



REVIEW

Bilingual edition English/Spanish

Pharmacist-led medication reconciliation in emergency hospital services in Brazil: A scoping review

Conciliación de medicamentos dirigida por farmacéuticos en los servicios de urgencias hospitalarias de Brasil: Revisión sistemática exploratoria

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Abstract

Objective: This scoping review aimed to map the evidence of pharmacist-led medication reconciliation in hospital emergency services in Brazil.

Method: We performed a scoping review by searching electronic databases LILACS, Pubmed, Embase, CINAHL, Scopus, Web of Science, Clinical trials, REBEC e Cochrane and conducting a manual search to identify studies published up to 20 October 2021. Studies that addressed pharmacist-led medication reconciliation in hospital emergency services in Brazil, regardless of clinical conditions, and outcomes evaluated, were included.

Results: A total of 168 studies were retrieved, with three matching the inclusion criteria. Most studies performed pharmacist-led medication reconciliation at emergency department admissions, but it was not the primary pharmaceutical attribution in this setting. Medication errors were identified during the medication reconciliation process, being drug omission the most reported. Studies did not describe the concerns in collecting the best medication history from patients and the humanistic, economic, and clinical outcomes of pharmacist-led medication reconciliation.

Resumen

Objetivo: Documentar la evidencia de la conciliación de medicamentos dirigida por farmacéuticos en los servicios de emergencia hospitalarios en Brasil.

Método: Se realizó una revisión sistemática exploratoria de bases de datos electrónicas LILACS, Pubmed, Embase, CINAHL, Scopus, Web of Science, Clinical Trials, REBEC y Cochrane para identificar estudios publicados hasta el 20 de octubre de 2021. Los estudios incluidos abordaban la conciliación de medicamentos dirigida por farmacéuticos en los servicios de emergencia hospitalarios en Brasil, independientemente de las condiciones clínicas y los resultados evaluados.

Resultados: Se recuperaron un total de 168 estudios, tres de los cuales cumplieron los criterios de inclusión. La mayoría de los estudios realizaban la conciliación de la medicación dirigida por el farmacéutico en las admisiones al servicio de urgencias, pero ésta no era la principal atribución farmacéutica en ese contexto. Los errores de medicación fueron identificados durante el proceso de conciliación de medicamentos, siendo la omisión de medicamentos el error más reportado. Los estudios no hacían

KEYWORDS

Medication reconciliation; Emergency service; Hospital; Professional-patient relations; Pharmacists.

PALABRAS CLAVE

Conciliación de medicamentos; Servicio de urgencias; Hospital; Relaciones profesional-paciente; Farmacéuticos.



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ni tampoco por la publicación de sus artículos.

Conclusions: This scoping review revealed the lack of evidence about the pharmacist-led medication reconciliation process in the emergency setting in Brazil. The findings suggest the need for future studies in this context.

Introduction

Medication reconciliation (MR) is encouraged in the third World Health Organization (WHO) Global Patient Safety Challenge: "Medication Without Harm" as a strategy capable of mitigating and preventing drug-related morbidity and mortality by obtaining an accurate and detailed history of pharmacotherapy¹. Adverse drug events are the first cause of harm and death related to health care systems, and poor communication between health professionals and between health professionals and patients and carers is a significant factor in their occurrence².

MR is "the formal process in which healthcare professionals partner with patients to ensure accurate and complete medication information transfer at interfaces of care" and consists of four steps: 1) obtain the best possible medication history (BPMH) by interviewing patients and carers, checking referral letters and other information sources; 2) verify the accuracy of the history with one or more sources; 3) reconcile the BPMH with prescribed medicines and resolve discrepancies with prescriber and document changes; 4) guide patients and carers about the modifications, include a list of current medicines when care is transferred². This process is recommended to be carried out within 24 hours or sooner if clinically necessary, in acute setting after admission or/and when the patient moves from one care setting to another, and it is essential to note that the term medicine also refers to over-the-counter medicines and those related to medicine³. MR should investigate these products' use³.

Patient care starts at the first contact with the health team, which is a critical moment to collect the patients' medication history to identify medicines used before admission, collaborate with the diagnosis, and optimize treatment safety¹. Emergency department (ED) admission medication history obtained by pharmacists are more accurate than other health care team members, and studies suggest that when this professional is involved in gathering and validating the patient's BPMH, there is an impact on preventing medication discrepancies and medications errors (ME) with the potential to cause harm^{2,4,5}. Pharmacists' involvement in MR is related to a more efficient process, making this an attractive economic strategy to promote patient safety¹.

ME and discrepancies are more frequent in ED admissions when comparing MR performed by usual care with pharmacist-led MR, and drug omissions are usually the leading cause of discrepancies^{4,7}. Moreover, pharmacist-led MR in care transitions is associated with a lower rate of ED readmissions⁷. The global costs associated with ME are estimated at \$42 billion per year¹. In this context, measures to prevent ME are essential for promoting patient safety, and MR in care transitions can be considered an essential step for ensuring medication safety^{1,8}.

Most evidence quantifies ME, discrepancies, and the potential for patient harm identified with pharmacist-led MR process are from studies in developed countries^{4,7,9}. WHO suggests that these events occur with the same frequency in developing countries¹. Such information makes the need for studies about the MR process scenario in these countries, enabling strategies to promote patient safety in care transitions.

Given the importance of the pharmacist's presence in emergency hospital services and their involvement in the MR process, such as the impact on patients' health and safety, this review sought to identify the evidence related to pharmacist-led MR in emergency hospital services in Brazil.

referencia a la importancia de recabar un historial farmacológico lo más completo posible ni a los resultados humanísticos, económicos y clínicos de la conciliación de medicamentos dirigida por farmacéuticos.

Conclusiones: Esta revisión sistemática exploratoria reveló la falta de evidencia sobre el proceso de conciliación de medicamentos dirigido por farmacéuticos en los servicios de urgencias de Brasil. Los hallazgos sugieren la necesidad de seguir investigando sobre este asunto.

Methods

Study design

We conducted a systematic scoping review following the recommendations by the Joanna Briggs Institute (JBI) and the PRISMA-ScR (Preferred Reporting Item for Systematic Reviews and Meta-analyses for scoping review) statement^{10,11}.

This scoping review's objectives, inclusion criteria, and methods have been specified previously and documented in a protocol available upon request to the corresponding author.

Search strategy and inclusion criteria

We included Portuguese, English, and Spanish studies published up to October 20, 2021. A preliminary systematic search was performed on the PubMed database on August 22, 2020. The words contained in the titles and abstracts of relevant articles and their respective terms were used to develop the search strategy and adapted, subsequently, for each database used. The last search was on Cochrane, LILACS, PubMed, Embase, CINAHL (Cumulative Index to Nursing and Allied Health Literature), Scopus, Web of Science, Clinical Trials and REBEC (Registro brasileiro de ensaios clínicos) databases on October 20, 2021 (Appendix 1). We explored the reference lists of the included articles to identify relevant articles not retrieved in the electronic searches.

This review included systematic reviews, observational, interventional studies, thesis, and dissertations, with no limit of the publication date, related to patients admitted to emergency hospital services in Brazil submitted to MR by a pharmacist at any stage of care transition, from public or private hospitals, regardless of the outcome assessed. The exclusion criteria were: 1. studies unrelated to Brazilian hospital emergency services; 2. MR performed by other health professionals (not a pharmacist) or by a multidisciplinary team; 3. conferences abstracts, case reports, book chapters and letters to the editor; 4. studies without full-text access.

Eligibility, extraction and presentation of data

We used the online tool for systematic reviews to select studies, Rayyan QCR¹². We first removed duplicates, and then two independent reviewers examined titles and abstracts to identify studies that met the study's inclusion criteria. After that, both reviewers read the full text of the eligible studies for the final selection. The two reviewers resolved discrepancies by consensus.

The quantitative data from the studies included were extracted and entered into a Microsoft Excel spreadsheet to be analyzed descriptively. The results were presented in a narrative form, with figures and tables. The variables studied were related to the MR process, as well as the characteristics of the included studies, which are: year, location, number of patients and interventions, the study design, objective, the pharmaceutical services described, the time of MR, limitations, conclusions, and findings related to this review.

Systematic scoping reviews aim to map all published evidence of a given subject without excluding studies by analyzing methodological quality¹⁰. Thus, following the JBI recommendations, this review did not seek to analyze the methodological quality of the articles included.

Results

The search strategy retrieved 168 articles. After the screening and full-text reading, three articles were eligible for data extraction (Figure 1). The excluded and included studies' references are available in Appendix 2 and 3, respectively. Table 1 summarizes the main characteristics and results of the included studies.

The included articles were published between 2012 and 2016, performed in Brazil by pharmaceutical services from university hospitals that assist patients from the Unified Health System (SUS)^{13,14} and from a private hospital¹⁵. The majority of studies were observational^{13,15}, and one study was interventional¹⁴, with patients admitted to the ED. One study also included patients admitted for elective procedures but did not describe the admissions rate into the different wards¹⁴.

The Spalla and Castilho (2016) study conducted MR for all included patients (n = 60). Moraes *et al.* (2016) included 107 patients, and of all drug prescriptions analyzed (n = 265), MR was performed in only 4.5% (n = 12) of them. Miranda *et al.* (2012) did not report the number of patients included but the number of prescriptions analyzed (n = 3,542), leading to 1,238 pharmaceutical interventions, of which 0.16% (n = 2) were MR. Factors such as the lack of information on patients' drug history, medical records¹⁴ and the pharmacist in emergency units for less than 24 hours were limitations for MR process and the pharmacists' performance in the ED^{13,15}.

In one study, the MR (n = 60) led to the detection of ME (n = 26) related to drug omission (61.50%), followed by dose errors (11.54%) and prescription of the wrong drug (3.85%)¹⁴. The other two studies included did not describe results from the pharmacist-led MR^{13,15}.

Figure 1. Flow diagram of the selection of sources.

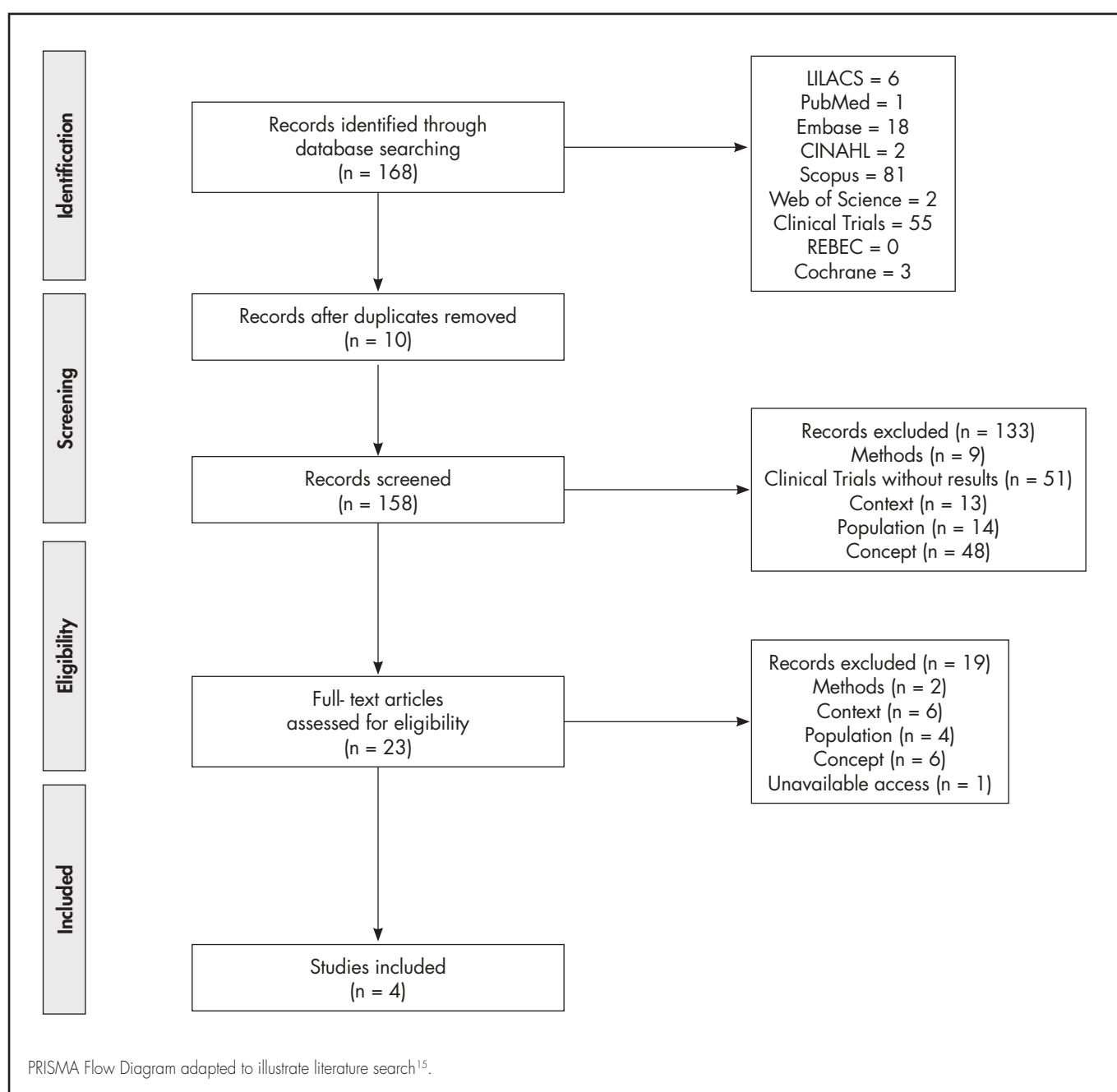


Table 1. Main characteristics of included studies.

Year of publication	Location	Objective	Methods	Pharmaceutical services	Population [n (n of woman)]	MR (n)	MR timing	Period
Miranda TMM, <i>et al.</i> , 2012	São Paulo	To demonstrate the importance of the CP in the ED through the identification, classification and the survey of the number of pharmaceutical interventions	Retrospective study	Pharmacotherapeutic review and MR	Adults [NR] and children [NR]	MR (2)	Within 48-hour after admission	12 months
Spalla LR, Castilho SR, 2016	Rio de Janeiro	To evaluate the pharmaceutical-led MR in hospital admission, as a tool to prevent ME	Interventional and prospective study	MR	Adults [60 (32)]	MR (60)	Within 48-hour after admission	6 months
Moraes GG, <i>et al.</i> , 2016	Rio Grande do Sul	To quantify the occurrence of potential DDI, medication incompatibilities and pharmaceutical interventions in the ED	Prospective, descriptive, quantitative study	Pharmacotherapeutic review and MR	Adults [107 (52)]	MR (4.52%)	Not specified	4 months

CP: clinical pharmacist; DDI: drug to drug interactions; ED: emergency department; ME: medication errors; MR: medication reconciliation; NR: not reported.

Source: The authors.

Most studies reported that the MR process was conducted at hospital admission^{14,15}. For Miranda *et al.* (2012), MR was the least reported pharmaceutical intervention. The authors justified that the hospital's policy determines that MR may be performed within 48 hours after hospital admission, making this process not a priority in the ED. Other pharmaceutical interventions described as more frequently in the studies were drug-to-drug interactions³ and dose adjustment¹⁵ but none was described as related to the MR process.

One study described the MR process through an interview to compare the patients' previous medication history list with the hospital prescriptions after admission¹⁴. None of the studies described the concern with obtaining the BPMH for the MR process, nor its clinical or humanistic outcomes.

Discussion

According to our knowledge, this is the first scoping review that maps studies related to pharmacist-led MR in the emergency setting in Brazil. Only three studies met the inclusion criteria, suggesting a scarcity of evidence about this topic. These results reinforce the data presented by the WHO on the absence of evidence on drug safety in care transitions in middle-income countries¹. Pharmaceutical care history in Brazil is relatively recent compared to high-income countries¹⁶. Publications about the clinical pharmacist activities in Brazil are dated from 2004¹⁷, and their attributions were first regulated in 2013¹⁸. Therefore, clinical pharmacy is under development in Brazil, and their activities in the emergency setting are not fully established, which may justify the period of studies publications. Moreover, some barriers described to pharmacist-led MR in the ER are the substantial number of assignments designated to this professional in this setting and the lack of human resources^{4,15,19}.

The studies included in this review pointed to the short period of hospitalization and the lack of knowledge or absence of information regarding the patient's medication history as barriers to performing MR in the ED^{4,15}. Despite the short time, it is possible to implement strategies to promote the performance of this process in emergency units, such as developing protocols, training other members of the multidisciplinary team to conduct MR, using digital resources, and unified systems aiming to promote the exchange of patient's information during care transitions, to collect the BPMH and reduce errors^{1,3,5,19}.

The primary purpose of MR is to prevent ME and medication-related harm¹⁹. Omission and dose errors were the leading ME identified after MR¹⁴. Studies from different countries comparing usual care MR, including physicians and nurses, versus pharmacist-led MR also demonstrate omission as one of the primary ME detected and others as wrong dose, frequency, and unnecessary therapy^{4,6,19,21}. Furthermore, evidence suggests that this process reduces the number of drug discrepancies and ME with the potential to cause patient harm as the pharmacists have the knowledge regarding medications and their characteristics^{4,5,20,21}. However, the impact of MR on preventing possible ADR is uncertain due to the quality of the available evidence²².

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Two studies of this review described other clinical pharmacists' interventions more frequently than MR^{13,15}. These professionals have a range of responsibilities in the emergency setting, working alongside physicians and nurses aiming to optimize pharmacotherapy, improve the safe and rational use of medications, and patient education, which is essential to increase efficiency and cost-effectiveness of care²³.

MR is one of the defined patient safety goals of The Joint Commission organization, but the challenges involving this process are recognized, starting from obtaining the patients' medication list²⁴. The systematic and standardized process for obtaining the BPMH was not reported in all the studies analyzed. Obtaining the BPMH in the emergency setting at the appropriate time and manner is essential to determine the diagnosis and an important strategy to reduce ME and risk for patient harm^{4,5,19}.

None of the evidence retrieved studied the outcomes related to the pharmacist-MR process. Systematic reviews have demonstrated that the pharmacist involvement in this process in the ED is economically worthwhile and is related to better outcomes as patient education to their diseases and medications, drug adherence and a reduced number of ED visits after hospital discharge^{1,25,27}.

This study has limitations. It should be considered that there is a risk of losing existing articles in emergency hospitals due to the non-standardization of terminologies and descriptors, which makes the search for studies related to the theme difficult. Also, it is possible to evaluate that there are few national publications on the subject. Besides, in most identified studies, MR was not the primary objective. In addition, the methodology applied does not allow qualitative analysis of the studies.

This scoping review reveals the lack of evidence about the pharmacist-led MR process in the emergency setting in Brazil. The results obtained could help improve the acting of clinical pharmacists in hospital emergencies services as a strategy for patient safety, considering the importance of the presence of these professionals by national and international institutions.

Funding

No funding.

Conflict of interests

No conflict of interests.

Contribution to the scientific literature

This is the first scoping review on pharmacist-led medication reconciliation in emergency hospital services in Brazil. It may be an useful tool to improve pharmaceutical practice and to guide a more comprehensive study in this country.

Appendix 1. Search strategy

22 August 2020

PubMed

#1 (('medication reconciliation') OR ('Medication Reconciliations') OR ('Reconciliation, Medication')) OR ('Reconciliations, Medication')) = 2.307

#2 ('Emergency Service, Hospital') OR ('Hospital Emergency Services') OR ('Services, Hospital Emergency') OR ('Emergency Hospital Service') OR ('Emergency Hospital Services') OR ('Hospital Service, Emergency') OR ('Hospital Services, Emergency') OR ('Service, Emergency Hospital') OR ('Services, Emergency Hospital') OR ('Hospital Service Emergency') OR ('Emergencies, Hospital Service') OR ('Emergency, Hospital Service') OR ('Hospital Service Emergencies') OR ('Service Emergencies, Hospital') OR ('Service Emergency, Hospital') OR ('Hospital Emergency Service') OR ('Emergency Units') OR ('Emergency Unit') OR ('Unit, Emergency') OR ('Units, Emergency') OR ('Service, Hospital Emergency') OR ('Accident and Emergency Department') OR ('Emergency Ward') OR ('Emergency Wards') OR ('Ward, Emergency') OR ('Wards, Emergency') OR ('Emergency Departments') OR ('Department, Emergency') OR ('Departments, Emergency')) OR ('Emergency Department') OR ('Emergency Room') OR ('Emergency Rooms') OR ('Room, Emergency') OR ('Rooms, Emergency') = 326.649

#3 (Pharmacist) OR ('Clinical Pharmacists') OR ('Clinical Pharmacist') OR ('Pharmacist, Clinical') OR ('Pharmacists, Clinical')) OR ('Community Pharmacists') OR ('Community Pharmacist') OR ('Pharmacist, Community') OR ('Pharmacists, Community') = 41.006

#4 (Brazil) = 399.568

#1 + #2 + #3 + #4 = 323

(((((('medication reconciliation') OR ('Medication Reconciliations') OR ('Reconciliation, Medication')) OR ('Reconciliations, Medication')) AND (('Emergency Service, Hospital') OR ('Hospital Emergency Services') OR ('Services, Hospital Emergency') OR ('Emergency Hospital Service') OR ('Emergency Hospital Services') OR ('Hospital Service, Emergency') OR ('Hospital Services, Emergency') OR ('Service, Emergency Hospital') OR ('Services, Emergency Hospital') OR ('Hospital Service Emergency') OR ('Emergencies, Hospital Service') OR ('Emergency, Hospital Service') OR ('Hospital Service Emergencies') OR ('Service Emergencies, Hospital') OR ('Service Emergency, Hospital') OR ('Hospital Emergency Service') OR ('Emergency Units') OR ('Emergency Unit') OR ('Unit, Emergency') OR ('Units, Emergency') OR ('Service, Hospital Emergency') OR ('Accident and Emergency Department') OR ('Emergency Ward') OR ('Emergency Wards') OR ('Ward, Emergency') OR ('Wards, Emergency') OR ('Emergency Departments') OR ('Department, Emergency') OR ('Departments, Emergency')) OR ('Emergency Department') OR ('Emergency Room') OR ('Emergency Rooms') OR ('Room, Emergency') OR ('Rooms, Emergency')) AND ((Pharmacist) OR ('Clinical Pharmacists') OR ('Clinical Pharmacist') OR ('Pharmacist, Clinical') OR ('Pharmacists, Clinical')) OR ('Community Pharmacists') OR ('Community Pharmacist') OR ('Pharmacist, Community') OR ('Pharmacists, Community')) AND (Brazil))

Appendix 1 (cont.). Search strategy

20 October 2021

LILACS<https://lilacs.bvsalud.org/>

#1 ((Medication* AND Reconciliation*) OR (Conciliación* AND Medicamento*) OR (Reconciliaç* AND Medicamento*) OR (Conciliaç* AND Medicamento*)) = 48

#2 (Emergenc* OR Urgenc* OR Urgência* OR Emergência*) = 30.683

#3 ((pharmacist* OR farmacêutico* OR Pharmac* OR Farmacia) OR (Clinical AND Pharmac*) OR (Farmac* AND Clínico*)) = 88.435

#4 (Brasil* OR Brazil*) = 144.397

#1 + #2 + #3 + #4 = 6

(((medication* AND reconciliation*) OR (conciliación* AND medicamento*) OR (reconciliaç* AND medicamento*) OR (conciliaç* AND medicamento*)) AND ((emergenc* OR urgenc* OR urgência* OR emergência*) AND (((pharmacist* OR farmacêutico* OR pharmacist* OR farmacia) OR (clinical AND pharmacist*) OR (farmac* AND clínico*)))

PubMed<https://pubmed.ncbi.nlm.nih.gov/>

#1 (Medication* AND Reconciliation*) = 2.529

#2 ((Pharmacist* OR Pharmac*) OR (Clinical AND Pharmac*)) = 4.969.884

#3 (Emergenc*) = 598.085

#4 (Brazil*) = 430.564

#1 + #2 + #3 + #4 = 1

(Medication* AND Reconciliation*) AND ((Pharmacist* OR Pharmac*) OR (Clinical AND Pharmac*)) AND (Emergenc*) AND (Brazil*)

Embase<https://www-embase.ez67.periodicos.capes.gov.br/?phase=continueToApp#search>

#1 (pharmacist*) = 133.563

#2 (emergenc*) = 916.453

#3 ('medication' OR 'medication'/exp OR medication) AND reconciliation OR (('drug' OR 'drug'/exp OR drug) AND ('therapy' OR 'therapy'/exp OR therapy) AND ('management' OR 'management'/exp OR management)) OR (('medication' OR 'medication'/exp OR medication) AND ('therapy' OR 'therapy'/exp OR therapy) AND ('management' OR 'management'/exp OR management)) = 1.041.486

#4 (Brazil*) = 705.535

#1 + #2 + #3 + #4 = 18

pharmacist* AND emergenc* AND (('medication' OR 'medication'/exp OR medication) AND reconciliation OR (('drug' OR 'drug'/exp OR drug) AND ('therapy' OR 'therapy'/exp OR therapy) AND ('management' OR 'management'/exp OR management)) OR (('medication' OR 'medication'/exp OR medication) AND ('therapy' OR 'therapy'/exp OR therapy) AND ('management' OR 'management'/exp OR management))) AND ('brazil' OR 'brazil'/exp OR brazil)

Appendix 1 (cont.). Search strategy

CINAHL

<https://web-p-ebscohost.ez67.periodicos.capes.gov.br/ehost/search/basic?vid=0&sid=f8f20b25-5276-423b-9b7e-75b1d6a79683%40redis>

#1 (Medication* AND Reconciliation*) = 2.568

#2 (emergenc*) = 229.172

#3 (Pharmacist* OR Pharmac* OR Pharmaceutic*) = 347.471

#4 (Brazil*) = 58.407

#1 + #2 + #3 + #4 = 2

(Medication* AND Reconciliation*) AND (Emergenc*) AND (Pharmacist* OR Pharmac* OR Pharmaceutic*) AND (Brazil*)

Scopus

<https://www.scopus.com/search/form.uri?display=basic#basic>

#1 (Medication* AND Reconciliation*) = 7.231

#2 (emergenc*) = 2.889.177

#3 (Pharmacist*) = 172.284

_#4 (Brazil*) = 2.508.093

#1 + #2 + #3 + #4 = 81

(medication* AND reconciliation*) AND (emergenc*) AND (pharmacist*) AND (brazil*)

Web of Science

<https://www.webofscience.com/wos/woscc/basic-search>

#1 ((Medication* AND Reconciliation*) OR (Reconciliaç* AND Medicamentos*)) = 2.368

#2 ((emergenc*) OR (emergênc*) OR (Urgenc*) OR (Urgênc*)) = 863.432

#3 ((Pharmacist* OR Pharmac* OR Farmaceutic*)) = 3.368.835

#4 (Brazil* OR Brasil*) = 1.360.012

#1 + #2 + #3 + #4 = 2

((Medication* AND Reconciliation*) OR (Reconciliaç* AND Medicamentos*)) AND (emergenc*) OR (emergênc*) OR (Urgenc*) OR (Urgênc*) AND (Pharmacist* OR Pharmac* OR Farmaceutic*) AND (Brazil* OR Brasil*)

Clinical Trials

<https://clinicaltrials.gov/ct2/search/advanced>

#1 (Medication reconciliation) = 55

Registro Brasileiro de Ensaios Clínicos (REBEC)

<https://ensaiosclinicos.gov.br/search/query/simple>

#1 (Reconciliação medicamentosa) = 0

Cochrane

<https://www.cochranelibrary.com/>

#1 (Medication* AND Reconciliation*) = 23

#2 ((Pharmacist* OR Pharmac*) OR (Clinical AND Pharmac*)) = 5.045

Appendix 1 (cont.). Search strategy

#3 (Emergenc*) = 2.053

#4 (Brazil) = 1.085

#1 + #2 + #3 + #4 = 3

(Medication* AND Reconciliation*) AND ((Pharmacist* OR Pharmac*) OR (Clinical AND Pharmac*)) AND (Emergenc*) AND (Brazil)

Appendix 2. Sources excluded following full-text review

Year	Author(s)	Title	Exclusion criteria (justification)
2012	Carvalho IV, <i>et al.</i>	Drug-related problems cause many admissions to a Brazilian hospital paediatric emergency unit: A prospective and observational study	Methods (congress abstract)
2014	Marques LFG, Romano-Lieber NS	Patient safety strategies for safe use of medications after hospital discharge	Methods (bibliographical research)
2014	Frizon F, <i>et al.</i>	Reconciliação de medicamentos em hospital universitário	Population (not conducted in the emergency setting)
2014	Costa JM, <i>et al.</i>	Análise de um programa para otimização da transição do cuidado de pacientes em terapia antimicrobiana	Concept (RM was not performed)
2015	Selcuk A, <i>et al.</i>	The potential role of clinical pharmacists in elderly patients during admission	Context (not conducted in Brazil)
2015	Kuhmmer R, <i>et al.</i>	Effectiveness of pharmaceutical care at discharge in the emergency department: study protocol of a randomized controlled trial	Concept (RM was not performed)
2016	Figueiredo TP de, <i>et al.</i>	Análise das intervenções realizadas na alta hospitalar de idosos acompanhados em serviço de orientação e encaminhamento farmacoterapêutico	Concept (RM was not performed)
2016	Mendes AE, <i>et al.</i>	Medication reconciliation at patient admission: A randomized controlled trial	Population (not conducted in the emergency setting)
2016	González FJ, Rousseau M	Conciliación farmacoterapéutica en las áreas de transición en la atención del paciente en un hospital pediátrico de alta complejidad	Context (not conducted in Brazil)
2018	Bonetti AF, <i>et al.</i>	Pharmacist-led discharge medication counselling: A scoping review	Population (Brazilian studies included were not in the emergency setting)
2020	Fernandes BD, <i>et al.</i>	Pharmacist-led medication reconciliation at patient discharge: A scoping review	Context (did not include Brazilian studies)
2020	Bonetti AF, <i>et al.</i>	Impact of pharmacist-led discharge counseling on hospital readmission and emergency department visits: A systematic review and meta-analysis	Population (Brazilian studies included were not in the emergency setting)
2020	Linden LV der, <i>et al.</i>	Clinical pharmacy services in older inpatients: An evidence-based review	Context (did not include Brazilian studies)
2021	Carvalho IV, <i>et al.</i>	Adverse drug event-related admissions to a pediatric emergency unit	Concept (RM was not performed)
2021	Gheno J, Weis AH	Care transition in hospital discharge for adult patients: integrative literature review	Concept (RM was not studied)
2021	Soares S, Trevisol DJ, Schuelter-Trevisol F.	Medication discrepancies in a hospital Southern Brazil: the importance of medication reconciliation for patient safety	Population (not conducted in the emergency setting)
2021	Alcântara T dos S, <i>et al.</i>	Prevalence of medication discrepancies on pediatric patients transferred between hospital wards	Concept (RM was not performed)
2021	Kelly WN, <i>et al.</i>	Association of pharmacist counseling with adherence, 30-day readmission, and mortality: A systematic review and meta-analysis of randomized trials	Concept (RM was not performed)
2021	Ramos JR, <i>et al.</i>	The impact of pharmaceutical care in multidisciplinary teams on health outcomes: Systematic review and meta-analysis	Context (did not include Brazilian studies)

MR: medication reconciliation.

Source: The authors.

Appendix 3. Data extraction instrument

Scoping review details			
Title	Pharmacist-led medication reconciliation in emergency hospital services in Brazil: a scoping review		
Objectives	To map the available research evidence related to pharmacist-led MR in emergency hospital services in Brazil, in which step of care transfer MR was conducted and its outcomes		
Question	What is the available research evidence of pharmacist-led MR in emergency hospital services in Brazil?		
Inclusion criteria			
Population	Patients admitted to Brazilian's emergency hospitals services, independently of their gender, age, comorbidities o/and reason for admission		
Concept	Pharmacist-led MR conducted on any step of care transition (admission, transfer or discharge) in an emergency hospital service		
Context	Studies conducted in Brazilian's services, in private or public settings		
Types of evidence source	Observational and interventional studies		
Evidence source details and characteristics			
Citation details	Miranda TMM, <i>et al.</i> Interventions performed by the clinical pharmacist in the emergency department. Einstein (São Paulo) , [S.L.], v. 10, n. 1, p. 74-78, mar. 2012	Moraes GG, <i>et al.</i> Atuação do farmacêutico residente em uma unidade de pronto atendimento: contribuindo para a promoção da saúde. Revista de Epidemiologia e Controle de Infecção , [S.L.], v. 6, n. 4, p. 1-4, 4 out. 2016	Spalla LR, Castilho SR de. Medication reconciliation as a strategy for preventing medication errors. Brazilian Journal of Pharmaceutical Sciences , [S.L.], v. 52, n. 1, p. 143-150, mar. 2016.
Country	Brazil	Brazil	Brazil
Context	ED of and Teaching Hospital	ED of and Teaching Hospital	ED and dermatology, endocrinology, nephrology, pneumology, gastroenterology, neurology, cardiology wards of a Teaching Hospital
Participants	Adults and children	Adults	Adults
Results extracted	Pharmaceutical intervention at the ED	Pharmaceutical intervention at the ED	Pharmacist-led MR conducted at hospital admission
	Pharmaceutical evaluation of medical prescriptions	Pharmaceutical evaluation of medical prescriptions	MR conducted at the ED
	Pharmacist-led MR within 48-hour admission	MR as one of the pharmaceutical interventions	Mean difference of the number of medications prescribed for patients before and after admission
			ME identified by the MR process and its classification
			Frequency of acceptance of pharmaceutical interventions by prescribing physicians
			Report of drug allergy history during MR process

ED: emergency department; MR: medication reconciliation.
Source: The authors.

Bibliography

- World Health Organization (WHO). Medication safety in transitions of care. June 2019. [Internet]. Available at: <https://www.who.int/publications/i/item/WHO-UHC-SDS-2019.9>
- World Health Organization. Standard Operating Protocol Assuring Medication Accuracy at Transitions in Care. High5s Proj – Stand Oper Protoc Medicat Reconcil [Internet]. 2014. Available at: <https://www.who.int/patientsafety/implementation/solutions/high5s/h5s-sop.pdf>
- National Institute for Health and Care Excellence (NICE) Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes NICE guideline [NG5]; Published: 04March 2015. Disponible en: www.nice.org.uk/guidance/ng5<https://www.nice.org.uk/guidance/ng5/chapter/1-recommendations>
- De Andrés-Lázaro AM, Sevilla-Sánchez D, Ortega-Romero MM, Codina-Jané C, Calderón-Hernanz B, Sánchez-Sánchez M. Accuracy in the medication history and reconciliation errors in the emergency department. *Med Clínica*. 2015;145:288-93. DOI: 10.1080/08998280.2018.1499005
- Pevnick JM, Nguyen C, Jackevicius CA, Palmer KA, Shane R, Cook-Wiens G, *et al*. Improving admission medication reconciliation with pharmacists or pharmacy technicians in the emergency department: A randomised controlled trial. *BMJ Qual Saf*. 2018;27(7):512-20. DOI: 10.1136/bmjqs-2017-006761
- Mogaka B, Clary D, Hong CLB, Farris C, Perez S. Medication reconciliation in the emergency department performed by pharmacists. *Baylor Univ Med Cent Proc*. 2018;31(4):436-8. DOI: 10.1080/08998280.2018.14990057
- Cadman B, Wright D, Bale A, Barton G, Desborough J, Hammad EA, *et al*. Pharmacist provided medicines reconciliation within 24 hours of admission and on discharge: A randomised controlled pilot study. *BMJ Open*. 2017;7(3):1-9. DOI: 10.1136/bmjopen-2016-013647
- World Health Organization (WHO). Patient safety. 2017.
- Armor BL, Wight AJ, Carter SM. Evaluation of Adverse Drug Events and Medication Discrepancies in Transitions of Care between Hospital Discharge and Primary Care Follow-Up. *J Pharm Pract*. 2016;29(2):132-7. DOI: 10.1177/0897190014549836
- Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis. JBI, 2020. Available at: <https://synthesismanual.jbi.global>. <https://doi.org/10.46658/JBIMES-20-01>
- Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, *et al*. PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Ann Intern Med*. 2018;169(7):467-73. DOI: 10.7326/M18-0850
- Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan-a web and mobile app for systematic reviews. *Syst Rev*. 2016;5(1):1-10. DOI: 10.1186/s13643-016-0384-4
- Moraes GG, Da Rosa K, Frantz MR, Sulzbacher Batista M, Helfer Schneider AP. Atuação do farmacêutico residente em uma unidade de pronto atendimento: contribuindo para a promoção da saúde. *Rev Epidemiol e Control Infecção*. 2016;6(4):4-7.
- Spalla LR, De Castilho SR. Medication reconciliation as a strategy for preventing medication errors. *Brazilian J Pharm Sci*. 2016;52(1):143-50. DOI: doi.org/10.1590/S1984-82502016000100016
- Miranda TMM, Petriccione S, Ferracini FT, Borges Filho WM. Interventions performed by the clinical pharmacist in the emergency department. *Einstein (Sao Paulo)*. 2012;10(1):74-8. DOI: 10.1590/s1679-45082012000100015
- Carter BL. Evolution of Clinical Pharmacy in the US and Future Directions for Patient Care. *Physiol Behav*. 2017;176(12):139-48.
- Campos Vieira N, Bicas Rocha K, Calleja Hernández MÁ, Faus Dáder MJ. Seguimiento farmacoterapéutico en pacientes ingresados en el Servicio de Medicina Interna del Hospital Infanta Margarita. *Farm Hosp*. 2004;28(4):251-7.
- Resolução n.º 585, de 29 de agosto de 2013a. Regulamenta as atribuições clínicas do farmacêutico e dá outras providências [Internet]. *Diário Oficial da União*. 2013. p. 186. Available at: <https://www.cff.org.br/userfiles/file/resolucoes/585.pdf>
- Choi YJ, Kim H. Effect of pharmacy-led medication reconciliation in emergency departments: A systematic review and meta-analysis. *J Clin Pharm Ther*. 2019;44(6):932-45. DOI: 10.1111/jcpt.13019
- De Winter S, Spriet I, Indevuyst C, Vanbrabant P, Desruelles D, Sabbe M, *et al*. Pharmacist-versus physician-acquired medication history: A prospective study at the emergency department. *Qual Saf Heal Care*. 2010;19(5):371-5. DOI: 10.1136/qshc.2009.035014
- Mills PR, McGuffie AC. Formal medicine reconciliation within the emergency department reduces the medication error rates for emergency admissions. *Emerg Med J*. 2010;27(12):911-5. DOI: 10.1136/emj.2009.082255
- Redmond P, Grimes TC, McDonnell R, Boland F, Hughes C, Fahey T. Impact of medication reconciliation for improving transitions of care. *Cochrane Database Syst Rev*. 2018;2018(8). DOI: 10.1002/14651858.CD010791.pub2
- Morgan SR, Acquisto NM, Coralic Z, Basalyga V, Campbell M, Kelly JJ, *et al*. Clinical pharmacy services in the emergency department. *Am J Emerg Med*. 2018;36(10):1727-32. DOI: 10.1016/j.ajem.2018.01.056
- The Joint Commission. National Patient Safety Goals Effective January 2021 for the Hospital Program [Internet]. 2020. p. 14. Available at: https://www.jointcommission.org/-/media/jtc/documents/standards/national-patient-safety-goals/2020/npsg_chapter_cah_jul2020.pdf
- Ruiz-Ramos J, Hernández MH, Juanes-Borrego AM, Milà R, Mangués-Bafalluy MA, Mestres C. The Impact of Pharmaceutical Care in Multidisciplinary Teams on Health Outcomes: Systematic Review and Meta-Analysis. *J Am Med Dir Assoc*. 2021;22(12):2518-26. DOI: 10.1016/j.jamda.2021.05.038
- Mekonnen AB, McLachlan AJ, Brien JAE. Effectiveness of pharmacist-led medication reconciliation programmes on clinical outcomes at hospital transitions: A systematic review and meta-analysis. *BMJ Open*. 2016;6(2). DOI: 10.1136/bmjopen-2015-010003
- Okere AN, Renier CM, Tomsche JJ. Evaluation of the influence of a pharmacist-led patient-centered medication therapy management and reconciliation service in collaboration with emergency department physicians. *J Manag Care Pharm*. 2015;21(4):298-306. DOI: 10.18553/jmcp.2015.21.4.298