

## Health interventions for the reduction of hospital readmission within 30 days in clinical patients: An integrative review

Intervenções de saúde para redução da readmissão hospitalar em 30 dias em pacientes clínicos: revisão integrativa

Intervenciones de salud para reducir el reingreso hospitalario en 30 días: una revisión integradora

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### **Abstract**

Study with the objective of analysing the evidence available in the scientific literature on the interventions used to reduce hospital readmissions within 30 days in clinical patients who were discharged from the hospital to the home. An integrative review was carried out on the online Medical Literature Analysis and Retrieval System and Latin American and Caribbean Literature in Health Sciences databases. Intervention research, published between January 2009 and April 2020, in Portuguese, English and Spanish, was included. The sample consisted of 71 articles. The most frequently performed interventions were telephone contact after discharge (73.2%), health education after discharge (71.8%) and health education during hospitalization (67.6%). Identification of readmission risk (12.9%), home visits after discharge (26.8%) and discharge planning (28.2%) were the least mentioned. The interventions were performed predominantly by a multidisciplinary team (39.5%). There was a significant reduction in readmissions in 50.7% of the studies. It was found that the interventions are aimed at preparing the patient during hospitalization for the return home and post-discharge monitoring to reinforce the care plans and clarify doubts, this important combination of different actions by the multiprofessional team impacts readmission rates.

**Keywords:** Patient readmission; Patient discharge; Continuity of patient care; Quality indicators, health care.

### **Resumo**

Estudo com objetivo de analisar as evidências disponíveis na literatura científica sobre as intervenções de saúde utilizadas para a redução de readmissões hospitalares em até 30 dias em pacientes clínicos que tiveram alta do hospital para o domicílio. Foi realizada uma revisão integrativa nas bases de dados Medical Literature Analysis and Retrieval System on-line e Literatura Latino-americana e do Caribe em Ciências da Saúde. Foram incluídas pesquisas de intervenção, publicadas entre janeiro de 2009 a abril de 2020, em português, inglês e espanhol. A amostra foi composta de 71 artigos. As intervenções mais frequentemente realizadas foram contato telefônico após alta (73,2%), educação em saúde após alta (71,8%) e na internação (67,6%). Identificação do risco de readmissão (12,9%), visita domiciliar após alta (26,8%) e planejamento de alta (28,2%) foram as menos citadas. As intervenções foram realizadas predominantemente por equipe multiprofissional (39,5%). Verificou-se redução significativa das readmissões em 50,7%

dos estudos. Constatou-se que as intervenções são voltadas à preparação do paciente durante a internação para o retorno ao domicílio e ao acompanhamento após a alta para reforçar os planos de cuidados e esclarecer dúvidas, sendo importante a combinação de diferentes ações pela equipe multiprofissional.

**Palavras-chave:** Readmissão do paciente; Alta do paciente; Continuidade da assistência ao paciente; Indicadores de qualidade em assistência à saúde.

### Resumen

Este estudio tuvo como objetivo analizar la evidencia disponible en la literatura científica sobre las intervenciones de salud utilizadas para reducir los reingresos hospitalarios en 30 días en pacientes clínicos que fueron dados de alta del hospital al domicilio. Se realizó una revisión integradora en las bases de datos Medical Literature Analysis and Retrieval System on-line y Literatura Latinoamericana y del Caribe en Ciencias de la Salud. Se incluyeron investigaciones de intervención, publicadas entre enero de 2009 y abril de 2020, en portugués, inglés y español. La muestra estuvo formada por 71 artículos. Las intervenciones más frecuentes fueron el contacto telefónico tras el alta (73,2%), la educación sanitaria tras el alta (71,8%) y durante la hospitalización (67,6%). La identificación del riesgo de reingreso (12,9%), las visitas domiciliarias tras el alta (26,8%) y la planificación del alta (28,2%) fueron las menos mencionadas. Las intervenciones fueron realizadas predominantemente por un equipo multidisciplinario (39,5%). Hubo una reducción significativa de los reingresos en el 50,7% de los estudios. Se encontró que las intervenciones están orientadas a preparar al paciente durante la hospitalización para el regreso a casa y el seguimiento posterior al alta para reforzar los planes de atención y aclarar dudas, siendo importante la combinación de diferentes acciones por parte del equipo multidisciplinario.

**Palabras clave:** Readmisión del paciente; Alta del paciente; Continuidad de la atención al paciente; Indicadores de calidad de la atención de salud.

## 1. Introduction

Rate of hospital readmission has been considered an indicator of quality of health care (Neta et al., 2017, Tavares et al., 2020). It measures how many patients are readmitted to the hospital after they have been discharged. However, it lacks an accurate definition of the time interval from the initial hospitalization, although 30 days was the most frequently used in the studies (Fischer et al., 2012). The continual discussion of hospital readmissions is evident in the management of health systems, due to their impact on the patient outcomes and on the costs of the services. Despite the efforts at all levels of the system, readmissions remain prevalent, expensive and potentially avoidable (Conner et al., 2020).

A number of studies indicate that hospital readmission is influenced by individual and organizational factors that can be related to the care provided from admission to post-discharge (Tavares et al., 2020, Fischer et al., 2012). The individual factors involve aspects related to the patients and their health status (Tavares et al., 2020, Fischer et al., 2012), such as presence of chronic diseases, comorbidities, disease severity, socioeconomic status (Conner et al., 2020, Souza & Peixoto, 2017), and patient's adherence to the therapy (Oscalices et al., 2019). The organizational factors include inadequate management of the comorbidities during hospitalization, errors in medication use, and failures in communication and in the post-discharge follow-up (Wiegmann et al., 2020).

A research study conducted in the United States identified that 26.9% of the readmissions are avoidable, with half of them representing gaps in care during the initial hospitalization. Various factors were associated with potentially preventable readmissions, the most important of which are failure to relay important information to outpatient health care professionals, premature discharge, lack of discussions about care goals with the patients, inadequate treatment of symptoms, inadequate monitoring for adverse effects or non-adherence to medications, follow-up appointments not scheduled, and patient's lack of awareness of whom to contact after discharge or when to resort to the emergency service (Auerbac et al., 2016).

Although not all readmissions are avoidable, it is understood that the use of different care transition strategies during hospitalization and at hospital discharge, as well as in the post-discharge period, may prevent readmissions (Conner et al., 2020, Lima et al., 2018). In a randomized clinical trial with heart failure patients, a multicomponent intervention was conducted, including self-care education during hospitalization, communication with primary health care providers for treatment continuity and post-discharge follow-up, where 37% reduction was observed in the number of readmissions within 30 days (Huynh et al.,

2019). In Brazil, the occurrence of hospital readmission varies from 12.3% to 22% (Neta et al., 2017, Weber et al., 2019), a significant percentage that poses a challenge for cost management and affects the health system (Neta et al., 2017). These high rates signal the importance of discussing and implementing safe, evidence-based care transition strategies.

However, the Brazilian literature about interventions to reduce hospital readmission is scarce. The studies identified are focused on the profile of readmissions (Neta et al., 2017), on therapeutic adherence and readmission (Oscalices et al., 2019), on reviewing readmission in kidney transplantation (Tavares et al., 2020), and on care transition strategies at hospital discharge, with no focus on the reduction in the number of readmissions (Lima et al., 2018). Consequently, the need was identified to synthesize the results obtained in national and international research studies on interventions that reduce hospital readmissions, constituting a consistent and comprehensive scenario for the development of effective practices and policies. The objective of this study is to analyze the evidence available in the scientific literature on the health interventions used to reduce hospital readmissions within 30 days in clinical patients who were discharged from the hospital to their homes.

## 2. Methodology

This is an integrative review study that followed five stages: 1) identification of the problem; 2) search in the literature; 3) data evaluation; 4) data analysis; and 5) data presentation (Whittemore & Knaf, 2005).

The PICO strategy (which represents Patient, Intervention, Comparison and Outcomes) was used to formulate the research question, where: P: clinical patients who were discharged from the hospital to their homes; I: health interventions to reduce hospital readmission; C: no intervention; and O: reduction in hospital readmission within 30 days after discharge. The following review question was elaborated: What is the scientific evidence on health interventions used to reduce hospital readmission within 30 days in clinical patients who were discharged from the hospital to their homes?

The data search was conducted in January 2019 and updated in April 2020 on the following databases: Medical Literature Analysis and Retrieval System on-line (MEDLINE via PubMed) and Latin American and Caribbean Literature in Health Sciences (Literatura Latino-Americana e do Caribe em Ciências da Saúde, LILACS).

A combination of the following Medical Subject Headings (MeSH) descriptors was used as search strategy: ("readmission" OR "hospital readmission" OR "patient readmission" OR "unplanned readmission\*" OR "30 day readmission" OR "re-admission" OR "re-admit\*") AND ("discharge planning" OR "patient discharge" OR "patient transfer" OR "care transition" OR "care transitions" OR "transition of care" OR "transitional care" OR "continuity of care" OR "follow-up" OR "patient education" OR "medication reconciliation" OR "communication" OR "patient care team") AND (planning OR intervention\*) NOT (child\* OR infant\* OR pediatri\* OR mental\* OR obstetric\*).

The eligibility criteria established were as follows: 1) articles from intervention research studies; 2) studies that had an Intervention Group (IG) and a Control Group (CG); 3) studies whose outcome is hospital readmission within 30 days; 4) studies whose population is clinical patients over 18 years old and discharged from hospital units to their homes; 5) full text available articles on the selected databases, published from January 2009 to April 2020; 6) articles written in Portuguese, English or Spanish.

Theses, dissertations and review articles were excluded, as well as qualitative, methodological and protocol studies, reflection and/or theoretical articles and those from the grey literature. Articles focusing on war veterans and on palliative, surgical, oncological, rheumatology, obstetric, gynecological, psychiatric and pediatric care were excluded because of its specificities.

The references found were forwarded to the EndNote® bibliography manager software program. Duplicate articles were excluded. Study selection was performed independently by two reviewers, and cases of disagreement were solved by consensus

in a meeting between the reviewers. A form containing the eligibility criteria was elaborated to select the articles. The papers included were read in full and a descriptive analysis of the characteristics of the studies was performed. For data extraction, an Excel spreadsheet was used to record main information of the studies, such as authors, year, language, title, objectives, design, level of evidence, study locus and population, sample size, health professional who performed the intervention, duration of intervention, interventions tested, and main results at readmission within 30 days.

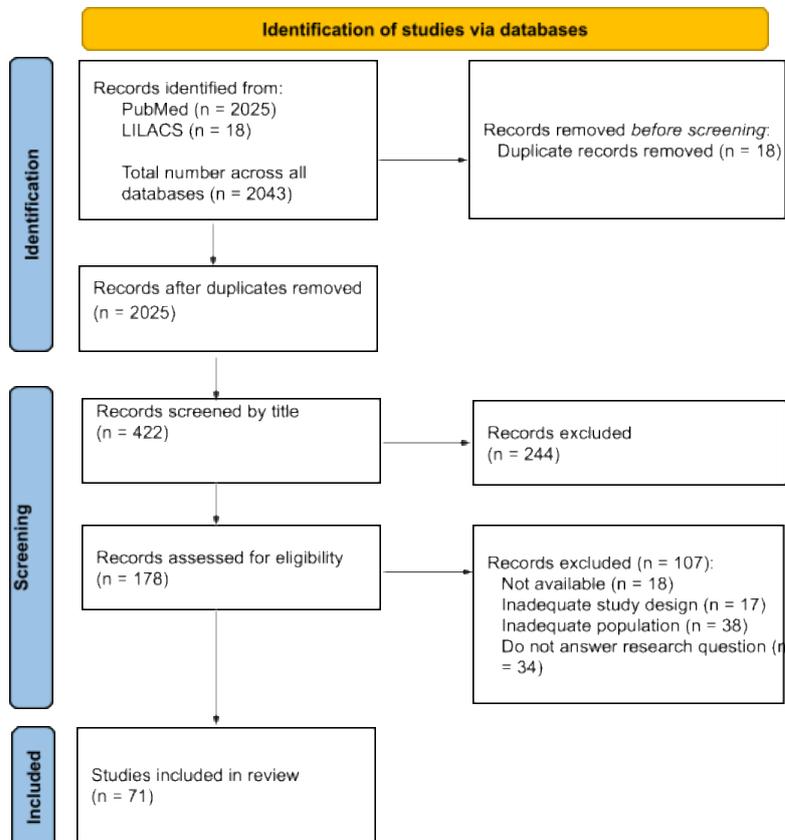
The levels of evidence of the studies were assessed as described in the literature (Melnik & Fineout-Overholt, 2015).

The data analysis of the integrative review was elaborated in the descriptive manner. The components used in the studies included were classified into nine intervention categories, which were identified by the following codes: Identification of Readmission Risk (IRR), Discharge Planning (DP), Education in Health during Hospitalization (EHH), Education in Health after Discharge (EHD), Medication Reconciliation (MR), Communication with Health Services (CHS), Outpatient Follow-up after Discharge (OFD), Phone Contact after Discharge (PCD), and Post-discharge Home Visit (PHV).

### 3. Results

Initially, 2,043 articles were identified in the databases. For selection of the studies, the titles were read and 422 articles were screened. Then, the abstracts were read and 178 were assessed for eligibility. Upon reading the full text articles, the sample consisted of 71, as shown in the flowchart (Figure 1).

**Figure 1.** Flow diagram corresponding to the search in the literature. Porto Alegre/Brazil, 2021.



Sources: Authors.

All the studies selected were written in English, with the United States as the country with the highest number of publications. The majority (53.5%) were published from 2013 to 2016. The most prevalent methodological designs were randomized clinical trials, cohort studies and quasi-experimental studies. Regarding the level of evidence of the publications, 29.6% were Level 02; 32.4%, Level 03; and 38%, Level 04. It was verified that 66.2% of the studies were focused on specific populations, such as seniors or people with heart or respiratory diseases. The interventions were predominantly conducted by a multi-professional team, pharmacists and nurses. Table 1 synthesizes the characteristics of the studies.

**Table 1** - Main characteristics of the studies. Porto Alegre, 2021.

Characteristic	Articles (n=71)
<b>Type of study (Level of Evidence)</b>	
Randomized Clinical Trial (LE 02)	19 (26.8%)
Randomized, controlled and prospective (LE 02)	2 (2.8%)
Quasi-experimental (LE 03)	12 (16.9%)
Pre-post Intervention (LE 03)	4 (5.6%)
Prospective (LE 03)	7 (9.9%)
Cohort (04)	19 (26.8%)
Retrospective and descriptive (LE 04)	5 (7.0%)
Observational (LE 04)	2 (2.8%)
Case-control (LE 04)	1 (1.4%)
<b>Year of publication</b>	
From 2009 to 2012	6 (8.5%)
From 2013 to 2016	38 (53.5%)
From 2017 to 2020	27 (38.0%)
<b>Country where the study was conducted</b>	
United States	49 (69.0%)
Canada	7 (9.9%)
Singapore	3 (4.2%)
Denmark	2 (2.8%)
United Kingdom	3 (4.2%)
Brazil	1 (1.4%)
Others	6 (8.4%)
<b>Study population</b>	
Adults in general	24 (33.8%)
Elders	9 (12.7%)
Patients with some heart disease	18 (25.3%)
Patients with some respiratory disease	7 (9.9%)
Others	13 (18.3%)
<b>Professionals who performed the intervention</b>	
Multi-professional team	28 (39.5%)
Nurse	9 (12.7%)
Pharmacist	25 (35.2%)
Social worker	2 (2.8%)
Physician	1 (1.4%)
Other	2 (2.8%)
Not reported	4 (5.6%)

LE: level of evidence. Sources: Authors.

Most of the studies had interventions with two or more components, resulting in a variety of strategies, where there may be multiple components present in a single article (Chart 1).

**Chart 1** - Synthesis of the interventions performed in the studies. Porto Alegre, 2021.

<b>Intervention</b>	<b>Description</b>	<b>Frequency n (%)</b>
Identification of the Readmission Risk	<ul style="list-style-type: none"> <li>- Screening of patients at readmission risk through validated instruments (such as the LACE Index and the Elders Risk Assessment index), predictive models in software programs, or a tool specifically designed for the intervention;</li> <li>- Prioritization of the intervention to patients at risk for readmission.</li> </ul>	9 (12.9%)
Discharge Planning	<ul style="list-style-type: none"> <li>- Development of discharge planning during hospitalization, generally in charge of the multi-professional team under the coordination of a specific professional (nurse, pharmacist, etc.);</li> <li>- Elaboration of an individualized plan, considering psychosocial and health issues, adapted to the individual needs and using institutional tools or software programs;</li> <li>- Provision of the discharge plan, report or letter in printed format to the patient and/or family member.</li> </ul>	20 (28.2%)
Education in Health during Hospitalization	<ul style="list-style-type: none"> <li>- Conduction of education in health activities during hospitalization by transition nurses, pharmacists and/or physicians;</li> <li>- Education in health focused on medication use, life habits (diet, physical exercise and smoking cessation) and management of symptoms after discharge;</li> <li>- Detailed explanation of the indications, benefits, duration and therapeutic goals, as well as dose, schedule, storage and possible drug-related adverse events;</li> <li>- Use of a standardized script or checklist to provide guidelines during hospitalization;</li> <li>- Delivery of educational material to the patient and family member containing information about post-discharge care measures.</li> </ul>	48 (67.6%)
Education in Health after Discharge	<ul style="list-style-type: none"> <li>- Conduction of education in health activities after discharge, by means of consultations, phone contacts or home visits;</li> <li>- Use of a standardized script or checklist to provide guidelines after discharge;</li> <li>- Reinforcement on the guidelines about the necessary home care measures and clarification of doubts;</li> <li>- Delivery of educational material to the patient and family member containing information about post-discharge care measures;</li> <li>- Participation in an interprofessional program that offers classes about the disease and post-discharge care measures.</li> </ul>	51 (71.8%)
Medication Reconciliation	<ul style="list-style-type: none"> <li>- Medication reconciliation performed by a pharmacist, evaluating medications used prior to admission and after discharge;</li> <li>- Multi-professional rounds to discuss inconsistencies in the drug treatment;</li> <li>- Use of a system to document and monitor medication reconciliation;</li> <li>- Risk stratification during reconciliation, based on a literacy in health assessment and on patient's adherence to the medication;</li> <li>- Delivery of educational material to the patient containing information about the medications in use.</li> </ul>	32 (45.1%)
Communication with Health Services	<ul style="list-style-type: none"> <li>- Patient's referral to care with specialists or at health services after hospital discharge, such as primary health care units, rehabilitation services and social community services, according to the patient's needs.</li> <li>- Scheduling of the appointment in the health unit for after discharge;</li> <li>- Notification of the patients' hospitalization to the service that will care for them after discharge via an integrated information system, text message, voicemail, email or letter;</li> <li>- Forwarding of the discharge summary, care plan or brief description of the transition care measures for professionals or services that will provide care continuity after discharge.</li> </ul>	32 (45.1%)

Outpatient Follow-up after Discharge	<ul style="list-style-type: none"> <li>- Conduction of follow-up appointments, between two and ten days after discharge, for disease management, monitoring of adverse events and provision of guidelines for adherence to the treatment;</li> <li>- Use of software programs to schedule and control follow-up appointments.</li> </ul>	24 (33.8%)
Phone Contact after Discharge	<ul style="list-style-type: none"> <li>- Telephone call made from two to 30 days after discharge for clinical reassessment, guidance on home care, treatment difficulties, and resumption of daily activities, clarification of doubts, and verification of appointment scheduling;</li> <li>- Follow-up appointment by telephone after discharge conducted by pharmacists;</li> <li>- Use of instruments to guide the telephone calls after discharge, such as scripts, checklists and questionnaires;</li> <li>- Full-time availability of telephone lines for communication between patients and health teams;</li> <li>- Use of an interactive system with smartphone alerts or messages for communication between patients and health teams.</li> </ul>	52 (73.2%)
Post-discharge Home Visit	<ul style="list-style-type: none"> <li>- Conduction of a home visit for clinical reassessment, assessment of adherence to the treatment, guidance about home care, clarification of doubts and adjustments in the care plan;</li> <li>- Assessment of the patient's need for social support;</li> <li>- Provision of equipment and medications for home use;</li> <li>- Use of instruments to guide the post-discharge home visits, such as protocols and checklists;</li> <li>- Visits to all the intervention patients or only to those at a higher risk of readmission or with more difficulties in the treatment;</li> <li>- Presence of a transition professional in the visits to the patient.</li> </ul>	19 (26.8%)

Source: Authors.

The most frequently used components in the studies for the reduction in the number of readmissions were Phone Contact after Discharge, Education in Health after Discharge and Education in Health during Hospitalization. The least frequent components were Identification of Readmission Risk, Post-discharge Home Visit and Discharge Planning. Chart 2 shows the components performed and the outcome of hospital readmission of the studies analyzed.

A significant reduction in the number of readmissions within 30 days after discharge was verified in 50.7% of the studies. Among the randomized clinical trials, 63.2% obtained significantly lower readmission rates in the intervention groups when compared to the control groups. Of the interventions performed by nurses, 66.6% obtained significant improvements in the outcome.

**Chart 2** - Interventions performed and outcome of hospital readmission of the studies included in the integrative review. Porto Alegre, 2021.

Methodological design of the articles and levels of evidence	Code of the interventions performed										Significant reduction in readmission*
	IRR	DP	EHH	EHD	MR	CHS	OFD	PCD	PHV	Other	
<b>Randomized Clinical Trial (LE 02)</b>											
Altfeld <i>et al.</i> (2013)		x				x	x	x			No
Balaban <i>et al.</i> (2015)		x				x	x	x			No
Bell <i>et al.</i> (2016)			x	x	X	x		x			No
Benzo <i>et al.</i> (2016)			x	x				x	X		Yes
Bonetti <i>et al.</i> (2018)		x	x	x	X			x			No
Davis <i>et al.</i> (2012)			x	x				x			No
Deek <i>et al.</i> (2017)			x								Yes
Dhalla <i>et al.</i> (2014)	x		x	x		x	x	x	X		No
Farris <i>et al.</i> (2014)			x	x	X	x		x			No
Graabaek <i>et al.</i> (2019)			x		X						No

Huynh <i>et al.</i> (2019)			x	x		x		x	X	x	Yes
Jennings <i>et al.</i> (2015)			x	x		x		x			No
Johnson-Warrington <i>et al.</i> (2016)			x	x				x			No
Lee <i>et al.</i> (2015)	x			x		x		x	X		No
Linden <i>et al.</i> (2014)		x	x	x	X	x	x	x			No
Low <i>et al.</i> (2017)	x	x	x	x	X	x	x	x	X		Yes
Riegel <i>et al.</i> (2016)				x				x	X		Yes
Soong <i>et al.</i> (2014)			x	x				x			No
Thygesen <i>et al.</i> (2015)	x			x		x	x		X		No
<b>Prospective and controlled (LE 02)</b>											
Haag <i>et al.</i> (2016)	x			x				x			No
Hawes <i>et al.</i> (2014)		x		x	X		x				Yes
<b>Quasi-experimental (LE 03)</b>											
Amarasingham <i>et al.</i> (2013)		X	x				x	x			Yes
Bhatt <i>et al.</i> (2017)			x			x	x	x			No
Bowles <i>et al.</i> (2015)	x	X				x					Yes
Dedhia <i>et al.</i> (2009)		X	x		x	x					Yes
Graham <i>et al.</i> (2012)	x			x				x			Yes
Kripalani <i>et al.</i> (2019)		X	x	x	x			x		x	Yes
Morales <i>et al.</i> (2018)			x	x					X		Yes
Odeh <i>et al.</i> (2019)				x		x		x			Yes
Ohuabunwa <i>et al.</i> (2013)		X	x	x		x		x	X		No
Smith <i>et al.</i> (2016)			x		x	x					No
Voss <i>et al.</i> (2011)		X	x	x				x	X		Yes
Walker <i>et al.</i> (2009)		X	x	x	x	x		x			No
<b>Pre-post Intervention (LE 03)</b>											
Garnier <i>et al.</i> (2018)			x	x	x	x	x	x	X	x	No
Johnson <i>et al.</i> (2016)	x		x	x			x		X	x	Yes
Verhaegh <i>et al.</i> (2014)		X	x		x		x				No
Xiang <i>et al.</i> (2019)						x		x			Yes
<b>Prospective (LE 03)</b>											
Budiman <i>et al.</i> (2016)		X	x	x	x			x			No
Murphy <i>et al.</i> (2019)			x	x	x	x	x	x			No
Rafferty <i>et al.</i> (2016)			x		x		x	x			Yes
Sales <i>et al.</i> (2013)			x	x		x	x	x			Yes
Sarangarm <i>et al.</i> (2013)			x	x	x			x			No
Shu <i>et al.</i> (2011)		X	x	x				x		x	Yes
Wright <i>et al.</i> (2019)				x	x	x		x			Yes
<b>Cohort (04)</b>											
Alshabanat <i>et al.</i> (2017)				x	x			x	X		Yes
Bae-Shaaw <i>et al.</i> (2020)			x	x			x	x			Yes
Baker <i>et al.</i> (2018)			x		x						No
Bilchick <i>et al.</i> (2019)				x	x		x	x	X		Yes
Christy <i>et al.</i> (2016)			x	x	x	x	x	x			No
Howie-Esquivel <i>et al.</i> (2015)			x	x			x	x			Yes
Kwan <i>et al.</i> (2015)			x	x			x	x			No
Lee <i>et al.</i> (2019)			x		x	x					No
Murphy <i>et al.</i> (2019)			x			x	x				Yes
Otsuka <i>et al.</i> (2019)		X		x	x		x	x			Yes
Patel <i>et al.</i> (2019)				x				x			No
Shcherbakova <i>et al.</i> (2016)				x	x				X		No
Shull <i>et al.</i> (2018)			x	x	x			x	X		Yes
Stranges <i>et al.</i> (2015)		X	x	x	x	x	x	x			No
Takahashi <i>et al.</i> (2016)		X	x	x	x	x		x	X		Yes

Truong <i>et al.</i> (2015)			x	x	x			x	X		Yes
Wee <i>et al.</i> (2014)		X	x			x		x	X		Yes
Yang <i>et al.</i> (2017)				x				x			No
Zemaitis <i>et al.</i> (2016)			x	x	x			x			Yes
<b>Retrospective and descriptive (LE 04)</b>											
Chava <i>et al.</i> (2019)			x								Yes
Costantino <i>et al.</i> (2013)				x		x		x			Yes
Farrell <i>et al.</i> (2015)				x		x		x			Yes
Singh <i>et al.</i> (2019)	x				x						No
Wiegmann <i>et al.</i> (2019)			x	x	x		x				Yes
<b>Observational (LE 04)</b>											
Patel <i>et al.</i> (2016)										x	No
Stewart <i>et al.</i> (2015)						x		x			No
<b>Case-control (LE 04)</b>											
Clarkson <i>et al.</i> (2017)			x	x						x	Yes

\*Statistically significant differences.

IRR: Identification of the Readmission Risk. DP: Discharge Planning. EHH: Education in Health during Hospitalization. EHD: Education in Health after Discharge. MR: Medication Reconciliation. CHS: Communication with Health Services. OFD: Outpatient Follow-up after Discharge. PCD: Phone Contact after Discharge. PHV: Post-discharge Home Visit. LE: level of evidence. Sources: Authors.

#### 4. Discussion

The use of strategies to reduce the number of readmissions within 30 days stood out in the international literature, whereas it is still not well explored nationally in Brazil. A greater number of publications were found in the United States, particularly after 2013. The greatest number of research studies on reducing hospital readmissions in the United States can be justified by the implementation of the Hospital Readmissions Reduction Program in 2012, when the federal government started to apply financial penalties to hospitals with excessive readmission rates (Costantino *et al.*, 2013). Only one study (Bonetti *et al.*, 2018) was identified in Brazil, which indicates that this topic has not been well explored in this country.

Most of the interventions to reduce the number of hospital readmissions within 30 days were conducted in populations of seniors and in patients with heart disease and/or chronic respiratory disease. Individuals aged 60 years old or more are vulnerable to readmissions (Neta *et al.*, 2017). Among the main factors for readmissions within 30 days are number of chronic diseases, disease severity and risk of death. Therefore, patients with severe diseases and multiple chronic conditions should be prioritized in hospital care transition interventions to reduce the rate of unnecessary readmissions (Conner *et al.*, 2020).

In this review, the interventions delivered to patients were varied and exerted different effects on the outcome of reduction in the number of readmissions within 30 days. The heterogeneity of the interventions and of the different methodological designs did not allow identifying the most effective components. Most of the research studies included were observational or quasi-experimental, and the randomized clinical trials corresponded to 26.8% of the sample. In a previously published systematic review, the authors also verified predominance of observational studies and identified that no intervention implemented in isolation was regularly associated with a reduction in the risk of readmissions within 30 days. The authors developed a taxonomy to categorize the interventions, which encompassed 12 activities. The pre-discharge interventions included education to the patient, medication reconciliation, discharge planning and scheduling of a follow-up appointment. The post-discharge interventions included follow-up phone calls, communication with health professionals, outpatient follow-up and post-discharge home visits, among others (Hansen *et al.*, 2011).

In this review it was verified that the most frequently implemented interventions were phone contact after discharge and education in health for patients and caregivers; identification of the readmission risk, discharge planning and post-discharge home visits were the least frequent interventions. This result presents similarities regarding some components of a systematic review with meta-analysis of care transition actions in surgical patients, which identified that the most frequently assessed interventions were phone follow-up and education to the patients. However, discharge planning and home visits were also more frequent (Jones *et al.*, 2016), which differs from this study.

It was identified that the phone contact component was the most frequent intervention, corresponding to the results described in the literature (Hansen *et al.*, 2011, Jones *et al.*, 2016). Phone contacts allow identifying questions from patients and caregivers in the household context, defining priorities in home visits, and immediate interventions during the call (Weber *et al.*, 2017).

The interventions with components related to health education during hospitalization (EHH) and after discharge (EHD) stand out. The strategies used in the studies reviewed may provide the opportunity to involve the patients, promote understanding and increase their self-care ability, thus improving the post-discharge outcomes. However, a study with surgical patients in Australia identified that many of them expressed dissatisfaction and insufficient understanding of the discharge guidelines, resulting in anxiety and stress due to insecurity in dealing with their recovery. There were reports of unclear instructions, given too hastily and not in a timely manner, not adapted to the individual needs, and with inappropriate post-discharge care recommendations (Kang *et al.*, 2020). Therefore, the literature acknowledges that the activities aimed at the patients' education and promotion of self-management are fundamental for care transition, provided that the education plans are individualized, respecting the way how patients think and live in their sociocultural context and promoting their autonomy in shared decision-making processes (Lima *et al.*, 2018).

Having a discharge plan is important for the implementation of self-care education. Discharge planning is a process that should begin at hospital admission and includes the development of a patient-centered plan, which must be periodically reviewed during hospitalization, ensuring that patients and caregivers understand and contribute to the decisions planned (Mennuni *et al.*, 2016). A study on care transition actions in Latin America identified that the care plans contained lists of medications and instructions, social support for access to the health services, underlying diseases, warning signs and symptoms, nutritional care and clinical monitoring (Lima *et al.*, 2018), actions similar to those observed in the articles included in this research. However, discharge planning was one of the least frequent components in the articles, which may be a routine practice, but not being carried out consistently in the interventions.

Although the Medication Reconciliation (MR) component is not one of the most frequent interventions in this review, it may be an effective tool for the management of medications. The main focus of this component is the patient's understanding about the drug regime, valuing detailed information of the indications, benefits, therapeutic goals, dosage, administration times, storage, duration of the therapies and possible drug-related adverse events. Most of the studies highlight the essential performance of pharmacists, nurses and health teams in the promotion of adherence to the medications and in the provision of medication reconciliation. However, a systematic review identified that medication reconciliation alone does not reduce the number of readmissions but, if combined with education for the patient, especially after discharge, it becomes a powerful tool to this end (Bach *et al.*, 2019).

Post-discharge home visits, which are focused on adherence to the medications, adequate outpatient follow-up and monitoring of symptoms, were a component that occurred in less than 30% of the studies. Although home visits are time intensive with a higher cost, they have been described in the literature as an effective intervention to reduce the number of readmissions within 30 days among clinical (Hansen *et al.*, 2011) and surgical (Jones *et al.*, 2016) adult patients.

The interventions analyzed in this study were predominantly conducted by a multi-professional team, pharmacists and nurses. The important performance of interprofessional teams in the care provided to the patients is highlighted. A study that assessed frail seniors evidenced that those who received integrated care with a interprofessional team attained a significant reduction in the number of unnecessary readmissions, as well as in the search for the emergency services (Di Pollina *et al.*, 2017).

Technologies such as fax, email, message applications, phone calls, and printed reports were used in communication with health services in the community. The use of communication technologies can streamline and qualify the communication flows in health and increase collaboration between the hospital team and the post-discharge team. The study showed that follow-up during the first week after hospital discharge has been associated with lower readmission rates within 30 and 90 days. The patients who attended a primary care appointment within 7 days after discharge had a lower number of readmissions compared with those who did not attend any appointment or who had one within the subsequent weeks (Wiest *et al.*, 2019).

The heterogeneity of the articles' methods is a limitation of this study. The method did not allow the identification of the actions that are more effective in reducing the number of hospital readmissions. Therefore, it is worth highlighting the need to conduct systematic reviews and meta-analyses with a focus on specific components or on bundling combinations of interventions to fill this gap.

## 5. Conclusion

This integrative review provided evidence that there is vast scientific knowledge in this area, especially in the United States, a country that applies financial penalties to hospitals with excessive readmission rates. The theme of interventions to reduce the number of hospital readmissions has not been the focus of studies and research in Brazil or in Latin America.

This review sought to synthesize the main interventions reported in the literature to reduce the number of hospital readmissions, although not able to recommend any practice over another. Several interventions performed in the research studies were identified, and the most frequent components were Phone Contact after Discharge, Education in Health after Discharge, and Education in Health during Hospitalization. It was found that the interventions were aimed at preparing the patients during hospitalization for returning to their homes with follow-up after discharge to reinforce the care plans and clarify doubts. Important to reduce hospital readmissions, is the implementation of combined interventions by the interprofessional team. The commitment of institutions and professionals enables interventions that change work routine, health promotion, prevention of health problems and recovery of health, with a focus that goes beyond treatment and clinical stabilization of patients. The results facilitate improvement in health practices with a focus on planned care transitions, resulting in benefits for patients, professionals and the health system.

Future research is needed to evaluate the effectiveness of specific components or on bundling combinations of interventions to reduce hospital readmission. We recommend studies with higher level of evidence, such as clinical trials, especially in Brazil and Latin America. Implementing evidence-informed practice might be challenging, though strategies to set priorities of which intervention to implement should consider opinions of stakeholders, including patients, health care providers, and hospital managers.

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