

Profile of the Medication Reconciliation Discrepancies in Oncology Patients: Integrative Literature Review

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Perfil das Discrepâncias Obtidas por meio da Conciliação Medicamentosa em Pacientes Oncológicos: Revisão Integrativa da Literatura

Perfil de las Discrepancias Obtenidas por la Conciliación de Medicamentos en Pacientes Oncológicos: Revisión Integradora de la Literatura

Ana Rosa Navegantes de Sousa¹; Andrea Almeida Tofani²; Carolina Lopes Martins³

ABSTRACT

Introduction: Cancer patient care requires actions of a multi-professional team due to the complexity of the treatment. One of the pharmacist's services to contribute for the patient safety is the medication reconciliation, able to detect discrepancies in prescriptions and preventing medication errors. **Objective:** Draw a profile of the main discrepancies found in the literature in cancer patients during the practice of medication reconciliation performed by pharmacists. Additionally, a descriptive approach of the pharmaceutical interventions found in the studies was also attempted. **Method:** Integrative review of the literature with descriptors "Medication Reconciliation", "Neoplasms", "Pharmacists", "Medication Errors" utilized to search in the following databases: PubMed, Web of Science, Embase and Scopus. **Results:** Initially, 141 articles were found and eleven were selected for discussion. Medication reconciliation was performed in patients at admission (27.3%), discharge from hospital (18.2%), and outpatient follow-up (54.5%). Observational Studies were the majority (72.7%) followed by intervention studies (27.3%). The main discrepancy reported was Omission/Need to add a medicine (81.5%). Pharmaceutical interventions were described in more detail in 36.4% of the publications. **Conclusion:** This study demonstrates the need for more articles that correlates the practice of medication reconciliation with the detection of discrepancies and pharmaceutical interventions in Oncology. Pharmacists should structure the practice of medication reconciliation in the clinical experience with cancer patients to improve their safety.

Key words: medication reconciliation; patient safety; evidence-based pharmacy practice; oncology service, hospital; pharmaceutical services.

RESUMO

Introdução: O cuidado ao paciente oncológico demanda ações de uma equipe multiprofissional em virtude da complexidade do seu tratamento. Um dos serviços oferecidos pelo farmacêutico, visando a contribuir para segurança do paciente, é a conciliação medicamentosa capaz de detectar discrepâncias nas prescrições e prevenir erros de medicação. **Objetivo:** Traçar o perfil das principais discrepâncias encontradas na literatura em pacientes oncológicos durante a prática da conciliação medicamentosa realizada por farmacêuticos. Adicionalmente, visa-se a uma abordagem descritiva sobre as intervenções farmacêuticas realizadas nos estudos. **Método:** Revisão integrativa da literatura. Foram utilizados os descritores: "Medication Reconciliation", "Neoplasms", "Pharmacists", "Medication Errors" para as estratégias de busca. As bases de dados selecionadas foram: PubMed, Web of Science, Embase e Scopus. **Resultados:** Inicialmente, identificaram-se 141 artigos. Destes, foram selecionados 11 trabalhos para serem discutidos. A conciliação medicamentosa foi realizada em pacientes na admissão hospitalar (27,3%), alta hospitalar (18,2%), e acompanhamento ambulatorial (54,5%). A maior parte era de estudos observacionais (72,7%) seguidos dos estudos de intervenção (27,3%). A principal discrepância relatada foi a de omissão/necessidade de adição de um medicamento (81,5%). As intervenções farmacêuticas estavam descritas mais detalhadamente em 36,4% das publicações. **Conclusão:** O estudo demonstrou a necessidade de mais trabalhos que correlacionem a prática da conciliação medicamentosa com a detecção de discrepâncias e intervenções farmacêuticas em Oncologia. Os farmacêuticos, objetivando a segurança do paciente, devem estruturar essa prática na vivência clínica dos pacientes oncológicos.

Palavras-chave: reconciliação de medicamentos; segurança do paciente; prática farmacêutica baseada em evidências; serviço hospitalar de oncologia; assistência farmacêutica.

RESUMEN

Introducción: La atención a los pacientes con cáncer exige las acciones de un equipo multidisciplinario debido a la complejidad de su tratamiento. Uno de los servicios ofrecidos por el farmacéutico para contribuir a la seguridad del paciente es la conciliación de medicamentos, capaz de detectar discrepancias en las recetas y prevenir errores de medicación. **Objetivo:** Obtener un perfil de las principales discrepancias encontradas en la literatura en pacientes con cáncer durante la práctica de conciliación de medicamentos realizada por farmacéuticos. Además, también está dirigido a un enfoque descriptivo sobre las intervenciones farmacéuticas llevadas a cabo en los estudios. **Método:** Estudio de revisión integradora. Se ha utilizado los descriptores: "Medication Reconciliation", "Neoplasms", "Pharmacists", "Medication Errors" para las estrategias de búsqueda. Las bases de datos seleccionadas fueron: PubMed, Web of Science, Embase y Scopus. **Resultados:** Inicialmente, se encontraron 141 artículos. Se seleccionaron 11 documentos a ser discutidos. La conciliación de medicamentos se realizó en pacientes con ingreso hospitalario (27,3%), alta hospitalaria (18,2%) y seguimiento ambulatorio (54,5%). La mayoría fue de estudios observacionales (72,7%) seguidos de estudios de intervención (27,3%). La principal discrepancia reportada fue la Omisión/Necesidad de añadir un medicamento (81,5%). Las intervenciones farmacéuticas se describieron con más detalle en el 36,4% de las publicaciones. **Conclusión:** El estudio demostró la necesidad de más trabajos que correlacione la conciliación de la medicación con la detección de discrepancias e intervenciones farmacéuticas en Oncología. Los farmacéuticos que buscan la seguridad del paciente deben estructurar esta práctica clínica en la experiencia clínica de los pacientes con cáncer. **Palabras clave:** conciliación de medicamentos; seguridad del paciente; práctica farmacéutica basada en la evidencia; servicio de oncología en hospital; servicios farmacéuticos.

^{1,2,3}Instituto Nacional de Câncer José Alencar Gomes da Silva (INCA), Serviço de Farmácia. Rio de Janeiro (RJ), Brasil. E-mails: annasousa6@hotmail.com; atofani@inca.gov.br; carolinamartins0104@hotmail.com. Orcid id: <https://orcid.org/0000-0001-6169-4219>; Orcid id: <https://orcid.org/0000-0003-2847-7145>; Orcid id: <https://orcid.org/0000-0003-3236-0732>

Corresponding author: Ana Rosa Navegantes de Sousa. Rua Maués, 695 – Brás de Pina. Rio de Janeiro (RJ), Brasil. CEP 21235-650. E-mail: annasousa6@hotmail.com



INTRODUCTION

The high quality of healthcare by the multiprofessional team impacts the patient safety. According to the World Health Organization (WHO), the patient safety is defined as reduction of unnecessary risks associated with healthcare to an acceptable level¹⁻³.

Medication reconciliation (MR) is common in the programs of patient safety as a pharmaceutical service of strong impact and is able to detect discrepancies and medication errors⁴⁻⁶.

International and national organizations of accreditation in USA, Canada and Brazil and the Joint Commission, Institute for Safety Medication Practices (ISMP), “*Consórcio Brasileiro de Acreditação*” (CBA), “*Conselho Federal de Farmácia*” (CFF), among others consider MR as priority to prevent adverse events⁷⁻¹⁰.

Although the term reconciliation is widely used as a synonym of conciliation, it was decided to not use it anymore to avoid ambiguity. According to the Directive RDC number 13/2013¹¹ of the Brazilian Health Regulatory Agency (ANVISA) which addresses Good Practices of Manufacturing Traditional Phytotherapy Products, the term reconciliation is utilized in a different context with distinct meaning in the setting of production of a batch when the actual quantity manufactured is compared with the estimated quantity.

A MR is a process to obtain the most complete, updated and accurate list as possible of all the medications each patient utilizes (including name, dosing, frequency and route of administration). These information will be compared with medical prescriptions at admission, transfers in the same hospital, outpatient consultations and/or hospital discharge¹². Based in this analysis, the pharmacist of record evaluates the prescriptions and if clinically relevant discrepancies are encountered, the multiprofessional team is contacted to optimize the pharmacotherapy through pharmaceutical interventions (PI)¹³.

PI is a patient-centered planned and documented action to prevent or solve problems that can interfere in the patient’s pharmacotherapy shared with the health team^{14,15}. The interventions made in MR are meant to solve health-related problems likely damaging to the patient¹⁶.

Medication errors (ME) are one of these problems, they are avoidable events causing or leading to the inadequate use of patient-damaging drugs. MR should be implemented to prevent ME¹⁷.

An intentional (ID) or unintentional (UD) discrepancy is any difference between the list of medications the patient uses and hospital prescription¹⁸.

Based in the patient’s care planning, knowledge or medical conduct, the prescriber decides to change intentionally (ID), said changes should be justified and documented. The undocumented ID can lead to errors made by the nurses and pharmacists. For not knowing the drugs the patient used prior to admission, the prescriber changes, adds or omits unintentionally (UD) and this discrepancy can be more damaging. MR intends to minimize UD^{12,19-22}.

The rational use of medications is the outcome of MR practices²³.

As healthcare is clearly advancing with sophisticated systems, it is anticipated that the efficacy of these processes improves as well, although it is known that it is challenging for the institutions to implement this practice⁷.

Cancer is a multifactorial disease with high rates of incidence and mortality worldwide²⁴⁻²⁷. The oncologic patient requires a complex therapeutic support often for a prolonged period and multiprofessional demands, further to oncologic treatment related complications (chemotherapy, radiotherapy, surgeries), other comorbidities (systemic arterial hypertension and/or diabetes) and polimedication^{28,29}.

The touch points (admission, hospital discharge, inter and outpatient transferences) are critical for communication among the teams, possibly leading to ME¹³.

This article aims to discuss MR through an integrative review of the literature, the types of discrepancies mostly found in the oncology context and the benefits it can bring for the oncologic patient for its safety and proactive pharmacist action. Additionally, a description of the PI addressed in the studies selected is presented.

METHOD

Integrative review of the literature including the applicability of the results of significant studies³⁰.

The research question of this article was: “What are the most common discrepancies found in the process of MR in oncology?” and “Is MR a beneficial practice for the oncologic patient?”

The literature search strategies (Chart 1) was based in the Boolean operators AND and OR, with Health Sciences Descriptors (DeCS): “Medication Reconciliation”, “Neoplasms”, “Pharmacists”, “Medication Errors”.

Scientific publications about the theme with full text available in English, Spanish or Portuguese published between 2000 and 2020 found at the databases PubMed, Web of Science, Embase and Scopus were eligible. Of these, the pharmacist of record selected those with MR for oncologic patients alone with the

discrepancies detected in this process as described. Publications which failed to meet these criteria were excluded.

In order to respond to the research question, the current review plans to find quantitative and descriptive data in the literature related to the discrepancies and/or PI in the articles selected.

RESULTS

Initially, 41 articles at PubMed, 30 at Web of Science, 47 at Scopus and 22 at Embase were found reaching 140 articles. An article not found at the databases was included (data from other sources) because it matched the criteria selected and eventually 141 articles were eligible (Figure 1).

After the first screening, duplicate articles were detected at the databases (n=58 articles). The abstracts of the remaining 83 articles were selected for reading in pairs. The exclusion criteria were applied and 36 of these were excluded for not addressing the theme (n=22), literature review (n=2), other than oncologic patients (n=6), the reconciliation was made by non-pharmacist (n=4) and articles in Germany (n=2).

47 articles were read fully and 36 were excluded for not meeting the study objectives, not describing discrepancies found in the practice of reconciliation and not responding to the research question. Ultimately, 11 articles were included and discussed in the present study.

Chart 2³¹⁻⁴¹ presents the characteristics of these studies.

USA was the origin country of most of the studies^{32,35,37,39,40} (45.5%; n=5), the years of 2013, 2016 and 2018 concentrated the majority of them (18.2%; n=2)^{33,34}, (27.3%; n=3)³⁵⁻³⁷ and (18.2%; n=2)^{38,39}, respectively in several journals.

The most prevalent study's design was observational (72.7%; n=8)^{31-35,37,40,41}, followed by intervention studies (27.3%; n=3)^{36,38,39}.

Table 1 shows the results in accordance with the research question, study population, types of cancer, MR practice among others.

In all, 1,180 patients were included in the studies with different types of cancer: 27.3% (n=3) of the articles^{34,37,39} addressed only oncology and hematology, one⁴¹ (9.1%), solid tumor or blood cancer and 36.4%, oncologic patients.

The practice of MR occurred in three touch points of the patient transition: hospital admission (27.3%; n=3)^{34,38,41}; hospital discharge (18.2%; n=2)^{37,39} and outpatient follow-up (54.5%; n=6)^{31-33,35,36,40}. These assignments were conducted by pharmacists and/or pharmacy residents/students under pharmacist supervision.

All the articles (100%; n=11)³³⁻⁴¹ adopted the protocols of MR, describing the list of medications the patients were using and addressing the discrepancies encountered.

The main discrepancies found in the process of oncologic MR were defined as: necessity to add unprescribed/omitted medication, duplicate therapies, necessity to withdraw medication, incorrect doses, relevant drug interaction, omissions in prescription, incorrect drugs, incorrect frequencies, incorrect duration of medication therapy and incorrect route of administration³¹⁻⁴¹.

More than one discrepancy can be found in each study, the most common was omission/necessity of addition of one medication for an untreated condition of the patient in 81.5% (n=9)^{32,33,35-41} of the 11 articles, followed by withdrawing one prescribed medication in 54.5% of the studies (n=6)^{33,35,37-40}.

Therapeutic duplicities were reported in the same number of studies (54.5%; n=6)^{32,35,36,38,39,41}, required doses changes^{33,36-38,40,41} and potential drug interactions^{31,32,35,38}.

Less reported discrepancies in some studies^{33,36,38,39,41}: incorrect drugs (27.3%; n=3), incorrect frequencies (18.2%; n=2), incorrect duration of the therapy (18.2%; n=2) and incorrect route of administration (9.1%; n=1).

Chart 1. Search strategies at the databases selected

Databases	PubMed	Web of Science	Scopus	Embase
Search strategies	(Medication Reconciliation [MESH] OR Medication Reconciliation [TW]) AND (Neoplasms [MESH] OR Neoplasms [TIAB] OR Tumor [TIAB] OR Cancer [TIAB]) AND (Pharmacists [MESH] OR Pharmacist* [TIAB] OR Medication Errors [MESH] OR Medication Errors [TIAB])	ALL = (Medication Reconciliation) AND AB = (Neoplasms OR neoplas* OR tumor OR cancer OR oncology) AND ALL = (Pharmacists OR Pharmacist* OR Medication Errors)	TITLE-ABS-KEY ("MEDICATION RECONCILIATION") AND TITLE-ABS-KEY (neoplas* OR tumor OR cancer OR onco*) AND TITLE-ABS-KEY (pharmac* OR "MEDICATION ERRORS") AND DOCTYPE (ar)	('Medication therapy management':ti,ab,kw OR 'Medication Reconciliation':ti,ab,kw) AND (Neoplasms:ti,ab,kw OR 'Malignant Neoplasms':ti,ab,kw OR Oncology:ti,ab,kw) AND (Pharmacist:ti,ab,kw OR 'Hospital pharmacy':ti,ab,kw OR 'Pharmacy service':ti,ab,kw OR 'Medication error':ti,ab,kw) AND [article]/lim

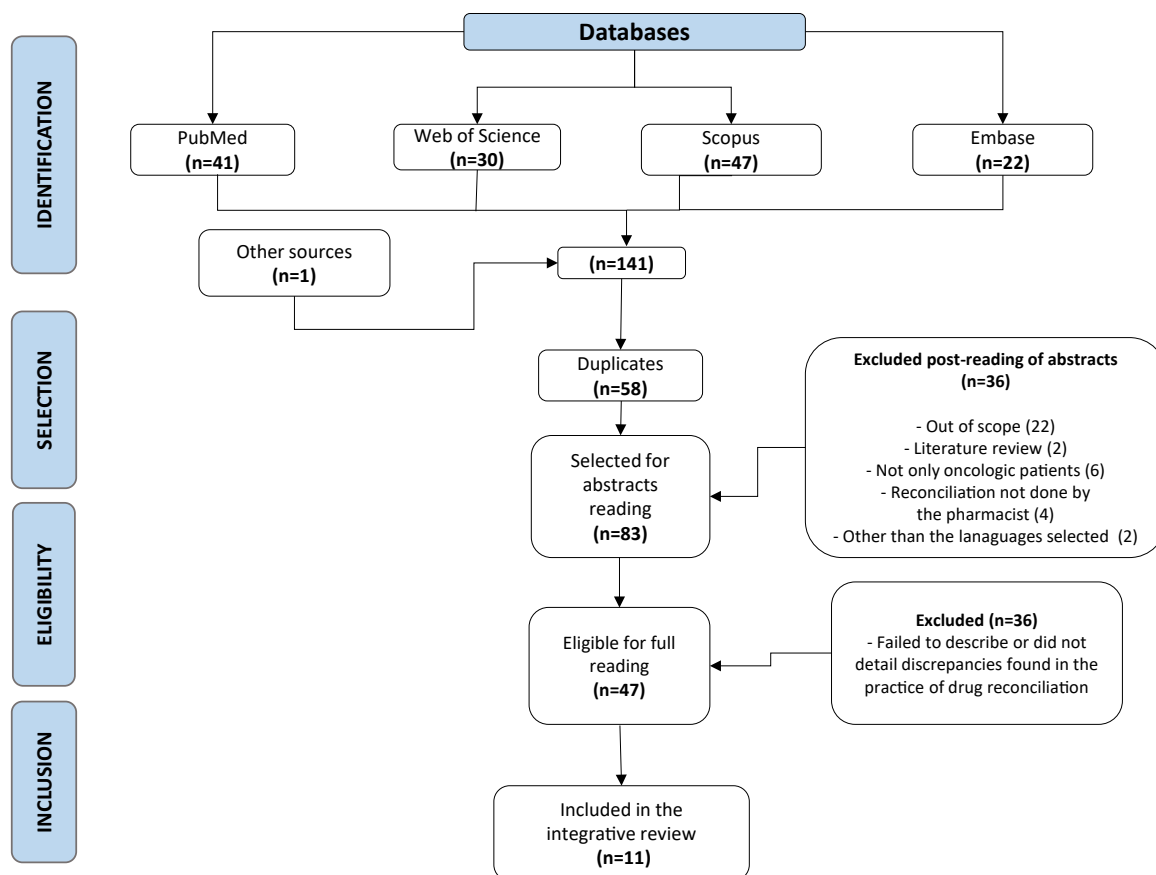


Figure 1. Flowchart of the stages of identification, selection, eligibility and inclusion of articles for integrative review

Figure 2 portrays the main discrepancies found in the studies.

Some of the studies^{31,34,38,39} (36.4%; n=4) detailed the PI carried out, correlating with the discrepancies found in the process of MR and reporting whether they were accepted or not. In the study of Duffy et al.³⁹, there were 111 PI. Of these, 92 (82.9%) were accepted, which can avoid a ME. Other study³⁸ noticed that 64 PI were done in the course of the reconciliation process with 63 (98%) accepted by the prescriber. In a case report³¹ during MR, the pharmacist identified that the patient were in use of medication with potential drug interactions and the intervention was accepted with change of the prescribed medication.

Unlike the study earlier mentioned³¹, when a UD was reported resulting in PI, another article³⁴ detected discrepancies in 120 drugs during MR, most of them were ID (83.3%), 17.7% were UD and all of them were omissions. The authors of this same study³² mentioned that for the PI, the pharmacist contacted the prescriber for 60% of the discrepancies and in 35% the problem was resolved.

A clinical trial³⁶ concluded that reconciliation errors avoided would be only those resulting in PI when the

physician changed the prescription; therefore, these interventions led to a much lower percentage of errors affecting the patient in the intervention group (4% of ME) than in the control group without MR (30% of ME).

Two studies^{35,37} (18.2%) described PI as “pharmaceutical recommendation”. One of them³⁵ correlated these recommendations with the discrepancies found in MR such as: modification of the therapy (carried out in 12%) and discontinuation of the therapy (carried out in 6.9%) but failed to report whether they were accepted. The other study³⁷ reported that the interventions were done to resolve the discrepancies before hospital discharge and the rate of acceptance were 89.7% by Hematology and 78% by Oncology.

Two articles^{32,33} (18.2%) did not separate PI from other terms. One³² describes interventions jointly with discrepancies, not mentioning how many were done or accepted. Another work³³ did not separate as well, categorizing together with medication-related problems but mentions the difficulty in measuring the impact of the clinical activities and detecting discrepancies is part of performance indicators.

Ashjian et al.⁴⁰ (9,1%) mentioned that PI were carried out by physicians in relation to drug interactions, but

Chart 2. Main characteristics and objectives of the studies selected for integrative review (n=11)

Author/Year	Journal	Title	Design	Country	Objective
Mellor and Jayasinghe, 2011 ³¹	J Pharm Pract Res	Drug interactions between anti-epileptics and chemotherapeutic drugs: value of a pre-treatment pharmaceutical review	Descriptive observational study: case report	Australia	To report a potential case of an interaction between antiepileptics and chemotherapeutic drugs
Mancini, 2012 ³²	J Support Oncol	Implementing a standardized pharmacist assessment and evaluating the role of a pharmacist in a multidisciplinary supportive oncology clinic	Observational study	USA	Describe the operational aspects focused to the pharmacist of a multidisciplinary supportive oncology clinic and address the findings and interventions of pharmacists during the first year of operation.
Ho et al., 2013 ³³	Can J Hosp Pharm	Pharmacist's role in improving medication safety for patients in an allogeneic hematopoietic cell transplant ambulatory clinic	Observational study	Canada	To determine the effect on medication safety of, as well as potential barriers to, incorporating a pharmacist in the multidisciplinary team of an allo-HCT clinic.
Lindenmeyer et al., 2013 ³⁴	Rev Bras Farm Hosp Serv Saúde	Medication reconciliation as strategy for oncologic patient safety: results of a pilot-study	Observational study	Brazil	Presents the results of a pilot- study of medication reconciliation at hospital admission of oncohematologic patients in a public hospital of a Brazilian Southern Region
Holle et al., 2016 ³⁵	J Oncol Pract.	Physician-pharmacist collaboration for oral chemotherapy monitoring: Insights from an academic genitourinary oncology practice	Observational study	USA	Define and evaluate the efficacy of a monitoring program of oral chemotherapy conducted by pharmacists
Vega et al., 2016 ³⁶	J Manag Care Spec Pharm	Medication reconciliation in oncological patients: a randomized clinical trial	Intervention study: Randomized clinical trial	Spain	To measure the effect of a medication reconciliation program on the incidence of reconciliation error that reached cancer patients receiving chemotherapy as outpatients.
Bates et al., 2016 ³⁷	Am J Health Syst Pharm	Expanding care through a layered learning practice model	Observational study	USA	Demonstrate a practice model to expand attending pharmacists services (including reconciliation) offered at hospital discharge
Son et al., 2018 ³⁸	Eur J Hosp Pharm	Pharmacist-led interdisciplinary medication reconciliation using comprehensive medication review in gynaecological oncology patients: a prospective study	Intervention study	South Korea	Examine the implementation of a pharmacist-led medication reconciliation program for short-term hospitalized patients and exploring the barriers and benefits and compare pharmacoeconomic analysis of medication returned before and after the implementation
Duffy et al., 2018 ³⁹	Am J Hosp Palliat Care	Facilitating home hospice transitions of care in oncology: evaluation of clinical pharmacists' interventions, hospice program satisfaction, and patient representation rates	Intervention study	USA	Describe the pharmacist interventions utilizing medication reconciliation and evaluate organizational changes of palliative care before and after the implementation of pilot-project at hospital discharge
Ashjian et al., 2015 ⁴⁰	J Am Pharm Assoc	Evaluation of outpatient medication reconciliation involving student pharmacists at a comprehensive cancer center	Observational study	USA	To determine the number of discrepancies and medication-related problems found as a result of pharmacy-led medication reconciliation involving introductory pharmacy practice experience students and outpatient oncologic patients in chemotherapy
Moghli et al., 2021 ⁴¹	J Oncol Pharm Pract	Medication discrepancies in hospitalized cancer patients: Do we need medication reconciliation?	Observational study	Jordan	Identify and point out the number and types of medication discrepancies among hospitalized cancer patients

Table 1. Results, conclusions and outcomes of the articles selected for integrative review (n=11)

Author/year	Study population	Types of cancer	Results (discrepancies and interventions)	Conclusions and outcomes
Mellor and Jayasinghe, 2011 ³¹	24-year-old oncologic female patient (n=1)	Rapidly progressing metastatic rhabdomyosarcoma	<ul style="list-style-type: none"> • Treated with the ARST0431 protocol (vincristine, irinotecan, cyclophosphamide, iphosphamide, doxorubicin, etoposide and actinomycin-D); during medication reconciliation, the pharmacist identified that the patient was also taking carbamazepine, a potent inducer of cytochrome P450 (CYP) enzymes, for left-sided focal epilepsy • The pharmacist's intervention resulted in carbamazepine switched to levetiracetam, a non-enzyme inducing antiepileptic and avoiding the potential interaction. 	Highlights the value of clinical pharmacist undertaking medication reconciliation prior to the start of chemotherapy
Mancini, 2012 ³²	Oncologic patients in palliative care (n=75)	Breast, colorectal, gastrointestinal tract, gynecological, head and neck, kidneys, leukemia, liver, lung, lymphoma, myeloma, pancreas and prostate	<ul style="list-style-type: none"> • Discrepancies and problems found in reconciliation: <ul style="list-style-type: none"> - Untreated conditions/additions (73.3% of the patients) - Duplicate therapies (46.7% of the patients) - Drug interactions (44% of the patients) - Lack of efficacy (94.7% of the patients) - Side effects (74.7% of the patients) 	Pharmacists are uniquely trained in medication therapy management and a thorough medication therapy review has been shown to assist other disciplines in their own assessments
Ho et al., 2013 ³³	Patients submitted to transplantation for less than 3 months (n=35)	Leukemia, myelomas and lymphomas	<ul style="list-style-type: none"> • 50 discrepancies found in reconciliation • 19 intentional • 21 unintentional and 10 undocumented intentional • Unintentional - 95% significant: <ul style="list-style-type: none"> - Omission (10) - Drug prescribed and not in use (2) - Incorrect dosage (8) - Incorrect frequencies (6) - Incorrect duration of the therapy (4) - Incorrect drug (2) - Discrepancy involving wrong dosage and frequency (1) 	This study has shown that a pharmacist working as part of the multidisciplinary team can improve medication safety for patients in the allo-HCT clinic
Lindenmeyer et al., 2013 ³⁴	Hematology and Oncology patients at admission (n=72)	Oncology and hematology	<ul style="list-style-type: none"> • 227 drugs reconciled • 52.9% discrepancies (120 drugs) • 83.3 % intentional discrepancies: <ul style="list-style-type: none"> • 20 (17.7%) unintentional discrepancies All of them as omission of continuous use medication Interventions: <ul style="list-style-type: none"> • In 60% of the cases, the prescriber was informed • In 35% of the cases, the problem was resolved 	Showed that the strategy proposed was able to identify a significant percentage of discrepancies bringing the pharmacist close to the health team and reinforcing the importance of this routine in the institution
Holle et al., 2016 ³⁵	Adult males with metastatic prostate or renal cancer in outpatient oral chemotherapy (n=20)	Prostate and renal cancers	<ul style="list-style-type: none"> • Discrepancies related to reconciliation: <ul style="list-style-type: none"> - Additions/review of drug therapy (20) - Drug interactions (5) - Unnecessary drug (3) - Duplicate therapy (1) 	Implementation of oral chemotherapy monitoring programs upholds the concept of a multidisciplinary approach including the pharmacist and aims to improve the communication among healthcare professionals

to be continued

Table 1. continuation

Author/year	Study population	Types of cancer	Results (discrepancies and interventions)	Conclusions and outcomes
Vega et al., 2016 ³⁶	Oncologic patients ≥ 8 years-old who started chemotherapy or were transferred to outpatient environment Intervention (n=76) Control (n=71)	Colorectal, lung, breast, head and neck, stomach, esophageal, cervix, pancreas, sarcoma, other, ovary and bladder	<ul style="list-style-type: none"> • Reconciliation errors affecting the patient: <ul style="list-style-type: none"> - 3 (4%) in intervention group - 21 (30%) in control group - Reduction of incidence of 26% • Most common discrepancies: <ul style="list-style-type: none"> Interaction (94.3%), duplicity (3.4%), omission (1.1%) and dosage/frequency (1.1%) 	Strengthens the necessity of drugs reconciliation programs for patients with cancer because the proportion of errors found in this process is similar to those found in other populations
Bates et al., 2016 ³⁷	Patients in hematology or oncologic services discharged during the study period (n=120: 42 Hematology; 78 Oncology)	Oncology and hematology	<ul style="list-style-type: none"> • Main discrepancies: <ul style="list-style-type: none"> - Additions (24) - Discontinue unnecessary medication (17) - Very low dosage (4) - Very high dosage (2) - Pharmaceutical recommendations accepted by the team: 89.7% by hematology and 78% by oncology 	Results support the development of patient-centered learning practice and is an opportunity for experimental education in pharmacy, integrating students in clinical functions and expansion of the services of pharmacist consultations
Son et al., 2018 ³	Oncologic patients ≥ 19 years-old admitted at an oncologic gynecologic clinic (n=95)	Ovary, cervical, endometrium, peritoneal, fallopian tube and other cancers	<ul style="list-style-type: none"> • 64 interventions during medication reconciliation • 63 (98%) were accepted by the physicians • The interventions included: <ul style="list-style-type: none"> - Correction of the duration of the treatment (53.1%) - Addition of medications for untreated conditions (28.1%) - Correct selection of medication (7.8%) - Discontinue duplicate therapies (6.3%) - Correction of dose, alternatives for drug interactions, unintentional omissions (1.6%) 	Medication reconciliation improved safe use of medications, prevented medication waste and reduced health-related costs
Duffy et al., 2018 ³⁹	Oncologic patients ≥ 18 years in palliative care, any type of cancer with readiness for hospital discharge, pre-implementation/control group (n=15), post-implementation/intervention group (n=12)	Oncology and hematology	<p>Post-implementation period:</p> <ul style="list-style-type: none"> • 111 interventions in reconciliation • 92 (82.9%) accepted • Discrepancies resulting in pharmaceutical interventions: <ul style="list-style-type: none"> - Medication discontinuation (60 and 51 accepted) - Add medication therapy (40 and 32 accepted) - Duplicate therapies (3 and 3 accepted) - Change of route of administration (7 and 6 accepted) 	Promising results supporting pharmacist's interventions in oncologic patients transitioning from hospital discharge to home
Ashjian et al., 2015 ⁴⁰	Oncologic patients ≥ 18 years who completed medication reconciliation in the study period (n=510)	Breast cancer, multiple myeloma, colorectal cancer, sarcoma, pancreatic cancer and leukemia	<ul style="list-style-type: none"> • 88% with at least 1 discrepancy <ul style="list-style-type: none"> - Prescribed medications already discontinued (62.1%) - Additions (61.5%) - Required dose changes (55.7%) - Addition of phytotherapeutic medication (13.1%) 	Need for medication reconciliation to occur at every touch point and importance of pharmacy students (opportunity of apprenticeship)

to be continued

Table 1. continuation

Author/year	Study population	Types of cancer	Results (discrepancies and interventions)	Conclusions and outcomes
Moghli et al., 2021 ⁴¹	Oncologic patients ≥ 18 years admitted more than 48 hours in use of at least 3 medications prior to admission (n=78)	Solid tumor or blood	<ul style="list-style-type: none"> • 78 charts reviewed - 166 discrepancies identified • 110 (66.3%) unintentional • Most common unintentional discrepancies: <ul style="list-style-type: none"> - Omission (65.1%) - Additions (14.7%) - Wrong medication (11%) - Wrong dose (8.3%) - Duplicate medication (0.9%) • Most of the discrepancies ranged between low to moderate in severity • 56 (33.7%) were intentional undocumented discrepancies (documentation errors) 	Cancer patients are critically ill, and therefore more effort should be made towards implementing medication reconciliation services in their treatment plan

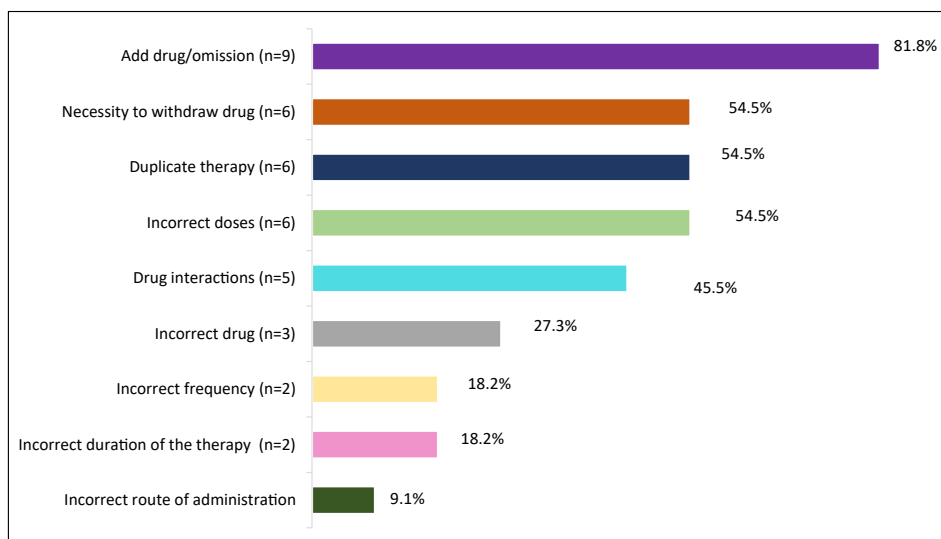


Figure 2. Main discrepancies found in the articles included in the review (x) number of studies in % (n=11; 100%)

these are not quantified or described in the article and referred the necessity of additional studies to determine the clinical impact of reducing ME in oncologic patients.

Another article⁴¹ did not mention the PI done, it only identified and classified the discrepancies.

Of the articles which did not detail the PI but highlight whether the discrepancies were intentional or unintentional, one of them³³ which detected 50 discrepancies, 21 were UD and ten, undocumented. 9.5% of them were UD classified as significant and able to impact the clinic by a clinical staff formed by physicians, nurses and pharmacists. Another study⁴¹ demonstrated that of 78 charts reviewed, 166 discrepancies were found, 110 (66.3%) were UD.

The benefits the practice of MR can bring to the oncologic patient are quite clear in the studies, mainly of intervention which addressed two groups of patients with significant improvement in the organization of the care. Three (4%) reconciliation errors affecting the patient in the intervention group and 21 (30%) in the control group were addressed in a clinical trial³⁶ reinforcing the necessity of implementing MR in patients with cancer because the proportion of errors found in this process is similar to those detected in other patients^{36,39}.

The studies concluded that the process of MR in oncology is important for the transition of the patient through every step of care in different time points: hospital admission (three studies^{34,38,41}), hospital discharge

(two studies^{37,39}), outpatient and before intravenous chemotherapy (one study³¹) and in outpatient through pharmacotherapeutic follow-up (five studies^{32,33,35,36,40}).

All the studies showed positive conclusions and outcomes of MR.

DISCUSSION

In the process of MR, UD are considered ME. Well-structured pharmacy services¹⁷ can possibly avoid errors which can damage the quality of the patient's care. The main discrepancies of the process of MR found in the review (oncologic population) were compared with the literature for another patients.

The main discrepancy of MR was the necessity of adding a medication due to omission^{32,33,35-41} which can cause discontinuation of the required treatment and damages to the patient^{30,42,43}. The literature upholds this conclusion based in similar results found in other populations of patients⁴⁴⁻⁴⁸.

A study conducted in a community pharmacy⁴⁹ reported that most of the discrepancies belonged to the inactive medication category, a problem that can be easily resolved with MR if a regular history of the patients' medication is in place. Similar to the studies reviewed, ME refer to non-withdrawal of an unnecessary/unprescribed/inadequate drug⁵⁰.

Dose-related discrepancy often mentioned in the studies was also found in some studies where pharmacists made MR^{49,51-53}. In one of them⁴⁹ with cardiology patients, UD of dose accounted for 20%, behind only drug omission; the same pattern was detected in the study of Anacleto et al.⁵⁰, in an internal medicine service, showing that this discrepancy is one of the four most documented, also behind omission, analogous to another study⁵⁴ at the admission of a tertiary hospital.

Discrepancies about therapeutic duplicities and drug interactions detected in some studies^{31,32,35,36,38,39,41} were also the most frequent according to the literature^{55,56}. In one of them⁵⁵, MR was made with orthopedic patients at hospital discharge.

The importance of electronic medical charts was discussed in an article⁵⁷ about MR, because it offers updated information with prompt identification of discrepancies as duplicate therapies and drug interaction. The most frequent types of discrepancies were drug interaction and omission followed by therapeutic duplicity, frequency and dose revealed in a study⁵⁵ with surgical patients, similar to the current review.

The majority of the articles revealed that 75% and 92.6% of the PI were accepted by the prescribers in concurrence with the literature^{54,58}. Another study

addressed the reconciliation of patients submitted to renal transplantation⁵⁹ where 72% of PI were accepted by the medical team and another study with patients admitted in neurology outpatient had an acceptance rate of 79.2%. An article described the MR in a cardiology service⁵⁰ where 117 discrepancies were detected, 50.4% of which were UD. The reconciliation with older adults in a study⁵⁴ has initially concluded 62% of UD, similar to another integrative review with 166 discrepancies detected and 110 (66.3%) of the type unintentional.

One publication³⁴ affirms that the prescriber was notified about the interventions made in 60% of the situations and in 35% the problem was resolved, similar to a study⁶¹ with patients admitted in orthopedics and neurology in a teaching hospital where 30.6% of the PI in the process of MR were accepted.

The literature still reinforces that the stages of the reconciliation is a process that must be implemented in every care setting from admission through internal transference and discharge⁶².

The importance of having a pharmacist in the multiprofessional team for the practice of reconciliation was emphasized in the studies reviewed. Pharmacy students making the reconciliation described in some studies^{37,40} adds value to hospital routine and formation of the clinical background.

The review detected the importance and necessity of applying the practice in every transition point, in addition to the opportunity of apprenticeship and clinical experience it brings to the professional in formation and the inclusion of the pharmacist in the multiprofessional team and its value in caring for the oncologic patient³¹⁻⁴¹.

Difficulties of characterization and definition of the discrepancies in the reconciliation process are mentioned as limitations because the terms are not standardized and the same definition eventually is repeated with different words. Similar to what occurs with PI described in some articles^{35,37} as "pharmaceutical recommendations". An additional limitation was that few articles detailed or made interventions, some of them emphasized only the detection of discrepancies and others did not separate interventions from discrepancies, creating doubts whether they were made or not. Likewise, if the acceptance or not of the interventions is not described, it is difficult to evaluate MR and assess the actual clinical impact in reducing ME. Additionally, the correlation of the results is hampered when it is not clear if the discrepancies encountered are intentional or not.

Similarly to other populations of patients, the practice of MR in oncology is still challenging in concurrence with the literature about limitations found in clinical activities; innumerous hurdles need to be surpassed as

lack of standardization of the process itself, poor IT to integrate data from other levels of care and inadequate human resources⁴⁸.

CONCLUSION

The studies reviewed suggest the practice of MR as strategic tool with potential to detect prescriptions' discrepancies in the critical touch points for the patient and likely reduce possible ME and potential risks for the oncologic patient.

Data found are similar to the literature's for patients of different non-oncologic populations, considering the complexity of the disease and the medications the patient uses in addition to the necessity of more studies involving MR, detection of discrepancies and oncology-related PI.

The results corroborate the necessity of additional more robust studies to identify and classify the discrepancies and mainly, detailed oncological PI. So far, studies addressing this theme in oncology are still scarce and, when existing, present incomplete methodologies for being a recent practice with novel background. In addition, they could emphasize the importance of the pharmacist in MR. Eventually, it is a beneficial clinical practice for oncologic patients and pharmacists as healthcare professionals should be guided to develop strategies to reduce medication errors, among them, to structure MR in clinical practice of oncologic patients.

CONTRIBUTIONS

All the authors contributed for the study conception and/or design, acquisition, analysis and interpretation of the data, wording and critical review. They approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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