Expanding the Horizon of Cost-Effectiveness Analysis: A Comprehensive Review of Alternative Methods

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Background & Objectives

- In recent years, alternative methods to classical cost-effectiveness analysis (CEA) have garnered increasing attention, particularly with the growing emphasis on Value Assessment in the United States healthcare system.
- As the healthcare landscape evolves, there is a recognized need to explore and adopt alternative approaches that do not rely on quality-adjusted life years (QALYs).
- These traditional metrics have been criticized for their limitations in capturing the full spectrum of value in healthcare interventions.
- This study aimed to shed light on the current state and use of alternative CEA methodologies, presenting a comprehensive overview of their visibility and adoption in the existing literature.

Methods

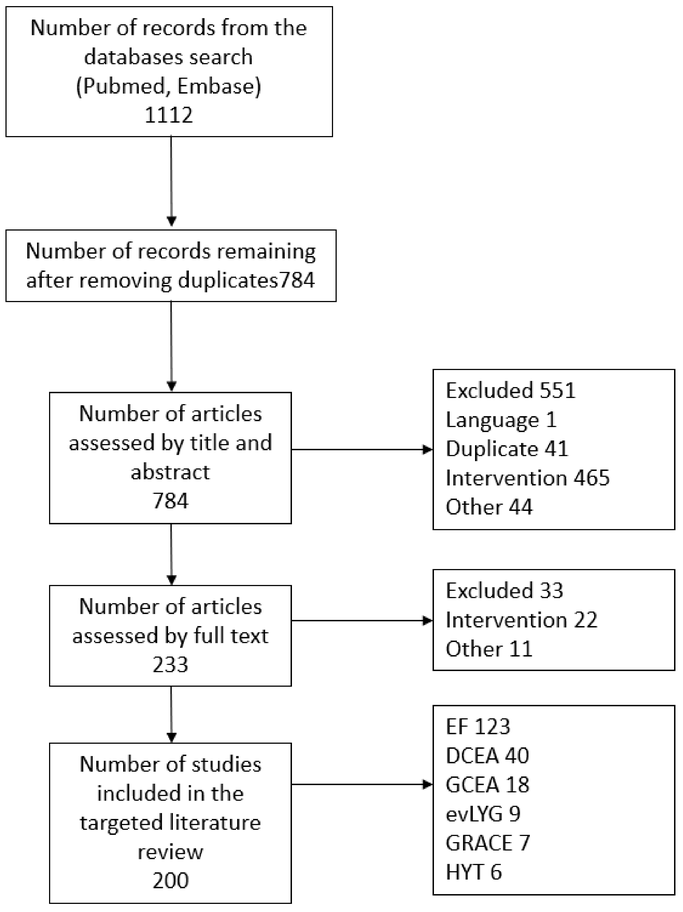
- To comprehensively examine alternative cost-effectiveness analysis (CEA) methodologies beyond the conventional QALY framework, we implemented a structured methodology encompassing database searches, screening, and review processes.
- We conducted a systematic search of two prominent biomedical databases: PubMed and Embase. These databases were selected for their extensive coverage of medical literature.
- The search was performed using a combination of relevant search terms and Boolean operators that indicated in the box below.

- Adjusted Cost-Effectiveness (GRACE)
- Generalized Cost-Effectiveness Analysis (GCEA)
- Equivalent Life Years Gained (evLYG)
- Healthy Years in Total (HYT)
- Efficiency Frontier (EF)
- Burden Augmented by Deadliness and Impact (BADI)
- Distributional Cost-Effectiveness Analysis (DCEA)

- These terms were chosen to ensure the inclusivity of articles discussing alternative CEA methodologies published within the past twenty years.
- Retrieved articles underwent a multi-stage screening process to identify relevant studies. Initial screening involved assessing titles and abstracts for relevance to alternative CEA methodologies. Articles meeting the inclusion criteria, including relevance to alternative CEA methodologies and publication within the specified timeframe, proceeded to full-text screening. Full-text articles were reviewed to confirm eligibility and extract relevant data.

Results

Figure 1: PRISMA Flow Diagram



- Our initial findings highlight varying levels of attention received by different alternative CEA methodologies.
- Specifically, EF analysis emerged as the most extensively studied approach, with a total of 123 publications identified. Within this body of literature, the majority (108 publications) presented case studies or analyses utilizing EF analysis, while the remaining publications focused on methodological descriptions.
- DCEA also attracted notable interest, with 40 publications identified. Among these, 34 publications presented case studies or analyses applying DCEA, while the remaining publications provided methodological descriptions.
- GCEA was the used in 18 publications, all of which presented case studies or analyses utilizing the GCEA framework.
- EvLYG and was used in 9 publications, 5 presented case studies or analyses and the remaining publications focused on methodological descriptions.
- GRACE was used in 7 publications, of which 3 were case studies.
- HYT methodology garnered 6 publications, with 2 presenting case studies or analyses, and the remainder focusing on methodological descriptions.
- Overall, while EF analysis received the most attention in terms of the number of publications, there was a notable scarcity of empirical analyses applying alternative CEA methodologies beyond methodological descriptions. This underscores the need for further empirical validation and application of these methodologies in real-world healthcare settings.

Table 1: Summary of publications reporting alternatives to QALY

Alternative cost effectiveness approach	Case studies or analyses	Methodological descriptions
Efficiency Frontier (EF)	108	15
Dynamic Cost-Effectiveness Analysis (DCEA)	34	6
Generalized Cost-Effectiveness Analysis (GCEA)	18	0
Equivalent Life Years Gained (evLYG)	9	5
Generalized Risk Adjusted Cost-Effectiveness (GRACE)	7	3
Healthy Years in Total (HYT)	6	2

Conclusion

- Our findings underscore a significant gap between the theoretical discourse and practical adoption of alternative cost-effectiveness analysis (CEA) methodologies in healthcare decision-making. Despite increased discussion among academics and Health Technology Assessment (HTA) bodies regarding expanded forms of the QALY, such as Generalized Risk Adjusted Cost-Effectiveness (GRACE) and Generalized Cost-Effectiveness Analysis (GCEA), their broad adoption remains limited.
- This discrepancy highlights a missed opportunity to address the inherent limitations and stagnation of classical CEA approaches, which have persisted in healthcare for multiple decades. Theoretically more robust alternatives have been available since at least 2018, yet their adoption has been sluggish.
- Our research prompts the critical question: *What factors are impeding the widespread adoption of these theoretically superior methodologies?* Addressing this question is crucial for bridging the gap between theoretical advancements and practical implementation in healthcare decision-making processes.
- Follow-up research could explore the specific barriers hindering the adoption of alternative CEA, including organizational and regulatory within healthcare systems. Further validation of alternative method is necessary, along with efforts to secure recognition and regulatory support from HTA bodies.

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