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Review Article

The Application of Cost-Effectiveness and Cost–Benefit Analysis to Pharmaceuticals

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Abstract

This paper investigates the application of cost-effectiveness and cost-benefit analysis in Pharmaceutical manufacturing. As healthcare costs rise and resources become increasingly limited, the need for effective allocation of resources in drug development distribution and strategies is paramount. Cost-effectiveness analysis (CEA) evaluates the relative costs and outcomes of various attacks, aiding decision-makers in deciding the most effective use of money. Meanwhile, a cost-benefit study (CBA) goes further, judging the costs against the benefits, often in financial conditions, to determine the overall societal prosperity impact. Both methods offer priceless intuitions into the economic associations of drug interventions, influencing policy decisions, valuing procedures, and healthcare resource distribution. However, challenges lie, in containing the complexities of determining indefinite benefits, giving reason for unending impacts, and reconciling disagreeing views on worth. Furthermore, the ethical concerns of prioritizing certain mediations over possible choices based alone on economic determinants require painstaking traveling. This paper argues these challenges and suggests strategies to embellish the use of cost-effectiveness and cost-benefit analysis in pharmaceuticals, guaranteeing an impartial approach to essential situations while optimizing societal prosperity

Key words: cost-effectiveness analysis; cost-benefit analysis; pharmaceuticals; healthcare economics; resources allocation

Introduction

The business-related reasoning of pharmaceuticals holds significant significance among the increasing healthcare costs worldwide. In the United States, healthcare expenditure reached $1.6 trillion in 2002, representing 15% of the gross domestic products and averaging $5,440 per person.^[1^] Notably, drug payments have increased more rapidly than overall healthcare giving, holding 10 percent of total healthcare payment for the first be present at quadragenarian years.^[1^] In 1970, medicine drug giving stood at $43 per person, but by 2002, it surged to $569 per person, indicating an urgent political concern and concreting the habit for pushes like Medicare prescription drug inclusion.^[2^] Consequently, drug giving and protection coverage have arisen as important business-related and political issues in the United States. Globally, akin apprehensions concerning increasing drug expenditures are materializing, accompanying per-person drug spending testifying a steep rise across automated countries with their government.^[3^]

The contentious type of drug giving is infuriated by the vast profits collected by manufacturers of brand-name control medications, experiencing constitutionally shielded monopolies overestimating and marketing.^[4^] While patents encourage research and development (R&D), guaranteeing change, the righteous quandary stands when existence-conditional medications are valued considerably above their marginal result costs, offering hurdles to approach for economically

disadvantaged victims.^[4^] Economic belief advocates for display segmentation by revenue classes to guarantee more extensive access to cures.^[4^] However, attempts by drug manufacturers to charge higher prices in wealthy countries frequently prompt demands for re-admittance standards, complicating the all-encompassing drug display dynamics.^[4^]

With the United States controlling worldwide drug sales and profits, the deception of Canadian- or European-style drug price controls, specifically through programs like Medicare, warns to diminish lures for R&D in creative cures.^[5^] Thus, the economic reasoning of pharmaceuticals is necessary in navigating the sensitive balance middle from two points incentivizing change, ensuring affordability, and advancing an impartial approach to life-conditional drugs on a worldwide scale.

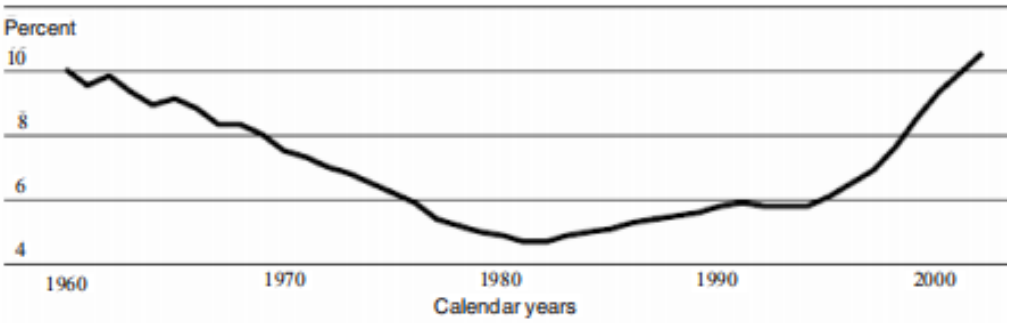

Figure 14.1: Prescription Drug Spending as a Share of U.S. Health Spending, 1960–2002. Source: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group.

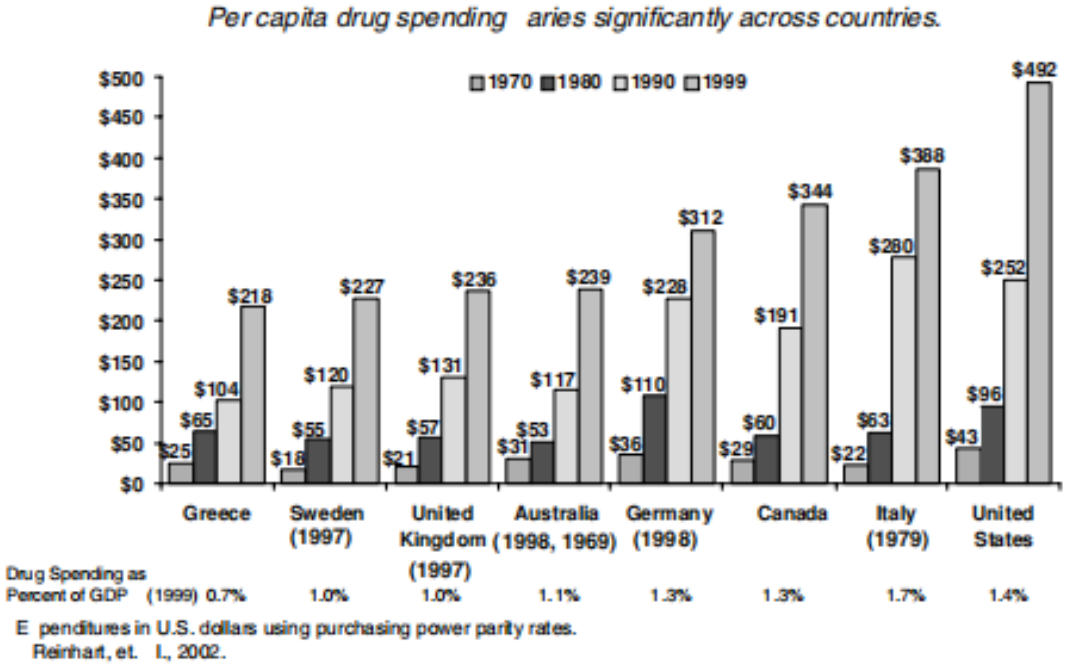

Figure 14.2: Per Capita Spending on Pharmaceuticals and Other Nondurables by OECD Country, 1970–99. Note: Data are arrayed by spending levels for 1999. Source: OECD Health Data 2002.

The economic happiness of both the United States and the worldwide public faces jeopardy if financing in drug testing (R&D) declines.^[6^] Encouraging global money in R&D is fault-finding for enhancing general comfort and wealth.^[6^] However, arriving at a balance between incentivizing property in risky drug R&D and pledging fair and impartial prices for current treatments is a critical all-encompassing concern. Cost-effectiveness and cost-benefit analysis present images of essential forms for evaluating healthcare giving effectiveness, specifically in the distorted healthcare forum.^[7^] These methods simulate cutthroat action to guide healthcare conclusion-makers toward interventions that reinforce efficiency and increase social work.^[7^] By giving the question of whether each healthcare invasion achieves equivalent advantage for the contribution, these analyses admit organizations to redistribute money to be dramatic energy outcomes inside existent spending restraints.^[7^] With healthcare absorbing a growing share of GDP, ensuring the direct distribution of every healthcare funds enhance control. Both cost-effectiveness and cost-benefit reasoning equate the costs of medical or drug interferences against the worth of intervention consequences.^[8^] The basic achievement lies in weighing effects: cost-effectiveness evaluates consequences in dispassionate wholes or health-accompanying kind of life indications, while cost-benefit study determines outcomes and costs in financial conditions.^[8^] Cost-effectiveness study, superior in financial evaluations of drug therapy, frequently measures interference outcomes in agreements of value-adjusted growth age (QALYs), indicating improvements in patient strength and happiness.^[8^] Recent developments in hesitation-logical posing for economic judgment, as

conferred by Weinstein, further enhance the methods secondhand for evaluating healthcare spending effectiveness.^[9^]

These leading recuperation technology, containing MRI and CT scans, device transplants, obtrusive coronary procedures, and type transplants, have contributed to reconstructing society's durability, nice records, and operating talents. but their extensive and frequent random use has nurtured concerns about their fee effectiveness and usefulness.^[10^] Whilst these sciences can provide essential blessings to sufferers, they again create strong prices, both in terms of healthcare giving and the dangers to inmates' health. moreover, the overutilization of those sciences can bring about avoidable techniques, revealing patients to preventable dangers and growing healthcare payments needlessly.^[11^]

In summary, even as prescribed drugs and recovery technology have converted healthcare and preserved innumerable lives, their price influence and appropriateness change widely contingent upon determinants inclusive of distinguishing assault, patient population, and healthcare machine instances. it's miles crucial for policymakers, healthcare providers, and patients to cautiously compare the worth and usability of pharmaceuticals and restoration technologies to ensure optimum use of healthcare possessions and maximize nicely-being consequences for things and populations.

Condition	Years	Change in Treatment Costs	Outcome		
			Change	Value	Net Benefi
Heart attack	1984–98	$10,000	One-year increase in life expectancy	$70,000	$60,000
Low-birth-weight infants	1950–90	$40,000	Twelve-year increase in life expectancy	$240,000	$200,00
Depression	1991–96	$0	Higher remission probability at some cost for those already treated		
		<$0	More people treated, with benefits exceeding costs		
Cataracts	1969–98	$0	Substantial improvements in quality at no cost increase for those already treated		
		<$0	More people treated, with benefits exceeding costs		
Breast cancer	1985–96	$20,000	Four-month increase in life expectancy	$20,000	$0

Table 14.1: Summary of Research on the Value of Medical Technology Changes

Source: Cutler DM, and McClellan M, "Is Technological Change in Medicine Worth It?" Health Affairs, 2001, 20 (5):11–29.

Dialysis rates in the United States outstrip those in Canada and Western Europe, still outside observable augmentations in aggregate longevity, affliction continuation, or overall features of life. ^[12^] Another outlook in the healthcare brochure emphasizes the importance of certain impacts of advancements in pharmaceuticals and healing electronics, a view long held by economists.^[13^][14^] Cutler and McClellan's current analysis across five main ailment types shows that the returns on grants in healing technology far surpass the costs for most afflictions, declaring the overall integrity of medical care regardless of challenges in giving particular rate-of-return evaluations.^[15^] Murphy and Topel further stress the solid returns on investment for healing research, judging that the increase in U.S. society's durability from two points between 1970 and 2000 added an extra $75 to the savings. ^[16^] Their research emphasizes the potential financial benefits of lowering mortality rates for important incessant afflictions through raised property in medical tests (R&D).^[17^] However, regardless of the potential benefits, current levels of healing and drug R&D financing in the United States may fall below philosophically or confidentially reasonable levels, raising concerns about underfunded biomedical research on a global scale.^[18^] While higher levels of healthcare science correspondence can obtain better inefficiency at the individual patient level, they are also found to be very economical and socially advantageous in the aggregate.^[19^] International correspondings signify that one nation has achieved corresponding improvements in longevity and ailment decline with less healthcare payment per person and a lower contribution in healing and drug R&D, prompting questions about whether these nations are benefiting from American mechanics change outside proportionate property.^[20^]

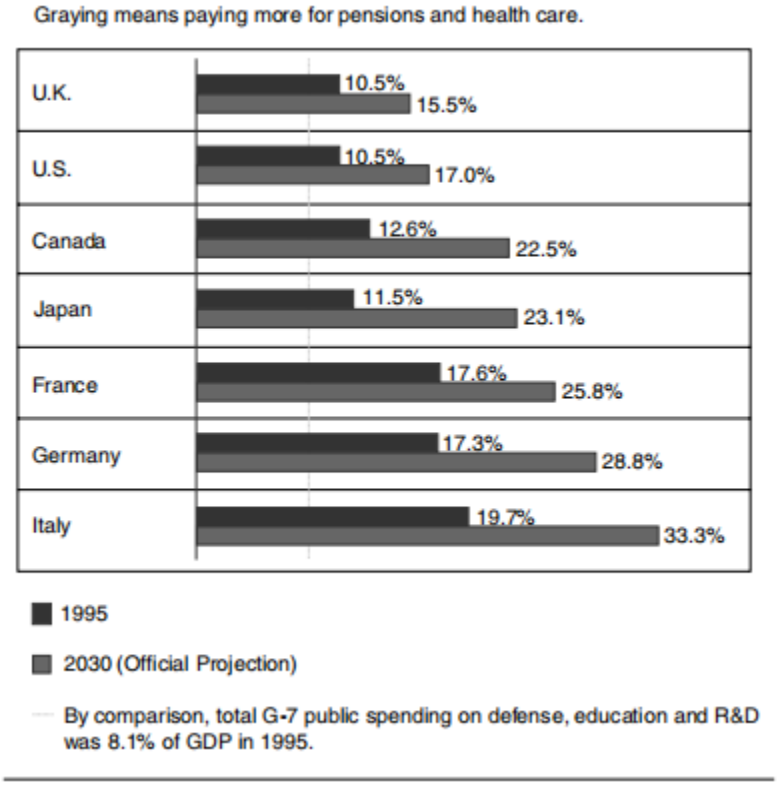

Figure 14.4: G7 Public Spending on Pensions and Health Benefits as a Percent of GDP by Country. Source: OECD (1996, 1997) and Census (1997) and "Global Aging – The Challenge of the New Millenium," Watson Wyatt/CSIS Report

The U.S. Medicare Modernization Act (MMA) of 2003 depicts the reason cost-benefit reasoning and cost-influence study will enhance increasingly having to do with drug administration. This regulation, by presenting an inclusive Part D drug benefit for Medicare receivers, unquestioned the fault-finding act of pharmaceuticals in healthcare situations and patient consequences. The lack of an ambulatory drug benefit under Medicare was putting meaningful commercial strains on common retirees, superior many to refrain from inevitable cures and inciting Medicare providers to apply harmful inpatient and medicinal care as substitutes.

Although the Medicare Modernization Act was passed in 2003, it taken assorted reviews assigned an outnumbered group of allure expected $500 billion supplementary giving over the first ten of something to new drug inclusion, and generally directed the giving toward replacement existent drug and healthcare inclusion determined to weak retirees by states under Medicaid. Moreover, it wanted important cost regulation or effectiveness supplyings.

A quarrelsome aspect of the MMA is that Medicare cannot influence allure huge trade capacity as a future buyer of drugs for all American retirees to cross prices beneath stock exchange rates, as usually exhausted other nations. This restraint was an important compromise to relieve concerns from drug manufacturing about potential profit reductions and impacts on test (R&D) exertions.

Furthermore, the MMA has hindered attempts to lower drug prices by helping limit the re-admittance of cheaper drugs from Canada and abroad. While the Act offers inducements to extend medical insurance substitutes to the standard Medicare commission-for-duty benefit, few benefits proper to choose this alternative, and allure impact on overall Medicare cost flows are expected littlest.

Due to the deficiency of significant cost restraint lures in usual Medicare, the drug inclusion growth under the MMA is projected to considerably increase costs. Medicare actuaries estimate a supplementary $162 billion in annual costs inside the first five pages of the exercise and a supplementary $8.1 millions in unfunded debts through 2078. These projections do not even give a reason for potential findings of important new drugs or other main healthcare program expansions, underscoring the instability of the position.

To check these bulged shortfalls, miscellaneous approaches to a degree of growing taxes, lowering benefits, or reinforcing healthcare resource adeptness grant permission be executed. Improving the effective exercise of healthcare possessions, as favored by cost-benefit and cost-influence reasoning, performs expected the smallest burdensome alternative. The distribution of the Medicare budget toward pharmacoeconomics and consequences research proper to increase extensively in the coming age, indicating an increasing importance of economic drug exercise and healthcare interventions.

It's value noticing that concerns over unfunded management rights programs longer further the United States, accompanying nations like Japan, Europe, and Canada an architectural finish analogous challenges.

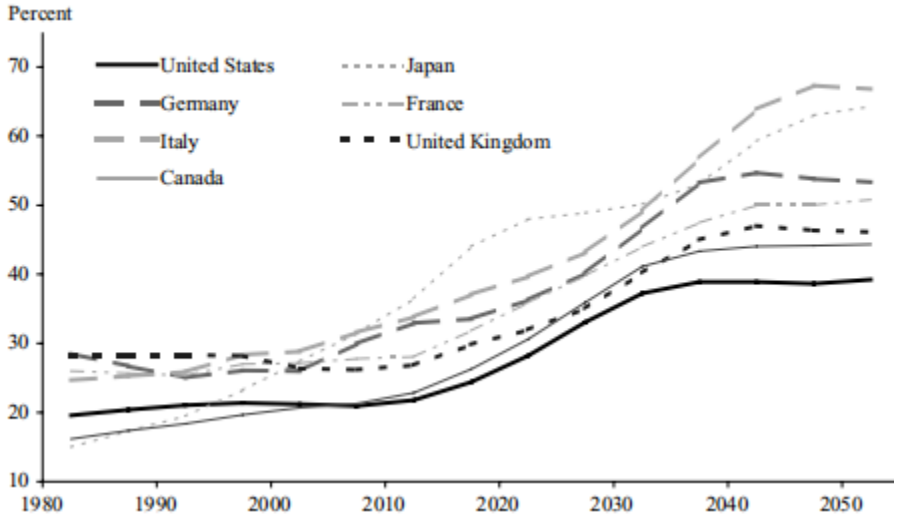

Figure 14.5: Old Age Dependency Ratios in G7 Countries. Source: Eurostat; United Nations (1998); and "Ageing Populations: Economic Issues and Policy Challenges," Ignazio Visco, OECD, Economic Policy for Ageing Societies," Kiel Week Conference, June 2001.

Future Trends for Drug Decision-Making and Reimbursement

The U.S. Medicare Modernization Act (MMA) of 2003 emphasizes the growing significance of cost-benefit studies and cost-effectiveness analysis (CEA) in drugs in charge. By corroborating an inclusive Part D drug benefit for Medicare receivers, the MMA recognized the essential duty of pharmaceuticals in healthcare and the important commercial burden on retirees without specific inclusion. However, the MMA has confronted critique for allure lack of strong cost-limit measures and for stopping Medicare from negotiating drug prices.

The MMA's approach focal points on a fuller issue: the incompetences and challenges of the formal patent whole in pharmaceuticals. Patents support occasion-restricted monopolies to motivate change but can also bring about bigger prices and limited approach. This is specifically dubious in the pharmaceutical area, place the costs of control cures may be intensely extreme, chief to meaningful global differences in drug approach.

Global Context and Pharmacoeconomics

As Figures 14.4 and 14.5 indicate, developing communities and plentiful someone of advanced years entitlements are beginning similar management capital challenges across all G7 nations. These questions are frequently best on a per-person action and will stand sooner than in the United States. The need for effective use of healthcare money, expedited by pharmacoeconomics, is accordingly a worldwide necessity.

Patent Protection and Innovation Rewards

Patent care has efficiently guaranteed new drug R&D, despite more rigid security and efficiency necessities from supervisory corpses like the FDA. However, the monopolistic type of patents leads to incompetence and high prices, which can prevent an approach to essential cures. In less-grown nations, this frequently results in patients purchasing general knock-destroy, while governments in wealthier nations use their ability to purchase to discuss meaningful discounts.

Moreover, few of the ultimate main medical changes, to a degree new uses for existing drugs, are not surely patentable, which can delay their approval. For example, anesthetic use in countering courage attacks and antibiotics like clarithromycin for stomach ulcers were slowed cause there was no potential patent reward to motivate drug guests to display these new uses.

Alternative Reward Systems

To address these issues, a potential resolution is for governments to establish cash prizes, rewards, patent buy-decrease, or pledged drug purchases for profitable inventors. This scheme would encourage novelty outside the inefficiencies of the patent structure. Governments keep gaining patent rights and therefore admit ambitious results of the drug, guaranteeing more extensive access at lower costs.

This behavior therapy is not creativeness; it dates back to the French administration's reward for the fabrication of daguerreotype fine arts in 1839. It has been promoted in the circumstances of pharmaceuticals, specifically for developing countries, to provoke the incidence of drugs and vaccines for ailments like sickness and dengue, place patents do not support enough lures.

Implementation and Benefits

The reward system would complement or supplant the patent plan. Innovators keep picking to trade their patents to the administration or fight in the forum. Rewards would be persistently established cost–influence, and cost-benefit reasonings, guaranteeing they indicate social outlooks on drug costs and benefits.

An independent committee of masters commits to demonstrating these rewards, with governments or worldwide instrumentalities preannouncing rewards for fields of particular need or background in the event of supervisory authorization. This approach would guarantee that creative cures are quickly created free at marginal costs while still benefiting inventors sufficiently.

By focusing on two together the incompetence of the patient arrangement and the need for an all-encompassing approach to essential medications, this behavior therapy drives meaningful progress in healthcare and guarantees a more impartial approach to history-saving situations.

In conclusion, as the worldwide public ages and healthcare costs rise, the unification of pharmacoeconomics and alternative reward structures for drug novelty will be critical in guaranteeing effective and equitable healthcare transfer in general.

Future Trends for Drug Decision-Making and Reimbursement

The U.S. Medicare Modernization Act (MMA) of 2003 focal points the growing significance of cost-benefit and cost-effectiveness analyses in drug in charge. This act, which received an inclusive Part D drug benefit for Medicare receivers, emphasized the increasing significance of pharmaceuticals in healthcare situations and patient consequences. Despite its aims, the MMA has confronted analysis for lacking strong cost regulation measures and for stopping Medicare from transacting drug prices, a practice universal in added nations to control costs.

Global Context and the Role of Pharmacoeconomics

As aging cultures and plentiful someone of advanced years entitlements strain administration capital, G7 nations face comparable, if not more harsh, commercial challenges distinguished from the United States. Efficient use of healthcare money, furthered by pharmacoeconomics, enhances importance globally. Pharmacoeconomics can help guarantee that money is assigned efficiently to have dramatic energy effects.

Patent Protection and Innovation Incentives

Patent protection has been favorable in advancing new drug R&D despite rigid supervisory requirements. However, patents, that grant period-restricted holdings, bring about extreme prices and limited access, conceiving incompetences and inequities in drug chance. This issue is specifically distinct in less grown nations where general knock-destroy is accepted, and even in wealthier nations, governments discuss meaningful discounts to survive costs.

Additionally, some detracting healing changes, in the way that new uses for existent drugs, are not surely patentable, leading to deferred enactment. For instance, the use of anesthetics for heart failure stops and medicines like clarithromycin for stomach ulcers were delayed on account of the lack of patent inducements for drug associations to display these new uses.

Reward Systems a suggestion of choice

A potential answer to these issues is the establishment of reward arrangements, to a degree cash prizes, patent buy-decrease, or insured drug purchases, for profitable inventors. This approach would determine incentives for novelty outside the incompetences guiding the patent whole. Governments keep acquiring patent rights post-FDA authorization, admitting cutthroat results and guaranteeing a fuller approach at lower costs.

The reward system is not a novel idea; it dates back to the French administration's reward for the fabrication of daguerreotype fine arts in 1839. Advocates like Michael Kremer have advanced this approach, exceptionally for expanding pharmaceuticals for diseases accepted in less grown nations, placing patents for sale to determine enough incentives for for-profit businesses to change.

Implementation and Benefits of Reward Systems

Behavior therapy would complement the patent structure and alternatively change it. Innovators keep opting to hawk their patents to the administration or face marketing if they favor them. Rewards hopeful determined utilizing cost-influence and cost-benefit reasonings, guaranteeing they indicate about society's outlooks on drug costs and benefits.

An independent committee of masters manage demonstrate reward principles established these studies. Governments or international instrumentalities manage to preannounce rewards for extreme-need fields or set bureaucracy events of supervisory approval. This approach guarantees that creative cures are quickly created handy at marginal costs while still sufficiently pleasing inventors.

One important benefit concerning this reward approach is the clear resolution point for earning and repaying the reward, that is when the FDA decides a drug's security and efficiency for shopping authorization. Should subsequent dispassionate evidence change the security and efficiency sketch, reward fees may be adjusted, therefore. Spreading reward fees over diversified ages, liable to be subjected to continuous clinical acting, would supply a proficient resolution.

By asking for cost-influence and cost-benefit reasonings in establishing a behavior therapy for drug novelty, the happening and use of new analyses may be severely extended. When patients and payers only cover the borderline costs of drugs, the range of economic uses for these new treatment will increase largely. Furthermore, likely the Medicare program's projected payment on cures, it hopefully more economical for taxpayers to obtain patents or reward drug inventors with lump-sum fees than in the second place repaying trust prices.

Research Method

Objective:

The basic objective of this research is out survey the request for cost-effectiveness analysis (CEA) and cost-benefit analysis (CBA) to pharmaceuticals, analyzing their part in drug decision-making and compensation processes.

Approach:

Literature Review: Conduct a thorough review of existent articles on CEA and CBA in pharmaceuticals, containing academic items, tactics documents, and case studies from differing nations.

Case Studies: Analyze distinguishing instances place CEA and CBA have used to drug in charge, concentrating on the consequences and affecting healthcare plans.

Data Collection: Gather a quantitative data on drug costs, healthcare consequences, and patient condition of growth from healthcare databases and written studies.

Analysis Framework: Utilize settled business-related judgment foundations to evaluate the costs and benefits guide distinguishing drug mediations.

Methods:

Cost-Effectiveness Analysis (CEA): This procedure includes equating the relative costs and consequences (belongings) of various courses of action. Outcomes are frequently calculated in instinctive parts (for instance, existence-age win, cases obviated).

Cost-Benefit Analysis (CBA): This arrangement converts effects into financial agreements, admitting a direct contrast of costs and benefits. This simplifies a more simple conclusion of whether the benefits of an interference exceed allure costs.

Results

Literature Review Findings:

Global Implementation: Various nations have selected CEA and CBA to various extents. For instance, Australian authorities cost-influence evidence for drug compensation under the allure nationwide healthcare program, while the United Kingdom uses NICE to judge the cost-influence of new drugs.

Impact on Drug Pricing: Countries that engage CEA and CBA have visualized more realistic drug valuing and compensation conclusions, guaranteeing that only economical drugs are subsidized.

Case Study Analysis:

Australia: The introduction of cost-effectiveness directions in 1992 has experienced more adept drug compensation processes and better healthcare consequences by prioritizing economic situations.

United Kingdom: NICE's evaluations have increased the enactment of valuable healing novelties and checked the use of less active situations.

Quantitative Data Analysis:

Cost Savings: Countries asking CEA and CBA in drug in charge have stated meaningful cost funds. For instance, the use of generics and economical drugs has reduced overall drug giving.

Health Outcomes: Improved patient outcomes are eminent on account of the prioritization of direct and essential situations over less advantageous ones.

Discussion

Effectiveness of CEA and CBA:

Economic Efficiency: Both CEA and CBA enhance more economically effective healthcare wholes by guaranteeing that money is assigned to interventions that specify ultimate significant strength benefits relating to their costs.

Policy Adoption: The enactment of these reasonings has managed to more understandable and liable drug compensation processes, promoting trust between shareholders, containing patients, providers, and payers.

Challenges: Despite their benefits, there are challenges, in the way that the complicatedness of weighing effects and the need for inclusive data. Additionally, skilled is fighting from partners the one can drop financially from the exercise of these reasonings.

Broader Implications:

Global Health: As more nations face commercial restraints on account of declining cultures and climbing healthcare costs, the request of CEA and CBA should be progressively appropriate everywhere.

Future Trends: There is a growing style towards merging these reasonings into fuller healthcare accountable foundations, containing the concern of non-financed benefits in the way that patient delight and features of existence.

Conclusion

The use of cost-effectiveness and cost-benefit analysis in pharmaceuticals is critical for guaranteeing that healthcare money is used efficiently. Countries that have executed these reasonings have known better strength effects and acceptable healthcare giving. The increasing approval of these systems everywhere displays a shift towards more evidence-located and economically sound healthcare administrative processes.

Future Recommendations:

Enhanced Data Collection: Improving data accumulation designs and foundation to support healthy CEA and CBA.

Stakeholder Engagement: Engaging all colleagues, including victims, healthcare providers, and policymakers, to guarantee the profitable exercise of these studies.

Training and Education: Providing preparation for healthcare pros and decision-makers on the significance and exercise of CEA and CBA.

By merging cost effectiveness and cost-benefit analysis into the drug accountable process, healthcare arrangements can guarantee that they determine high-quality care while ensuring fiscal responsibility.

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Declaration of Interest

I at this moment declare that :

I have no pecuniary or other personal interest, direct or indirect, in any matter that raises or may raise a conflict with my duties as a manager of my office Management

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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References:

1. Keehan, Sean P., (2005). and others. "Health-giving projections through 2013." Health Affairs, vol. 24, no. 2, pp. W5-79-W5-93.
2. Cutler, David M., and Mark McClellan. (2001). "Is concerning details change in cure value it?" Health Affairs, vol. 20, no. 5, pp. 11-29.
3. OECD. "Health seemingly 2021: OECD Indicators." OECD Publishing, 2021.
4. Herzlinger, Regina E. (2001). "Can change endure healthcare?" Harvard Business Review, vol. 79, no. 5, pp. 97-100.
5. Grabowski, Henry G., and John M. Vernon. (2000). "The cause of drug test payments." Journal of Evolutionary Economics, vol. 10, no. 1-2, pp. 201-215.
6. Grabowski, Henry G., and John M. Vernon. (2000). "The cause of drug test payments." Journal of Evolutionary Economics, vol. 10, no. 1-2, pp. 201-215.
7. Drummond, Michael F., and others. (2015). "Methods for the business-related judgment of health management programs." Oxford University Press,
8. Gold, Marthe R., Joanna E. Siegel, Louise B. Russell, and Milton C. Weinstein. (1996). "Cost-effectiveness in well-being and cure." Oxford University Press,
9. Weinstein, Milton C. (2014)."Recent happenings hesitation-logical shaping for financial judgment." Pharmacoeconomics, vol. 32, no. 1, , pp. 21-25.
10. Bunker, John P., and others. (1989). "Assessing health management sciences." Annals of Within Cure, vol. 110, no. 11, pp. 892-901.

11. Wennberg, John E., and Alan M. Garber. (1999). "Improving healthcare utilizing the Dartmouth Atlas of Health Care." New England Journal of Medicine, vol. 340, no. 13, pp. 1012-1013.
12. The original beginning for news on being apart rates in the United States distinguished from Canada and Western Europe.
13. One of the remarks upholds the view on progress in pharmaceuticals and healing electronics.
14. Another citation advocates for the outlook on progress in pharmaceuticals and healing electronics.
15. Cutler, David M., and Mark McClellan. "Is mechanics changing the value of it?" Health Affairs, vol. 20, no. 5, 2001, pp. 11–29.
16. Murphy, Kevin M., and Robert H. Topel. (2006). "The advantage of strength and endurance." Journal of Political Economy, vol. 114, no. 5, pp. 871–904.
17. (2004).The original beginning of the National Institutes of Health's (NIH) annual research budget was in
18. The original beginning of the U.S. drug manufacturing test (R&D) was in 2003.
19. (2001). Cutler, David M., and Mark McClellan. "Is mechanics changing the value of it?" Health Affairs, vol. 20, no. 5, pp. 11–29.
20. (1992). The original beginning of the supplementary giving on pharmaceuticals in the United States relating to Europe.

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