ICER vs. NICE: Economic Model Structure Comparison

Milev S; Sardesai A; Taylor A; Sunil Raj S; Zou D

Evidera, San Francisco, CA, US

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Introduction

- The Institute for Clinical and Economic Review (ICER) is an independent organization in the US that examines comparative clinical-effectiveness and cost-effectiveness data to make recommendations on drug pricing.
- The National Institute for Health and Care Excellence (NICE) is an executive body of the department of health in England that conducts technology appraisals by assessing clinical and cost effectiveness of health technologies and provides recommendations as to whether they should be made available on the National Health Service (NHS).
- In cost-effectiveness analyses, an appropriate model structure is the first step to ensure that the model represents the disease and clinical pathways accurately and therefore, adequately addresses the decision problem, while still minimizing redundant complexity.

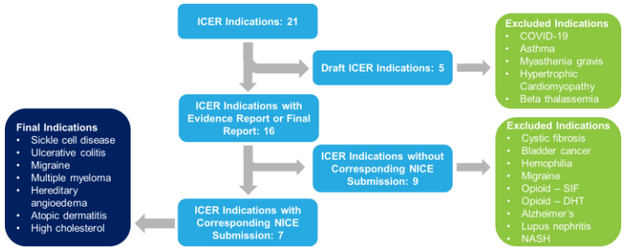
Objective

- The objective of this study was to compare the degree to which the structure of cost-effectiveness models submitted to NICE and developed by ICER differ.

Methods

- This study was limited to health technology assessments (HTA) published by ICER in 2020 and 2021.
- Indications were included if a completed ICER report and a final NICE HTA in the same indication were available.
- Indications based on the model structure comparison were classified as:

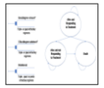
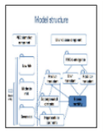
Figure 1. Assessment Selection Process



Abbreviations: COVID-19 = coronavirus disease 2019; DHT = dihydrotestosterone ; ICER = Institute for Clinical and Economic Review; NASH = non-alcoholic steatohepatitis; NICE = National Institute for Health and Care Excellence

Results

- Seven ICER submissions had corresponding NICE evaluations in the same indication. Of these, three ICER models had a different model structure, three had a broadly similar model structure, and one had a very similar model structure when compared to the corresponding NICE submission models.
- In the different structure category, NICE models contained added complexity with more health states (two of three). In the broadly similar category, NICE models tended to capture the effect of the new treatments more accurately (two of three) with complex data elicitation approaches (two of three). For the very similar category (hereditary angioedema), the key difference was the means of capturing treatment effect.

ICER	NICE
Moderate-to-Severe Atopic Dermatitis	
 Markov[1]: Health states were defined by the degree of response using EASI score categories (non-responder, EASI 50, EASI 75, EASI 90).	Decision tree/Markov (TA534)[2] and Markov (TA681)[3]: Health states were defined based on treatment status (on/off), with induction and maintenance phases, where response was defined by EASI-50 + DLQI binary outcome. 
Pretreated Relapsed and Refractory Multiple Myeloma	
 Decision tree/partitioned survival[4]: Decision tree first assessed whether patients who start CAR-T therapy stay on it. Patients were then allocated to a three-state partitioned survival (pre-progression, post-progression and death).	Partition survival[5-7]: Four health states based on progression and treatment status; treatment status subdivided the PF state (PF on-treatment, PF off-treatment, progressed, and dead) 
Sickle Cell Disease	
 Markov[8]: The five health states were defined based on disease related complications (no complications, acute condition, chronic condition, acute and chronic condition) or death.	Markov[9]: Four health states (death and three states defined by the number of VOCs) were included. Each of the three VOC-based health states had a distinct mortality risk and risk of acute complications. 
Migraine	
 Markov[10]: A semi-Markov model with time-varying proportions of patients with response to treatment. The four health states were on treatment migraine/no-migraine and off treatment migraine/no-migraine.	Decision tree/Markov[11]: Decision tree was a fixed assessment period; state transitions represented post-assessment period (health states: on treatment, discontinuation, and death). 
Ulcerative Colitis	
 Markov[12]: Health states were active UC, clinical response without remission, clinical remission, one elective surgery called post-colectomy (with or without complications), and death. The model had two lines of treatment: conventional and subsequent.	Markov[13,14]: Health states included active UC, response-no-remission, two post-surgery health states (first and second surgery): with or without complications; and death. The model had one line of active treatment. 
High Cholesterol	
 Markov[15]: Health states were history of ACS, stroke, ACS and stroke, other ACVD such as SA, prior revascularization without prior ACS, or stroke, CV-related death, and non-CV death. In each annual cycle, a subset of the cohort may experience an ACS, stroke (fatal or non-fatal), CV or non-CV death.	Markov[16-18]: Health states were based on MI, stroke, transient ischemic attack, SA, and UA. All had post-event tunnel health states which were termed primary, secondary (0- to 1-year post-CV event), and tertiary (>2 years post-CV event). 

All Markov models were cohort models.
Abbreviations: ACS = acute coronary syndrome; ACVD = atherosclerotic cardiovascular disease; CAR-T = chimeric antigen receptor T-cell; CV = cardiovascular; EASI = Eczema Area and Severity Index; DLQI = Dermatology Life Quality Index; MI = myocardial infarction, PF = progression free; SA = stable angina; UA = unstable angina; VOC = vaso-occlusive crisis

Discussion

- Four out of the seven NICE and ICER models compared for this study had similar structures. Major differences were observed for a few indications, among which, NICE models typically used a more complex structure.
- This added complexity could be due to access to patient-level data from clinical trials used to inform models submitted to NICE; when these models were constructed; the evidence available; and the manufacturers' intent to capture treatment effect to the best possible extent.

References

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