical area are described, as well as direct results of implementing the PNM regarding access, quality and rational use of medications<sup>13</sup>. Although result indicators were proposed in the second case, the focus of the paper was centered on the structure and process indicators of pharmaceutical assistance. The result indicators in this paper were proposed by a group of experts, after applying the Delphi<sup>14</sup> methodology.

In the national literature, there are few studies that have evaluated hospital pharmaceutical assistance and, specifically, its results, even from the perspective of health units and not the health system's<sup>15,16</sup>. There is a range of indicators already well documented about its structure and process<sup>17</sup>, but not about the results in this care area. In this sense, there is an information gap that justifies conducting a study on the subject matter. Thus, the article aims at identifying methods and indicators applied to the evaluation of hospital pharmaceutical assistance results.

## Methods

A scoping review was carried out, which is a type of literature review whose main purpose is to evaluate and understand the extent of knowledge in an emerging field or to identify, map, report and discuss the characteristics or concepts in this field<sup>18</sup>. According to the PRISMA recommendation, scoping reviews can be prepared with a view to several objectives, with the following among them: examining the extent (what is the size) and nature (characteristics) of the evidence on a topic or issue; determining the pertinence of conducting a systematic review; summarizing findings of the knowledge produced in a given field or discipline that is heterogeneous; and identifying gaps in the literature to assist in planning and conducting future research studies<sup>19</sup>.

A scoping review has knowledge synthesis as its product, addressed by an exploratory question, making key concepts clearer and synthesizing research gaps. It is a rigorous and reproducible methodology that allows mapping the state-of-the-art of a given topic, but without the objective of comparing results or making a critical evaluation of the quality of the studies<sup>19,20,21</sup>.

In this article, the PRISMA recommendation for conducting scoping reviews was observed<sup>19</sup>. According to this regulation, the review is divided into three main stages<sup>22</sup>. The first stage involves screening and selecting the evidence. It begins with the definition of the research question, which should make clear which the population or participants are, the concepts and the context in which the research will be carried out. In this article, the participants are the hospital units, specifically the pharmacy of this unit, for which it is desired to identify methods and indicators for evaluating the results of the services provided (concept), within the hospital context, encompassing public and private units. The scoping review question was enunciated as follows: *Which methods and indicators have been applied to evaluate the hospital pharmaceutical assistance results?*

The following databases were considered: i) EMBASE, with articles indexed since 1947, basically of European origin<sup>23</sup>; ii) MEDLINE, with articles indexed since 1879, originating not only in the United States of America, but worldwide<sup>24</sup>; and iii) LILACS, which has articles published by authors from Latin America and the Caribbean since 1982<sup>25</sup>.

The search strategy was applied according to the characteristics of each database, aiming at retrieving evaluative studies with both quantitative and qualitative approaches. As qualitative approaches in the evaluation of health services are less frequent, one of the purposes of the search was to identify qualitative methods for this purpose. Therefore, six strategies were used, considering two purposes in all three databases (Table 1).

The term 'pharmacy' was used instead of 'pharmaceutical assistance' or 'pharmaceutical services' because, in this area, national and international articles generally refer to the unit within the hospital structure, that is, to the hospital pharmacy, and not to the set of services provided by this unit.

The inclusion criteria for this article were as follows: i) primary studies that report findings from evaluative research on the pharmaceutical assistance results in hospital units or that present/discuss methods and indicators for evaluating the pharmaceutical assistance results in these units; ii) made available as full-text papers; and iii) published in Portuguese, English and Spanish. The following exclusion criteria were considered: a) secondary studies (reviews); b) not available as full-text papers (abstracts presented at congresses, for example); and c) published in languages other than the three mentioned.



**Table 1.** Database search strategies

SEARCH PURPOSES	Search strategies by scientific literature database		
	EMBASE	MEDLINE	LILACS
Purpose 1 – Focus on identifying methods and quantitative indicators	(indicator:ab,ti OR indicators:ab,ti) AND hospital:ab,ti AND (pharmacy:ab,ti OR pharmacies:ab,ti) AND evaluation:ab,ti	((indicator[Title/Abstract] OR indicators[Title/Abstract]) AND (hospital[Title/Abstract]) AND (pharmacy[Title/Abstract] OR pharmacies[Title/Abstract]) AND (evaluation[Title/Abstract]))	(indicador OR indicadores) AND (hospital OR hospitais OR farmácias OR farmacêutica) AND (avaliação)
Purpose 2 – focus on identifying qualitative methods	hospital:ab,ti AND (pharmacy:ab,ti OR pharmacies:ab,ti) AND 'qualitative evaluation':ab,ti	((hospital[Title/Abstract] AND (pharmacy[Title/Abstract] OR pharmacies[Title/Abstract])) AND (qualitative evaluation[Title/Abstract]))	(farmácia OR farmácias OR farmacêutica) AND (hospital OR hospitais OR hospitalar) AND (avaliação qualitativa)

Source: Created by the authors.

No time frame was adopted and the search was carried out on August 8<sup>th</sup>, 2022. All articles indexed to the databases used were considered. Thus, the period analyzed depends on the year in which articles were indexed in each of these databases. Furthermore, in addition to them, documents from the Gray Literature were analyzed, such as theses, reports and manuals of concepts and official websites of the Brazilian government and other countries, as well as the titles of the references of the articles included to verify if any of them could be of interest to the study.

The second stage of the review involves extracting data from the documents selected. In this study, the articles were extracted, coded and recorded in electronic spreadsheets, being reviewed by two women researchers. The screening process was presented in a PRISMA diagram and the data tabulation of the articles selected involved systematization of diverse information for the following variables: year of publication, study objective, country, study duration, participants, hospital context (which specialty), method used in the evaluation of hospital pharmaceutical assistance, method used in data collection, norms that served as the basis for the evaluation and parameters used. In addition to that, for the indicators, the definition and form of calculation of each of them were obtained.

Finally, the third stage of the review concerns data analysis. The analysis of the methods and indicators identified, applied to the evaluation of the hospital pharmaceutical assistance results, sought to explore the type of evaluation method used, whether quantitative or qualitative, as well as to identify the quality dimensions that were investigated, based on the results' evaluation indicators used, as described by Donabedian<sup>9</sup>: efficacy, effectiveness, efficiency, optimization, acceptability, legitimacy and equality.

## Results

A total of 418 articles were found in the search carried out in all three databases, considering both purposes described in Figure 1. Of these, 63 were duplicates, leaving 355 to analyze their titles and abstracts. After reading these topics, 297 documents were excluded according to the previously defined inclusion and exclusion criteria, leaving 58 articles for full reading.

Of these 58 documents selected for the final evaluation, 53 were excluded because the evaluation and the indicators used were not about results but about processes, or because the context was not that of the hospital pharmacy. Thus, 5 articles were selected in this stage. In the analysis of the reference lists of these articles, another article of interest was identified. Thus, a total of 6 documents were included to investigate the main methods and indicators used in the evaluation of hospital pharmaceutical assistance (Figure 2).

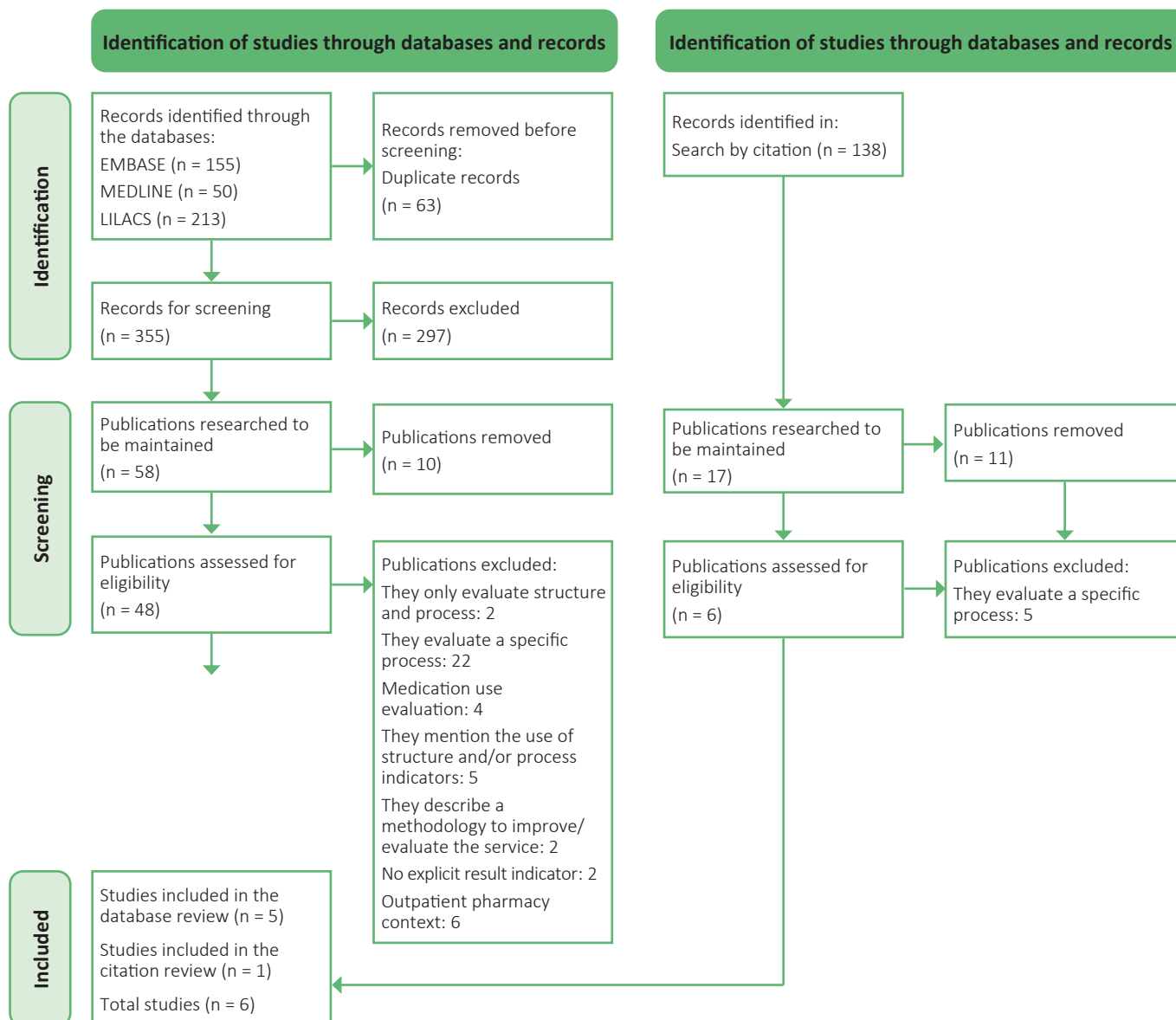
Table 2 shows the description of the articles selected, according to the variables that make it possible to identify the participants, the concepts and the context of the evaluation of hospital pharmaceutical assistance. All 6 selected articles are international and, regarding the context, the evaluations were carried out in specialized hospitals (in Trauma, General Surgery and in Oncology and Hematology), and it was not possible to identify the type of hospital in two studies<sup>24,35</sup>, nor the parameters used for the indicators found.

Table 3 presents the result indicators identified, according to the quality dimensions investigated. As can be seen in this Table, of the seven quality pillars defined by Donabedian<sup>9</sup>, indicators were found that translate the quality of hospital pharmaceutical assistance results into four of them: effectiveness, efficiency, acceptability and optimization. Three quality attributes in this area did not have any indicators identified: effectiveness, equality and legitimacy.

## Discussion

In this paper, few evaluations of the hospital pharmaceutical assistance results were identified at an international level. At the national level, the scarcity of scientific literature on the subject matter had been pointed out by Messeder<sup>26</sup> in 2005. This author concluded that, although some evaluations of the hospital pharmacy structure, process and results in Brazil had been carried out up to that moment, most of them were conducted in a punctual and unplanned way, contributing little to the knowledge of pharmaceutical assistance quality in Brazilian hospitals.

**Figure 1.** PRISMA flowchart corresponding to selection of the studies



Source: Created by the authors

In this review, it is observed that this reality has not changed, at least regarding the evaluation of results at the national and international levels. In almost three decades, considering the first article selected, only six studies on the topic were identified, which shows that there is scarce literature on methods and indicators for investigating the results of services in this area. In addition to this aspect, it is verified that there was no tendency to increase the number of publications on the topic, as the few studies identified were published between 1995 and 2020.

The first paper selected was published by Bajcar<sup>27</sup> in the mid-1990s. This is a quantitative assessment of pharmacists' clinical activities, with the objective of developing a workload documentation system that would capture these activities and assess the impact of pharmaceutical services on the results and costs of the patients' pharmacological therapy. The other papers selected also used

quantitative methods, focusing on the services provided by these professionals, although the authors of two of them stated using qualitative approaches<sup>27,28</sup>. This finding suggests that qualitative research may be even scarcer in the pharmaceutical assistance area.

The use of indicators in health assessments is important because they incorporate criteria (ideal quality conditions to be achieved), reflect concepts or aspects of an activity, and translate them into a specific measure, which can be interpreted. They should meet the following basic requirements: i) clarity: ability to be easily understood; ii) usefulness: ability to reflect a relevant aspect; iii) measurability: possibility of being defined in qualitative or quantitative terms; iv) reliability: ability to allow evaluation over time between different observations and observers; and v) validity: ability to measure what is really wanted to be measures<sup>10</sup>.

Regarding the quality dimensions investigated with the application of indicators, Donabedian<sup>9</sup> conceptualizes them as follows: effectiveness concerns the ability of care to produce improvements in health when used under the most favorable conditions, whereas effectiveness refers to the degree to which the improvements that can be achieved in health are actually obtained through care provided in real conditions. Efficiency is the ability to reduce the care-related cost without reducing the improvements that can be achieved in health, and optimization involves balancing the improvements in health through care and the costs of achieving such improvements. Acceptability is the care compliance with the wishes, desires and expectations of the patients and their families, and legitimacy is the care compliance with the social preferences, expressed in terms of ethical principles, values, norms, customs, laws and regulations. Finally, equality is the care compliance with the principle that determines what is fair and equitable in its distribution and its benefits among members of the population.

In the studies identified in this review, the effectiveness indicators measured clinical outcomes in addition to mortality and morbidity; those of acceptability measured the patients' psychological outcomes, such as satisfaction with the information received about medications, as well as evaluative care outcomes, such as physicians'

acceptance of information received from pharmacists about drug-related problems (DRPs), which involves greater commitment to the care provided (meticulousness); finally, the efficiency and optimization indicators measured evaluative care results<sup>9</sup>.

Non-identification of equality indicators can be explained by the context of the care assessment and the loci where the studies were carried out. As in hospital units the care offered is usually very standardized in protocols, large variations in care are not expected due to the socioeconomic conditions of patients in less unequal societies such as those of the countries where the studies were carried out, although these variations may eventually exist.

As for the efficacy indicators, as this is a measure of patient improvement attributable to care provided under ideal conditions, this is usually done in controlled studies, which was not the case of the studies selected in this review, which investigated the results under real conditions. And in relation to legitimacy, although the publication of guides, manuals and booklets is usually a routine in health units and systems, these materials are not always used as a reference in the practice, which may explain the non-identification of indicators on this dimension of care quality in hospital pharmaceutical assistance.

**Table 2.** Figure 3 shows the description of the articles selected according to the variables that make it possible to identify the participants, the concepts and the context of the hospital pharmaceutical assistance evaluation.

Variables/ Author	Bajcar <i>et al</i> <sup>27</sup>	Zimmerman <i>et al</i> <sup>25</sup>	Romera <i>et al</i> <sup>28</sup>	Jackson <i>et al</i> <sup>22</sup>	Barnum <i>et al</i> <sup>28</sup>	Zecchini <i>et al</i> <sup>29</sup>
<b>Year of publication</b>	1995	1997	2000	2005	2011	2020
<b>Objective</b>	To evaluate the impact of pharmaceutical interventions on the patients' therapeutic results and on the treatment cost	To evaluate a continuous improvement program for the quality of pharmacists' clinical interventions	To evaluate a pharmaceutical care program	To evaluate applicability in private hospitals of medication use indicators recommended by a therapeutic counseling group	To evaluate the efficiency of the hospital pharmacy	To describe the clinical, economic and organizational impacts of pharmaceutical interventions in a chemotherapy drug preparation unit
<b>Country</b>	Canada	USA	Spain	Australia	USA	France
<b>Study duration</b>	1 year	1 year	4-6 months	6 months	13 periods lasting 2 weeks each (6.5 months)	10 weeks (2.5 months)
<b>Participants</b>	1 hospital without specifying the number of beds	1 hospital with 432 beds	1 hospital, 10 beds under study (the total number of beds in the hospital was not reported)	13 hospitals, totaling 2,115 beds	12 healthcare system hospitals in the USA (it was unclear if linked to public Medicaid and Medicare programs)	1 university hospital with 2,000 beds
<b>Hospital context</b>	Not reported	Trauma	General Surgery	General Surgery	Not reported	Oncology and Hematology
<b>Methods</b>	Quantitative evaluation	Quantitative evaluation	Quantitative evaluation	Quantitative evaluation	Data Envelopment Analysis	Avaliação quantitativa
<b>Data collection</b>	(DEA)	Quantitative evaluation	Avaliação clínica e conversa com o próprio paciente	Ficha padronizada	Sistema informatizado dos hospitais/extração de relatórios	Dados coletados do sistema informatizado do hospital
<b>Normative</b>	Standard form used by pharmacists	Team of pharmacists to evaluate the interventions performed	Clinical evaluation and conversation with the patient	Standardized sheet	Computerized system of the hospitals/ Extraction of reports	Data collected from the hospital's computerized system
<b>Parameter</b>	Not reported	JCAHO* Recommendations <sup>46</sup>	Canaday <i>et al.</i> , 1994 <sup>38</sup>	New South Wales Therapeutic Assessment Group, 2003 <sup>45</sup>	Does not apply	Does not apply
	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported

Fonte: Elaboração própria.

Nota: \*JCAHO = JOINT COMMISSION ON ACCREDITATION OF HEALTHCARE ORGANIZATIONS.



**Table 3.** Description of the hospital pharmaceutical assistance result indicators identified and their relationship with the health care quality dimensions.

Quality dimensions	Indicators	Definition	Calculation	Reference
Effectiveness	Resolution of DRPs <sup>1</sup>	Percentage of DRPs solved out of the total number of DRPs identified	(Number of DRPs solved / Number of DRPs identified) x 100	Bajcar <i>et al</i> (1995) <sup>27</sup>
	Resolution of DRPs	Percentage of DRPs solved in the total interventions accepted by the physicians	(Number of DRPs solved / Number of interventions accepted by the physicians) x 100	Romera <i>et al</i> (2000) <sup>28</sup>
	Clinical impact	Percentage of level II and III interventions <sup>4</sup> in relation to the total interventions	(Number of type II and III interventions / Number of interventions performed) x 100	
	Morbidity due to preventable adverse drug events	Percentage of patients who became ill as a result of preventable drug adverse events	(Number of patients who became ill due to preventable adverse drug events / Number of patients identified with preventable adverse drug events) x 100	Jackson <i>et al</i> (2005) <sup>32</sup>
	Morbidity due to preventable adverse drug events	Percentage of patients' deaths resulting from preventable drug adverse events	(Number of patients' deaths due to preventable adverse drug events / Number of patients identified with preventable adverse drug events) x 100	
Optimization	Clinical impact of pharmaceutical interventions	Percentage of interventions whose impact was negative, null, small, moderate, large, undetermined or that prevented the need for intensive care or death in the total number of interventions performed	(Number of interventions according to clinical impact / Number of interventions performed) x 100	Zecchini <i>et al</i> (2020) <sup>39</sup>
	Costs avoided	Sum of medication-related costs avoided with the interventions performed <sup>2</sup>	Amounts expressed in monetary unit	Bajcar <i>et al</i> (1995) <sup>27</sup>
	Economic impact of pharmaceutical interventions	Percentage of interventions that reduced, did not change and increased the costs, as well as of interventions with undetermined impact, in the total number of interventions performed	(Number of interventions according to clinical impact / Number of interventions performed) x 100	Zecchini <i>et al</i> (2020) <sup>39</sup>
Efficiency	Cost-benefit ratio <sup>3</sup>	Ratio between pharmaceutical costs and medication-related costs avoided	Sum of pharmacists' salaries / Sum of medication-related costs avoided	Bajcar <i>et al</i> (1995) <sup>27</sup>
	Technical efficiency of the hospital pharmacy	Number of interventions performed and costs avoided per hour of clinical activity	In the data envelopment analysis (DEA), the hours of clinical activities employed were considered as inputs and the results were measured in terms of interventions performed (clinical activities performed by pharmacists) and savings (costs avoided)	Barnum <i>et al</i> (2011) <sup>38</sup>
Acceptability	Percentage of interventions accepted by the physicians	Percentage of interventions accepted in relation to the number of interventions performed	(Number of interventions accepted / Number of interventions performed) x 100	Bajcar <i>et al</i> (1995) <sup>27</sup>
	Percentage of interventions accepted and implemented by the physicians	Percentage of pharmaceutical interventions accepted in the total interventions implemented	(Number of interventions implemented / Number of interventions accepted) x 100	Zimmerman <i>et al</i> (1997) <sup>35</sup>
	Percentage of interventions accepted by the physicians	Interventions recommended by the pharmacists to the physicians and applied to the patients in the total recommendations	(Number of interventions that were accepted and applied / Number of interventions recommended) x 100	Romera <i>et al</i> (2000) <sup>28</sup>
	Percentage of interventions accepted by the physicians	Percentage of interventions accepted in relation to the number of interventions performed	(Number of interventions accepted / Number of interventions performed) x 100	
	Patients satisfied with the information about medications received	Percentage of satisfied patients out of the total number of patients who received information about medications	(Number of patients satisfied with the information about medications / Number of patients who received information about medications) x 100	Jackson <i>et al</i> (2005) <sup>32</sup>
	Patients satisfied with the information about medications received	Percentage of satisfied patients out of the total number of patients who received information about medications	(Number of patients satisfied with information about medications / Number of patients who received information about medications) x 100	

Fonte: Elaboração própria.

Notas: <sup>1</sup>PRM = problema relacionado aos medicamentos. <sup>2</sup>As intervenções terapêuticas realizadas pelos farmacêuticos são diversas em cada estudo constante desta tabela. São exemplos desse tipo de intervenção: i) discutir com um médico a seleção adequada de antibióticos; ii) recomendar a troca de um medicamento da via intravenosa para a oral; e iii) interromper um medicamento que não seja mais necessário. <sup>3</sup>Embora os autores chamem de razão de custo-efetividade, tanto o numerador quanto o denominador dessa razão são expressos em unidades monetárias. Trata-se, na verdade, de uma razão de custo-benefício. <sup>4</sup>Indicador de impacto clínico: segundo Hepler e Strand (1991)<sup>35</sup>, intervenções de nível II e III são, respectivamente, aquelas que evitam danos com alta probabilidade de ocorrer ou aumentar tempo de internação e danos que causam ameaça grave a vida.



The indicators listed in Table 3 of this review seem to meet the five requirements proposed by Osório-de-Castro and Castilho<sup>10</sup>. However, the absence of parameters for evaluating the indicators described was clear. However, it is possible to compare the results of the indicators to findings in the literature or to the history of the hospital unit for the same indicator<sup>29</sup>.

In addition to a parameter for judging the results, it becomes necessary to describe which regulation is based on each indicator under study<sup>10</sup>. In this regard, in three studies it was possible to deepen on this theme a little with a discussion on the result indicator used.

In 2014, the New South Wales Therapeutic Advisory Group Inc. (NSW) updated the *Indicators for drug and performance indicators workbook*, publishing the *National Quality Use of Medicines Indicators for Australian Hospitals: User Guide*<sup>30</sup>, which describes how to define indicators in the practice of hospital services, focused on medication use. In a general way, the guide presents four stages to arrive at an ideal methodology for evaluating results: a. How to choose the collection method; b. How to choose the research sample; c. What type of analysis to develop; and d. How to present the result. As it is a guide, it can serve as a basis for each hospital unit to develop its own indicators.

The manual called "*Indicators for drug and performance indicators workbook*"<sup>31</sup> published in 2003 was the reference used by Jackson et al.<sup>32</sup> and describes in more depth a number of indicators with clinical impacts, that is, to which extent the intervention carried out is beneficial or avoids harms to the patient. Hepler and Strand<sup>33</sup> classify the clinical impact of DRPs on a three-level scale: Level I: Mild events, which, even with a low occurrence probability, may increase hospitalizations; Level II: Severe events that have a high occurrence probability and may increase hospitalization times or cause permanent harm; and Level III: Events that directly threaten life. In this way, the result indicators can measure to which extent pharmaceutical assistance was able to prevent DRPs at these three levels.

The "*1996 Comprehensive accreditation manual for hospitals*"<sup>34</sup> is a series published by the Joint Commission on Accreditation of Healthcare Organizations – JCAHO, which is updated annually. Zimmerman et al.<sup>35</sup> grounded their paper on this document and used an indicator of acceptability of pharmaceutical interventions by physicians.

Standardization of the identification, description and resolution planning of DRPs was recommended as an essential activity of the pharmaceutical practice<sup>36</sup>. A DRP can be defined as actual or potential undesirable signs or symptoms for the patient, related to pharmacological therapy<sup>37</sup>. According to Hepler and Strand<sup>33</sup>, DRP interventions are distinguished between: i) those that result in increased benefit for the patient, for example, on untreated indication, inappropriate selection, underdose and non-compliance with the prescription; and ii) those that reduce risks, that is, acting to avoid overdose, drug interactions, adverse reactions and medication use without indication.

All the studies selected<sup>27,28,32,35,38,39</sup> describe indicators that use pharmaceutical intervention on DRPs as a basis for measuring hospital pharmaceutical assistance services. Pharmaceutical interventions on DRPs are the pillars of pharmacists' clinical activities, hence the use of indicators to evaluate their results, as shown by the studies selected in this review.

In relation to the place of publication, the studies originate from developed countries. At least one paper was found in each

continent, except for Asia and Africa. Given that the inclusion criteria restricted the full-text reading to Portuguese, English and Spanish, the absence of papers from the Asian continent may have been due to the exclusion of publications in Asian languages, which constitutes a limitation of this review. In addition to that, no results of research studies carried out in Brazil were found.

Among the services provided in the hospital pharmaceutical assistance scope, pharmaceutical care stands out, which was defined by Hepler and Strand<sup>33</sup> as the responsible action of the pharmacological treatment with the purpose of achieving concrete results that improve patients' quality of life. Destro<sup>40</sup> clarifies that pharmaceutical care is the pharmacist's integrated action with the health team, centered on the user, for health promotion, protection and recovery, in addition to the prevention of problems. For him, the result of pharmaceutical assistance is measured through the quality of the pharmaceutical care provided, according to the type of health unit.

In Brazil, it is considered that in hospital pharmacy pharmacists perform important clinical, administrative and advisory functions, and that pharmaceutical assistance should be developed across the hospital<sup>41</sup>. This understanding was corroborated by the Federal Pharmacy Council (*Conselho Federal de Farmácia*, CFF), which also established that the hospital pharmacy comprises planning and executing clinical activities and medication logistics, organized and developed according to the characteristics of the hospital and its location<sup>42</sup>.

Seeking to guide hospital management and its duties, in 2017, the Ministry of Health<sup>43</sup> established the main objectives of hospital pharmacy, namely: i) to guarantee medication supply, dispensing, access, control, traceability and rational use; ii) to ensure and monitor medication use; iii) to optimize the relationship between cost, benefit and risk of care technologies and processes, to develop pharmaceutical assistance actions, articulated and synchronized with the institutional guidelines; and iv) to actively participate in the continuous improvement of the multidisciplinary team practices<sup>43</sup>.

For many decades, in the hospital environment quality has been understood as a dynamic, uninterrupted and permanent process of identifying flaws in routines and procedures, which must be periodically reviewed, updated and disseminated<sup>44</sup>. Evaluation is a fundamental part of health system planning and management. An effective evaluation system must reorient the execution of actions and services, resizing them in order to contemplate the needs of its target population and to optimize use of the resources<sup>45</sup>.

In this context, result evaluations are considered the closest thing to total care assessment. With its conduction, there are changes related to the patients' knowledge, behavior and health status, in addition to the consequences and effects obtained in care, as well as satisfaction of the user and of the professional involved in the assistance provided<sup>46</sup>.

Regarding the health result, as already mentioned, Donabedian<sup>47,48</sup> defined it as the change in the patients' current and future health status, attributable to the care provided, including physical and physiological, social and psychological changes and attitudes, satisfaction and behavior. The evaluation of health service results is performed less frequently in relation to structure and process assessments because of the difficulty inherent in the complexity of the health-disease relationship, which requires using methods capable of identifying changes attributable to the assistance provided<sup>49</sup>.

## Conclusion

In the scientific literature, studies were identified that evaluated the hospital pharmaceutical assistance results, with application of quantitative methods and indicators to measure the following care quality dimensions in this area: effectiveness, acceptability, efficiency and optimization.

Thus, the main contribution of this study to hospital pharmaceutical assistance is the systematization of simple, easy-to-use and low-cost indicators that can be adapted and used in public or private hospitals. Additionally, it shows the need for more studies on the topic and for the development of indicators that make it possible to evaluate the hospital pharmaceutical assistance results, especially regarding its effectiveness, legitimacy and equality.

## Funding source

This research did not receive funding for its conduction.

## Collaborators

NMSL worked on the study design, data analysis and interpretation, writing of the article and approval of the version to be published; and FSV contributed to conception and design of the study, data analysis and interpretation, writing of the article and approval of the version to be published.

## Acknowledgments

The authors would like to thank the Graduate Program in Health Management and Economics (*Programa de Pós-Graduação em Gestão e Economia da Saúde*, PPGGES – UFPE) for the opportunity to work with this topic.

## Conflict of interest statement

There are no conflicts of interest in carrying out the research.

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