

Analysis of clinical decision support systems for deprescribing in polymedicated older adults in Primary Health Care: a scoping review

Análise dos sistemas de apoio à decisão clínica para desprescrição em idosos polimedicados na Atenção Primária à Saúde: uma revisão de escopo

Análisis de los Sistemas de Apoyo a la Decisión Clínica para la desprescripción en adultos mayores polimedicados en Atención Primaria de Salud: una revisión de alcance

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Abstract

Introduction: Polypharmacy may lead to risks such as adverse events and drug–drug interactions, particularly among older adults. Deprescribing has emerged as a structured strategy to optimize medication use in polymedicated older individuals, aiming to improve patient-specific outcomes. In this context, clinical decision support systems (CDSS) are used as tools to assist in identifying potentially inappropriate medications and drug interactions, thereby facilitating deprescribing in Primary Health Care (PHC). **Objective:** To map and analyze CDSS used for deprescribing medications in polymedicated older adults receiving care in PHC, assessing the impact of these tools on quality of care and patient safety. **Methods:** A scoping review was conducted, with a protocol registered in the Open Science Framework (10.17605/OSF.IO/5Q37V), following the Joanna Briggs Institute (JBI) manual and the PRISMA Extension for Scoping Reviews. Search strategies used keywords covering DeCS/MeSH terms across Scopus, PubMed, and LILACS, as well as related terms in EMBASE's Emtree, within the last 10 years. Inclusion and exclusion criteria were applied to select relevant studies, with article selection conducted independently by two reviewers. Data were extracted and analyzed qualitatively, identifying the CDSS used, as well as the results and conclusions of the included studies. **Results:** Of the 198 initial records, 117 titles and abstracts were screened, resulting in the inclusion of 7 publications. The included studies showed a diversity of research designs, predominantly randomized clinical trials. Six CDSS were identified, employing various approaches such as computerized alerts, decision-support reports, and outcome prioritization tools. Most tools were based on criteria addressing potentially inappropriate medications for older adults. **Discussion:** CDSS show potential to improve medication management in older adults; however, they face challenges such as limited integration with electronic health records and barriers to the adoption of information and communication technologies. Despite these limitations, the tools demonstrated benefits in reducing polypharmacy and improving patients' quality of life. **Conclusions:** This review highlighted the need for greater efforts in implementing and improving CDSS in PHC, as well as the necessity for further research to develop tools that enhance care for polymedicated older populations. The findings provide support for guiding policies and clinical practices aimed at improving the safety and effectiveness of treatment for older adults in PHC.

Keyword: Decision support systems, clinical; Deprescriptions; Aging; Health of the elderly; Primary health care.

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Resumo

Introdução: A polifarmácia pode acarretar riscos como eventos adversos e interações medicamentosas, sobretudo em pessoas idosas. A desprescrição surge como uma estratégia organizada para otimizar os medicamentos em idosos polimedicados, visando melhorar resultados específicos para o paciente. Nesse contexto, os Sistemas de Apoio à Decisão Clínica (SADC) surgem como ferramentas de auxílio na identificação de medicamentos inapropriados e interações medicamentosas, facilitando a desprescrição na Atenção Primária à Saúde (APS). **Objetivo:** Mapear e analisar os SADC utilizados na desprescrição de medicamentos em idosos polimedicados assistidos na APS, avaliando o impacto dessas ferramentas na qualidade da assistência e na segurança do paciente. **Métodos:** Revisão de escopo com protocolo registrado no Open Science Framework (10.17605/OSF.IO/5Q37V), seguindo o manual do Joanna Briggs Institute (JBI) e a ferramenta *Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Extension for Scoping Reviews*. As estratégias de busca utilizaram palavras-chave abrangendo os termos DeCS/MeSH (Descritores em Ciências da Saúde / *Medical Subject Headings*) nas bases *Scopus*, *PubMed* e Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), além de termos correlatos no Emtree do *Embase*, em um recorte dos últimos 10 anos. Os critérios de inclusão e exclusão foram aplicados para selecionar os estudos relevantes, com a escolha dos artigos sendo conduzida por dois avaliadores de forma independente. Os dados foram extraídos e analisados qualitativamente, identificando os SADC utilizados, seus resultados e conclusões dos estudos incluídos. **Resultados:** Dos 198 registros iniciais, 117 títulos e resumos foram avaliados, resultando na inclusão de 7 publicações na revisão. Os estudos incluídos apresentaram uma diversidade de métodos de pesquisa, predominantemente ensaios clínicos randomizados. Foram identificados seis SADC, com diversas abordagens, como alertas computadorizados, relatórios de suporte à decisão e priorização de resultados. A maioria das ferramentas tinha embasamento em critérios sobre medicamentos potencialmente inapropriados para idosos. **Discussão:** Os SADC apresentam potencial para melhorar o manejo medicamentoso em idosos, mas enfrentam desafios como a falta de integração com registros eletrônicos de saúde e a adoção de tecnologias de informação e comunicação. Apesar disso, as ferramentas mostraram benefícios na redução da polifarmácia e na melhoria da qualidade de vida dos pacientes. **Conclusões:** A revisão destaca a importância de mais esforços na implantação e no aprimoramento dos SADC na APS, além da necessidade de pesquisas adicionais para desenvolver ferramentas que melhorem a assistência à população idosa em polifarmácia. Os resultados fornecem subsídios para orientar políticas e práticas clínicas voltadas para a segurança e eficácia do tratamento em idosos na APS.

Palavras-chave: Sistemas de apoio a decisões clínicas; Desprescrições; Envelhecimento; Saúde do idoso; Atenção primária à saúde.

Resumen

Introducción: La polifarmacia puede conllevar riesgos como eventos adversos e interacciones medicamentosas, especialmente en personas mayores. La desprescripción aparece como una estrategia organizada para optimizar la medicación en adultos mayores polimedicados, con el objetivo de mejorar resultados específicos para el paciente. En este contexto, los Sistemas de Apoyo a la Decisión Clínica (SADC) surgen como herramientas para ayudar a identificar medicamentos inapropiados e interacciones farmacológicas, facilitando la desprescripción en la Atención Primaria de Salud (APS). **Objetivo:** Mapear y analizar los SADC utilizados en la desprescripción de medicamentos en personas mayores polimedicadas atendidas en Atención Primaria de Salud, evaluando el impacto de estas herramientas en la calidad asistencial y la seguridad del paciente. **Métodos:** Revisión de alcance con un protocolo registrado en Open Science Framework (10.17605/OSF.IO/5Q37V), siguiendo el manual del Joanna Briggs Institute (JBI) y la herramienta PRISMA Extension for Scoping Reviews. Las estrategias de búsqueda utilizaron palabras clave que cubren los términos DeCS/MeSH en las bases de datos Scopus, PubMed y LILACS, además de términos relacionados en Emtree de EMBASE, que cubren los últimos 10 años. Se aplicaron criterios de inclusión y exclusión para seleccionar estudios relevantes, y la elección de los artículos fue realizada por dos evaluadores de forma independiente. Los datos se extrajeron y analizaron cualitativamente, identificando los SADC utilizados, sus resultados y conclusiones de los estudios incluidos. **Resultados:** De los 198 registros iniciales, se evaluaron 117 títulos y resúmenes, resultando en la inclusión de 7 publicaciones en la revisión. Los estudios incluidos presentaron una diversidad de métodos de investigación, predominantemente ensayos clínicos aleatorios. Se identificaron seis SADC, con diferentes enfoques, como alertas computarizadas, informes de apoyo a las decisiones y priorización de resultados. La mayoría de las herramientas se basaron en criterios relacionados con medicamentos potencialmente inadecuados para las personas mayores. **Discusión:** Las SADC tienen el potencial de mejorar la gestión de medicamentos en las personas mayores, pero enfrentan desafíos como la falta de integración con los registros médicos electrónicos y la adopción de tecnologías de la información y la comunicación. A pesar de esto, las herramientas mostraron beneficios al reducir la polifarmacia y mejorar la calidad de vida de los pacientes. **Conclusiones:** La revisión destaca la importancia de mayores esfuerzos en la implementación y mejora de la SADC en la APS, además de la necesidad de investigaciones adicionales para desarrollar herramientas que mejoren la atención a la población adulto mayor en polifarmacia. Los resultados brindan apoyo para orientar políticas y prácticas clínicas orientadas a la seguridad y eficacia del tratamiento en personas mayores en APS.

Palabras-clave: Sistemas de apoyo a decisiones clínicas; Deprescripciones; Envejecimiento; Salud del anciano; Atención primaria de salud.

INTRODUCTION

Population aging is a global phenomenon that poses substantial challenges to healthcare systems. With increasing life expectancy, the prevalence of chronic diseases has also risen markedly, leading to the

frequent use of multiple medications among older adults, a phenomenon known as polypharmacy. In the literature, several definitions of polypharmacy exist; however, in the elderly population, the most widely adopted criterion defines it as the concurrent use of five or more medications.¹⁻³

Globally, the prevalence of polypharmacy is higher among individuals aged ≥ 65 years⁴ with estimates as low as 4% among community-dwelling older adults.⁵ In Brazil, the estimated prevalence of polypharmacy among older adults is 13.5%⁶, and it is commonly observed in primary health care (PHC) clinical practice. This pattern results from the prescription of medications for the management of multiple chronic conditions, thereby increasing the risk of adverse events, reduced treatment adherence, and harmful drug interactions.⁷

In this context, deprescribing emerges as a structured process, supervised by healthcare professionals, aimed at discontinuing or reducing medications in order to improve specific patient outcomes, while taking into account overall health status, life stage, and treatment goals.⁸ In the context of deprescribing among polymedicated older adults, certain tools may support the identification of potentially inappropriate medications, drug–drug interactions, and strategies for reducing polypharmacy.

Selecting the most effective interventions to ensure appropriate polypharmacy remains a challenge for healthcare professionals and organizations. In this context, Clinical Decision Support Systems (CDSS) emerge as tools to facilitate safer decision-making, providing support to healthcare professionals through a range of computerized and non-computerized tools and interventions.⁹

Clinical decision support systems are characterized as essential tools for information management in clinical practice.⁹ Accordingly, they are technological resources that provide evidence-based information to support healthcare professionals in clinical decision-making.¹⁰

This study aimed to conduct a scoping review to map and analyze CDSS tools used in medication deprescribing among polymedicated older adults in PHC, as well as to evaluate the impact of these tools on quality of care and patient safety.

The relevance of this review lies in its potential to provide insights into the range of clinical decision support tools for deprescribing, as well as to identify their applications, challenges, and opportunities for implementing these strategies in primary care.

METHODOLOGY

This scoping review examined the available national and international literature to identify scientific production in public health addressing CDSS for medication deprescribing among polymedicated older adults within the context of PHC.

The methodological framework adopted for this review was based on the Joanna Briggs Institute (JBI) manual.¹¹ A research protocol was developed and registered on the Open Science Framework (OSF) platform under the identifier 10.17605/OSF.IO/5Q37V.¹² The bibliographic search was conducted in March 2024 across the PubMed, Latin American and Caribbean Health Sciences Literature (*Literatura Latino-Americana e do Caribe em Ciências da Saúde* – LILACS), Virtual Health Library (VHL), Scopus, and Embase databases, considering publications from the past 10 years.

The PCC strategy was used to formulate the research question: “How are CDSS applied in the deprescribing of medications among polymedicated older adults receiving care in PHC?” In this framework, “P” corresponds to polymedicated older adults in Primary Health Care; “C” to the concept under investigation (the use of CDSS for medication deprescribing); and the second “C” to the context (the impact on the quality of care and safety of polymedicated older adults in PHC).

The reporting of results will follow the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Extension for Scoping Reviews.¹³ The search strategies were developed using a combination of keywords structured according to the PCC acronym, incorporating DeCS/MeSH terms in Scopus, PubMed, and LILACS, and corresponding terms based on the Emtree thesaurus in Embase. Accordingly, Chart 1 presents the search strategies by database, along with the number of records identified. For this study, the following inclusion criteria were adopted:

Chart 1. Search strategies and total number of studies identified by database.

Database	Search strategy	No. Of studies
LILACS/BVS	(Decision Support Systems Clinical) AND (Deprescriptions) OR (POLYPHARMACY) AND (aged) OR (aging) OR (Health of the Elderly) AND (Primary Health Care) OR (primary care)	50
PubMed	((("decision support systems, clinical"[MeSH Terms] OR ("decision"[All Fields] AND "support"[All Fields] AND "systems"[All Fields] AND "clinical"[All Fields]) OR "clinical decision support systems"[All Fields] OR "decision support systems clinical"[All Fields]) AND ("polypharmacy"[MeSH Terms] OR "polypharmacy"[All Fields] OR ("deprescriptions"[MeSH Terms] OR "deprescriptions"[All Fields] OR "deprescription"[All Fields])) AND ("aged"[MeSH Terms] OR "aged"[All Fields] OR ("aging"[MeSH Terms] OR "aging"[All Fields] OR "ageing"[All Fields]) OR ((("health"[MeSH Terms] OR "health"[All Fields] OR "health s"[All Fields] OR "healthful"[All Fields] OR "healthfulness"[All Fields] OR "healths"[All Fields]) AND ("aged"[MeSH Terms] OR "aged"[All Fields] OR "elderly"[All Fields] OR "elderlies"[All Fields] OR "elderly s"[All Fields] OR "elderlys"[All Fields])))) AND ("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields])) AND (y_10[Filter])	45
Embase	('decision support systems clinical'/exp OR 'decision support systems clinical' OR (('decision'/exp OR decision) AND ('support'/exp OR support) AND systems AND ('clinical'/exp OR clinical))) AND ('polypharmacy'/exp OR polypharmacy OR 'deprescriptions'/exp OR deprescriptions) AND ('aged'/exp OR aged OR 'aging'/exp OR aging OR 'health of the elderly' OR (('health'/exp OR health) AND of AND the AND ('elderly'/exp OR elderly))) AND ('primary health care'/exp OR 'primary health care' OR 'primary care'/exp OR 'primary care') AND [2014-2024]/py	48
Scopus	(TITLE-ABS-KEY (decision AND support AND systems AND clinical) AND TITLE-ABS-KEY (polypharmacy) OR TITLE-ABS-KEY (deprescriptions) AND TITLE-ABS-KEY (aged) OR TITLE-ABS-KEY (aging) OR TITLE-ABS-KEY (health AND of AND the AND elderly) AND TITLE-ABS-KEY (primary AND health AND care) OR TITLE-ABS-KEY (primary AND care)) AND PUBYEAR > 2013 AND PUBYEAR < 2025	55

Source: authors (2024).

- studies addressing the use of CDSS as a technological tool for deprescribing in polymedicated older adults in PHC, including primary care clinics, medical offices, community health centers, or similar settings; studies describing the impact of CDSS on the quality of care and safety of polymedicated older patients, based on the concept of the routine and concomitant use of five or more medications by a patient;
- studies providing evidence-based guidelines or recommendations for deprescribing in older adults in Primary Health Care; studies published in the last 10 years;
- studies available in English, Portuguese, or Spanish; with full-text availability.

The following were excluded: studies that did not address older adults with polypharmacy; studies not available in the specified languages; studies not related to the context of PHC; studies that did not provide relevant data on the impact of CDSS on the quality of care and safety of older adults using multiple medications; and, finally, scoping reviews, systematic reviews, study protocols, letters to the editor, theses, and dissertations were not considered for analysis.

Article selection was conducted independently by two reviewers and subsequently assessed by a third reviewer, in accordance with the established inclusion and exclusion criteria. After the removal of duplicates, the screening process was performed through the evaluation of titles and abstracts using the Rayyan QCRI15 bibliographic management platform.¹⁴

For data extraction, a spreadsheet was developed to include the following information: author(s), journal/country, year of publication, objective, study design, population, method, and main results — in accordance with the classification proposed by JBI. The data were extracted and analyzed qualitatively to identify the clinical decision support systems used to support deprescribing, as well as the results obtained and the main conclusions of the included studies. The methodological quality of the studies was not assessed, in line with JBI guidelines.¹¹

The results were synthesized and presented in an objective and structured manner, identifying the most frequently used CDSS and their impacts within the described context. Based on these findings, the discussion is subsequently developed in alignment with the study objectives, considering the existing literature and available clinical guidelines.

RESULTS

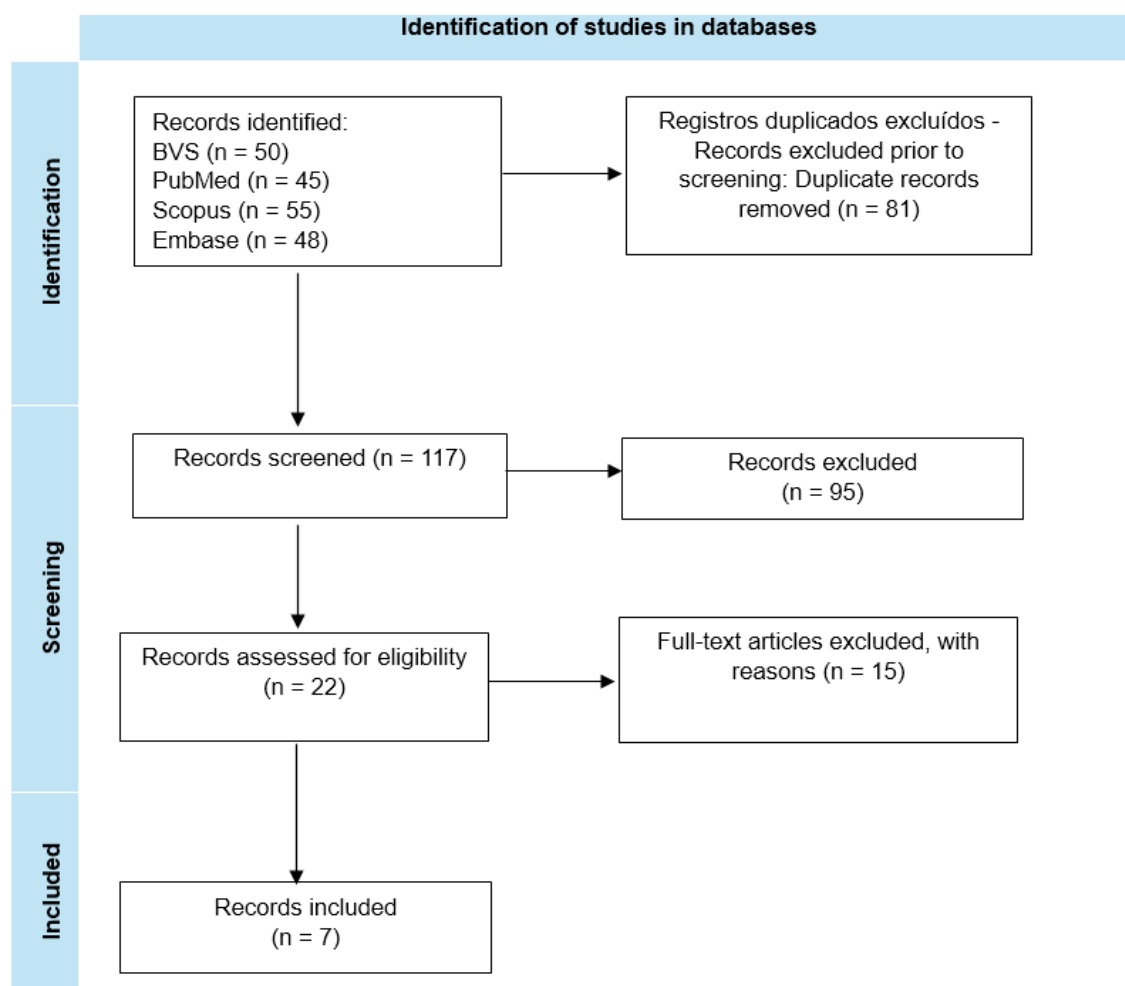
From an initial total of 198 records, 117 titles and abstracts were evaluated after the removal of duplicates. At the end of the selection process, seven publications were included in this scoping review, as illustrated in the flowchart (Figure 1).

During the screening phase, qualitative analysis led to the exclusion of studies for the following reasons: failure to characterize the use of CDSS; absence of a Primary Health Care context; classification as systematic reviews; lack of a defined research protocol; and inclusion of systems that had not yet been implemented.

In Chart 2, the articles included in the review are presented according to title, authorship, journal, country, year, objectives, study population, methods, type of intervention, and main findings. The analysis of the seven included studies reveals a diversity of research methods employed to address different aspects of the topic under investigation. Specifically, four randomized controlled trials, one pilot study, one quasi-experimental study, and one qualitative study with characteristics of participatory action research were identified.

Graphic 1 presents the distribution of included studies according to the type of CDSS identified. A higher frequency of tools based on structured reports for clinical decision support is observed, followed by systems that combine computerized alerts and reports, while only one study used alerts in isolation. Some studies incorporated outcome prioritization tools, indicating the importance of patient-centered approaches.

Graphic 2 presents the frequency of the main outcomes assessed by clinical decision support tools in the studies included in the review, highlighting the most frequently investigated impacts of these interventions within the context of Primary Health Care.



Source: authors, based on *PRISMA*. 2024.

Figure 1. Flowchart of study selection.

Outcomes related to prescription appropriateness, reduction in the number of medications, and the identification of potentially inappropriate prescriptions predominate, indicating that most tools are focused on optimizing the pharmacotherapeutic regimen. Additional outcomes, such as improvements in quality of life, reductions in healthcare costs, and decreased prescription omissions, were assessed less frequently, suggesting gaps in the evaluation of broader, patient-centered effects.

Most of the included publications reported that their tools were based on pre-existing criteria for Potentially Inappropriate Medications for Older Adults (PIMs). Among the identified criteria, the following distribution was observed: Beers¹⁵(1); START-STOPP^{16,17}(2); Beers and STOPP¹⁸(1); Beers and START-STOPP¹⁹(1); and EU(7)-PIM²⁰(1). Only one study²¹ did not report the use of pre-existing PIM criteria as a basis.

Chart 3 presents the identified CDSS, their characteristics, and the impact of their application in the reviewed studies

In this review, the tools described are based on three main lines of action: the generation of computerized alerts (CA), the provision of reports to support clinical decision-making, and the prioritization of outcomes. One study¹⁵ identified a tool operating exclusively within the first line, generating CA. The second line was used exclusively in two studies.^{18,19} Furthermore, two studies^{20,21} described tools that simultaneously generate CA and reports. In the third line, two additional studies^{16,17} were identified,

in which outcome prioritization tools assist patients and healthcare professionals in prioritizing different health outcomes based on individual preferences and needs.

DISCUSSION

The increasing proportion of older adults in the population necessitates the review and adaptation of public health policies, particularly those related to medication use. This demographic shift is associated with greater demand for access to health services and more continuous pharmacological monitoring.²²

Chart 2. Synoptic panel characterizing the included articles.

Authors	Journal/ country/ year	Objetivo	Population	Methods	Type of intervention	Main results
Alagiakrishnan et al. ¹⁵	Clin Interv Envelhe- cimento Canada 2016	To develop clinically acceptable medication management alerts and integrate them into an outpatient electronic health record, aiming to implement Seniors Medication Alert and Review Technologies (SMART) tools while minimizing workflow disruption and maximizing clinician attention.	Primary care physicians responsible for older adults (≥65 years) in two clinics, a population at higher risk of polypharmacy, inappropriate medication use, and increased healthcare costs.	Qualitative study with participatory action research characteristics. Application of modified 2012 Beers Criteria and Cockcroft-Gault estimated glomerular filtration rate (eGFR).	The SMART intervention was implemented in primary care and geriatric specialty clinics. Passive (chart messages) and active (order-entry alerts) notifications flagged potentially inappropriate medications, reduced eGFR, and the need for medication adjustments.	Subjective data analysis indicated that most clinicians considered the CDSS timely during care, with modest time impact and no disruption to workflow. However, concerns remained regarding clinician accountability and liability.
Jungo et al. ¹⁶	Socio- Economic Planning Sciences Switzerland 2024	To evaluate the cost-effectiveness of a medication review intervention based on an electronic Clinical Decision Support System (eCDSS) to improve general practitioners' performance.	Older adults (≥65 years) with ≥3 chronic conditions and ≥5 medications. A total of 160 participants in the intervention group received an eCDSS-based medication review.	Cluster randomized controlled trial conducted in Swiss primary care settings between 2019 and 2021.	Patients were followed by telephone at baseline and at 6 and 12 months. The control group received usual care. The study was conducted in primary care clinics in Switzerland.	Medication review reduced costs and improved quality of life, resulting from cumulative small positive effects, fewer hospitalizations, and fewer nursing home visits.

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Chart 2. Continuation.

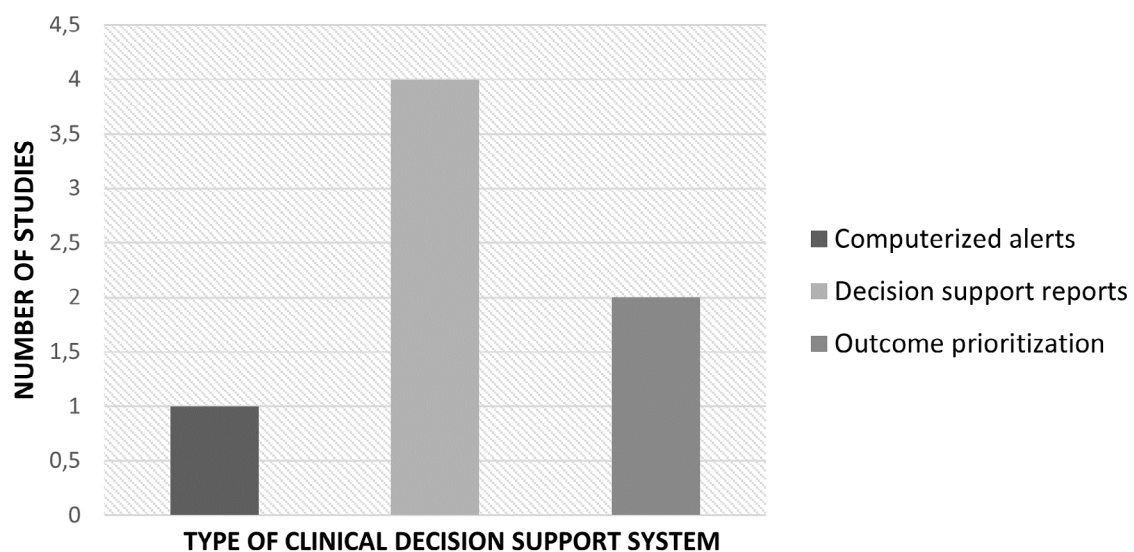
Authors	Journal/ country/ year	Objetivo	Population	Methods	Type of intervention	Main results
Jungo et al. ¹⁷	BMJ Switzerland 2023	To assess the impact of a medication review supported by an electronic clinical decision system in primary care on prescribing appropriateness and therapeutic omissions in older adults with multimorbidity and polypharmacy, compared with usual care.	Eligible patients were ≥65 years old with ≥3 chronic conditions and 5 or more long-term medications. A total of 43 general practitioners recruited 8 to 10 patients each.	Cluster randomized controlled trial with 43 general practitioners as clusters. Based on validated Screening Tool of Older Person's Prescriptions (STOPP) and Screening Tool to Alert to Right Treatment (START) criteria to detect potentially inappropriate prescriptions.	Pharmacotherapy optimization supported by an eCDSS, conducted by general practitioners and combined with shared decision-making, compared with usual care.	Results were inconclusive regarding the effectiveness of eCDSS-supported medication review in improving prescribing appropriateness or reducing therapeutic omissions after 12 months, compared to usual care.
Mecca et al. ¹⁸	Patient Educ Couns United States 2022	To explore the effects of a prescribing intervention on medication-related communication among primary care clinicians.	Community-dwelling veterans aged 65 years old or older receiving 7 or more medications.	Randomized clinical trial. Use of Beers Criteria and STOPP.	A clinical decision support tool provided individualized reports on inappropriate medications, therapeutic de-intensification, and adherence.	The individualized report improved medication reconciliation and discussion of inappropriate medications, but had no effect on chronic care de-intensification or adherence.
Corona-do-Váz-quez et al. ¹⁹	J Clin Med Spain 2019	To determine the effectiveness of a shared decision-making intervention for medication appropriateness in patients with chronic diseases and polypharmacy.	Family physicians and nurses from 11 health centers participated. Patients were 65 years old or older, using 5 or more medications for >6 months, and had at least one potentially inappropriate medication, according to Beers and/or STOPP/START criteria.	Quasi-experimental study (randomized, controlled, multicenter). Uses Beers' criteria and START/STOPP.	Paper-based decision support tool providing information on polypharmacy, inappropriate medications, and available alternatives, promoting shared decision-making. The outcome assessed was the proportion of medication appropriateness.	After six months, the intervention group showed a higher proportion of appropriate medication use (32.5%) compared with controls (27.9%), with 2.8 times greater likelihood of appropriateness. Among adherent patients, appropriateness reached 62.1% in the shared Decision group vs. 37.9% in the control group.

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Chart 2. Continuation.

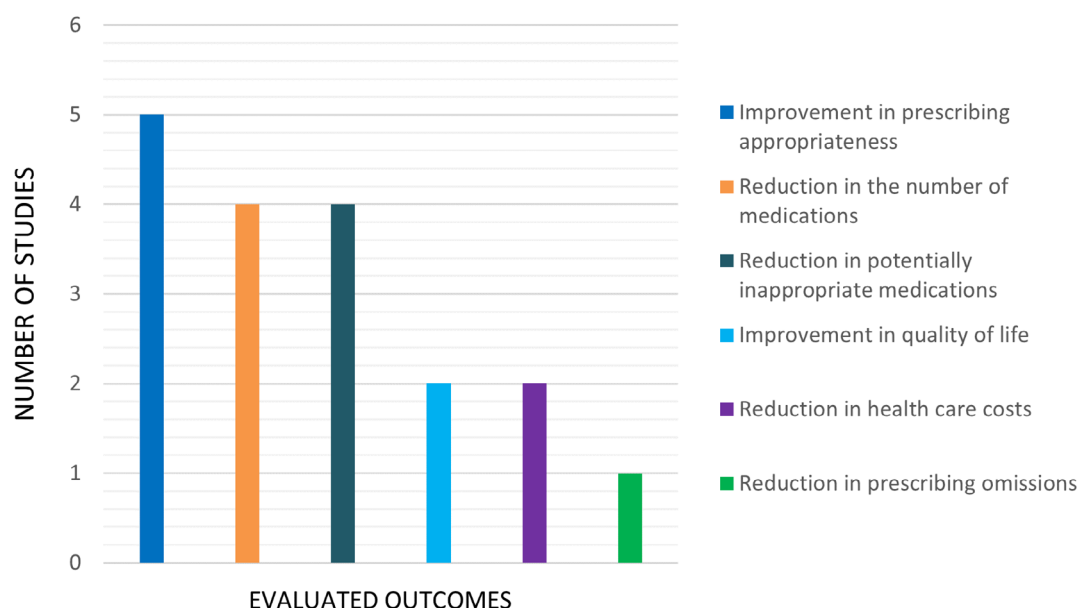
Authors	Journal/ country/ year	Objetivo	Population	Methods	Type of intervention	Main results
Rieckert et al. ²⁰	BMJ Austria, Germany, Italy, and the United Kingdom. 2022	To evaluate the effects of a computerized decision support tool for comprehensive medication review in older adults with polypharmacy.	3,904 adults aged 75 years old or older using 8 or more medications regularly, recruited by general practitioners.	Pragmatic, multicenter, cluster randomized controlled trial. Use of the EU- PIM list.	Electronic decision support tool enabling comprehensive medication review to assist general practitioners in prescribing potentially inappropriate and non- evidence-based medications.	Over 24 months, the number of prescribed medications decreased in the intervention group compared with the control group.
Van Summeren et al. ²¹	Br J Gen Pract Netherlands 2017	To determine proposed and observed medication changes when using an Outcome Prioritization Tool (OPT) during medication review in general practice.	Older patients with multimorbidity (≥69 years) and polypharmacy (5 or more chronic medications).	Pilot intervention study.	General practitioners were trained to use OPT to elicit patient priorities.	General practitioners proposed medication changes for 20 patients when using the OPT during medication review, mainly involving medication discontinuation.

Source: authors (2024).



Source: authors, 2024.

Graphic 1. Distribution of the included studies according to the type of CDSS.
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figura com ponto ao invés de vírgula



Source: authors (2024).

Graphic 2. Frequency of outcomes of the decision support tools used.

In this context, medication deprescribing emerges as a fundamental strategy to promote the safety and effectiveness of pharmacological treatment in this population.

In this context, CDSS are tools that provide guidance for the implementation of interventions, complementing the routine tasks, existing knowledge, and skills of healthcare professionals, while also playing a direct role in improving patient clinical management.²³

In turn, Alagiakrishnan and colleagues¹⁵ implemented and evaluated a computational tool integrated into the electronic health record. The functionalities of this tool include alerts regarding drug–drug interactions. However, an aspect not addressed in the study description was the weighting applied in the generation of alerts, a factor with a strong influence on outcomes, as an excessive volume of alerts may lead prescribers to disregard them.²⁴

In the study by Jungo et al.¹⁷, an electronic alert and reporting tool was evaluated without integration into an electronic health record system. It is noted that the lack of integration with CDSS may limit the potential of the tool's functionalities, considering that electronic health records provide a key platform for the development and application of decision support systems.²⁵

However, it is recognized that an electronic health record system integrated with a non-functional or inaccessible decision support tool can significantly compromise the ability of healthcare professionals to make informed decisions regarding patient treatment.²⁶ This may result in treatment delays, prescription errors, or limited access to critical patient health information, thereby compromising the effectiveness and safety of care.

It is noted that tools such as STRIPA¹⁷, PRIMA-eDS²⁰, and TRIM¹⁸ demonstrate substantial capacity for detecting PIMs and supporting decision-making by physicians and pharmacists. Among these, TRIM stands out for using information from electronic health records to identify older adults at risk of receiving inappropriate prescriptions in primary care.²⁷

In contrast to the use of computerized systems, the study by Van Summeren et al.²¹ applied an OPT, whose characteristics and objectives are similar to those of the shared decision-making tool in healthcare implemented by Coronado-Vázquez et al.¹⁹ It is noteworthy that the changes proposed by physicians largely reflected efforts to align medication regimens with the health outcomes prioritized by patients.

Chart 3. Identified CDSS, according to line of action, characteristics, and impact of their application.

CDSS	Line of action	Characteristics	Impact – Efficacy – Effectiveness
Tool to Reduce Inappropriate Drugs (TRIM) ¹⁸	2 nd line: provision of reports to support clinical decision-making.	The tool uses a program to extract age, medications, and chronic conditions from the electronic health record to identify high-risk patients and support medication regimen evaluation. Additional health variables obtained through chart review and direct patient assessment are entered into a web-based program. Based on a set of algorithms, TRIM generates feedback reports for clinicians.	Study data showed more robust medication reconciliation performed by clinicians in the intervention group, but also highlighted overall low rates of physician adherence to report recommendations. Additionally, the intervention's impact on communication and prescribing varied according to the type of medication-related problem identified.
SMART ¹⁵	1 st line: generation of computerized alerts. 2 nd line: provision of reports to support clinical decision-making.	The SMART intervention generates chart messages and order-entry alerts, highlighting potentially PIMs, decreased glomerular filtration rate, and possible need for medication adjustments.	This tool was considered acceptable by both specialists and primary care physicians, with no significant negative impact on workflow.
OPT ²¹	3 rd line: outcome prioritization tools.	A conversational support instrument with four movable slider buttons on a 0–100 scale, each representing one of four health outcomes with four analog visual scales: prolonging life, maintaining independence, reducing pain, and reducing other symptoms. Developed through qualitative research with older patients with multimorbidity, who were required to consider trade-offs among outcomes.	As it captures comprehensive health outcomes, the tool can be applied in both primary and secondary care settings. Its use to support physicians in proposing medication changes according to patient priorities mainly resulted in medication discontinuation and dose reduction.
Systematic Tool to Reduce Inappropriate Prescribing- Assistant' (STRIPA) ^{16,17}	2 nd line: provision of reports to support clinical decision-making.	STRIPA is a web-based clinical decision support system that helps tailor medication reviews. It is based on validated STOPP and START criteria to detect potentially inappropriate prescriptions. In addition to identifying overuse, underuse, and misuse, it generates recommendations to prevent drug interactions and inappropriate dosing.	No conclusive evidence was found that this intervention improved medication appropriateness or reduced prescribing omissions compared with usual care. The lack of integration with electronic health record systems used by general practitioners may explain implementation challenges.
Paper-based Decision Support Tool (DST)	3 rd line: outcome prioritization tools.	An informational guide designed to assist patients in decision-making by providing information on risks associated with inappropriate medications, based on Beers and START/STOPP criteria. Participants received information on polypharmacy, inappropriate medications, associated problems, and available alternatives, interacting with clinicians through Shared Decision-Making (SDM).	The use of this decision support tool increased medication appropriateness by 2.8 times compared with usual clinical practice. To enhance effectiveness, it is recommended to train healthcare professionals, promote dissemination of the tool, and provide guidance on its use.

Source: authors (2024).

In the context of primary care, CDSS can provide information on medications and dosages, thereby supporting healthcare professionals in making more informed decisions by suggesting modifications to medications, dosing, or dosage adjustments.^{10,28} This facilitates the deprescribing process, understood as a careful review of an individual's health status and a reconciliation of the current medication list, providing an opportunity to optimize the pharmacotherapeutic regimen.²⁹

However, in Brazil, the CDSS that rely on computerized systems may face specific challenges in their implementation within healthcare practice. This is because, although progress has been made, the country remains at an early stage in the adoption of Information and Communication Technologies (ICTs) in Primary Health Care.³⁰

Within the Brazilian context, the implementation of CDSS aimed at deprescribing in PHC should be understood as a complex process that extends beyond the mere availability of technology. Recent literature indicates that the adoption of these tools depends on factors related to service organization, integration with existing information systems, and the capacity of healthcare teams to incorporate them into routine care workflows.³¹ In large and heterogeneous public health systems, such as the Brazilian Unified Health System (*Sistema Único de Saúde* – SUS), these conditions remain unevenly distributed across services.

Furthermore, overly complex decision support tools or those poorly integrated with electronic health records tend to have lower acceptability among healthcare professionals, particularly in settings characterized by high care workloads, as observed in Brazilian Primary Health Care. The presence of frequent alerts, usability challenges, and the requirement for manual data entry may contribute to low adherence and limited utilization of these interventions, thereby reducing their potential impact on prescription appropriateness and medication safety.³¹

Regarding costs, one study¹⁶ evaluated the cost-effectiveness of a tool designed to improve the performance of general practitioners. The findings indicated a reduction in healthcare costs and an improvement in patients' quality of life, attributed to the discontinuation or initiation of specific medications as recommended.

It should be noted that, although several intervention studies have addressed prescription appropriateness among older adults in primary care, there is a scarcity of published economic evaluations on the subject.³² Despite the limited available evidence, interventions aimed at improving medication use have the potential to yield significant benefits that may offset the costs associated with their implementation.³³

It should be noted that one study²⁰ was included in this review despite adopting a different definition of polypharmacy than that specified in the research protocol.¹² This decision was justified by the relevance of the data and the contribution of the study to a comprehensive understanding of the phenomenon of polypharmacy and its implications, as it demonstrated that the PRIMA-eDS tool was able to reduce the number of medications in the intervention group.

This review did not identify studies conducted in Latin American countries, highlighting a potential gap in research and clinical practice in this region, particularly in Brazil. The incidence of polypharmacy in the Brazilian context exceeds 46% over an 11-year period³⁴, and is associated with frequent use of health services, often without clear clinical justification, indicating the need for policies aimed at curbing overprescribing and reducing the occurrence of this phenomenon.⁶ These findings underscore the importance of further studies to better understand and address the specific needs and challenges related to the use of CDSS within the context of polypharmacy in the country.

Finally, this study presents certain limitations, including the possibility that selective reporting and publication bias may have influenced the results of this review, as studies with positive findings are more

likely to be published than those with negative or neutral outcomes. It is also important to note that the synthesis conducted was limited to the assessment of the efficacy and effectiveness of the systems identified in the review.

CONCLUSION

The results of this review indicate the feasibility and usefulness of six clinical decision support tools identified as improving the deprescribing process among older adults receiving care in primary care settings. Furthermore, the findings highlight successful experiences in the implementation of clinical decision support systems, which may inform policies and clinical practices aimed at improving medication management in this population, with an emphasis on treatment safety and effectiveness, as well as the reduction of healthcare system costs.

Based on the analysis of the objectives established to map and analyze CDSS tools applied to polypharmacy among older adults in PHC, it is concluded that this review successfully identified, synthesized, and described the tools reported in the literature that support the deprescribing of medications in polymedicated older adults.

This paper highlights the need for greater commitment to the implementation and continuous improvement of these tools. Above all, it emphasizes the need for further research to develop additional CDSS that enhance the care provided to older adults with polypharmacy in Primary Health Care. Furthermore, it briefly discusses the extent to which the current level of computerization of public health services in Brazil is prepared to incorporate these tools in support of clinical practice.

CONFLICT OF INTERESTS

Nothing to declare.

AUTHORS' CONTRIBUTIONS

RGR: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Validation, Visualization, Writing – Original Draft, Writing – Review & Editing. GRMF: Supervision, Validation, Writing – Review & Editing. JFB: Methodology, Validation, Writing – Review & Editing. RPS: Methodology, Validation, Writing – Review & Editing.

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