Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Adapting Value-Based Pricing to Chinese Patent Medicines: International Lessons and a Hedonic Pricing Perspective

Yijiu Yang
Institute of Basic Research in Clinical Medicine, China Academy of Chinese Medical Sciences
Zhenhua Zhang
Guang'anmen Hospital, China Academy of Chinese Medical Sciences
Zhifeng Nie
International Research Center of Medicinal Administration, Peking University
Haili Zhang
Institute of Basic Research in Clinical Medicine, China Academy of Chinese Medical Sciences
Houfang Ma
Institute of Basic Research in Clinical Medicine, China Academy of Chinese Medical Sciences
Yanping Wang
Institute of Basic Research in Clinical Medicine, China Academy of Chinese Medical Sciences
Sheng Han
hansheng@bjmu.edu.cn

International Research Center of Medicinal Administration, Peking University
Nannan Shi
Institute of Basic Research in Clinical Medicine, China Academy of Chinese Medical Sciences

Research Article

Keywords: Value-based pricing, Chinese patent medicines, traditional herbal medicine, health technology assessment, pharmacoeconomics, hedonic pricing, resource allocation, reimbursement decision-making

Posted Date: November 4th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11045352/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Value-based pricing (VBP) has become an important policy approach for aligning pharmaceutical prices with clinical benefit, cost-effectiveness, and health system priorities. However, most existing VBP mechanisms have been developed within modern biomedical and health technology assessment frameworks, where clinical outcomes, comparators, and evidence hierarchies are relatively well defined. Whether these mechanisms can be directly applied to traditional herbal medicines remains uncertain, particularly for Chinese patent medicines (CPMs), which are characterized by complex formulations, multidimensional value attributes, heterogeneous clinical use, and uneven evidence quality. This review adopts a policy-oriented narrative approach with a structured search strategy to synthesize academic literature, policy documents, technical guidelines, and assessment reports related to international pharmaceutical VBP practices. Three representative mechanisms are examined: cost-effectiveness threshold-based pricing, multi-payer value negotiation, and added-benefit-based price negotiation. These mechanisms commonly rely on high-quality comparative evidence, clear comparators, standardized outcome measures, and mature health technology assessment and reimbursement decision-making processes. For CPMs, direct transplantation of these approaches may be constrained by evidence mismatch, difficulties in measuring holistic and long-term benefits, heterogeneous real-world use, and insufficient mechanisms for expressing multidimensional value in price formation. To address these challenges, this review proposes a hedonic-pricing-informed pathway for CPM value-based pricing. This pathway links multidimensional value attribute identification, evidence mapping and data construction, hedonic pricing modelling, interpretation of price signals, value-to-price translation and policy options, and dynamic updating. By examining how observable drug characteristics are associated with market prices, hedonic pricing may help identify which value attributes are already reflected in prices, which remain under-recognized, and whether current price signals are consistent with the expected value structure of CPMs. This approach is not intended to replace conventional health technology assessment or pharmacoeconomic evaluation, but to provide a complementary empirical perspective for value-to-price translation under conditions of evidence uncertainty. The proposed pathway may support more transparent, feasible, and policy-relevant pricing, reimbursement, and resource allocation decisions for traditional herbal medicines.

Introduction

Value-based pricing (VBP) has become an increasingly important policy approach for aligning pharmaceutical prices with therapeutic value, health system priorities, and sustainable resource allocation. According to the World Health Organization (WHO) guideline on country pharmaceutical pricing policies, VBP represents one of the major pharmaceutical pricing approaches used internationally[1]. In contrast to cost-plus pricing or external reference pricing, VBP aims to link the price of a medicine to the value it generates for patients, payers, and health systems. This approach has important implications not only for reimbursement and price negotiation, but also for pharmaceutical innovation. By rewarding medicines that generate meaningful clinical and social value, pricing and

reimbursement policies may reduce incentives for low-value repetitive research and development and guide investment toward areas of greater public health need[2] .

The global pharmaceutical pricing landscape has increasingly shifted from cost-driven mechanisms toward value-oriented approaches. Traditional pricing methods, such as cost-plus pricing and external reference pricing, have shown limitations in the context of rapidly increasing prices for high-cost medicines[3]. These methods may fail to adequately reflect the real therapeutic benefit of medicines or to guide research and development resources toward innovations with substantial clinical and social value. In areas such as oncology and rare diseases, the launch prices of new medicines have increased substantially, while the incremental health benefits generated by some of these products may not be proportional to their prices[4,5]. This mismatch has intensified the financial pressure on payers under constrained health budgets and has become a recurring challenge in contemporary pharmaceutical policy. VBP was proposed partly in response to the failure of market prices to fully reflect therapeutic benefit[6]. Against this background, many countries have explored pricing mechanisms that use clinical value, cost-effectiveness, or added therapeutic benefit as the basis for price formation[7]. However, the implementation of VBP remains challenging, partly because the availability, usability, and completeness of value evidence are often insufficient to support robust pricing decisions[8,9].

Beyond conventional biomedical pharmaceuticals, traditional, complementary, and integrative medicine continues to contribute to health care through distinctive theoretical systems, holistic therapeutic concepts, and accumulated clinical experience[10,11].The draft WHO global traditional medicine strategy 2025–2034 emphasizes that decisions regarding the use of traditional, complementary, and integrative medicine should be based on the best available evidence on safety and effectiveness from both research and practice[12]. In recent years, traditional medicine products have gained increasing social acceptance and international attention[13,14]. Nevertheless, their evidence structures and modes of value expression may differ from those commonly used in modern biomedical evaluation frameworks[15].As a result, traditional medicine products often face higher uncertainty and more demanding evidence requirements when they seek market entry, reimbursement, or integration into formal health systems[16,17].

Chinese patent medicines (CPMs), as a major form of traditional herbal medicines, provide a typical example of this challenge. In this review, CPMs refer to standardized, manufactured traditional Chinese medicine products with fixed formulations and dosage forms that are approved and used in clinical practice in China. In China, the deepening coordination of medical care, health insurance, and pharmaceutical governance has made reimbursement negotiation, competitive bidding, and tendering increasingly important mechanisms for shaping payment standards and indirectly regulating drug prices[18]. Under this policy environment, whether a medicine can obtain an appropriate pricing position depends increasingly on whether its clinical and social value can be clearly identified and effectively expressed. This issue is particularly prominent for CPMs[19]. Many CPMs have accumulated extensive clinical experience through long-term use. Their therapeutic value is often expressed through holistic

regulation, symptom improvement, long-term disease management, and real-world clinical utility. However, these value attributes may not be fully captured by evaluation frameworks that prioritize single clinical endpoints, short-term outcomes, or conventional evidence hierarchies.

The current pricing and payment mechanisms for CPMs also have limitations in value stratification and differentiated value expression. When value differences among CPM products cannot be adequately identified, products with potentially distinctive clinical value may be insufficiently differentiated in reimbursement negotiation, tendering, or procurement processes. This may weaken value-related price signals, reduce incentives for quality improvement and evidence generation, and limit the capacity of the health insurance system to allocate resources according to value. From a resource allocation perspective, insufficient value expression may lead not only to inappropriate pricing, but also to distorted priority-setting. Under constrained health insurance budgets, medicines whose long-term or multidimensional value is not adequately recognized may be underfunded or marginalized, whereas products with stronger market visibility but weaker value evidence may receive disproportionate resources. This creates an opportunity cost for the health system and weakens the efficiency of reimbursement decisions. Therefore, an important policy question is how to introduce a more systematic and operational value expression mechanism within the existing pharmaceutical pricing and reimbursement framework, so that the clinical, economic, and social value of CPMs can be more appropriately reflected in price formation.

International VBP practices provide useful lessons for addressing this question, but their direct transferability to CPMs requires careful examination. Existing VBP mechanisms, including cost-effectiveness threshold-based pricing, multi-payer value negotiation, and added-benefit-based price negotiation, have largely been developed within modern health technology assessment (HTA) and pharmacoeconomic evaluation systems. These mechanisms generally depend on high-quality clinical evidence, clearly defined comparators, measurable outcomes, and relatively mature institutional arrangements for value assessment and price negotiation. CPMs, however, are characterized by complex formulations, multiple mechanisms of action, heterogeneous clinical use, multidimensional value attributes, and relatively uneven evidence quality. These features create a potential mismatch between the evidence requirements of international VBP mechanisms and the value-generation logic of traditional herbal medicines.

Therefore, there is a need to systematically review major international VBP practices, clarify their institutional logic and evidence requirements, and identify the points at which they may or may not be transferable to CPMs. More importantly, it is necessary to explore a value-to-price translation pathway that is more consistent with the characteristics of CPMs. Hedonic pricing theory may provide a useful perspective in this regard. By viewing product value as a bundle of observable characteristics and estimating the implicit prices of these characteristics, hedonic pricing may help reveal how different value attributes are reflected in market prices. This perspective may complement conventional HTA and pharmacoeconomic evaluation by providing an empirical approach to identifying and expressing the multidimensional value of CPMs under conditions of evidence uncertainty.

Accordingly, this article is positioned as a policy-oriented narrative review and conceptual framework paper. It aims to synthesize representative international VBP mechanisms and analyze their implications for CPMs from the perspectives of evidence requirements, policy transferability, and value-to-price translation. Rather than directly transplanting pricing tools developed for conventional pharmaceuticals, this review argues that CPMs require a tailored value identification and expression framework that reflects their evidence structures, multidimensional value attributes, and real-world use patterns. In particular, it discusses the potential role of a hedonic-pricing-informed pathway in linking observable drug characteristics, market price signals, and multidimensional value assessment, thereby supporting more feasible, transparent, and policy-relevant pricing, reimbursement, and resource allocation decisions for traditional herbal medicines.

Objectives and methodology of this review

The objectives of this review were to:

1. provide a structured synthesis of major international value-based pricing mechanisms for pharmaceuticals, including cost-effectiveness threshold-based pricing, multi-payer value negotiation, and added-benefit-based price negotiation;

2. analyze the evidence requirements, institutional logic, and policy transferability of these mechanisms in relation to Chinese patent medicines;

3. explore the potential role of a hedonic-pricing-informed pathway in supporting value identification, value expression, and value-to-price translation for Chinese patent medicines.

As a policy-oriented narrative review, this study focused on conceptual frameworks, policy mechanisms, evidence requirements, and methodological adaptation rather than quantitative evidence synthesis. The aim was not to conduct a meta-analysis of economic evaluation results, but to examine how international value-based pricing practices may inform the development of a more feasible and context-sensitive pricing framework for Chinese patent medicines.

Search strategy and scope

A policy-oriented narrative review with a structured search strategy was conducted to identify academic publications, policy documents, technical guidelines, and institutional reports relevant to pharmaceutical value-based pricing and its potential application to traditional herbal medicines and Chinese patent medicines. The purpose of the search was not to conduct a quantitative systematic review or meta-analysis, but to support a conceptual and policy analysis of value assessment, price formation, evidence requirements, and transferability to Chinese patent medicines.

Given the policy-oriented and conceptual nature of this review, the search aimed to identify representative and policy-relevant literature and documents rather than to exhaustively include all eligible studies.

Chinese and English databases were searched, including China National Knowledge Infrastructure, Wanfang Data, VIP, PubMed, and Web of Science. In addition, grey literature and institutional documents were retrieved from the official websites of international organizations and health technology assessment or reimbursement agencies, including the World Health Organization, the Organisation for Economic Co-operation and Development, the National Institute for Health and Care Excellence, the Institute for Clinical and Economic Review, the Institute for Quality and Efficiency in Health Care, and the Federal Joint Committee.

The search covered records from database inception to December 2025. Search terms were developed around four conceptual domains: value-based pricing and pharmaceutical pricing; health technology assessment and pharmacoeconomic evaluation; traditional herbal medicines and Chinese patent medicines; and reimbursement or market access. Corresponding Chinese and English terms were used when searching Chinese and English databases, respectively. Boolean operators were used to combine terms across these domains, such as “value-based pricing” AND “health technology assessment”, “pharmaceutical pricing” AND “reimbursement”, and “traditional herbal medicine” AND “economic evaluation”.

Inclusion and exclusion criteria

Documents were eligible for inclusion if they met at least one of the following criteria: they discussed pharmaceutical value-based pricing mechanisms; described the role of health technology assessment or pharmacoeconomic evaluation in pricing or reimbursement decisions; analyzed pricing practices in representative settings such as the United Kingdom, the United States, or Germany; addressed evidence requirements for value-based pricing; or discussed the evaluation, reimbursement, market access, or value expression of traditional medicine products or Chinese patent medicines.

Documents were excluded if they were unrelated to pharmaceutical pricing or reimbursement, focused solely on clinical efficacy without implications for value assessment or pricing, lacked accessible full text, were duplicate records, or did not provide relevant information on value assessment, price formation, or policy transferability.

Data extraction and synthesis

Data extraction focused on four domains: value assessment logic, price translation mechanisms, evidence requirements, and potential limitations for Chinese patent medicines. For international value-based pricing practices, information was extracted on the type of pricing mechanism, representative setting, value basis, assessment method, price formation process, and institutional characteristics. For literature related to traditional medicine and Chinese patent medicines, information was extracted on evidence structures, value attributes, evaluation challenges, and implications for pricing and reimbursement decisions.

A narrative synthesis approach was used because the included materials consisted of heterogeneous academic literature, policy documents, technical guidelines, and institutional reports. The synthesis first categorized major international value-based pricing mechanisms, then examined the evidence and institutional conditions required for their implementation. On this basis, the review analyzed the transferability of these mechanisms to Chinese patent medicines and further explored how hedonic pricing theory may provide a complementary perspective for value-to-price translation.

International value-based pricing mechanisms

Health technology assessment (HTA) and pharmacoeconomic evaluation are the two core tools supporting the implementation of value-based pricing for pharmaceuticals. HTA provides a structured approach for assessing the value of health technologies from multiple dimensions, including clinical effectiveness, safety, costs and economic implications, as well as ethical, social, cultural, and legal considerations[20,21]. While HTA is primarily used to inform whether a medicine should be reimbursed or adopted within a health system, pharmacoeconomic evaluation further quantifies the incremental health benefits and costs of a medicine compared with existing alternatives, thereby providing an analytical basis for value-based price formation[22].

Although countries differ in their institutional arrangements, international value-based pricing practices generally share a common policy logic: value is first assessed through clinical, economic, or comparative benefit evidence, and then translated into price through thresholds, negotiations, or benefit categories. Based on representative international practices, three major mechanisms can be identified: cost-effectiveness threshold-based pricing, multi-payer value negotiation, and added-benefit-based price negotiation. Their key features are summarized in Table 1.

Table 1. Comparison of major international value-based pricing mechanisms

Type	Representative setting	Value basis	Main assessment method	Price formation mechanism	Institutional feature
Cost-effectiveness threshold-based model pricing	United Kingdom	Incremental health benefits, commonly measured by QALYs	HTA and cost-effectiveness analysis	Acceptable price range informed by social willingness-to-pay thresholds	Highly model-based, with clear evidence and threshold orientation
Multi-payer market-driven value assessment and pricing	United States	Payers' willingness to pay for health gains	Market negotiation and independent value assessment	Prices shaped by manufacturer pricing and negotiations with multiple payers	Highly market-oriented, with multiple payers and decentralized decision-making
Added-benefit-based value and price negotiation	Germany	Additional clinical benefit compared with existing treatment	Early benefit assessment	Negotiated price range informed by added-benefit categories	Institutionalized benefit grading, with strong emphasis on direct comparative evidence

Abbreviations: HTA, health technology assessment; QALY, quality-adjusted life year.

Cost-effectiveness threshold-based pricing

The United Kingdom is one of the most frequently cited examples of cost-effectiveness threshold-based value-based pricing. The National Institute for Health and Care Excellence (NICE) evaluates medicines primarily through HTA and cost-effectiveness analysis. In this framework, the incremental cost per quality-adjusted life year (QALY) gained is commonly used as a key metric to assess whether a new medicine provides sufficient value for the National Health Service (NHS). Cost-effectiveness is therefore central to reimbursement decisions, and the willingness-to-pay threshold provides a reference for determining whether the price of a medicine is acceptable relative to its expected health benefits[23,24].

The United Kingdom's value-based pricing reforms have also been closely linked to attempts to improve the predictability of pricing and reimbursement decisions. The Pharmaceutical Price Regulation Scheme introduced the concept of value-based pricing and provided an institutional basis for subsequent policy exploration[24,25]. Mechanisms such as flexible pricing and patient access schemes were developed to reduce uncertainty, improve patient access, and allow further evidence generation after market entry[26]. In this model, value-to-price translation is highly dependent on model-based economic evaluation and the relationship between incremental health benefit, cost, and the willingness-to-pay threshold.

Multi-payer value negotiation

The United States represents a market-oriented and multi-payer pathway for value-based pricing. Unlike single-payer systems, the United States has a highly pluralistic reimbursement environment involving commercial insurers, health maintenance organizations, government programmes, and other payers. In this setting, medicine prices are not centrally determined by the government, but are shaped by manufacturer pricing strategies and negotiations with multiple payers. The willingness of payers to pay for health gains therefore plays an important role in the formation of value-based prices[27,28].

The Institute for Clinical and Economic Review (ICER) has played an important role in providing independent value assessments and value-based price benchmarks in the United States. ICER analyses often estimate value-based benchmark prices according to cost-effectiveness thresholds, such as commonly cited ranges of 100,000 to 150,000 US dollars per QALY gained[20]. However, ICER assessments do not directly determine drug prices. Instead, they provide information that may be used by payers, manufacturers, and policymakers in negotiations or policy discussions. Despite these efforts, prescription drug prices in the United States remain substantially higher than those in many other industrialized countries, indicating that value assessment alone does not necessarily ensure value-consistent price formation in a fragmented market system[6].

Several value-based arrangements have emerged in the United States to link payment more closely with clinical performance or budgetary impact. Examples include value-based rebates for patients who do not achieve expected clinical improvement and state-level initiatives that use value assessments to constrain prescription drug spending[29,30]. These practices suggest that value-based pricing in a multi-payer system is less a single centralized pricing rule than a set of negotiation tools and contractual arrangements. The policy effectiveness of this mechanism depends not only on the quality of evidence, but also on payer bargaining power, transparency, and the institutional capacity to translate value assessments into enforceable payment terms.

Added-benefit-based price negotiation

Germany provides a representative example of added-benefit-based price negotiation. Since the implementation of the Act on the Reform of the Market for Medicinal Products (AMNOG) in 2011, newly launched medicines have been required to undergo early benefit assessment. Manufacturers submit evidence comparing the new medicine with an appropriate comparative therapy, and the Institute for Quality and Efficiency in Health Care evaluates the extent of additional benefit based on outcomes such as mortality, morbidity, and health-related quality of life[31,32].

The final decision on added benefit is made by the Federal Joint Committee (G-BA), which considers the manufacturer dossier, the IQWiG assessment, and the results of public consultation. Added benefit is categorized into several levels, including major, considerable, minor, non-quantifiable, no additional benefit, and less benefit[33]. These categories then inform price negotiation between the National Association of Statutory Health Insurance Funds and the manufacturer. For medicines with demonstrated additional benefit, the negotiated price is expected to reflect the value of the medicine for

the relevant patient population. For medicines without proven additional benefit, prices may be restricted or the products may be assigned to reference pricing groups[34–36].

Compared with cost-effectiveness threshold-based pricing, the German approach places stronger emphasis on direct comparative clinical evidence and the classification of added benefit. Its value-to-price translation does not rely primarily on a single cost-effectiveness threshold, but on the institutional linkage between benefit categories and negotiated reimbursement prices. This mechanism offers a relatively transparent way to connect comparative clinical value with price negotiation, but it also requires robust comparative evidence and clear definitions of relevant patient populations and outcomes.

Summary of international mechanisms

Overall, international value-based pricing mechanisms differ in institutional design, but they share several common features. First, value assessment is usually anchored in clinical benefit, cost-effectiveness, or added therapeutic value. Second, price formation is mediated through explicit thresholds, payer negotiations, or benefit categories. Third, the successful implementation of value-based pricing depends heavily on the availability of high-quality evidence, clearly defined comparators, measurable outcomes, and mature institutional capacity for HTA and reimbursement decision-making. These shared features provide useful lessons for Chinese patent medicines, but they also indicate why direct transplantation of international mechanisms may be difficult when evidence structures and value attributes differ substantially from those of conventional pharmaceuticals.

Evidence system and value assessment challenges in traditional Chinese medicine

Traditional Chinese medicine (TCM), as an important component of traditional medicine, has increasingly been incorporated into evidence-based research and decision-making frameworks. The World Health Organization has emphasized that unlocking the potential of traditional medicine through scientific research and transforming accumulated experience into evidence are essential for its sustainable development[37,38]. Although evidence-based medicine was originally developed within the context of modern biomedical research, its concepts and methods have gradually been introduced into the field of TCM to support the evaluation of safety, effectiveness, and clinical utility.

In recent years, TCM has made substantial progress in evidence generation and evidence synthesis. The number of clinical studies, systematic reviews, meta-analyses, and clinical practice guidelines related to TCM has increased rapidly. At the same time, efforts have been made to develop evaluation tools and outcome measures that are more consistent with TCM theories, syndrome differentiation, and clinical response patterns. These developments provide an important foundation for integrating TCM into evidence-informed health policy and reimbursement decision-making. However, the expansion of evidence does not necessarily imply sufficient readiness for value-based pricing or health technology assessment. A persistent challenge in TCM research is the uneven quality of evidence. Many studies remain limited by small sample sizes, insufficient methodological rigor, heterogeneity in diagnostic

criteria and interventions, inadequate reporting, and limited long-term follow-up. These limitations may reduce the reliability and comparability of clinical evidence and constrain the use of conventional HTA or pharmacoeconomic evaluation methods in TCM-related decision-making.

The value assessment of Chinese patent medicines faces additional complexity. CPMs are usually characterized by compound formulations, multiple active components, multi-target effects, and heterogeneous clinical use. In real-world practice, CPMs may be used alone, in combination with Western medicines, or as part of broader TCM-based therapeutic strategies. Their benefits may be reflected not only in disease-specific biomedical endpoints, but also in symptom relief, functional improvement, prevention of disease progression, long-term management, patient experience, and suitability for specific clinical scenarios. These multidimensional value attributes are difficult to fully capture using single endpoints or short-term trial designs.

This creates a methodological tension between the evidence requirements of value-based pricing and the value-generation characteristics of CPMs. International VBP mechanisms generally require clearly defined indications, appropriate comparators, standardized outcome measures, and robust evidence on incremental clinical and economic benefits. By contrast, the value of CPMs is often generated through long-term clinical practice, syndrome-based use, accumulated patient and physician experience, and heterogeneous real-world application. As a result, conventional value assessment frameworks may underestimate or incompletely represent the value of CPMs if they rely exclusively on narrow clinical endpoints, short-term comparative trials, or standardized cost-effectiveness models.

These challenges do not mean that TCM or CPMs should be exempt from evidence-based evaluation. Rather, they suggest that evidence-based principles need to be combined with value domains and evaluation methods that are compatible with the characteristics of traditional herbal medicines. For CPMs, future value assessment should strengthen high-quality clinical research and real-world evidence while also developing methods capable of expressing multidimensional value attributes. Such an approach is essential for supporting pricing, reimbursement, and resource allocation decisions that are both evidence-informed and responsive to the specific features of CPMs.

Challenges in transferring international VBP mechanisms to Chinese patent medicines

The preceding sections indicate that international value-based pricing (VBP) mechanisms share several common evidence and institutional prerequisites. These include high-quality comparative clinical evidence, clearly defined patient populations, appropriate comparators, standardized outcome measures, reliable cost and effectiveness data, and mature institutional arrangements for health technology assessment (HTA), price negotiation, and reimbursement decision-making. However, Chinese patent medicines (CPMs) differ from conventional pharmaceuticals in terms of formulation composition, mechanisms of action, clinical use patterns, evidence structures, and value attributes. Therefore, the transferability of international VBP mechanisms to CPMs should be assessed carefully rather than assumed as a direct policy transplantation.

Table 2 summarizes the key evidence requirements, main limitations, and possible adaptations of major international VBP mechanisms when applied to CPMs. Overall, international mechanisms can provide useful methodological references, but their use for CPM pricing requires adjustment according to the characteristics of traditional herbal medicines and the practical needs of reimbursement decision-making.

Table 2. Transferability of international value-based pricing mechanisms to Chinese patent medicines

International VBP mechanism	Key evidence requirement	Main limitation for CPMs	Possible adaptation
Cost-effectiveness threshold-based pricing	Reliable estimates of incremental costs and health outcomes; clear comparators; standardized QALY- or ICER-based analysis	Holistic, symptom-related, and long-term benefits of CPMs may be difficult to fully capture using single outcomes or short-term cost-effectiveness models	Use cost-effectiveness evidence as one component of multidimensional value assessment rather than the sole pricing basis
Multi-payer market-driven value assessment and pricing	Payer-defined value, budget impact evidence, transparent negotiation rules, and sufficient market information	CPM value attributes may be insufficiently expressed in payer negotiations if evidence is fragmented or value domains are not clearly defined	Develop structured value profiles for CPMs to support negotiation, including clinical value, safety, suitability, accessibility, affordability, and real-world use
Added-benefit-based price negotiation	Robust direct comparative evidence against appropriate alternatives; clearly defined patient populations and outcomes	Head-to-head comparative evidence for CPMs is often limited, and syndrome-based use may not align with fixed indication-based comparison	Combine direct comparative evidence with real-world evidence, syndrome-related outcomes, and scenario-specific value assessment

Evidence mismatch

The first challenge is the mismatch between the evidence requirements of international VBP mechanisms and the current evidence structure of CPMs. Cost-effectiveness threshold-based pricing and added-benefit-based negotiation typically require robust comparative evidence, clearly defined comparators, and standardized outcome measures. In contrast, the evidence base for CPMs is often characterized by heterogeneity in study design, diagnostic criteria, intervention patterns, and outcome selection. Although the number of clinical studies, systematic reviews, and clinical practice guidelines related to traditional Chinese medicine has increased, uneven methodological quality remains a persistent concern. As a result, it may be difficult to generate stable and comparable estimates of incremental clinical benefit, cost-effectiveness, or added therapeutic value for many CPMs.

This mismatch is particularly important because VBP depends not only on the existence of evidence, but also on whether the evidence can be translated into pricing decisions. When clinical evidence is

fragmented or methodologically weak, economic models may still be technically feasible, but their outputs may be highly uncertain or unsuitable for decision-making. In such cases, applying conventional VBP tools mechanically may create a risk of “computable but unusable” results, where the model produces numerical estimates that appear precise but do not adequately reflect the real value of the medicine.

Multidimensional and holistic value attributes

The second challenge concerns the multidimensional and holistic value attributes of CPMs. International VBP mechanisms are often built around measurable clinical endpoints, incremental health gains, or added benefit compared with a defined alternative. However, the value of CPMs may extend beyond disease-specific biomedical endpoints. In clinical practice, CPMs may contribute to symptom relief, functional improvement, quality-of-life improvement, long-term disease management, prevention of disease progression, reduction in recurrence, or improved suitability in specific patient groups. These value attributes are clinically meaningful, but they may not be fully captured by QALY-based cost-effectiveness models or added-benefit classifications based on short-term comparative trials.

This does not mean that CPMs should avoid standardized outcome measurement. Rather, it suggests that value assessment for CPMs should incorporate both conventional biomedical outcomes and value domains that reflect the characteristics of traditional herbal medicines. These may include syndrome-related outcomes, patient-reported outcomes, real-world effectiveness, treatment suitability, accessibility, and safety in long-term use. Without a multidimensional value framework, pricing mechanisms may underestimate the value of CPMs whose benefits are expressed through complex, cumulative, or context-dependent pathways.

Heterogeneous real-world use

The third challenge is the heterogeneous real-world use of CPMs. International VBP mechanisms usually assume that the medicine, comparator, patient population, and outcome measures can be clearly specified. In contrast, CPMs are frequently used in more complex clinical scenarios. They may be prescribed according to disease diagnosis, TCM syndrome differentiation, patient constitution, physician experience, or combined treatment needs. They may also be used together with Western medicines, non-pharmacological TCM interventions, lifestyle management, or other supportive therapies. This heterogeneity complicates the attribution of clinical and economic outcomes to a single CPM.

Risk of distorted price signals

The fourth challenge is the risk of distorted price signals. If conventional VBP mechanisms are applied to CPMs without sufficient methodological adaptation, medicines with meaningful but difficult-to-measure value may be undervalued. Conversely, medicines with weak evidence but favorable market recognition may be overvalued if value domains and evidence standards are not clearly defined. In both

cases, price signals may fail to guide rational resource allocation, evidence generation, or quality improvement.

For CPMs, value-based pricing should therefore not be reduced to a single threshold, a single comparative trial result, or a single added-benefit category. A more appropriate approach would combine conventional evidence-based evaluation with multidimensional value identification and real-world evidence. Such an approach would allow decision-makers to distinguish between evidence uncertainty and value absence. It would also help identify whether a CPM's value has already been reflected in existing market prices or whether important value attributes remain under-recognized in current pricing and reimbursement systems.

In summary, international VBP mechanisms provide important reference points for CPM pricing reform, but their transferability is constrained by evidence mismatch, multidimensional value attributes, heterogeneous real-world use, and the risk of distorted price signals. These challenges suggest that CPM value-based pricing requires not only stronger clinical and economic evidence, but also a tailored value expression and value-to-price translation framework. This provides the rationale for exploring a hedonic-pricing-informed pathway, which may help connect observable drug attributes, market price signals, and multidimensional value assessment.

A hedonic-pricing-informed pathway for Chinese patent medicines

The preceding analysis suggests that direct transplantation of international value-based pricing mechanisms to Chinese patent medicines (CPMs) may be constrained by evidence mismatch, multidimensional value attributes, heterogeneous real-world use, and the risk of distorted price signals. Therefore, CPM pricing reform requires not only the strengthening of clinical and economic evidence, but also a method capable of linking observable value attributes with price formation. Hedonic pricing theory may provide a useful perspective for this purpose.

Hedonic pricing theory is based on the assumption that a product can be understood as a bundle of characteristics and that its market price reflects the implicit value of these characteristics. Lancaster proposed that consumer demand is not directed toward the product itself, but toward the characteristics embodied in the product[39]. Rosen further developed the hedonic pricing model, arguing that in a competitive market, the implicit prices of product characteristics can be revealed through observed market prices and consumer-producer interactions[40]. This theoretical perspective has been widely used to estimate the implicit value of heterogeneous product attributes in fields such as housing, environmental economics, and consumer goods.

This perspective has conceptual relevance for CPMs. The value of CPMs is not generated solely by one measurable clinical endpoint or one isolated active ingredient. Rather, it is embedded in multiple observable and partially observable attributes, including formulation characteristics, clinical indications, safety profile, quality standards, manufacturing attributes, reimbursement status, historical use, TCM-specific theoretical basis, and real-world clinical acceptance. In this sense, CPMs can be viewed as

heterogeneous products whose prices may reflect, to varying degrees, the combined influence of multiple value-related characteristics.

A hedonic-pricing-informed pathway does not aim to replace health technology assessment, cost-effectiveness analysis, or clinical evidence-based evaluation. Instead, it may serve as a complementary tool for value-to-price translation, especially in settings where evidence is heterogeneous, value attributes are multidimensional, and conventional economic evaluation alone is insufficient. By estimating the association between observable drug characteristics and prices, hedonic pricing analysis can help identify which value attributes are already reflected in market prices, which attributes remain under-recognized, and whether current price signals are consistent with the expected value structure of CPMs.

For CPMs, a hedonic-pricing-informed pathway may be constructed through six linked components: value attribute identification, evidence mapping and data construction, hedonic pricing modelling, interpretation of price signals, value-to-price translation and policy options, and implementation with dynamic updating. These components are not intended to represent a rigid linear pricing formula, but rather a structured analytical pathway that links evidence generation, value expression, market price signals, and policy decision-making.

The first component is value attribute identification. This step aims to identify and classify value attributes that are relevant to CPM pricing and reimbursement decisions. These attributes may include clinical effectiveness, safety, economic value, suitability, accessibility, quality control, inheritance and innovation, formulation complexity, evidence strength, reimbursement status, and real-world use. Existing studies on characteristic price variables of CPMs provide a preliminary basis for developing such an attribute framework[41,42].

The second component is evidence mapping and data construction. This step links each value attribute to corresponding evidence sources, including clinical trials, real-world evidence, published literature, clinical guidelines, registries, insurance claims databases, policy documents, and market price databases. Its purpose is to determine which attributes are measurable, which evidence sources are available, and whether the data are sufficiently reliable and relevant for subsequent modelling.

The third component is hedonic pricing modelling. In this step, hedonic pricing models can be used to estimate the relationship between CPM prices and selected drug characteristics. Depending on the research question and data structure, model specifications may include linear, log-linear, or semi-log models. The choice of model specification should be guided by theoretical plausibility, data distribution, model fit, and robustness checks rather than being predetermined. The estimated coefficients may be interpreted as the implicit price effects of specific characteristics, after controlling for other relevant factors. Such analysis can help identify the role of different drug characteristics in price formation, including whether factors such as quality standards, reimbursement coverage, strength of clinical evidence, and TCM-specific attributes are associated with price differences among CPMs.

The fourth component is interpretation of price signals. Hedonic pricing results should not be used mechanically to determine prices. Instead, they should be interpreted together with clinical evidence, real-world evidence, and policy priorities. Because hedonic pricing is primarily a positive empirical approach, it should be used to reveal existing price signals rather than to define normative value on its own. This step can help identify which value attributes are already reflected in prices, which attributes may be under-recognized or under-priced, and whether current price signals are consistent with the expected value structure of CPMs.

The fifth component is value-to-price translation and policy options. The interpretation of price signals can provide empirical information for pricing, reimbursement, and resource allocation decisions. For example, the findings may support reimbursement negotiation, price adjustment, procurement grouping, post-listing reassessment, differential reimbursement, or enterprise pricing strategies. At this stage, hedonic pricing should be used as a complementary empirical tool, rather than a standalone normative pricing rule.

The sixth component is implementation and dynamic updating. As new clinical evidence, real-world data, utilization patterns, and market price information become available, both the value profile of CPMs and the hedonic pricing model can be periodically updated. This dynamic process may help ensure that CPM pricing and reimbursement decisions remain responsive to evolving evidence, changing market conditions, and policy priorities.

A proposed hedonic-pricing-informed pathway for CPMs is shown in Fig. 1. The pathway begins with multidimensional value attribute identification, followed by evidence mapping and data construction. Observable characteristics are then incorporated into hedonic pricing models to estimate their association with price. The results are interpreted as price signals and translated into policy options for pricing, reimbursement, procurement, and post-listing reassessment. This process may help connect evidence generation, value expression, market price signals, and health insurance decision-making in a more transparent and structured manner.

This pathway has several potential advantages. First, it provides a practical way to examine price signals when conventional evidence is incomplete or heterogeneous. Second, it allows multidimensional value attributes to be incorporated into empirical analysis without forcing all value into a single clinical endpoint or cost-effectiveness ratio. Third, it can help distinguish between evidence uncertainty and value absence, which is particularly important for CPMs whose value may be generated through long-term and context-dependent clinical use. Fourth, it can support dynamic reassessment as new evidence, real-world data, and market information become available.

Nevertheless, the hedonic pricing perspective also has limitations. Market prices do not always reflect true clinical or social value, especially when markets are affected by historical pricing rules, information asymmetry, regulatory constraints, reimbursement policies, or procurement mechanisms. Therefore, hedonic pricing analysis should be interpreted cautiously and should be combined with clinical evaluation, pharmacoeconomic evidence, real-world evidence, and policy judgment. Its main contribution

lies not in replacing normative value assessment, but in providing an empirical lens through which the relationship between drug characteristics and price signals can be examined.

In this sense, hedonic pricing may serve as a bridge between international VBP mechanisms and the specific value-generation characteristics of CPMs. It can help translate multidimensional drug attributes into analyzable price signals while preserving the need for evidence-based assessment and policy deliberation. For traditional herbal medicines, this approach may provide a feasible and policy-relevant pathway for adapting value-based pricing to contexts where value is complex, evidence is evolving, and decision-makers require transparent methods for resource allocation.

Policy implications

The findings of this review have several implications for the development of value-based pricing for Chinese patent medicines (CPMs). First, international value-based pricing (VBP) mechanisms should be treated as methodological references rather than directly transplantable policy tools. Cost-effectiveness threshold-based pricing, multi-payer value negotiation, and added-benefit-based price negotiation all provide useful lessons for linking value assessment with price formation. However, these mechanisms were largely developed for conventional pharmaceuticals under relatively mature health technology assessment (HTA) systems. Their application to CPMs requires careful adaptation according to the evidence structure, value attributes, and clinical use patterns of traditional herbal medicines.

Second, value-based pricing for CPMs should be built on a multidimensional value identification framework. The value of CPMs cannot be fully represented by a single clinical endpoint, a single cost-effectiveness ratio, or a single added-benefit category. In addition to clinical effectiveness and safety, value assessment should consider economic value, suitability, accessibility, quality standards, real-world use, patient experience, long-term disease management, and TCM-specific value attributes such as syndrome-based applicability and theoretical inheritance. A multidimensional framework would help distinguish between medicines with different value profiles and reduce the risk that products with distinctive clinical value are insufficiently differentiated in reimbursement negotiation, tendering, or procurement processes.

Third, real-world evidence should play a more prominent role in CPM value assessment and post-listing reassessment. Because CPMs are frequently used in heterogeneous clinical scenarios, including combination therapy, long-term management, and syndrome-based treatment, randomized controlled trials alone may not be sufficient to capture their full value. Real-world data from clinical practice, insurance claims, electronic medical records, registries, and patient follow-up systems may provide important information on effectiveness, safety, utilization patterns, treatment adherence, and budget impact. Such evidence can complement clinical trials and support more context-sensitive pricing and reimbursement decisions.

Fourth, hedonic pricing analysis may serve as a complementary empirical tool for examining the relationship between value attributes and price signals. It can help identify which observable

characteristics of CPMs are reflected in existing prices, which value attributes may be under-recognized, and whether some price differences are driven by non-value-related factors. However, hedonic pricing results should not be used mechanically to determine prices. They should be interpreted together with clinical evidence, pharmacoeconomic evidence, real-world evidence, and policy priorities. In this sense, hedonic pricing can support, rather than replace, normative HTA and reimbursement decision-making.

Finally, the development of CPM value-based pricing requires coordinated institutional support. Evidence generation, value assessment, price negotiation, procurement, reimbursement, and post-listing reassessment should not be treated as isolated policy processes. A more integrated governance approach is needed to ensure that value evidence can be continuously generated, updated, interpreted, and translated into pricing and reimbursement decisions. Such an approach would help improve the transparency, consistency, and policy relevance of CPM pricing, while also encouraging manufacturers to invest in quality improvement and evidence development. Although this review focuses on CPMs, the proposed pathway may also provide methodological insights for other traditional herbal medicine systems in settings where evidence structures are heterogeneous and HTA capacity is still evolving.

Conclusion

International value-based pricing mechanisms provide important experience for linking pharmaceutical value assessment with price formation. Cost-effectiveness threshold-based pricing, multi-payer value negotiation, and added-benefit-based price negotiation demonstrate different ways of translating clinical benefit, cost-effectiveness, payer willingness to pay, and comparative therapeutic value into pricing and reimbursement decisions. However, these mechanisms depend heavily on high-quality evidence, clearly defined comparators, standardized outcomes, and mature HTA or reimbursement systems.

For CPMs, direct transplantation of these mechanisms may be limited by evidence mismatch, multidimensional value attributes, heterogeneous real-world use, and the risk of distorted price signals. The core challenge is not only the selection of pricing tools, but also the construction of a value identification and expression framework that is compatible with the value-generation characteristics of traditional herbal medicines. CPM value-based pricing should therefore combine evidence-based principles with multidimensional value assessment and real-world evidence.

A hedonic-pricing-informed pathway may provide a complementary perspective for this purpose. By examining how observable drug characteristics are associated with market prices, hedonic pricing analysis can help reveal existing price signals, identify under-recognized value attributes, and support more transparent value-to-price translation. Although this approach cannot replace HTA, pharmacoeconomic evaluation, or clinical evidence-based assessment, it may provide a feasible methodological bridge between international VBP experience and the specific value characteristics of CPMs. Future research should further validate this pathway using empirical data and explore its application in reimbursement negotiation, price adjustment, procurement grouping, and post-listing reassessment.

Limitations of the review

This review has several limitations. First, it was designed as a policy-oriented narrative review rather than a systematic review or meta-analysis. Although a structured search strategy was used, the aim was to identify representative and policy-relevant literature and documents rather than to exhaustively include all eligible studies. Therefore, some country-specific pricing practices, institutional reforms, or empirical studies may not have been fully captured.

Second, the proposed hedonic-pricing-informed pathway remains a conceptual and methodological framework. Although previous studies on characteristic price variables and hedonic pricing models for CPMs provide an initial basis, further empirical validation is needed. Future studies should use real-world price data, drug characteristic data, clinical evidence, and reimbursement information to test whether this pathway can reliably support value-to-price translation across different disease areas and policy scenarios. In addition, empirical hedonic pricing analysis in pharmaceutical markets may face econometric challenges, including endogeneity, omitted variable bias, information asymmetry, and the influence of price regulation or procurement policies. When appropriate, future empirical studies should consider approaches such as sensitivity analysis, instrumental variables, fixed-effects models, or subgroup analyses to address these challenges.

Third, CPMs are highly heterogeneous in formulation, indications, evidence base, market history, and reimbursement status. The transferability of international VBP mechanisms and the applicability of hedonic pricing analysis may vary across different types of CPMs. Therefore, the framework proposed in this review should be viewed as a general analytical pathway rather than a fixed pricing formula. Its practical application requires further refinement according to product category, disease area, evidence maturity, and decision-making context.

Abbreviations

AMNOG
Act on the Reform of the Market for Medicinal Products
CEA
Cost-effectiveness analysis
CPMs
Chinese patent medicines
CUA
Cost-utility analysis
EBA
Early benefit assessment
G-BA
Federal Joint Committee
HTA

Health technology assessment
ICER
Incremental cost-effectiveness ratio
ICER Institute
Institute for Clinical and Economic Review
IQWiG
Institute for Quality and Efficiency in Health Care
NHS
National Health Service
NICE
National Institute for Health and Care Excellence
OECD
Organisation for Economic Co-operation and Development
PPRS
Pharmaceutical Price Regulation Scheme
QALY
Quality-adjusted life year
RWE
Real-world evidence
TCIM
Traditional, complementary, and integrative medicine
TCM
Traditional Chinese medicine
VBP
Value-based pricing
WHO
World Health Organization

Declarations

Author contributions

Yijiu Yang: Conceptualization, Methodology, Literature review, Formal analysis, Writing—original draft.

Zhenhua Zhang: Conceptualization, Methodology, Policy analysis, Writing—original draft.

Zhifeng Nie: Literature review, Investigation, Writing—review and editing.

Haili Zhang: Literature review, Validation, Writing—review and editing.

Houfang Ma: Investigation, Resources, Writing—review and editing.

Yanping Wang: Strategic guidance, Supervision, Critical intellectual input.

Sheng Han: Supervision, Methodology, Project administration, Writing—review and editing.

Nannan Shi: Supervision, Methodology, Project administration, Writing—review and editing.

Yijiu Yang and Zhenhua Zhang contributed equally to this work and share first authorship. Sheng Han and Nannan Shi contributed equally as corresponding authors. All authors read and approved the final manuscript.

Funding

This work was supported by the Fundamental Research Funds for Central Public Welfare Research Institutes (Grant No. ZC2025006); the Fundamental Research Funds for Young Researchers Newly Recruited by China Academy of Chinese Medical Sciences (Grant No. ZZ18-XRZ-082); the National Natural Science Foundation of China, General Program (Grant No. 82174532); the Young Qihuang Scholar Program of the National Administration of Traditional Chinese Medicine (Grant No. GZYRJH [2022] 256); and the Innovation Team and Talents Cultivation Program of Traditional Chinese Medicine—National Multidisciplinary Innovation Team of Traditional Chinese Medicine (Grant No. ZYYCXTD-D-202401).

The funders had no role in the design of the review, interpretation of the findings, writing of the manuscript, or decision to submit the article for publication.

Data availability

No new datasets were generated or analyzed during the current study. All materials reviewed in this article were obtained from publicly available academic literature, policy documents, technical guidelines, and institutional reports.

Ethical approval

Not applicable. This article is a policy-oriented narrative review and did not involve human participants, human data, or animal experiments.

Consent for publication

Not applicable.

AI declarations

Generative AI tools were used to assist with language refinement, structural optimization, and reduction of redundancy during manuscript preparation. The authors reviewed, edited, and verified all AI-assisted outputs and take full responsibility for the final content of the manuscript.

Competing interests

The authors declare no competing interests.

References

1. WHO guideline on country pharmaceutical pricing policies. Geneva: World Health Organization. 2020. 2nd ed. Geneva: World Health Organization; 2020.
2. OECD, Docteur E, Paris V, Moise P. Pharmaceutical pricing policies in a global market[J]. (No Title), 2008. [Internet]. OECD; 2008 [cited 2025 Nov 25]. https://doi.org/10.1787/9789264044159-en
3. Rand LZ, Kesselheim AS. International Reference Pricing for Prescription Drugs in the United States: Administrative Limitations and Collateral Effects. Value Health. 2021;24:473–6. https://doi.org/10.1016/j.jval.2020.11.009.
4. Serra-Burriel M, Perenyi G, Laube Y, Mitchell AP, Vokinger KN. The cancer premium - explaining differences in prices for cancer vs non-cancer drugs with efficacy and epidemiological endpoints in the US, Germany, and Switzerland: a cross sectional study. EClinicalMedicine Engl. 2023;61:102087. https://doi.org/10.1016/j.eclinm.2023.102087.
5. OECD, Paris V, Slawomirski L, Colbert A, et al. New health technologies managing access, value and sustainability[J]. New Heal Technol. 2017;19–44. https://doi.org/10.1787/9789264266438-en. [Internet]. OECD Publishing; 2017 [cited 2025 Nov 25].
6. Bach PB, Pearson SD. Payer and Policy Maker Steps to Support Value-Based Pricing for Drugs. JAMA. 2015;314:2503–4. https://doi.org/10.1001/jama.2015.16843.
7. Prieto-Pinto L, Garzon-Orjuela N, Lasalvia P, Castaneda-Cardona C, Rosselli D. International Experience in Therapeutic Value and Value-Based Pricing: A Rapid Review of the Literature. Value Health Reg Issues United States. 2020;23:37–48. https://doi.org/10.1016/j.vhri.2019.11.008.
8. Ostrominski JW, Hirji S, Bhatt AS, Butler J, Fiuzat M, Fonarow GC, et al. Cost and Value in Contemporary Heart Failure Clinical Guidance Documents. JACC Heart Fail United States. 2022;10:1–11. https://doi.org/10.1016/j.jchf.2021.08.002.
9. Zhou J, Lan T, Lu H, Pan J. Price negotiation and pricing of anticancer drugs in China: An observational study. PLoS Med United States. 2024;21:e1004332. https://doi.org/10.1371/journal.pmed.1004332.
10. Zhu Z, Wang T, Fu D, Gui Y, Wang J, Cui T. Innovative development path of ethnomedicines: an overview of ethnomedicines in China. Front Med. 2016;10:166–77. https://doi.org/10.1007/s11684-016-0448-9.
11. Liu G, Xie Y, Sun Y, Zhang K, Ma J, Huang Y. Drug research and development opportunities in low- and middle-income countries: accelerating traditional medicine through systematic utilization and comprehensive synergy. Infect Dis Poverty Engl. 2022;11:27. https://doi.org/10.1186/s40249-022-00954-4.

12. World Health organization. Draft global traditional medicine strategy 2025–2034[J]. Seventy-eighth World Health Assembly. Provisional agenda item; 2025. p. 13.
13. Yuan H, Ma Q, Ye L, Piao G. The Traditional Medicine and Modern Medicine from Natural Products. Molecules. 2016;21:559. https://doi.org/10.3390/molecules21050559.
14. Jamshidi-Kia F, Lorigooini Z, Amini-Khoei H. Medicinal plants: Past history and future perspective. J Herbmed Pharmacol. 2018;7:1–7. https://doi.org/10.15171/jhp.2018.01.
15. Hoenders R, Ghelman R, Portella C, Simmons S, Locke A, Cramer H, et al. A review of the WHO strategy on traditional, complementary, and integrative medicine from the perspective of academic consortia for integrative medicine and health. Front Med. 2024;11:1395698. https://doi.org/10.3389/fmed.2024.1395698.
16. Li J, Zhu J, Hu H, Harnett JE, Lei CI, Chau KY, et al. Internationalization of Traditional/Complementary Medicine products: market entry as medicine. Chin Med. 2018;13:50. https://doi.org/10.1186/s13020-018-0209-6.
17. Park YL, Canaway R. Integrating Traditional and Complementary Medicine with National Healthcare Systems for Universal Health Coverage in Asia and the Western Pacific. Health Syst Reform. 2019;5:24–31. https://doi.org/10.1080/23288604.2018.1539058.
18. Han S, Tao L, Zhu D, Huang G, Li X, Li Y, et al. Economic theoretical analysis of the initial pricing mechanism for newly marketed drugs and the encouragement of high-quality innovation. China Health Insurance. 2024;311–6. 10.19546/j.issn.1674-3830.2024.3.002. . (in Chinese).
19. Yang YJ, Liu B, Zhang HL, Liang N, Song T, Cao WJ, et al. Application and implications of WHO pharmaceutical pricing methods in medical insurance pricing of Chinese patent medicines in China. Chin Health Econ. 2023;42(12):53–6. (in Chinese).
20. Jommi C, Armeni P, Costa F, Bertolani A, Otto M. Implementation of Value-based Pricing for Medicines. Clin Ther United States. 2020;42:15–24. https://doi.org/10.1016/j.clinthera.2019.11.006.
21. O'Rourke B, Oortwijn W, Schuller T, the International Joint Task Group. The new definition of health technology assessment: A milestone in international collaboration. Int J Technol Assess Health Care. 2020;36:187–90. https://doi.org/10.1017/S0266462320000215.
22. Danzon P, Towse A, Mestre-Ferrandiz J. Value-Based Differential Pricing: Efficient Prices for Drugs in a Global Context. Health Econ. 2015;24:294–301. https://doi.org/10.1002/hec.3021.
23. Claxton K, Briggs A, Buxton MJ, Culyer AJ, McCabe C, Walker S, et al. Value based pricing for NHS drugs: an opportunity not to be missed? BMJ. 2008;336:251–4. https://doi.org/10.1136/bmj.39434.500185.25.
24. Williams P, Mauskopf J, Lebiecki J, Kilburg A. Using multicriteria decision analysis during drug development to predict reimbursement decisions. J Market Access Health Policy. 2014;2:25270. https://doi.org/10.3402/jmahp.v2.25270.
25. Taylor D, Craig T. Value based pricing for NHS medicines: magic bullet, counterfeit treatment or the mixture as before? HEPL. 2009;4:515–26. https://doi.org/10.1017/S1744133109990247

26. Towse A. Value based pricing, research and development, and patient access schemes. Will the United Kingdom get it right or wrong? Brit J Clin Pharma. 2010;70:360–6. https://doi.org/10.1111/j.1365-2125.2010.03740.x.
27. Comanor WS, Schweitzer SO, Riddle JM, Schoenberg F. Value Based Pricing of Pharmaceuticals in the US and UK: Does Centralized Cost Effectiveness Analysis Matter? Rev Ind Organ. 2018;52:589–602. https://doi.org/10.1007/s11151-018-9616-1.
28. Pauly MV. The Questionable Economic Case for Value-Based Drug Pricing in Market Health Systems. Value Health. 2017;20:278–82. https://doi.org/10.1016/j.jval.2016.11.017.
29. Hwang TJ, Kesselheim AS, Sarpatwari A. Value-Based Pricing and State Reform of Prescription Drug Costs. JAMA. 2017;318:609–10. https://doi.org/10.1001/jama.2017.8255.
30. Kaltenboeck A, Bach PB. Value-Based Pricing for Drugs: Theme and Variations. JAMA. 2018;319:2165–6. https://doi.org/10.1001/jama.2018.4871.
31. Hofmann S, Branner J, Misra A, Lintener H. A Review of Current Approaches to Defining and Valuing Innovation in Health Technology Assessment. Value Health. 2021;24:1773–83. https://doi.org/10.1016/j.jval.2021.06.006.
32. Ruof J, Schwartz FW, Schulenburg J-M, Dintsios C-M. Early benefit assessment (EBA) in Germany: analysing decisions 18 months after introducing the new AMNOG legislation. Eur J Health Econ. 2014;15:577–89. https://doi.org/10.1007/s10198-013-0495-y.
33. Henschke C, Sundmacher L, Busse R. Structural changes in the German pharmaceutical market: Price setting mechanisms based on the early benefit evaluation. Health Policy. 2013;109:263–9. https://doi.org/10.1016/j.healthpol.2012.12.005.
34. Lauenroth VD, Stargardt T. Pharmaceutical Pricing in Germany: How Is Value Determined within the Scope of AMNOG? Value Health. 2017;20:927–35. https://doi.org/10.1016/j.jval.2017.04.006.
35. Gandjour A, Schüßler S, Hammerschmidt T, Dintsios C-M. Predictors of negotiated prices for new drugs in Germany. Eur J Health Econ. 2020;21:1049–57. https://doi.org/10.1007/s10198-020-01201-z.
36. Dintsios C-M, Chernyak N. How Far is Germany From Value-Based Pricing 10 Years After the Introduction of AMNOG? Appl Health Econ Health Policy New Z. 2022;20:287–90. https://doi.org/10.1007/s40258-021-00712-x.
37. Xiong X. Integrating traditional Chinese medicine into Western cardiovascular medicine: an evidence-based approach. Nat Rev Cardiol. 2015;12:374–374. https://doi.org/10.1038/nrcardio.2014.177-c1.
38. Patwardhan B, Wieland LS, Aginam O, Chuthaputti A, Ghelman R, Ghods R et al. Evidence-Based Traditional Medicine for Transforming Global Health and Well-Being.
39. Lancaster KJ. A New Approach to Consumer Theory. Journal of Political Economy. Volume 74. University of Chicago Press; 1966. pp. 132–57.
40. Rosen S. Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. Journal of Political Economy. Volume 82. The University of Chicago Press; 1974. pp. 34–55.

41. Yang YJ, Zhang HL, Liu B, Liang N, Li HZ, Song T, et al. Construction of an indicator system for characteristic price variables of Chinese patent medicines. Chin Health Econ. 2025;44(2):18–23. (in Chinese).
42. Yang YJ, Exploration. and heterogeneity analysis of characteristic prices of Chinese patent medicines based on a hedonic model [Internet] [dissertation]. Beijing: China Academy of Chinese Medical Sciences; 2024 [cited 2025 Oct 30]. Available from: https://doi.org/10.27658/d.cnki.gzzyy.2024.000128. (in Chinese).

Figures

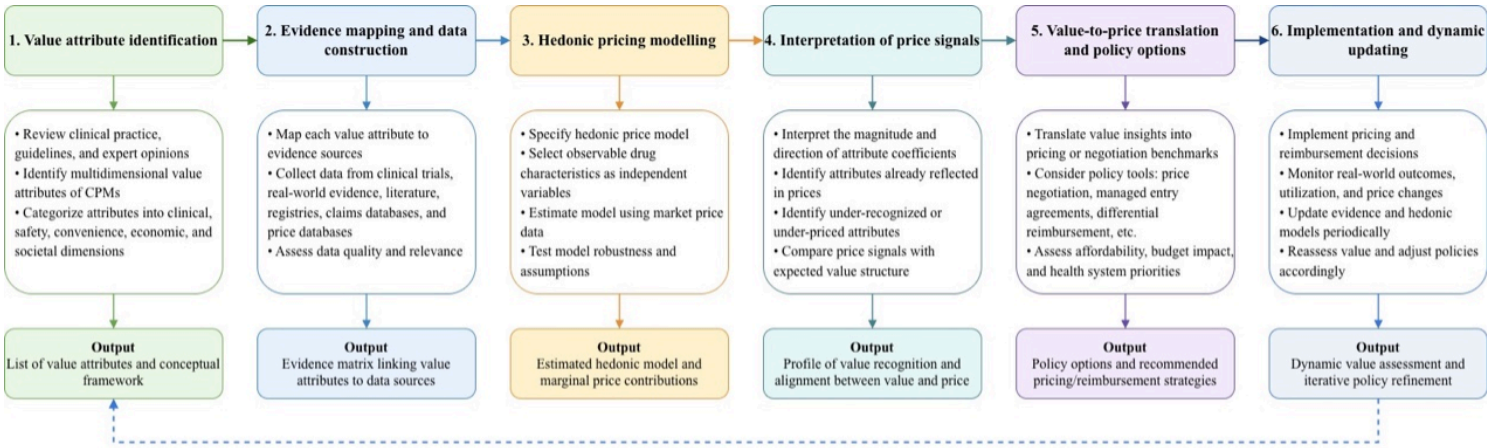


Figure 1

A hedonic-pricing-informed pathway for value-based pricing of Chinese patent medicines