Incorporating health equity into value assessment: frameworks, promising alternatives, and future directions

Vakaramoko Diaby, PhD; Askal Ali, PhD; Aram Babcock, PharmD, MS, MBA; Joseph Fuhr, PhD; and Dejana Braithwaite, PhD

ABSTRACT

Exploring methods that value diverse perspectives is critical to better understand the value of health equity in value assessment frameworks. In this paper, we examined emerging value assessment frameworks in the United States and present examples where evidence on outcomes and preferences for value do not take into consideration diverse perspectives. We identify possible solutions to improve existing value assess-

ment methods and illustrate—using a hypothetical shared decision-making case study—an alternative to current value-assessment frameworks, “equitable multicriteria decision analysis,” which could be implemented in the context of the value-based assessment of prevention choices for women at high risk of developing breast cancer. These proposed alternatives and solutions can be used by researchers and decision makers to incorporate health equity into value assessment.

In response to growing concerns about spiraling health care costs, the US health care system is undergoing a paradigm shift in the way it delivers and pays for care.¹ It is in this context that value assessment frameworks (VAFs) have emerged to assist different stakeholders, including clinicians and payers, in realigning health care decisions based on the most robust clinical and economic evidence. However, the use of these frameworks has sparked growing concerns, of which health equity achievement has become central, triggering a debate over the meaning of value and its measurement.² Thus, there is a critical need to identify and assess avenues to incorporate health equity measures into VAFs.

In this paper, we examined current VAFs and document examples in which available evidence on outcomes and preferences traditionally accounted for in value assessments do not consider diverse perspectives. We document processes that may inadequately address health disparities and underserved populations. Next, we propose solutions to improve existing value assessment methods. Finally, we illustrate, using a hypothetical shared decision-making case study, how an alternative to current value-assessment frameworks, equitable multicriteria decision analysis, could be implemented as part of the value-based assessment of prevention choices for women at high risk of developing breast cancer.

Author affiliations

Vakaramoko Diaby, PhD, College of Pharmacy, University of Florida, Gainesville. Askal Ayalew Ali, PhD, Division of Economic, Social and Administrative Pharmacy College of Pharmacy and Pharmaceutical Sciences, Institute of Public Health, Florida A&M University, Tallahassee. Aram Babcock, PharmD, MS, MBA, PhD Student, and Joseph Fuhr, PhD, Department of Pharmaceutical Outcomes and Policy, College of Pharmacy, University of Florida, Gainesville. Dejana Braithwaite, PhD, University of Florida Health Cancer Center, Department of Aging and Geriatric Research, and Department of Epidemiology, University of Florida, Gainesville.

AUTHOR CORRESPONDENCE:
Askal Ayalew Ali, 850.599.3082,
askal.ali@fam.u.edu; Vakaramoko Diaby,
352.273.9397, v.diaby@ufl.edu

J Manag Care Spec Pharm.
2021;27(9-a):S22-S29

Copyright©2021, Academy of Managed
Care Pharmacy. All rights reserved.

Overview of Value Assessment Frameworks: A Comparative Analysis

The primary goal of VAFs is to support evidence-based health care decision making using robust clinical and health economic evidence.^{1,3} Since the 1990s, the United States has fallen behind many high-income countries in relation to the benefit-cost of health care expenditures.⁴ Lately, the United States has begun shifting from a volume-based system to one based on value.³ Figure 1 shows the evolution of government and private investments in infrastructure supporting evaluation of costs and effectiveness of medicines and health care technologies in the United States.

In this context, several professional organizations such as the American Society of Clinical Oncology (ASCO),⁵ American Heart Association/the American College of Cardiology,⁶ National Comprehensive Cancer Network,⁷ Memorial Sloan Kettering Cancer Center (MSKCC [DrugAbacus])⁸ and the Institute for Clinical and Economic Review (ICER)⁹ have developed their VAFs. In this section, we examine these US VAFs according to their target audience, rationale, elements of value considered, methodological approach, and other considerations including equity attainment. Table 1 presents a summary of this comparative analysis. An initial examination of Table 1 reveals that VAFs have different rationales and perspectives. Elements of value considered in these frameworks differ based on perspectives, target audience (clinical/shared decision making versus coverage and policy), and expected outcomes, either direct or indirect.

Clinical evidence used in these frameworks is generated from population-level sources including randomized controlled trials (RCTs). As an example, the ASCO framework solely depends on RCTs to generate the net health benefit (NHB) scores and does not reflect the real-world clinical practice. Clinical trials represent the cornerstone of evidence generation when it comes to establishing treatment efficacy. Yet, it has been reported that only 5% and 1% of trial participants are Black/African American and Hispanic/Latino, despite making up 13.4%¹⁰ and 18.1%¹¹ of the US population, respectively. Knowing that participation of racial/ethnic minority groups in clinical trials is low, such evidence is not tailored to meet the needs of minority patients/communities, or underrepresented subgroups of the population including the young and the elderly.¹² Except for the ICER framework, VAFs completely ignore patient heterogeneity (eg, age, sex, race/ethnicity, socioeconomic status), complex demographic factors (eg, geography), and health care system-level factors

(eg, access to care) that are known contributors to health care disparity. This potentially leads to inefficient allocation of health care resources, coverage, and drug pricing decision making,¹³ with a huge burden on minority patients as they may not be provided with the optimal clinical services they deserve.

Similarly, equity measures (eg, unmet needs, health disparity, burden of illness) are not explicitly and quantitatively incorporated in value assessment as evidenced in Table 1. Only the MSKCC considers unmet needs and burden of illness quantitatively, whereas ICER uses an ad hoc process to include health disparity contextually, if judged feasible. Finally, the VAFs discussed in this section have previously been criticized for their limited transparency in their data aggregation processes, their ability to be reproduced,¹⁴ and the lack of decision criteria that matter the most to patients.¹

Solutions to Improve Existing Value Assessment Frameworks

In recent years, the need to curtail the spiraling of health care costs coupled with the imperative to deliver value-based care has legitimated the emergence of VAFs in the United States. With the progressive adoption of these VAFs, major limitations to VAFs have become apparent. In this section, we propose a range of solutions to address the limitations of existing VAFs, starting from the generation of appropriate elements of value, equity data specifically, to the adoption of robust data aggregation methods.

A call for action to make recruitment and inclusion of underrepresented minority groups a priority in clinical trial implementation is critical as it will ensure that RCTs contribute to the development of interventions that are responsive to the needs of a diverse population.^{15,16} Evidence obtained from these trials can then feed VAFs. Pharmaceutical companies could be incentivized to develop drugs for rare diseases and diseases that affect underrepresented minorities the most such as sickle cell disease. Including the patient voice in the clinical drug development to identify endpoints and achieve outcomes that are important to them will expand elements of value used in VAFs.

Criticized for their lack of patient centeredness while being agnostic of health equity considerations, emerging VAFs need to build on existing methodological approaches that allow for the explicit incorporation of the health inequality impacts of the health care interventions evaluated.¹⁷ We briefly present 3 approaches, 2 of which build on traditional cost-effectiveness analyses. These approaches are (1) 2-part health technology appraisal, (2) distributional

FIGURE 1 Evolution of Government and Private Investments in Infrastructure Supporting Evaluation of Costs and Effectiveness of Medicines and Health Care Technologies in the United States^a ^aAdapted from Diaby et al (2019).¹

cost-effectiveness analysis (DCEA), and (3) equitable multicriteria decision analysis.

TWO-PART HEALTH TECHNOLOGY APPRAISAL

The goal of the 2-part health technology appraisal is to ensure patient access to health care interventions that generate extensive value to society, which is not captured by the incremental cost-effectiveness ratios traditionally used in economic evaluations.¹⁸ Specifically, the incremental cost-effectiveness ratio is used jointly with a comprehensive benefits and value (CBV) score for decision making about the value of health care interventions. The CBV score is a composite and qualitative score obtained from the aggregation performance of the interventions evaluated against expanded elements of value including innovativeness, disease severity, and unmet need.¹⁸ This approach was initially proposed as an alternative process to the National Institute for Health and Care Excellence health technology assessment.

DISTRIBUTIONAL COST-EFFECTIVENESS ANALYSIS

The term "DCEA" serves as an umbrella for economic evaluations that model distributions of health (health gains/disease burden) associated with health care interventions at both population (societal) and subgroup (eg, sex, race/ethnicity) levels.¹⁹⁻²¹ In other words, DCEA provides breakdowns of health gains and losses per equity-relevant sociodemographic variables and per disease categories. In making decisions about the value of health care technologies, decision makers make tradeoffs between improving total population health and reducing unfair health inequality.¹⁹⁻²¹

EQUITABLE MULTICRITERIA DECISION ANALYSIS

Value assessments of health care interventions are complex in nature as they involve multiple criteria of varying importance to decision makers and data from diverse sources. This conundrum calls for the development of more structured frameworks that allow for the transparent aggregation of value elements into a decision composite metric. One of the

TABLE 1 Comparative Analysis of Major Value Assessment Frameworks in the United States

	ASCO	AHA/ACC	NCCN	MSKCC (DrugAbacus)	ICER
Audience	Providers/patients	Providers/patients	Providers/patients	Payers, policymakers, providers/patients	Payers, policymakers, providers/patients
Purpose/rationale	Shared decision-making tool for patients and providers to promote access to the highest-quality care at the lowest cost	Shared decision-making tool for patients and providers to support clinical decisions regarding the adoption of health care interventions including drugs and devices	Shared decision-making tool for patients and providers to support clinical decisions regarding treatment regimens	To assess the value-based price of treatments to inform payer and policy decisions	To assess the value of treatments to support coverage and reimbursement decisions
Elements of value considered	Benefits (survival and QOL), risks, and cost	Benefits (survival and QOL) and cost	Benefits (survival and QOL) and cost	Drug price, toxicity, efficacy, novelty, research and development costs, rarity of the disease, and population health burden	Costs, benefits, opportunity cost
Approach/type of evidence used	NHB score, a combination of weighted measure of clinical benefit and side effects, with extra points assigned to bonus items including QOL. Cost information are reported separately	Value is measured qualitatively using 5 levels anchored on incremental cost-effectiveness ratio	Health benefits measured using a score (1-5, 5 being the highest) for each of 5 key measures (efficacy, safety, quality of evidence, consistency of evidence, and affordability) shown as evidence blocks. For each treatment, scores are averaged across the evidence blocks.	Value-based pricing	Incremental cost-effectiveness ratio and budget impact analysis (BIA)
Other considerations					
Equity (unmet need, health disparity, burden of illness)	No	Considers unmet need qualitatively	No	Considers unmet need and burden of illness quantitatively	Ad hoc process to include health disparity contextually "if judged feasible"
Patient heterogeneity	No explicit account of patient heterogeneity	No explicit account of patient heterogeneity	No explicit account of patient heterogeneity	No explicit account of patient heterogeneity	Subgroup analyses can be conducted
Cost/price	Yes, but costs reported separately (patient only)	Yes, costs included in traditional CEA	Yes, but costs reported separately	Yes, maximum acceptable price set	Yes, costs included in traditional CEA
Affordability	No BIA	No BIA	Affordability scale used	Yes, BIA	Yes, BIA
Stakeholders engagement	Yes	Yes	Yes	Yes	Yes

ACC=American College of Cardiology; AHA=American Heart Association; ASCO=American Society of Clinical Oncology; BIA=budget impact analysis; CEA=cost-effectiveness analysis; ICER=Institute for Clinical and Economic Review; MSKCC=Memorial Sloan Kettering Cancer Center; NCCN=National Comprehensive Cancer Network; NHB=net health benefit; QOL=quality of life.

TABLE 2 Hypothetical Performance of Each Treatment Option Against the Decision Criteria²⁶

	Out-of-pocket costs (USD) ²⁶	Safety profile	Quantification of cancer risk reduction (%)	Treatment impact on health equity
Treatment options	C ₁ (min)	C ₂ (max)	C ₃ (max)	C ₄ (max)
Low-dose tamoxifen	20	4	30	H
Tamoxifen	40	1	30	H
Exemestane	60	2	40	VH
Raloxifene	30	3	30	F
Patient preference weights for decision criteria	0.28	0.22	0.35	0.15

C₁ (min)=criterion 1 (out-of-pocket costs), to minimize; C₂ (max)=criterion 2 (safety), to maximize; C₃ (max)=criterion 3 (quantification of cancer risk reduction), to maximize; C₄ (max)=criterion 4 (treatment impact on health equity), to maximize; F=fair; H=high; USD=US dollars; VH=very high.

most comprehensive quantitative approaches to choose, rank, and select treatment options is multicriteria decision analysis (MCDA).^{22,23} The explicit consideration of criteria importance and the transparency inherent in the use of this approach ensure that the underlying process of arriving at any decision based on treatment profiles and decision criteria is consistent and clear. In this context, equitable multicriteria decision analysis can help support decision makers faced with evaluating treatment options by considering multiple criteria in an explicit manner, among which is the treatment impact on health equality.^{24,25} In the next section, we develop a hypothetical case study illustrating the application of equitable multicriteria decision analysis to the value-based assessment of prevention choices for women at high risk of developing breast cancer.

Case Study: Application of Equitable Multicriteria Decision Analysis to the Value-Based Assessment of Prevention Choices for Women at High Risk of Developing Breast Cancer

CASE STUDY PRESENTATION

Imagine that Jane Doe, a Hispanic woman at high risk of developing breast cancer, has a clinical encounter with her care provider. She is offered a choice among 4 chemoprevention alternatives: low-dose tamoxifen, tamoxifen, exemestane, and raloxifene. Treatment recommendation in this shared decision-making process is based on the performance of the treatment options (ie, how well each treatment option meets prespecified decision criteria)

against 4 criteria that reflect the following dimensions of value: cost (out-of-pocket costs), safety (drug safety profile), clinical benefit (quantification of cancer risk reduction), and equity (treatment impact on health equity). These criteria are defined as follows:

- **Out-of-pocket costs:** Monthly co-pay expressed in dollars. This criterion is measured on a quantitative scale and needs to be minimized (ie, the lower the out-of-pocket costs, the better).
- **Safety profile:** This criterion is measured on a quantitative scale from 1 to 5, 5 being the best. This criterion needs to be maximized (ie, the higher the score, the better).
- **Quantification of cancer risk reduction:** This criterion is measured on a quantitative scale from 0 to 100 (percent), 100 being the best. This criterion needs to be maximized (ie, the higher the score, the better).
- **Treatment impact on health equity:** In this hypothetical case, the treatment impact on health equity is captured through its ability to reduce the differences in terms of cancer risk reduction among racial and ethnic groups. This criterion is measured on a qualitative scale (very low [VL]; low [L], fair [F], high [H] and very high [VH]) and is expected to be maximized (ie, VL is the least preferred, whereas VH is the most preferred).

Table 2 summarizes the performance of each treatment option against the 4 decision criteria. It is worth noting that the data contained in this table are used for illustrative purposes. In a real-world setting, this data would be obtained from clinical trials, comparative effectiveness studies, relevant cost data sources, and experts as needed.

As part of the shared decision-making process, the provider has quantified Ms. Doe's preferences using an approach called ELICIT,²⁷ which yielded the following weights: 0.28, 0.22 0.35, and 0.15 for out-of-pocket costs,

FIGURE 2 Dominance Relationships Among Alternatives

The arrow points towards dominated treatments.
A1 = low-dose tamoxifen; A2 = tamoxifen;
A3 = exemestane; A4 = raloxifene.

safety, quantification of cancer risk reduction, and treatment impact on health equity, respectively. These weights indicate the contribution of each criterion to the decision about the best chemoprevention agent. For example, the criterion safety makes up 22% of the decision while OPC makes up 28%. The weights sum to 100%.

METHODS: VALUE ASSESSMENT USING EQUITABLE MULTICRITERIA DECISION ANALYSIS

We use partial or noncompensatory MCDA methods for transparent aggregation of elements of value, notably outranking models. These models establish dominance relations among alternatives such that even if an alternative A (treatment option in our case) is as good as an alternative B on every decision criterion, a decision-maker (provider/patient) can conclude that A outranks B if a majority of the decision criteria support this assertion as long as there is no criterion on which A is worse than B. The majority rule is fulfilled when the sum of the preference weights associated to these

TABLE 3 Hypothetical Treatment Ranking by Preference Order

Alternatives	Victories ^a	Defeats ^b	Copeland score ^c	Rank
A1—Low-dose tamoxifen	2	0	2	1
A3—Exemestane	1	0	1	2
A4—Raloxifene	1	1	0	3
A2—Tamoxifen	0	3	−3	4

Note: the green highlighted row indicates the recommended treatment.

^aNumber of times a treatment is dominant over others.

^bNumber of times a treatment is dominated by others.

^cDifference between “victories” and “defeats.”

criteria are superior or equal to 55%. This is the basic principle of the Elimination and Choice Expressing Reality (ELECTRE) methods.^{28–30} In ELECTRE methods, alternatives are compared pairwise to establish outranking relationships by considering the weights of the criteria in favor of the outranking relation and also the possibility that an opposing criterion vetoes (“veto threshold”) that relation. Outranking relations are analyzed using an ELECTRE method to select the best alternative, rank the alternatives, or sort them into predefined categories. The issue of ELECTRE methods not yielding a single winner or best choice is circumvented by using the Copeland's pairwise aggregation method³¹ where alternatives, treatment options in this case, are ranked by the number of pairwise “victories” (ie, number of times an alternative is dominant over others) minus the number of pairwise “defeats” (ie, number of times an alternative is dominated by others). The higher the Copeland's score, the better the rank. Deterministic and probabilistic sensitivity analyses can be conducted to address the impact of uncertainty of the analysis results using “equitable multicriteria decision analysis.”

RESULTS: TREATMENT RECOMMENDATION FOLLOWING RANKING

Figure 2 shows the relationship among the treatment options, which translate into the ranking of these treatments by order of preference (Table 3). Each arrow represents a dominance relationship between 2 treatment options (Ax versus Ay). An arrow departing from an alternative/treatment (Ax) would suggest that Ax is dominant over Ay (Victory for Ax) while an arrow pointing towards Ax would suggest that Ax is dominated by Ay (Defeat for Ax). For example, looking at the pairwise comparison between A1—low dose tamoxifen and A2—tamoxifen in Table 1, A1 has a performance that is at least as good as A2 on all the criteria. The majority rule is fulfilled given that the sum of the weights of the criteria for which A1 is at least as good as A2 is superior to 55% (Majority weight = 0.28 + 0.22 + 0.35 + 0.15). Thus, A1 has 2 victories and 0 defeat. These dominance relationships are established for all pairwise treatment comparisons. Using equitable multicriteria decision analysis, which accounted for both patient preferences and included an equity criterion in the decision process, low-dose tamoxifen has the highest Copeland score and therefore

ranked first. As a result, low-dose tamoxifen is the treatment returning the most value.

Conclusions

Recent societal and cultural movements have helped place a spotlight on inequities that for far too long have not been addressed in our health care system. As a case in point, these inequities can be found where underrepresented communities are underserved, including VAFs. Thus, the solution is to focus resources on these communities using decision toolkits that are already available but can be adapted to ensure decision makers appropriately measure equity-efficiency tradeoffs. Innovations for improved health outcomes for marginalized groups should be appropriately incentivized to ensure the attainment of health equity. While concerns remain about VAFs, the solutions to their expansion are attainable and include fostering inclusion and diversity in clinical trials and translational research, use of appropriate value aggregation methods that can capture equity, and input from the patients on what endpoints/criteria matters most.

DISCLOSURES

No funding was received for this study. The authors have no conflicts of interest to report.

REFERENCES

- Diaby V, Ali AA, Montero AJ. Value assessment frameworks in the united states: a call for patient engagement. *Pharmacoecon*. 2019;3(1):1-3. doi:10.1007/s41669-018-0094-z
- Westrich K, Lisabeth Buelt M. Current landscape: value assessment frameworks. 2020. Accessed January 22, 2021. <https://www.npcnow.org/sites/default/files/media/npc-current-landscape-value-assessment-2020-final.pdf>
- The Lewin Group. Comparison of value assessment frameworks using the national pharmaceutical council's guiding practices for patient-centered value assessment: Final white paper. 2016. Accessed January 22, 2021. <https://www.lewin.com/content/dam/Lewin/Resources/Comparison-of-Value-Assessment-Frameworks.pdf>
- Tikkanen R, Abrams MK. U.S. health care from a global perspective, 2019: higher spending, worse outcomes? The Commonwealth Fund. Issue Briefs. January 30, 2020. Accessed January 22, 2021. <https://www.commonwealthfund.org/publications/issue-briefs/2020/jan/us-health-care-global-perspective-2019>
- Schnipper LE, Davidson NE, Wollins DS, et al. Updating the American Society of Clinical Oncology value framework: revisions and reflections in response to comments received. *J Clin Oncol*. 2016;34(24):2925-34. doi:10.1200/JCO.2016.68.2518
- Anderson JL, Heidenreich PA, Barnett PG, et al. ACC/AHA statement on cost/value methodology in clinical practice guidelines and performance measures: a report of the American College of Cardiology/American Heart Association Task Force on Performance Measures and Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2014;63(21):2304-22. doi:10.1016/j.jacc.2014.03.016
- National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines) with NCCN Evidence Blocks. 2021. Accessed January 22, 2021. <https://www.nccn.org/evidenceblocks/>
- Memorial Sloan Kettering Cancer Center. DrugAbacus FAQs. Accessed January 21, 2021. <https://www.drugpricinglab.org/tools/drug-abacus/>
- Institute for Clinical and Economic Research. Value assessment framework. 2021. Accessed January 22, 2021. <https://icer.org/our-approach/methods-process/value-assessment-framework/>
- Taylor K. Why Improving inclusion and diversity in clinical trials should be a research priority. September 4, 2019. Accessed January 31, 2021. <https://www2.deloitte.com/us/en/blog/health-care-blog/2019/why-improving-inclusion-and-diversity-in-clinical-trials-should-be-a-research-priority.html>
- Clinical Research Pathways. Diversity in clinical trials. 2021. Accessed January 22, 2021. <https://clinicalresearchpathways.org/diversity/>
- Society for Women's Health Research. Policy principles: health care value assessment. Accessed January 22, 2021. https://swhr.org/wp-content/uploads/2019/10/SWHR-Health-Care-Value-Assessment-Principles_10.2019.pdf
- Basu A, Grieve R, Pritchard D, Stevens W. One size does not always fit all in value assessment. *Am J Manag Care*. 2019;25(11):540-42.
- Bentley TKG, Cohen JT, Elkin EB, et al. Validity and reliability of value assessment frameworks for new cancer drugs. *Value Health*. 2017;20(2):200-05. doi:10.1016/j.jval.2016.12.011
- Loree JM, Anand S, Dasari A, et al. Disparity of race reporting and representation in clinical trials leading to cancer drug approvals from 2008 to 2018. *JAMA Oncol*. 2019;5(10):e191870. doi:10.1001/jamaoncol.2019.1870
- Dean LT, Gehlert S, Neuhaus ML, et al. Social factors matter in cancer risk and survivorship. *Cancer Causes Control*. 2018;29(7):611-18. doi:10.1007/s10552-018-1043-y
- Shafir J, Venkatachalam M. Creating incentives to narrow the gap in health outcomes: expanding value assessment to incorporate health inequality. *Health Affairs blog*. July 15, 2020. Accessed January 31, 2021. <https://www.healthaffairs.org/do/10.1377/hblog20200708.876257/full/>

18. Goldman D, Lakdawalla D, Philipson TJ, Yin W. Valuing health technologies at NICE: recommendations for improved incorporation of treatment value in HTA. *Health Econ.* 2010;19(10):1109-16. doi:10.1002/hec.1654
19. Asaria M, Griffin S, Cookson R, Whyte S, Tappenden P. Distributional cost-effectiveness analysis of health care programmes—a methodological case study of the UK Bowel Cancer Screening Programme. *Health Econ.* 2015;24(6):742-54. doi:10.1002/hec.3058
20. Dawkins BR, Mirelman AJ, Asaria M, Johansson KA, Cookson RA. Distributional cost-effectiveness analysis in low- and middle-income countries: illustrative example of rotavirus vaccination in Ethiopia. *Health Policy Plan.* 2018;33(3):456-63. doi:10.1093/heapol/czx175
21. Lee T-H, Kim W, Shin J, Park E-C, Park S, Kim TH. Strategic distributional cost-effectiveness analysis for improving national cancer screening uptake in cervical cancer: a focus on regional inequality in South Korea. *Cancer Res Treat.* 2018;50(1):212-21. doi:10.4143/crt.2016.525
22. Adunlin G, Diaby V, Xiao H. Application of multicriteria decision analysis in health care: a systematic review and bibliometric analysis. *Health Expect.* 2015;18(6):1894-905. doi:10.1111/hex.12287
23. Mühlbacher AC, Kaczynski A. Making good decisions in healthcare with multi-criteria decision analysis: the use, current research and future development of MCDA. *Appl Health Econ Health Policy.* 2016;14(1):29-40. doi:10.1007/s40258-015-0203-4
24. Jehu-Appiah C, Baltussen R, Acquah C, et al. Balancing equity and efficiency in health priorities in Ghana: the use of multicriteria decision analysis. *Value Health.* 2008;11(7):1081-87. doi:10.1111/j.1524-4733.2008.00392.x
25. Zuniga MA, Carrillo-Zuniga G, Seol YH, Fos PJ. Multi-criteria assessment of county public health capability disparities. *J Health Hum Serv Adm.* 2009;32(3):238-58.
26. GoodRx. Drug prices. Accessed January 31, 2021. <https://www.goodrx.com/>
27. Diaby V, Sanogo V, Moussa KR. ELICIT: an alternative imprecise weight elicitation technique for use in multi-criteria decision analysis for healthcare. *Expert Rev Pharmacoecon Outcomes Res.* 2016;16(1):141-47. doi:10.1586/14737167.2015.1083863
28. Diaby V, Dias L. Beyond Value function methods in MCDA for health care. In: Marsh K, Goetghebuer M, Thokala P, Baltussen R, eds. *Multi-Criteria Decision Analysis to Support Healthcare Decisions*. Springer International Publishing; 2017:299-310. doi:10.1007/978-3-319-47540-0_15
29. Roy B. The outranking approach and the foundations of ELECTRE methods. *Theory Decis.* 1991;31(1):49-73. doi:10.1007/BF00134132
30. Greco S, Ehrgott M, Figueira JR, eds. *Multiple Criteria Decision Analysis*. Vol 233. Springer New York; 2016. doi:10.1007/978-1-4939-3094-4
31. Pomeroy J-C, Barba-Romero S. *Multicriterion Decision in Management*. Vol 25. Springer US; 2000. doi:10.1007/978-1-4615-4459-3