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REVIEW

International Experience in the Management of Pharmaceutical Expenditure: A Narrative Literature Review

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Abstract

This narrative review examines global efforts to manage pharmaceutical expenditures across diverse economic settings, with the goal of identifying strategies that balance cost containment with equitable access to medications. The review highlights the impact of various policy measures on pharmaceutical pricing and spending trends in high-, middle-, and low-income countries. We conducted a comprehensive narrative literature review using PubMed, Scopus, and EconLit databases, applying no chronological or geographical restrictions. Articles were selected based on their relevance to pharmaceutical cost-containment strategies and their impact on medication access. Data extraction was performed independently by two independent reviewers, with a conflict-resolution protocol to ensure accuracy and minimize bias. The review identifies a range of policy interventions, including price regulation, reference pricing, and the promotion of generic drugs. While high-income countries have implemented sophisticated regulatory frameworks, lower-income countries often face challenges in aligning cost containment with healthcare access needs. The effectiveness of these strategies varies widely, underscoring the need for policies tailored to local healthcare and economic conditions. Effective management of pharmaceutical expenditures requires adaptable policy frameworks that consider local contexts and economic capacities. International collaboration and continuous policy evaluation are essential to developing sustainable strategies that enhance both cost efficiency and access to essential medicines.

Key words: pharmaceutical expenditure; cost containment; healthcare policy; sustainable healthcare; drug pricing; patient outcomes

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Introduction

Allocating financial resources to healthcare remains a global challenge, especially in managing pharmaceutical expenditures, which significantly impact both public and private healthcare budgets. High-income countries often contend with rising costs due to investments in innovative therapies, middle-income countries balance limited budgets with increasing healthcare demands, and low-income countries struggle to finance even basic healthcare services. These challenges lead to considerable disparities in healthcare access, quality, and sustainability across income levels (Mousnad et al, 2014). Recent trends indicate a growing global demand for healthcare, driven by demographic shifts, technological advancements,

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and structural changes within healthcare systems. In developing countries, this demand is further intensified by the emergence of novel diseases, such as Coronavirus Disease 2019 (COVID-19), and persistent disparities in healthcare provision (Smith et al, 2009).

Prescription drug costs represent a substantial component of healthcare spending worldwide, with significant implications for both healthcare budgets and patient access to essential medicines. Rising prescription costs, fueled by increased demand, pharmaceutical innovation, and patent-protected market exclusivity, impose financial strain on healthcare systems, especially in middle- and low-income countries. This review focuses on prescription drug costs to explore cost management strategies that promote access to affordable medications while supporting healthcare system sustainability (Murimi-Worstell et al, 2019; Shah, 2022; Teasdale et al, 2022). Additionally, factors such as colonial legacies, trade policies, and environmental degradation shape long-term trends in life expectancy, GDP per capita, and healthcare expenditures, particularly in low- and middle-income regions (Hermanowski et al, 2015).

Projections suggest that global pharmaceutical spending will increase annually by 2–8%, driven by demographic changes, expanded drug utilization, rising treatment expectations, and the introduction of high-cost medications, which collectively challenge healthcare affordability and sustainability (Godman et al, 2015). In low-income countries, pharmaceutical costs can account for up to 70% of total healthcare expenditures, highlighting the urgent need for effective cost-management strategies (Cameron et al, 2009).

This study reviews global policies aimed at controlling pharmaceutical spending and optimizing medication use to maximize health outcomes through efficient resource allocation. Specifically, we examine demand-side regulations, which seek to influence prescriber and patient behaviors, alongside supply-side measures that regulate industry practices, including pricing and reimbursement strategies. By analyzing these strategies across diverse economic contexts, we aim to understand how different regions navigate the complex interplay of cost, access, and sustainability in pharmaceutical spending.

Methods

The scope of this review includes studies from high-, middle-, and low-income countries to provide a comprehensive assessment of global strategies for managing pharmaceutical expenditures. This inclusive approach captures the nuances and contextual differences in policy effectiveness across varied healthcare environments. Given the substantial variation in healthcare systems and economic constraints globally, a broad selection of studies was essential for offering a holistic view of pharmaceutical expenditure management. This approach ensures that our conclusions provide adaptable insights applicable to diverse economic and healthcare contexts, aligning with the review's objectives of balancing cost containment with equitable access.

Literature Search Strategy

This narrative literature review was conducted systematically to evaluate global strategies for managing pharmaceutical expenditures. We conducted thorough searches in PubMed (https://pubmed.ncbi.nlm.nih.gov/), Scopus (https://www.scopus.com/), and EconLit (https://www.ebsco.com/products/research-databases/econlit), using a range of search terms to capture relevant literature. The search terms included "pharmaceutical expenditure", "pharmaceutical expense", "pharmaceutical spend", "drug expenditure", "drug expense", "drug spend", "cost containment", "cost constraint", "cost curtailment", "cost reduction", "cost control", and "cost cut". For the purpose of this review, the term "pharmaceutical expenditure" refers to all costs associated with drug spending, while "cost containment" denotes strategies aimed at controlling these expenditures.

Inclusion and Exclusion Criteria

We included articles published in peer-reviewed journals that provided primary or secondary data on pharmaceutical spending or cost management strategies. To ensure a comprehensive understanding of global efforts, we imposed no chronological or geographical limitations. Exclusion criteria included studies that did not specifically focus on pharmaceutical expenditures or were unrelated to cost management strategies within the healthcare sector.

Literature Search and Study Selection

The initial search yielded a substantial number of potentially relevant studies. Two reviewers independently screened titles and abstracts for eligibility, followed by a full-text review to determine final inclusion. Discrepancies between reviewers were resolved through discussion or, if needed, consultation with a third reviewer, ensuring a rigorous selection process and minimizing bias.

Data Extraction and Bias Avoidance

Data extraction was conducted independently by two reviewers using a standardized form capturing key information, such as study location, design, outcomes, and relevance to cost management practices. The form included criteria such as article relevance to pharmaceutical expenditure management, data quality and reliability, and study type (e.g., empirical research, systematic review, case study). Each article was evaluated against these criteria to ensure suitability for inclusion, supporting a structured and transparent selection process. Two reviewers, Vasileios Leivaditis and Nikolaos Kontodimopoulos—both experts in healthcare policy, pharmacoeconomics, and public health—oversaw the selection process to ensure high-quality, relevant studies were included. This dual-reviewer approach aimed to minimize extraction errors and reduce bias.

Categorization of Literature

The selected studies were categorized by country income level (low, middle, high) and by the specific cost management strategies discussed. This categorization

enabled a structured analysis and facilitated a clearer understanding of the geographical distribution and effectiveness of different approaches.

Additional Search Parameters

While our search included PubMed, Scopus, and EconLit, it did not incorporate other economic databases, which may limit certain economic perspectives in our review. The review focused on prescription drug costs but included studies discussing over-the-counter medications if they provided relevant insights into broader expenditure trends. No language restrictions were applied; however, due to database limitations, most included studies were in English.

The literature selection process, including screening and inclusion criteria, is summarized in a flowchart (Fig. 1), detailing each stage from initial identification to final inclusion. Through this structured selection, categorization, and analysis, we aim to gain insights into global management strategies for pharmaceutical expenditures across diverse economic contexts. The following sections present our findings based on these structured analyses.

Results

The selected studies are organized in the subsequent section based on the distinct strategies and approaches employed across high-, middle-, and low-income countries.

Factors Influencing Pharmaceutical Expenditure

Supply-Side Factors

Research and Development Costs

Pharmaceutical innovation relies heavily on substantial research and development (R&D) investments, which directly impact drug prices as manufacturers seek to recover costs, influencing overall drug spending. R&D costs are a key factor driving pharmaceutical prices globally, as companies must balance the high costs of innovation with pricing strategies that allow for accessibility. Countries adopt different approaches to manage this balance based on local economic conditions and healthcare priorities (Børty et al, 2023; van der Gronde and Pieters, 2018).

In 2021, 35 OECD governments allocated a combined USA$69 billion to health-related R&D, exceeding pharmaceutical budgets, with approximately two-thirds directed to the USA, marking a 45% increase in government budgets since 2010. The pharmaceutical industry, largely concentrated in the USA, spent USA$129 billion on R&D in 2021, a 39% increase since 2010. This high level of investment underscores the emphasis on pharmaceutical innovation in countries like the USA and Japan, where drug discovery is prioritized but also contributes to elevated drug prices. Meanwhile, China's healthcare spending surged from USA$4.9 billion in 2015 to USA$14.2 billion in 2019, reflecting 189% increase as China expands its healthcare infrastructure to meet the needs of its large population (OECD, 2023).

Japan, for instance, has implemented reimbursement strategies to mitigate risks for pharmaceutical companies, aiming to sustain R&D incentives without directly inflating drug prices. A Japanese study suggests that reducing reimbursement risk

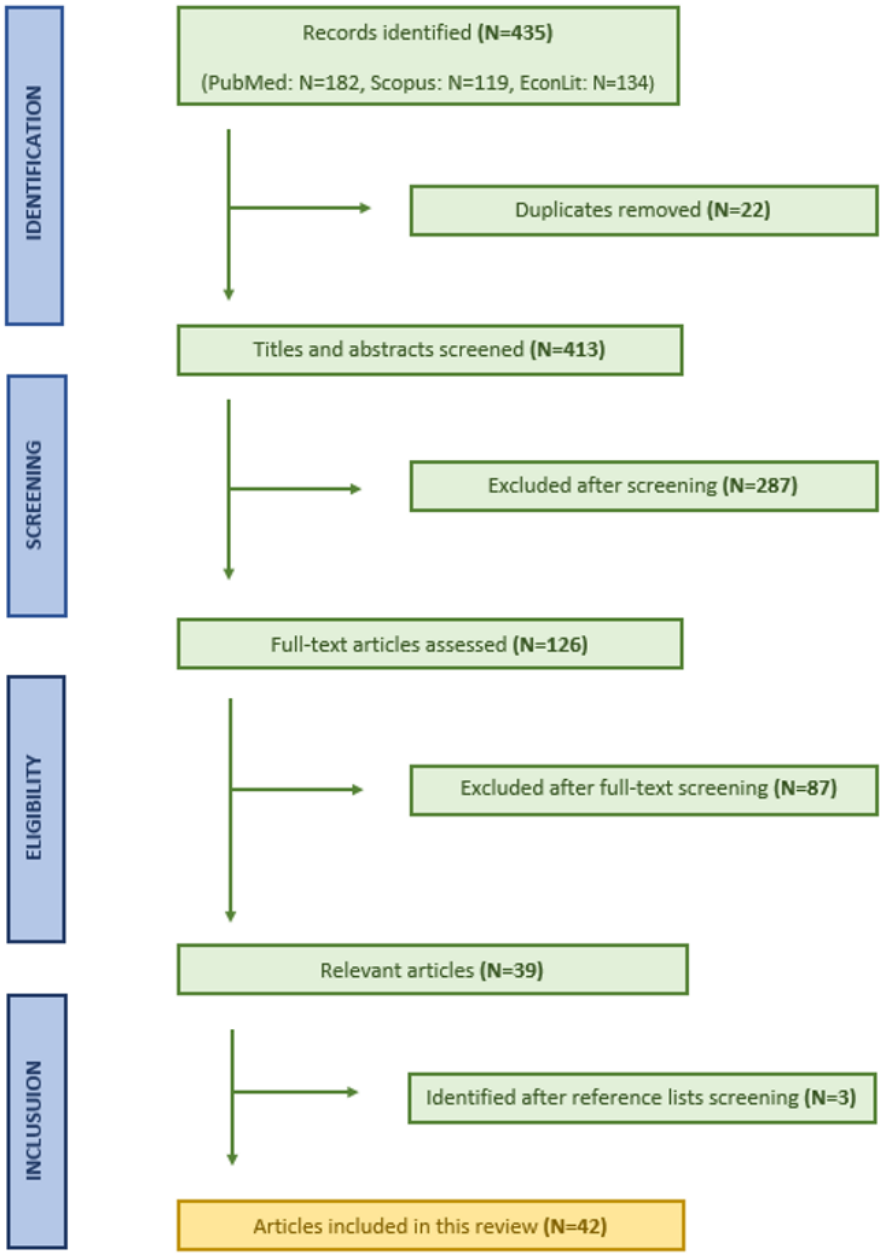

Fig. 1. Flow chart of literature selection process. This flow chart illustrates the article selection process for the review. A total of 435 records were initially identified across three databases: PubMed (182 records), Scopus (119 records), and EconLit (134 records). After removing 22 duplicates, 413 unique records were screened by title and abstract. Following this, 287 records were excluded due to irrelevance, leaving 126 articles for full-text evaluation. During the full-text review, 87 additional articles were excluded as they were deemed irrelevant to our study objectives. An additional 3 articles were identified through reference list screening, resulting in a final inclusion of 42 articles in the review.

enhances R&D incentives while controlling costs (Nakamura and Wakutsu, 2020). This example illustrates how national policies can contribute to the global discourse on balancing R&D costs with affordable access, demonstrating adaptable cost-management strategies across healthcare and economic environments. Furthermore, pharmaceutical innovation has the potential to reduce overall healthcare costs by

enabling more effective treatments, potentially offsetting the initial high prices of new drugs. Lichtenberg (2024) found that drugs approved between 1984 and 1997 led to a 10.5% reduction in hospitalization days in the USA by effectively managing disease episodes.

These variations in pharmaceutical expenditure reflect how economic capacity, healthcare priorities, and regulatory frameworks shape spending trends across countries, highlighting the need for adaptable strategies that address diverse healthcare demands.

Patent and Intellectual Property Rights

Patent rights allow pharmaceutical companies to maintain higher drug prices by securing exclusive rights to newly developed drugs (Avram et al, 2020). The duration and scope of patent protection directly impact the availability of affordable generic alternatives. High-cost innovative drugs, particularly in areas like oncology and biologics, often hold extended patent protections, delaying the entry of more affordable generics and biosimilars. This contributes to higher pharmaceutical spending, particularly in high-income regions like Europe, where innovative therapies are more widely accessible (Mousnad et al, 2014).

The introduction of innovative drugs notably contributes to the escalation of pharmaceutical expenditure in Europe (Mousnad et al, 2014). Despite their widespread acceptance in the USA, innovative drugs encounter delays in approval due to protracted processes, safety apprehensions and resistance to high prescription costs. Annually, there is an uptick in the approval of new, expensive drugs for chronic conditions (Hoffman et al, 2008). While the United States leads in pharmaceutical innovation with high investments in R&D, other regions also contribute substantially. Europe, with countries like Germany and Switzerland, is known for advancements in biotechnology and biosimilars, while Japan and South Korea in Asia have made strides in drug development, focusing on treatments for chronic diseases and aging-related health issues. These contributions reflect a global effort to address diverse health needs through innovation, though R&D spending levels and policy support vary widely across regions (OECD, 2023).

Production and Distribution Costs

The complexities of production and distribution play a substantial role in pharmaceutical costs. Intricate manufacturing processes and supply chain challenges can drive up costs, which ultimately affect drug prices for consumers and health systems (Mousnad et al, 2014). Drug price changes are often measured by an index that reflects real price adjustments, similar to the consumer price index. In most high-income countries, pharmaceutical spending consistently outpaces general inflation rates, indicating that pharmaceutical costs grow faster than other consumer prices (Dubois et al, 2000).

Demand-Side Factors

Demand-side factors—including consumer preferences, prescribing practices, and public awareness—affect pharmaceutical spending differently across countries,

shaped largely by economic and healthcare system characteristics. In high-income countries, higher disposable incomes and comprehensive insurance coverage often lead to increased demand for branded and innovative drugs, which can elevate pharmaceutical expenditures. In middle-income countries, economic growth improves access to healthcare, driving demand for both branded and generic drugs; however, budget constraints remain a limiting factor. In low-income countries, spending is generally more constrained, with demand concentrated on essential medicines to meet basic healthcare needs. Public awareness and acceptance of generic drugs also vary significantly across regions, which further influences spending patterns. For instance, in some countries, public perceptions favor brand-name drugs over generics, impacting the demand for lower-cost alternatives (Godman et al, 2018; Kildemoes et al, 2010; Morgan and Cunningham, 2011; Morgan, 2006).

Health Financing Models

Distinct healthcare financing models across nations significantly impact pharmaceutical spending. Systems that rely on public funding, private insurance, or direct out-of-pocket payments create varying pressures on drug pricing and accessibility (Godman et al, 2018).

Changes in Population Age Distribution

Population aging exerts only modest pressure on pharmaceutical spending (Morgan and Cunningham, 2011; Morgan, 2006). While aging alone does not significantly impact spending and is beyond policy control, it remains a relevant factor for policy formulation and budget allocation (Kildemoes et al, 2010). Notably, individuals aged 45–64 are more likely to increase pharmaceutical usage compared to those aged 65–84. Additionally, women tend to utilize pharmaceuticals at higher rates than men (Suh et al, 1999).

Consumer Behavior and Prescribing Practices

Patient preferences and physician prescribing patterns play a significant role in shaping pharmaceutical spending. Consumer demand for brand-name drugs, combined with aggressive marketing by pharmaceutical companies, often favors higher-priced medications over affordable alternatives. Although physicians are pivotal in treatment decisions, many lack adequate knowledge of drug costs, frequently underestimating the expense of high-priced medications. Consumer demand for branded versus generic drugs is also influenced by regulatory policies that affect market availability and pricing (Kong, 2009). In countries with policies promoting generic substitution or mandatory generic prescribing, consumer preferences tend to shift toward lower-cost options. Conversely, in markets without such policies, a strong preference for branded drugs often persists, encouraged by direct-to-consumer advertising and limited price controls. This dynamic presents a regulatory challenge, as managing consumer behavior requires a balance between ensuring accessibility and containing costs. Prescribing practices are heavily influenced by regulatory guidelines, feedback mechanisms, and financial incentives. In environments with strict prescribing guidelines, physicians may be incentivized

to select cost-effective medications, thereby reducing overall expenditure. However, in countries lacking robust regulatory oversight, prescribing behavior is often driven by pharmaceutical promotions, leading to the selection of higher-cost treatments. This variability highlights a regulatory challenge in aligning prescriber incentives with cost-containment goals while maintaining treatment quality. Additionally, limited awareness of drug costs among prescribers, even in regulated markets, complicates efforts to effectively control expenditures (Allan et al, 2007).

An Austrian study examined household characteristics influencing out-of-pocket pharmaceutical expenditures, dividing these costs into two categories: prescription and non-prescription (over-the-counter, OTC) expenses directly borne by consumers. The likelihood of incurring both types of expenses was significantly influenced by household structure, with expenditures increasing with age, frequency of medical consultations, and among females. Education level and income primarily affected the likelihood of OTC pharmaceutical spending. While non-prescription spending remained largely unexplained, household structure and age were key determinants of prescription drug spending. The type of household insurance—whether private or public—had only a minor impact on overall spending levels (Sanwald and Theurl, 2017).

The interplay between regulatory frameworks, consumer preferences, and prescribing practices poses considerable challenges to managing pharmaceutical expenditures. Although regulatory policies can steer consumers and prescribers toward cost-effective options, the success of these interventions varies widely depending on local healthcare dynamics. Achieving optimal outcomes requires a balanced approach that integrates consumer education, prescriber incentives, and regulatory oversight to foster sustainable pharmaceutical spending.

Changes in Drug Quantities and Treatments

Fluctuations in drug prices and changes in drug quantities are primary drivers of pharmaceutical expenditure (Mousnad et al, 2014). Monitoring changes in drug volume involves assessing shifts in prescription rates, levels of drug utilization, and instances of polytherapy. Increased prescribing intensity and greater treatment exposure contribute to actual rises in drug utilization and overall expenditure (Steinberg et al, 2000).

Effectiveness of Policy Interventions

In response to escalating costs and the complex dynamics of pharmaceutical expenditure, governments worldwide have implemented a range of policy measures to regulate and manage pharmaceutical costs. Table 1 presents various policy measures aimed at controlling pharmaceutical expenditure. These initiatives are likely to intensify as resource pressures increase and healthcare demands persist (Godman et al, 2018).

Over the past two decades, pharmaceutical expenditure has outpaced GDP growth in all European countries. In Europe, a variety of policies have been implemented, targeting not only healthcare market stakeholders—such as the pharmaceutical industry, marketers, retailers, consumers, and prescribers—but also the

Table 1. Policy measures to control pharmaceutical expenditure.

Policy measure	Description
Pricing policies	
Price regulation	Sets maximum allowable prices for drugs, aiming to make medications affordable without compromising quality.
Reference pricing	Establishes a benchmark price for drugs within the same therapeutic category, encouraging cost-effective choices.
Profit control	Limits profit margins for manufacturers or distributors to prevent excessive drug pricing.
Parallel imports	Allows the import of patented drugs from countries where prices are lower, reducing local costs.
Generic and biosimilar substitution	Promotes the use of lower-cost generic or biosimilar alternatives to branded drugs.
Reimbursement lists	Lists drugs eligible for reimbursement, often based on therapeutic value and cost-effectiveness.
Patient co-payments	Requires patients to pay a portion of drug costs, aimed at reducing unnecessary demand.
Physicians' prescribing behavior	
Prescription guidelines	Provides guidelines for prescribers to encourage the use of cost-effective medications.
Information campaigns	Increases awareness about drug costs and effective alternatives among patients and healthcare providers.
Feedback mechanisms	Provides prescribers with feedback on prescription patterns to encourage cost-effective practices.
Financial constraints	Limits the budget or financial resources allocated to pharmaceutical expenditures, prompting cost-conscious decisions.
Drug price negotiations	Engages in price negotiations with manufacturers to secure lower prices for essential medications.
Volume & other discount mechanisms	Arranges discounts based on the volume of drugs purchased, reducing overall expenditure.
Maximum spending agreements	Caps total spending on certain drugs or within certain drug categories to control budget overflows.
Centralized drug procurement programs	Centralizes drug purchasing to leverage bulk buying power and achieve lower prices.

Table 1. Continued.

Policy measure	Description
Educational strategies	
Practice guidelines	Standardizes treatment practices to improve cost efficiency and care quality.
Continuing education programs	Provides ongoing education for healthcare providers on cost-effective prescribing and emerging treatment options.
Drug committees	Committees that review and select drugs for formularies based on efficacy, safety, and cost-effectiveness.
Patient information initiatives	Programs that inform patients about treatment options, including the benefits of generics, to support informed choices.
Regulating direct-to-consumer advertising	Establishes rules for pharmaceutical advertisements to ensure accurate information and reduce demand for non-essential drugs.
Pharmacoeconomics—health technology assessment	Evaluates drugs based on their clinical and cost-effectiveness to guide reimbursement and formulary decisions.
Administrative and financial strategies	
Fixed budgets for prescribing	Sets a budget limit for prescribing practices to encourage judicious use of resources.
Price review & reductions	Regularly reviews drug prices, often leading to reductions to maintain affordability.
Price/volume agreements	Agreements that adjust drug prices based on the volume of drugs used, help control total expenditure.
Financial incentives to physicians and pharmacists	Provides financial rewards to providers who follow cost-effective prescribing and dispensing practices.
Facilitation of generic drug market penetration	Implements policies that support the entry and acceptance of generic drugs to reduce overall pharmaceutical costs.

general public (Ess et al, 2003). Additionally, demographic factors and disease incidence, which fall outside the pharmaceutical chain, are essential considerations when developing policies and allocating budgets (Mousnad et al, 2014).

In Turkey, pharmaceutical expenditure has notably increased, likely due to the Health Transformation Program. While improved access to healthcare facilities has led to higher pharmaceutical consumption, the policies implemented have generally been effective in controlling overall pharmaceutical costs (Yılmaz et al, 2016). In Hungary, both health and pharmaceutical spending have shown an upward trend, with significant regional disparities in drug availability and health insurance subsidies, indicating unequal access to medications and healthcare support across regions (Eisingerné Balassa et al, 2019). In Italy, private pharmaceutical spending has risen while public spending has remained stable. There has been a shift from public expenditure without direct medicine distribution to expenditure involving direct distribution. However, household payments for prescription drugs have unexpectedly increased. These findings suggest that pharmaceutical expenditure management policies may have complex and unforeseen effects over time, underscoring the importance of considering such potential impacts when designing health policies (Lenzi and Gianino, 2022).

Various strategies have been implemented across countries to curb the rise in pharmaceutical costs, utilizing educational, managerial, administrative, and financial approaches (de Joncheere, 2001). Three primary pricing policies are commonly used: price regulation, reference pricing, and profit control. Price regulation remains the most widely used method for setting drug prices. Profit control is primarily applied in the UK, whereas reference pricing systems were initially adopted in Germany and the Netherlands. Reference pricing is particularly aimed at containing costs in drug categories where numerous options exist without substantial evidence of superiority (Ioannides-Demos et al, 2002).

Table 1 outlines key policy interventions aimed at controlling pharmaceutical expenditure, such as pricing regulations, reimbursement restrictions, and prescribing guidelines. Analysis of these interventions reveals varying levels of effectiveness across countries. For example, profit margin regulations and centralized drug procurement have achieved significant cost reductions in several European countries but face adaptation challenges in markets with less developed regulatory infrastructure. Generic substitution policies, widely implemented to reduce costs, are highly effective in settings with supportive regulations and strong consumer acceptance, although their impact may be limited in markets with strong brand loyalty.

Additionally, reference pricing and profit controls, which are effective in high-income countries, may create accessibility challenges in lower-income regions where cost-control mechanisms are less developed. Patient co-payments and restrictions on reimbursable drugs can reduce immediate expenditures but may also raise barriers to access, particularly for lower-income populations. Evaluating these policies highlights the importance of contextual adaptability and underscores the need to tailor cost-containment strategies to the specific requirements of each healthcare system (Ess et al, 2003).

In 2021, the USA Secretary of Health issued the "Comprehensive Plan to Address High Drug Prices", outlining the government's strategy for legislative actions to reform drug pricing. The plan focuses on supporting drug price negotiations with manufacturers, curbing price escalation, strengthening supply chains, promoting biosimilar and generic alternatives, and enhancing transparency. If passed, negotiations between the Centers for Medicare and Medicaid Services and drug manufacturers could begin in 2023, with negotiated prices taking effect in 2025. Additional provisions in the bill include measures to limit price increases for existing drugs over time, accelerate the entry of generics into the market, and prohibit anticompetitive practices by manufacturers (Tichy et al, 2023).

Established in 2010, the Pan-Canadian Pharmaceutical Alliance leads the negotiation of prices for selected new pharmaceutical products in Canada. The alliance aims to conduct joint negotiations to improve national consistency in drug listings, secure lower prices to ensure cost-effective benefits, and increase access to medications. The alliance employs various tools, including transparent and confidential price reductions, volume-based and other discount mechanisms, and maximum spending agreements (Memedovich et al, 2019).

In China, the share of pharmaceuticals in total healthcare expenditure (50–62%) significantly exceeds that in the USA and European countries (Chen and Schweitzer, 2008). Given rising costs, pharmaceutical policies have become a priority in China and other Asia-Pacific countries (Su et al, 2022). Proposed policies include setting reasonable pharmaceutical prices, establishing rational incentives for healthcare decision-makers to encourage effective pharmaceutical use, and enhancing market efficiency (Chen and Schweitzer, 2008). Since 2015, all pilot cities involved in China's public hospital reform have adopted the zero-markup drug policy and implemented the Separation of Hospital Revenue from Drug Sales (SHRDS) policy. Following SHRDS implementation, a notable reduction in drug spending led physicians to encourage increased healthcare service utilization among patients. However, this shift has transferred part of the healthcare cost burden to patients, as the reimbursement ratio has decreased. The effectiveness of the SHRDS policy in reducing overall healthcare expenditure remains inconclusive (Li and Yu, 2021). In 2019, China launched its first National Centralized Drug Procurement (NCDP) pilot program, which successfully reduced costs for targeted drugs. Despite these savings, overall medication expenditure remained high due to increased utilization of alternative pharmaceuticals (Chen et al, 2020).

Overall, the effectiveness of pharmaceutical cost-containment policies is highly context-dependent, highlighting the importance of flexible frameworks that can adapt to local healthcare and economic conditions. These findings emphasize the need for ongoing evaluation of policy outcomes to ensure both cost-efficiency and equitable access to medications.

Educational Strategies

Educational strategies include practice guidelines, continuing education programs, drug committees, and patient information initiatives. Managing direct-to-consumer advertising involves regulatory oversight of marketing and commercial

information. Educational initiatives—such as provider training, patient awareness campaigns, and information dissemination—play a critical role in influencing pharmaceutical spending by promoting cost-effective prescribing practices and encouraging the use of generic drugs (Lee et al, 2015).

For example, educating prescribers on drug pricing and cost-effective alternatives can reduce high-cost prescriptions. Similarly, patient education on the efficacy of generics compared to brand-name drugs shifts demand toward more affordable options, which can help lower overall spending. These strategies are particularly impactful in high-income countries with a higher prevalence of brand-name drug use, but they also support cost containment in middle- and low-income settings by fostering rational drug use (Schneeweiss, 2007).

Pharmacoeconomics—Health Technology Assessment

Healthcare systems employ formulary management and pharmacoeconomic evaluations to guide drug selection and reimbursement decisions. By prioritizing cost-effective medications and establishing reimbursement lists, they aim to optimize healthcare spending without compromising efficacy. The increasing emphasis on Health Technology Assessment (HTA) has become a critical tool for evaluating the clinical and cost-effectiveness of pharmaceutical products. These assessments play a significant role in reimbursement decisions, directing healthcare expenditures toward drugs that offer high value for money (Brown and Brown, 2016; Yang, 2009).

Administrative and Financial Strategies

Administrative and financial strategies include fixed budgets for prescribing, price review mechanisms, price/volume agreements, and financial incentives for physicians and pharmacists to promote services and the use of generics. Many countries have adopted price review processes and negotiation tactics to control costs. Promoting access to generic drugs is a key strategy for reducing pharmaceutical expenses, focusing on increased availability of affordable alternatives after patent expiration (Schneeweiss, 2007).

The USA Food and Drug Administration (FDA) has been working to improve access to generics, granting full or trial approval for 776 generic agents in 2021—a decrease of 14.6% from 2020. Although fewer new drug applications were approved, 93 drugs received first-time approval in 2021, representing a 22.5% increase from 2020. In 2021, USA spending on generics reached $99.4 billion, marking a slight increase of 0.02% from 2020. Generics accounted for 17.3% of total pharmaceutical spending in 2021, with their share of total spending rising by 0.1% from the previous year, reversing the steady decline observed from 2015 to 2020. Legislative efforts may further support education and awareness among healthcare providers regarding bioequivalence, potentially enhancing the market penetration of generics (Tichy et al, 2023).

Discussion

Impact of Policy Interventions

As governments implement policy measures to regulate pharmaceutical spending, it is essential to ensure both equity and efficiency. Assessing the equity of these policies requires a comprehensive approach (Bevan et al, 2010), including an evaluation of whether current policies provide access to essential medicines for marginalized or vulnerable populations. Key considerations include geographic accessibility, affordability, and cultural factors influencing access (La Rosa-Salas and Tricas-Sauras, 2008). Additionally, policies should be examined to ensure they maintain drug affordability across various income levels, as equity demands that individuals across all income strata have equal access to essential pharmaceuticals (Schneeweiss, 2007).

It is also crucial to assess the impact of policies on reducing disparities in pharmaceutical access and health outcomes across diverse demographic groups. Effective policies should aim to bridge these disparities, promoting equitable health outcomes (Bevan et al, 2010). While the primary goal of cost management policies is to control pharmaceutical spending, their effectiveness should also be evaluated based on patient outcomes. Policies that succeed in containing costs but compromise quality of care or restrict access to essential medications may ultimately undermine the goals of sustainable healthcare (Luiza et al, 2015). For instance, generic substitution policies can lower costs while maintaining treatment efficacy, benefiting healthcare systems and patients by improving access to essential medications. However, patient co-payment policies, while effective in reducing expenditure, may create financial barriers for low-income patients, potentially leading to poorer health outcomes if essential medications are delayed or skipped. Reference pricing encourages the use of cost-effective drugs, supporting quality of care by prioritizing affordable options; however, it may limit choices for patients who need specific branded medications.

Challenges in Pharmaceutical Expenditure Management

This review highlights the complex factors driving the rise in pharmaceutical costs worldwide. Central to this issue are the multifaceted influences from both the supply and demand sides of health economics, which perpetuate a continuous increase in pharmaceutical spending globally (Chi et al, 2024). To manage costs, governments employ various strategies, including price adjustments and the promotion of generic alternatives. However, the effectiveness of these measures varies across healthcare systems. While some policies have successfully contained costs without compromising accessibility or quality, others may require reassessment to better align with optimal outcomes (Godman et al, 2018). Key findings underline the critical role of policy interventions, shedding light on both their potential and limitations in promoting equitable access to medicines while addressing the complex challenges of cost containment.

Balancing Equity and Efficiency in Policy Design

Balancing equity and efficiency remains a critical challenge, requiring policies that ensure equitable access across socioeconomic groups while optimizing resource allocation and fostering healthcare innovation. Policymakers should adopt an integrated approach, considering multiple dimensions of equity to enhance affordability and reduce access disparities. Continuous evaluation is essential to enable timely adjustments that align with the evolving needs of healthcare systems (Bevan et al, 2010; La Rosa-Salas and Tricas-Sauras, 2008). Therefore, the assessment of cost-management policies should not only consider financial metrics but also prioritize patient outcomes, including quality of care and health improvements. This approach helps ensure that cost-containment efforts do not inadvertently compromise patient health or equity in healthcare access.

Forecasting and Planning for Sustainable Access

Given budget constraints, payers and providers worldwide face challenges in ensuring sustainable access to new medications. Within initiatives to enhance healthcare systems' readiness for introducing new drugs, forecasting drug utilization and expenditure has become increasingly important. A Swedish study analyzing various forecasting reports demonstrated the feasibility of accurately predicting pharmaceutical expenditure. For budget allocation decisions and agreements between payers and providers, it is highly recommended to update forecasts as close as possible to the decision date to ensure precision (Linnér et al, 2020).

Societal Value and Holistic Assessment of Drug Expenditures

A comprehensive assessment of pharmaceutical expenditure and value is essential for optimizing healthcare resource allocation, benefiting both healthy individuals and those requiring medical care. A holistic view of drug value reveals that the value of a branded drug to an individual patient often represents only a fraction of its broader societal value. Therefore, societal value should be a key consideration in determining medication affordability and accessibility. It is important not to limit access to drugs with significant societal benefits by imposing high out-of-pocket costs or relying solely on narrow economic assessments for coverage decisions. Additionally, understanding the full societal cost of untreated or undertreated conditions is crucial for appreciating how the biomedical innovation ecosystem generates value for society. Discouraging new solutions without acknowledging the implications of unresolved health issues would be shortsighted (Ramagopalan et al, 2024).

Future Directions: Global Cooperation and Harmonization

Global cooperation has become essential in managing pharmaceutical expenditures. The alignment of best practices and international agreements offers a pathway to harmonize affordability, innovation, and access on a global scale. Ultimately, managing pharmaceutical costs requires a balance between containing expenses and ensuring equitable access to essential medicines. Looking ahead, future

efforts should focus on fostering continued collaboration and innovation to address the evolving challenges in pharmaceutical expenditure management.

Conclusion

In conclusion, this review highlights that cost management strategies, such as pricing regulations, generic substitution, and centralized procurement, are essential for controlling pharmaceutical expenditure across various income levels. However, the effectiveness of these measures is highly dependent on local healthcare and economic contexts. Policymakers must strike a balance between cost containment and equitable access to essential medicines to ensure sustainable healthcare. Continuous evaluation of these strategies is crucial to adapt to changing healthcare needs and to promote affordability without compromising quality of care.

Key Points

- Cost management policies such as pricing regulation, generic substitution, and centralized procurement are essential for controlling pharmaceutical expenditure across different healthcare systems.
- The effectiveness of these policies varies significantly depending on local economic and healthcare contexts, with high-income countries able to invest more in innovative therapies while low-income countries focus on essential medicines.
- Patent protection duration impacts the availability of affordable generics, contributing to higher pharmaceutical costs, especially for innovative drugs in high-income countries.
- Educational strategies targeting prescribers and patients promote cost-effective drug use and support the adoption of generics, contributing to overall spending reduction.
- Policymakers must balance cost containment with ensuring equitable access to essential medications to support sustainable healthcare systems.
- Continuous evaluation and adaptation of pharmaceutical policies are necessary to meet evolving healthcare needs and maintain both affordability and quality in care.

Availability of Data and Materials

Not applicable.

Author Contributions

Conceptualization, VL, FM and NK; methodology, VL, CN and NK; validation, VL, CN, FM, JF and NK; formal analysis, VL, CN, JF and NK; investigation, VL and NK; resources, VL, CN, JF and NK; data curation, VL, CN, JF and NK; writing—original draft preparation, VL, FM and NK; writing—review and editing, VL, CN, JF and NK; visualization, VL, CN, JF and NK; supervision, JF and NK;

project administration, VL, CN, JF and NK. All authors contributed to the important editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

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Conflict of Interest

The authors declare no conflict of interest.

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