



Professional pharmacy Services' outcomes performance measurement: A narrative review[☆]

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ABSTRACT

Background: Professional pharmacy services are widely recognized for their role in promoting patient health and ensuring optimal medication therapy outcomes. Community pharmacies and pharmacists need to assess professional services' performance at patient level and demonstrate their value to stakeholders. To do so is important to understand which outcome performance indicators are currently being used and how added value is proven.

Objective: To identify performance indicators that measure patients' outcomes and demonstrate value of professional pharmacy services.

Methods: A narrative review was performed based on a systematic search in Pubmed and Scopus databases since year 2000. Manually search was also conducted in Google Scholar and Google.com. Inclusion criteria followed the PCC mnemonic in which Population is "community pharmacies", Context is "pharmaceutical care, professional pharmaceutical services or pharmaceutical interventions" and Concept is "key performance indicators, or performance measures or clinical indicators". English, Spanish or Portuguese language were accepted.

Results: All types of papers were included, adding up to a total of 12 papers. The publication of papers on this subject has increased in the last decade. Outcomes indicators identified were based in different frameworks, mainly linked to quality, and were clearly outlined. Disease and therapy management were the most evaluated services. Indicators were identified across 8 different domains corresponding, predominantly, to outputs rather than outcomes. Measurement is mainly conducted under the auspices of coalitions, alliances, government and payers reflecting their perspectives and based on easy-to-retrieve pharmacy data and information.

Conclusions: A paradigm shift is needed, so that performance indicators are based on more appropriate frameworks to measure patient level outcomes and value assignment of professional pharmacy services. By providing robust evidence of the impact of pharmacist interventions on patient outcomes, community pharmacists can advocate for the integration, expansion, and recognition of pharmacist-led services within the broader healthcare system.

Professional pharmacy services have come to encompass a range of clinical and patient-centered activities provided by community pharmacists to optimize medication therapy and improve patient outcomes.^{1,2} Starting in the 1990s, the conceptualization of patient-centered care and pharmaceutical care practice have driven the innovation of new professional pharmacy services.^{3,4} Defined as "an action or set of actions undertaken in or organized by a pharmacy, delivered by a pharmacist or other health practitioner, who applies their specialized health

knowledge personally or via an intermediary, with a patient/client, population or other health professional, to optimize the process of care, with the aim to improve health outcomes and the value of healthcare",² professional pharmacy services go beyond traditional dispensing of medications and involve direct patient care, medication management, health promotion, and collaboration with other healthcare providers. Some examples of professional pharmacy services include medication therapy management, chronic disease management, immunizations, medication

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reconciliation, comprehensive medication reviews for older adults, patient education and adherence monitoring.⁵⁻⁷

A systematic review with meta-analysis conducted by Yuan et al.⁸ provided valuable insights into the positive impact of community pharmacy services on various health outcomes, particularly in the management of chronic diseases and self-management programs. This review highlighted the effectiveness of pharmacist-led interventions in improving clinical parameters such as blood pressure, hemoglobin A1c (HbA1c), and cholesterol levels among patients with chronic conditions like hypertension, diabetes mellitus, asthma, and cardiovascular disease.⁸ Another systematic review, aimed to examine the effectiveness of direct patient care services delivered by pharmacists in community pharmacy settings within the United States, revealed that the interventions assessed had a statistically significant impact on 30 % of the total health outcomes evaluated.⁹ In total, since 2000, thirty-three systematic reviews were published evaluating the effectiveness of community pharmacist interventions in achieving these expanded roles and responsibilities, but only nine scored as 'good' methodological quality.⁵ Despite the overall positive outcomes, the interpretation of pharmacy services results demands caution as it must take into consideration the context, limitations, and potential biases inherent to study design and available evidence.^{10,11} Utilizing appropriate study designs, control groups, adequate outcome measures, sampling methods, and follow-up procedures is essential for minimizing bias, maximizing internal and external validity, and ensuring the robustness of study findings in pharmacy services research.¹²

Value in health is determined by the outcomes achieved for patients - improvements in health status, quality of life, functional capacity, and overall well-being - *versus* the resources expended to deliver healthcare interventions.¹³ Value-based health care (VBHC) has gained importance in the field of health management studies and health policy development in the last decade, since its goal is to achieve better outcomes at a lower cost.^{14,15} Value depends on outcomes, not inputs. In order to add value, health care systems must shift the focus from the volume and profitability of services provided—consultations, hospitalizations, procedures, and tests - to patient outcomes achieved, which means to organize care around patient's medical conditions.¹⁶ Like outcomes, costs should be measured around the patient. To accurately measure value, it is necessary to track patient outcomes and costs longitudinally.¹⁶

Valuing something typically involves quantification whereby performance measures play a central role in value-based care models by incentivizing providers to achieve better outcomes, lower costs, and improve patient experiences.¹⁷ Performance measurement, widely used in the area of management, has been described as "the use of statistical evidence to determine progress toward specific defined organizational objectives".¹⁸ This process involves collecting, analyzing, and interpreting data related to key performance indicators (KPI) or metrics that reflect the organization's performance in various areas. By tracking performance metrics, healthcare organizations can evaluate how well they are delivering care and achieving desired outcomes for patients as well as identify trends, patterns, and variations, making data-driven decisions to optimize care delivery.

As stated, to measure performance, indicators are needed, *i.e.* quantitative or qualitative metrics that assess efficiency, effectiveness, quality, and outcomes of healthcare delivery. These measures provide objective data that help evaluate the performance of healthcare providers, organizations, and systems, and inform decision-making, quality improvement efforts, and resource allocation. Performance measures can encompass various dimensions of healthcare delivery, including clinical care processes, patient outcomes, patient experiences, and healthcare system performance. Performance measurement serves as a mean to an end rather than an end in itself: "it is a tool for achieving healthcare goals".¹⁹

Although it is undeniable that professional pharmacy services have a direct and immediate impact on patient-outcomes,²⁰ quality of life,²¹

functional status, and symptom control,²² there is a lack of agreed set of indicators or outcome measures that can be used across diverse health systems and settings. These health outcomes should be equally valuable in assessing the benefits of pharmaceutical care services such as mortality and hospital admissions, considered the *gold standard* outcomes.²³ Professional pharmacy services may have lower-level outcomes compared to major clinical events like deaths or hospital admissions, but they hold significant clinical relevance for individual patients²⁴ and add value to medication management and patient care.²⁵ Once professional pharmacy services are provided on a daily basis and outcomes recorded, one should be able to demonstrate its effectiveness without relying solely on external studies or research. Recently, de Souza et al.²⁶ published a systematic review on key performance indicators for pharmaceutical services provided by pharmacists in various settings, including hospital pharmacies and ambulatory care. However, this review identified only one study conducted in a community pharmacy.²⁶ Thus, to effectively demonstrate the value proposition of community pharmacist services, it is essential to link the interventions provided by community pharmacists to improvements in patient outcomes and healthcare system outcomes.²⁷ To initiate the design of a set of health outcomes metrics, we propose this narrative review, which aims to identify performance indicators that measure patient outcomes and demonstrate the value of professional pharmacy services.

1.1. Materials and methods

The PCC mnemonic, that stands for Population, Concept, and Context,²⁸ was used to define the search terms and inclusion criteria. For the purposes of this study *participants* were "community pharmacies", the *context* "pharmaceutical care, pharmacy professional services or pharmacist interventions" and the *concept* "key performance indicators, or performance measures or clinical indicators".

For this narrative review, PUBMED and SCOPUS databases were searched. Search strategy in PubMed used MeSH terms in all fields with the query ("community pharmacy services" OR "pharmaceutical services" AND key performance indicators) and SCOPUS search strategy used (TITLE-ABS-KEY (key AND performance AND indicators) OR TITLE-ABS-KEY (performance AND measures) AND TITLE-ABS-KEY (pharmaceutical AND care) OR TITLE-ABS-KEY (services) OR TITLE-ABS-KEY (interventions) AND TITLE-ABS-KEY (community AND pharmacy) OR TITLE-ABS-KEY (community AND pharmacy)) AND PUBYEAR >1999 AND PUBYEAR >1999 as query. Manual search was also conducted to identify additional relevant literature in Google Scholar and Google.com. Searches were limited to the time period between 2000 and 2023.

All types of papers and study designs were considered as long as they met the 3 defined PCC criteria: "community pharmacies", "pharmaceutical care, pharmacy professional services or pharmacist interventions" and "key performance indicators, or performance measures or clinical indicators". Abstracts were screened by two reviewers independently to identify papers that discussed pharmacy professional services' outcomes performance measures. Papers were selected for initial review if they were full text papers (papers that were only available as abstracts were excluded) and written in English, Spanish or Portuguese language.

1.2. Results

A total of 287 articles were selected from all databases and Google. Two articles were duplicates. Titles and abstracts were screened based on PCC criteria, resulting in the exclusion of 260 articles: 39 did not meet one criterion, 43 did not meet two criteria, and 177 did not meet any PCC criteria. Additionally, one article was no longer retrievable. After reviewing the full text of the remaining 25 papers, 13 more were excluded for the following reasons: they focused on clinical pharmacists (1), compared pharmacies (1), had only the abstract available (1),

referred to implementation strategies (1), did not present performance measures (2), were not specific to professional pharmacy services (4), used a self-assessment tool (1), addressed a prescription system (1), or described platform usability testing (1). The results of the search process are summarized in Fig. 1, following the PRISMA flowchart.²⁹

Twelve papers were included in the review. Table 1 summarizes the main features of included papers. Various types of studies design and papers were included, namely one systematic review,³⁰ three randomized controlled trial,^{31–33} five descriptive observational studies^{34–38} one cross-sectional design,³⁹ one feasibility study⁴⁰ and one using Delphi technique.⁴¹

Performance indicators identified in this review were based on different frameworks. These frameworks often serve as guiding principles for selecting, organizing, and interpreting performance indicators within a specific context. The majority of papers used the Pharmacy Quality Alliance framework^{32,33,35,37,40} while the remaining used the Donabedian Quality Framework,^{34,38,41} North Carolina Community Pharmacy Enhanced Services Network measures,³⁹ NCQA–HEDIS performance standards,³¹ CMS Star Rating program.³⁶ Only one study presented business performance indicators.³⁰

The professional pharmacy services covered by performance indicators were mainly therapy and disease management,^{31,34,36,38,41} often aimed at hypertensive, diabetic or asthmatic patients, followed by dispensing service.^{33,37,40}

The identified performance measures for professional pharmacy services were clearly defined and characterized, including specifying the numerator and denominator. This level of detail ensures transparency, consistency, and accuracy in measuring and reporting performance. Considering the framework used in each study, performance indicators

were then organized into domains namely adherence, appropriate medication use, medication safety, process, clinical, economic, humanistic, and healthcare utilization. Table 2 presents identified indicators organized by referential and domain and the number of papers citing the indicator.

1.3. Discussion

The aim of this narrative review was to identify performance indicators that measure patients' outcomes and demonstrate value of professional pharmacy services. The review highlights some issues that are important to consider in a more specific and detailed manner.

a) Publishing Trend

A significant observation is the growing interest among authors and researchers in various countries regarding performance measures for professional pharmacy services. This reflects a growing recognition of the importance of optimizing pharmacy services to enhance patient outcomes and efficiency. The United States has been at the forefront of developing and implementing performance indicators for healthcare services, including those related to pharmacy services. The introduction of performance indicators in the U.S. pharmacy sector dates back to the early 2000s, with health plans, insurers, and government agencies like Agency for Healthcare Research and Quality (AHRQ), National Quality Forum (NQF), National Committee for Quality Assurance (NCQA), Pharmacy Quality Alliance (PQA), and American Society of Health-System Pharmacists (ASHP) Accountability Measures Work Group, leading the way in their development and utilization.¹⁹

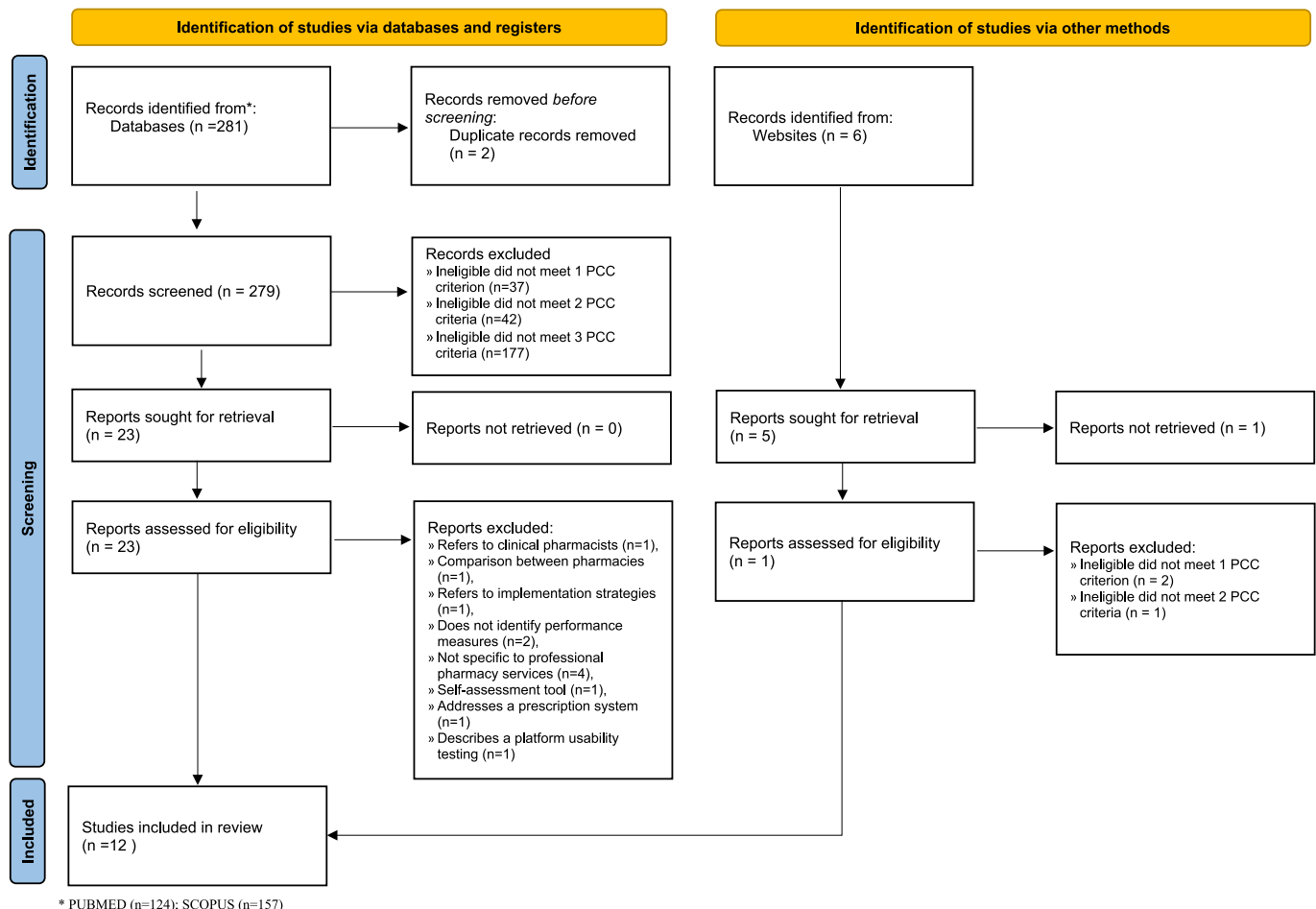


Fig. 1. - Study selection PRISMA flowchart.

Table 1

- Descriptive data and characteristics of the included studies sorted by year of publication.

TITLE & COUNTRY	YEAR	FRAMEWORK /REFERENCIAL	STUDY TYPE	PROFESSIONAL SERVICES	PERFORMANCE MEASURE
Development and testing of performance measures for pharmacy services, USA ³⁷	2009	Pharmacy Quality Alliance	Descriptive	Dispensing	<p>PDC - The percentage of patients who were dispensed a medication within the targeted drug class who met the PDC threshold of 80 %. This category contained seven measures within targeted drug classes: ACEI/ARBs, beta-blockers, calcium-channel blockers, lipid modifiers, biguanides, sulfonylureas, and thiazolidinediones.</p> <p>Gap in therapy - The percentage of prevalent users of a medication within the targeted drug class who had a significant gap (>30 days) in medication therapy. This category contained seven measures with targeted drug classes: ACEI/ARBs, beta-blockers, calcium-channel blockers, lipid modifiers, biguanides, sulfonylureas, and thiazolidinediones.</p> <p>Diabetes: ACEI/ARB - The percentage of patients who were dispensed a medication for diabetes and a medication for hypertension who are not receiving an ACEI or ARB.</p> <p>Antidiabetic medication dosing - The percentage of patients who were dispensed a dose higher than the FDA-indicated maximum dose for the following three therapeutic categories of oral antihyperglycemic agents: biguanides, sulfonylureas, and thiazolidinediones.</p> <p>Suboptimal asthma control - The percentage of patients with persistent asthma who were dispensed more than five canisters of a short-acting beta2 agonist inhaler over any 3-month period.</p> <p>Absence of asthma controller - The percentage of patients with persistent asthma and suboptimal control who received controller therapy.</p> <p>Use of high-risk medications in the elderly -</p> <ul style="list-style-type: none"> .the percentage of patients 65 years or older who received at least one high-risk medication .the percentage of patients 65 years or older who received at least two different high-risk medication <p>Pharmacy-specific performance rates were calculated on four quality of care indicators:</p> <ol style="list-style-type: none"> 1. safety indicators <ol style="list-style-type: none"> a. dispensing of contra-indicated benzodiazepines to seniors b. dispensing of nonselective beta-blockers to patients with respiratory disease 2. effectiveness indicators <ol style="list-style-type: none"> a. dispensing asthma medications to non-compliant patients b. dispensing hypertension medications to non-compliant patients <p>Diabetes care measures (9-month study period):</p> <p>HbA1C <7.0 %,</p> <p>Blood pressure < 130/80 mmHg,</p> <p>LDL cholesterol <100 mg/dL)</p> <p>Composite indicator of success - assessing whether the participant attained the goal for at least two of the three measurements by the end of the study</p>
Monitoring community pharmacist's quality of care: A feasibility study of using pharmacy claims data to assess performance, Canada ⁴⁰	2011	Pharmacy Quality Alliance (PQA)	Feasibility study	Dispensing	<p>Pharmacy-specific performance rates were calculated on four quality of care indicators:</p> <ol style="list-style-type: none"> 1. safety indicators <ol style="list-style-type: none"> a. dispensing of contra-indicated benzodiazepines to seniors b. dispensing of nonselective beta-blockers to patients with respiratory disease 2. effectiveness indicators <ol style="list-style-type: none"> a. dispensing asthma medications to non-compliant patients b. dispensing hypertension medications to non-compliant patients <p>Diabetes care measures (9-month study period):</p> <p>HbA1C <7.0 %,</p> <p>Blood pressure < 130/80 mmHg,</p> <p>LDL cholesterol <100 mg/dL)</p> <p>Composite indicator of success - assessing whether the participant attained the goal for at least two of the three measurements by the end of the study</p>
Evaluation of a diabetes management program using selected HEDIS measures, USA ³¹	2012	NCQA-HEDIS performance standards (efficacy)	RCT	Disease management programs - Diabetes management	<p>Diabetes care measures (9-month study period):</p> <p>HbA1C <7.0 %,</p> <p>Blood pressure < 130/80 mmHg,</p> <p>LDL cholesterol <100 mg/dL)</p> <p>Composite indicator of success - assessing whether the participant attained the goal for at least two of the three measurements by the end of the study</p>

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Table 1 (continued)

TITLE & COUNTRY	YEAR	FRAMEWORK /REFERENCIAL	STUDY TYPE	PROFESSIONAL SERVICES	PERFORMANCE MEASURE
Optimizing the changing role of the community pharmacist: A randomized trial of the impact of audit and feedback, Canada ³³	2016	Pharmacy Quality Alliance (PQA)	Randomized, controlled, single-blind trial	Dispensing to hypertensive and asthmatic patients and provision of targeted services	Pharmacy-specific rates of dispensing: 1. antihypertensive medications to non-adherent patients (defined as those who had used <80 % of their required medication over the previous 90 days) 2. short-acting β agonists (SABAs) to patients with demonstrated overuse of these medications (defined as more than 200 doses of SABAs over the previous 90 days).
Pharmacist-to-prescriber intervention to close therapeutic gaps for statin use in patients with diabetes: A randomized controlled trial, USA ³²	2017	Pharmacy Quality Alliance (PQA)	Randomized controlled trial	pharmacist-to-prescriber intervention	Statin Use in Persons with Diabetes - the percentage of patients aged 40–75 years who were dispensed a medication for diabetes and also received a statin medication.
Community pharmacist-led intervention to identify persons with diabetes not on statin therapy, USA ³⁵	2018	Pharmacy Quality Alliance (PQA) (Effectiveness)	Descriptive	Identification of patients with diabetes but are not on statin therapy	Statin Use in Persons with Diabetes (SUPD): percentage of patients 40 to 75 years of age who were dispensed a medication for diabetes and received a statin medication as well. 1. Percentage of patients flagged for intervention by the pharmacist 2. Number of statin prescriptions received for the measure-eligible intervention population
Lessons learned from using global outcome measures to assess community pharmacy performance, USA ³⁸	2018	Donabedian Quality Framework	Descriptive	Medication management service	Medication adherence (PDC - with the standard 80 % cut-off for renin-angiotensin system antagonists, oral diabetes medications, statin medications and other chronic medications) Hospitalizations and emergency department visits (medical claims data were used to capture rates of all-cause hospitalizations among attributed patients) Total cost of medical care (included payments made by the Medicaid program for all, outpatient, inpatient, and ED services.)
A model for the financial assessment of professional services in community pharmacy: A systematic review ³⁰	2019	Theoretical model to financially assess professional pharmacy services.	Systematic Review	Professional Pharmacy Services	Return on investment Net profit (also described as net benefit, net gain, net daily revenue, or increase in EBIT) Net loss
Development and validation of key performance indicators for medication management services provided for outpatients, Brazil ⁴¹	2019	Donabedian Quality Framework	Quantitative approach using Delphi technique	Medication management services	Pharmaceutical consultation provided (number of pharmaceutical consultations provided/total number of pharmaceutical consultations scheduled) x100 Pharmacist interventions accepted by the prescriber (number of pharmacist interventions accepted by the prescriber/ number of pharmacist interventions performed with the prescriber) x100 Drug therapy problems resolved (number of drug therapy problems resolved/ number of drug problems attended) x100 Patient clinical status (number of patients with desired clinical status/total number of patients attended) x100 Patient satisfaction (number of satisfied patient/total number of patients attended) x100 Patient quality of life (number of patients with improvement in quality life/total number of patients attended) x100
Positive Impact of Technician-Driven MTM Program on Performance Measures, USA ³⁶	2020	CMS Star Rating program	Descriptive	Medication therapy management	PDC for cholesterol, diabetes, renin-angiotensin system antagonists and high-risk medication use
Indicators of the pharmacotherapeutic follow-up service for hypertensive and diabetic patients, Brazil ³⁴	2021	Donabedian Quality Framework	descriptive, longitudinal, quantitative, and retrospective	Pharmacotherapeutic Monitoring based on the Dáder method	Pharmaceutical consultation performed (number of appointments performed divided by the number of appointments scheduled x100)

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Table 1 (continued)

TITLE & COUNTRY	YEAR	FRAMEWORK /REFERENCIAL	STUDY TYPE	PROFESSIONAL SERVICES	PERFORMANCE MEASURE
Medication synchronization adoption and pharmacy performance, USA ³⁹	2021	North Carolina Community Pharmacy Enhanced Services Network measures (NC CPESN SM)	Cross-sectional design	Medication synchronization programs	Problems related to pharmacotherapy resolved (divide the number of problems solved by the number of problems identified x100) Clinical situation (number of patients with desired clinical situation by the number of patients treated x100) Desired clinical situation is classified as: stable, improved, partially improved Summary score of pharmacy's performance on seven risk-adjusted measures: a. total cost of care (3 points), b. Hospital admission rate (2 points), c. Emergency department admissions (2 points), d. The proportion of patients adherent to statin medications PDC 80 % (1 point), e. The proportion of patients adherent to oral diabetes medication PDC 80 % (1 point), f. The proportion of patients adherent to antihypertensive medication PDC 80 % (1 point), g. The proportion of patients using four or more chronic medications adherent to 75 % or more of their medications PDC 80 % (1 point).

PDC - Proportion of days covered; ACEI - Angiotensin-converting-enzyme inhibitors; ARB - Angiotensin receptor blockers; HbA1c - Hemoglobin A1c; LDL - low-density lipoprotein cholesterol; ED -Emergency Department; MTM - Medication Therapy Management; FDA – Food and Drug Administration; NCQA - National Committee for Quality Assurance; HEDIS - Healthcare Effectiveness Data and Information Set; CMS - Centers for Medicare & Medicaid Services; EBIT - Earnings Before Interest and Taxes.

b) Frameworks

A common issue that prevails in the studies included in the review is the use of quality frameworks instead of using performance measurement frameworks. Performance indicators identified in this review are strongly rooted in quality frameworks.^{32,34,35,37,38,40–42} Quality frameworks often focus on ensuring compliance with standards, meeting customer expectations, and achieving process efficiency and effectiveness, while performance measurement frameworks facilitate the linkage of measures through cause-and-effect relationships.⁴³ The relationship between performance and quality in healthcare is indeed complex and subject to varying interpretations. On one hand, quality is regarded as an overarching issue. Many stakeholders in healthcare view quality as the primary concern that must be addressed through performance measurement. This perspective suggests that ensuring high-quality care should be the ultimate goal, with performance measurement serving as a means to achieve and maintain it. On the other hand, quality is seen as one of several domains. Some stakeholders argue that quality is just one aspect of health services performance among several others. In this view, performance measurement encompasses various dimensions such as efficiency, access, patient experience, and outcomes, with quality being one of these dimensions.⁴⁴ Despite attempts to differentiate between performance and quality, the terms are often used interchangeably in healthcare literature and practice. A helpful conceptual distinction between quality and performance is that performance reflects the actual level of achievement or progress, whereas quality involves the evaluation or assessment of that performance.⁴⁴ The connection between quality and performance may also derive from the fact that performance measures for health have been developed for the three classical components of care - structure, process and outcomes -, defined by Donabedian⁴⁵ for all levels of care, from patient to population. Alternatively, performance measurement frameworks provide a structured approach tracking progress toward goals and drive continuous improvement.⁴³ These frameworks, from which metrics must be built, typically include a

set of key components, such as objectives, indicators, targets, data collection methods, analysis techniques, and reporting mechanisms.¹⁹

c) Outputs vs Outcomes

Performance measurement indicators currently used in evaluating professional pharmacy services are mainly based on process outputs instead of patient outcomes. While outputs are important for tracking progress and activity, outcomes are essential for evaluating impact and determining success in achieving desired goals or objectives. Performance indicators identified in this review associated with the domains of adherence, appropriate medication use, or medication safety provide valuable insights into aspects of pharmacy services delivery but are mainly focused on processes representing its outputs and may not fully capture the effectiveness of professional pharmacy services in achieving their main objective of impacting patient outcomes, quality of life, functional status, and symptom control. From the analysis of the papers included in the review we found that only Lima et al.,⁴¹ Batista A.³⁴ and Planas et al.³¹ presented clinical outcomes or clinical status which resulted from diabetes management and medication management services. When focusing on patient's level performance measurement manifests primarily as measurement of the process or outcomes of treatment. In fact, there is a strong relation between healthcare processes and patient outcomes. Hence, some authors defend that performance measurement should use both outcomes and process measures to understand organizational performance and effect positive change to improve care.^{18,46} This importance of measuring processes and outcomes simultaneously is demonstrated by the study of Batista,³⁴ included on the review, highlighting that hypertensive and diabetic patient who underwent 3 or more pharmaceutical consultations, that is, greater pharmaceutical monitoring, had the best results showing improvement in their clinical situation.

d) Data Sources and Reporting

Table 2

- Indicators organized by referential/domain and number of papers citing the indicator.

Framework / Referential	Domain	Performance indicator	Papers using the indicator
Pharmacy Quality Alliance	Adherence	Proportion of days covered (PDC)	4
		Gap in therapy	1
		Dispensing antihypertensive to non-adherent patients	2
		Dispensing SABAs to patients with overuse	1
		Dispensing asthma medications to non-compliant patients	1
		Statin use in diabetic patients	2
	Appropriate Medication Use	Dispensed ACEI/ARB to diabetic or hypertensive patient	1
		Suboptimal asthma control	1
		Absence of asthma controller	1
		Use of high-risk medications in the elderly	2
	Medication Safety	Dispensing of contra-indicated BZP to seniors	1
		Dispensing of nonselective β -blockers to patients with respiratory disease	1
		Patient clinical status	2
	Clinical	Pharmaceutical consultation provided	2
		Pharmacist interventions accepted by the prescriber	1
		Drug therapy problems resolved	2
NCQA-HEDIS	Clinical	Diabetes care measures (HbA1c, BP, LDL)	1
		Total cost of medical care	2
Business Management	Economic	Return on investment	1
		Net profit	1
		Net loss	1
		Hospital admission rate	2
N.A.	Healthcare utilization	Emergency department admissions	2
		Patient satisfaction	1
	Humanistic	Patient quality of life	1

PQA - Pharmacy Quality Alliance; NCQA - National Committee for Quality Assurance; HEDIS - Healthcare Effectiveness Data and Information Set; N.A. not applicable; PDC - Proportion of days covered; ACEI - Angiotensin-converting-enzyme inhibitors; ARB - Angiotensin receptor blockers; BZP - Benzodiazepines; HbA1c - Hemoglobin A1c; BP - Blood pressure; LDL - Low-density lipoprotein cholesterol.

The analysis of studies included revealed that performance indicators retrieve information from various sources and report through different systems. Three categories of data sources are identified: 1) records from pharmaceutical appointments or comprehensive assessments^{31,34,39}; 2) pharmacy claim data, data on prescriptions dispense or billing data^{33,37,40}; and 3) data from EQuIPP online platform.^{32,35,36} On one side the failure or lack of records of clinical outcomes of pharmaceutical care provided to patients has forced the use of dispensing data as 'outcome' indicators.⁴⁷ On the other side performance measures in Value Based Health Care (VBHC) tend to be based on easy to obtain data that do not necessarily reflect the complexities of everyday healthcare practice and may contribute to the lack of integration between VBHC and performance management.¹⁷ To analyze data and produce useful and actionable information it is necessary to use a set of tools that fit performance measurement.⁴⁸ Scorecards and dashboards are tools often used in healthcare to measure and sustain outcomes improvement. The final instrument with key performance indicators for pharmaceutical

care services presented by Lima et al.⁴¹ and Batista³⁴ are examples of reporting. These authors presented each performance indicator detailed by its name, objective, metric (numerator and denominator), target achieved and measurement frequency.

e) Economic and Financial Evaluation

Another aspect that stood out from the review was the economic evaluation of pharmaceutical services. This evaluation is fundamental for the efficient and sustainable provision of high-quality services, which is why it is important to analyze the economic indicators and patient outcomes achieved.⁴⁹ Of the 12 studies included, only one systematic review³⁰ identified economic performance indicators that align with the most common indicators used in business management. Economic and financial measures related to professional pharmacy services—such as direct and indirect costs, fixed and variable costs, sources of revenue (from patients, insurance, or government), net total cost, net total revenue, break-even point, break-even price, and net profit or loss—are crucial for gaining a business perspective. This aligns with the sustainability framework suggested by the theoretical model for financially assessing professional pharmacy services.³⁰ The sustainability stage is critical for pharmacy owners and managers to assess the long-term viability, effectiveness, and integration of professional pharmacy services into daily practice.⁴⁹ Measuring all costs and revenue is also crucial to calculate the true value of professional pharmacy services according to Porter's formula - health outcomes achieved per dollar spent.^{13,50}

f) Value Perspectives and Expectations

Finally, the pursuit of value is a universal objective across all stakeholders involved in healthcare delivery, but each stakeholder group has different perspectives and expectations and, consequently, measure value differently.¹⁹ Regardless of the stakeholder role - receiving, paying for, or participating in providing healthcare services - they share a common interest in maximizing the value derived from healthcare investments.¹⁹ While healthcare payers measure value in terms of healthcare expenditures, cost-effectiveness, return on investment, and the ability to control healthcare spending while maximizing health outcomes,¹⁹ healthcare professionals measure value based on their clinical expertise, professional judgment, and the ability to achieve positive health outcomes for their patients.⁵¹ Despite these perspectives, patients often value outcomes that directly impact their health and well-being and low costs.⁵² It is also important to consider whether the stakeholder is external - *public sector* - or internal to the organization - *private sector*.⁵³ In case of an external stakeholder such as the government, agencies, insurers, or those who pay for health care, the metrics and requirements of the monitoring system are defined by them. As shown by the studies included, most of the work related to performance measurement is conducted under the auspices of coalitions and alliances of providers, government entities and purchasers.⁵¹ When private stakeholders, define internally the monitoring system they do it as part of their responsibility to provide quality health care by measuring outcomes, comparing them with standards and objectives in order to continuously improve health indicators.⁵³ Notwithstanding, performance measurement may be driven by market dynamics, competitive pressures, and the need to innovate and differentiate services to meet customer needs and stay ahead of competitors.

Despite extensive research, a specific performance measurement framework for evaluating the health outcomes of professional pharmacy services has not yet been identified. Similarly, no standardized performance indicators or key performance indicators (KPIs) have been established to measure the health outcomes of these services. One notable exception is the tool developed by Lima et al.,⁴¹ which proposes six KPIs for medication management services.

Therefore, future research efforts should focus on two potential pathways: (i) Identification of proxy frameworks such as those used in

clinical pharmacy, primary care, or the ECHO model, to explore common indicators or points of intersection; or (ii) application of a design approach starting with the identification of key domains of professional pharmacy services, constructing potential indicators based on relevant guidelines, selecting a final set of indicators and assessing the feasibility of these indicators. Whichever path is chosen, they should require iterative collaboration with pharmaceutical professionals and key stakeholders through participatory methodologies.^{54,55}

1.3.1. Limitations

This narrative review synthesizes information and studies about performance indicators that measure patients' outcomes and demonstrate value of professional pharmacy services but one must attend to its limitations.

This type of review relies on the author's perspective and judgment, which can lead to biases and subjectivity in the selection and interpretation of the included studies. Despite a systematic approach to papers search and objective definition of inclusion criteria, a non-representative sample of the available literature may have been obtained, affecting the validity of the conclusions. Since all types of studies design were included, it was not possible to use any tool to assess the quality of the studies. Moreover, the fact that a limited number of studies or perspectives was found may not capture the full complexity and diversity of the literature on the topic.

1.4. Conclusions

In this narrative review, disease and therapy management emerged as the most frequently evaluated services for which there are sets of indicators. It also highlights that professional pharmacy services' outcomes indicators were grounded in various frameworks, predominantly associated with quality. Indicators spanned across eight domains: adherence, appropriate medication use, medication safety, process, clinical outcomes, economic aspects, humanistic factors, and healthcare utilization. However, the indicators largely corresponded to outputs rather than outcomes which are not suited for effectively measuring the value of professional pharmacy services. Measurement practices were predominantly conducted by coalitions, alliances, government entities, and purchasers, aligning with their respective perspectives. Furthermore, indicators were based on readily accessible pharmacy data.

Incorporating performance indicators into the evaluation of professional pharmacy services, patients and stakeholders can provide a more comprehensive understanding of the effectiveness of pharmacy interventions in achieving desired patient outcomes, improving quality of life, enhancing functional status, and optimizing symptom control. This holistic approach to performance measurement will enable pharmacists to demonstrate the value of their services and drive continuous improvement efforts to enhance patient care and outcomes. The measurement of pharmaceutical services' outcomes will require a new set of indicators, probably aligned with indicators used in Primary Health Care systems. By providing robust evidence of the impact of pharmacist interventions on patient outcomes and healthcare system performance, community pharmacists can advocate for the integration, expansion, and recognition of pharmacist-led services within the broader healthcare system.

CRediT authorship contribution statement

Lígia Reis: Writing – original draft. **João Gregório:** Writing – review & editing, Validation, Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence

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