Considerations for Health Economic Modelling in a Crowded Treatment Landscape: Lessons from Recent Models for Psoriasis, Psoriatic Arthritis, and Ulcerative Colitis

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Introduction

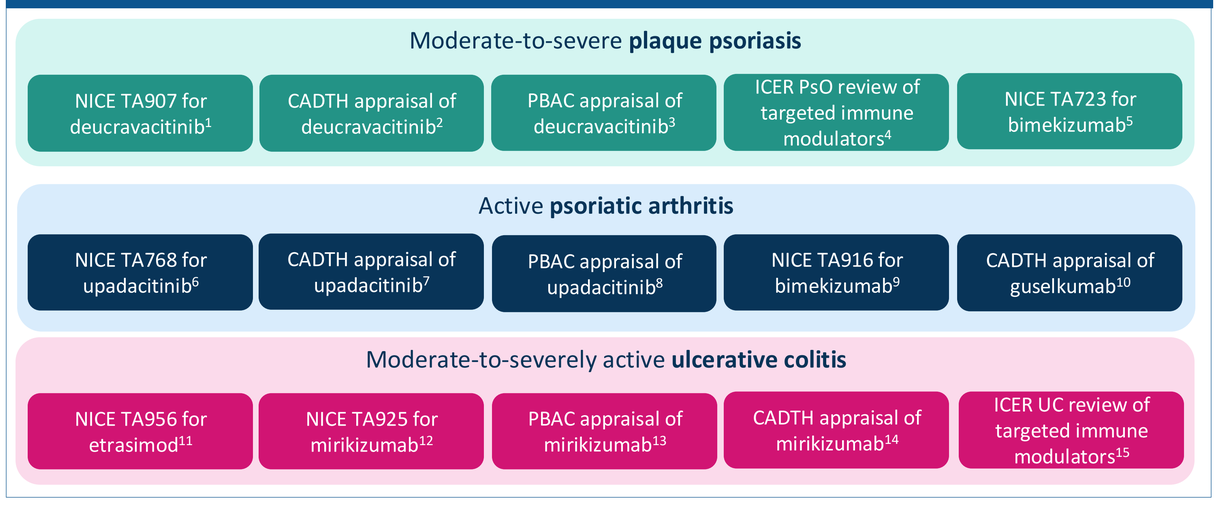
- As more and more highly effective treatments join the market, some disease areas have an abundance of available treatment options, presenting unique challenges and considerations for developing a health economic model for new treatments.

Objective: To explore considerations unique to health economic modelling in a crowded treatment landscape and provide recommendations for addressing these considerations.

Methods

- Three disease areas with several available treatments were chosen as case studies:
  - moderate-to-severe psoriasis
  - active psoriatic arthritis
  - moderately-to-severely active ulcerative colitis
- Within each area, five recent health technology assessments (HTAs) from the UK, Canada, Australia, and the US were reviewed for considerations unique to modelling in a crowded treatment landscape.

Figure 1. Reviewed HTAs



Abbreviations: CADTH, Canadian Agency for Drugs and Technologies in Health; HTAs, health technology assessments ; ICER, Institute for Clinical and Economic Review; NICE, National Institute for Health and Care Excellence; PBAC, Pharmaceutical Benefits Advisory Committee; PsO, psoriasis; UC, ulcerative colitis.

Results

Precedent and model concept

- New models typically build upon previous lessons learned where HTA bodies have previously assessed model structures or assumptions **(Figure 2)**.
- Where models diverge from precedent, HTA bodies may scrutinise assumptions in more detail.

Treatment placement

- With several comparators, it may only be possible to demonstrate cost-effectiveness within a specific subgroup of patients **(Table 2).**
- If placed early in the pathway, a treatment may be evaluated against several other comparators and may be recommended for a wider patient population. However, where there is only minimal distinction between treatments, manufacturers may be encouraged to take a cost minimisation/cost comparison approach.
- The considerable number of additional treatment options may put downward pressure on the treatment price **(Figure 3).**

Treatment pathway and sequencing

- Attempts to capture treatment sequencing typically either rely on unfounded simplifying assumptions or introduce an elevated level of modelling complexity **(Figure 4)**.
- Most models take a simplified approach by assuming a limited number of active treatment lines before the patient enters the best supportive care (BSC) health state.
- The impact of prior treatment exposure may not be consistently reported across comparators, introducing additional uncertainty into sequencing modelling.

Definition of best supportive care (BSC)

- In clinical practice, patients may cycle between different advanced therapies, and it may be unlikely for patients to revert to less effective and palliative care.
- For modelling purposes, BSC often serves as an absorbing state which allows for consistency in comparison of first-line treatments. It also prevents the model from becoming overly complex in the estimation of several treatment sequences.
- However, sourcing up-to-date resource use and cost data may be challenging, and within each disease area, many models rely on shared and often dated data sources, garnering critique or reluctant acceptance from HTA bodies **(Figure 5).**

Table 1. Themes and considerations across economic models

		Moderate-to-severe plaque psoriasis					Active psoriatic arthritis					Moderate-to-severely active ulcerative colitis				
		NICE	CADTH	PBAC	ICER	NICE	NICE	CADTH	PBAC	NICE	CADTH	NICE	NICE	PBAC	CADTH	ICER
		Deucravacitinib[1]	Deucravacitinib[2]	Deucravacitinib[3]	Targeted immune modulators[4]	Bimekizumab[5]	Upadacitinib[6]	Upadacitinib[7]	Upadacitinib[8]	Bimekizumab[9]	Guselkumab[10]	Etrasimod[11]	Mirikizumab[12]	Mirikizumab[13]	Mirikizumab[14]	Targeted immune modulators[15]
Followed precedent	Model structure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Cost and utility estimates		✓	✓	✓	CCA	✓	✓	CCA	CCA	✓	CCA	CCA	CCA	✓	✓
	Core assumptions	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
HTA outcomes	Recommended for limited population						✓			✓						
	Downward pressure on price	✓	n/r	✓	n/r	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	n/r
Treatment sequencing	Noted challenges of capturing treatment pathways	✓	✓	✓	✓	CCA	✓	✓	CCA	CCA		CCA	CCA	CCA		
	Noted challenges of capturing prior treatment effect	✓	✓	✓	✓	✓										
	Number of treatment lines included in model	3			2		1-2	4			1				1	
	Next line treatment modelled as basket average		✓	✓												✓
	CCA; no subsequent treatments modelled					✓			✓	✓		✓	✓	✓		
BSC	BSC included in the model	✓	✓	✓	✓	n/r	✓	✓	✓	n/r	✓	n/r	n/r	n/r	n/r	n/r
	Approach to BSC criticised for dated data sources	✓	✓	✓		n/r				n/r		n/r	n/r	n/r	n/r	n/r

Abbreviations: BSC, best supportive care; CADTH, Canadian Agency for Drugs and Technologies in Health; CCA, cost comparison approach; HTAs, health technology assessments; ICER, Institute for Clinical and Economic Review; NICE, National Institute for Health and Care Excellence; n/r , not relevant; PBAC, Pharmaceutical Benefits Advisory Committee; PsO, psoriasis; UC, ulcerative colitis.

Table 2. Placement in the treatment pathway

	Earlier	Later
Eligible population	⬆ Larger	⬇ Smaller
Number of alternatives	⬆ Larger	⬇ Smaller
Pricing considerations	⬇ Downward pressure	⬆ May be priced higher

Figure 2. Model structure followed precedent

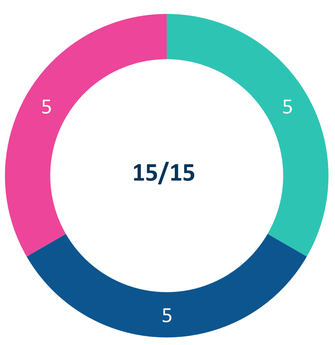


Figure 3. Downward pressure on price

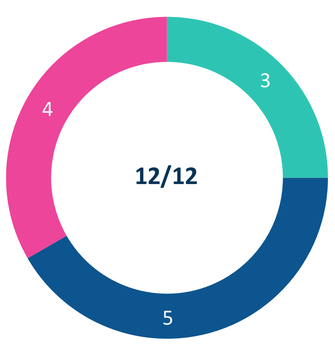
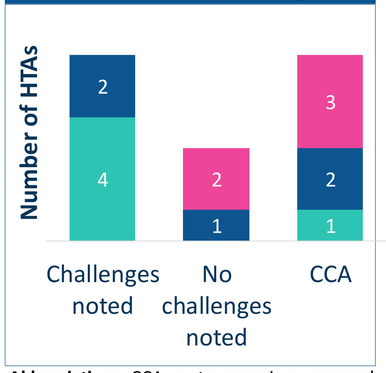
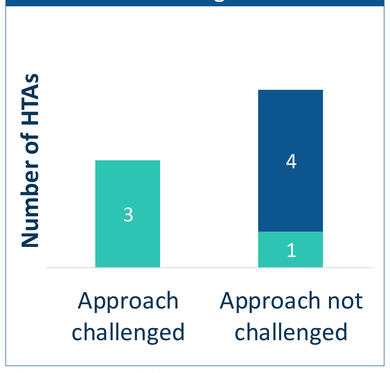


Figure 4. Noted challenges of treatment sequencing



Abbreviations: CCA, cost comparison approach; HTAs, health technology assessments.

Figure 5. Approach to BSC challenged



Abbreviations: BSC, best supportive care; HTAs, health technology assessments.

Conclusions

- Unique considerations emerged when reviewing economic models for new treatments in crowded landscapes, though findings are limited by the limited scope of research.

Recommendations

Precedent and model concept

- Review previous model approaches to jump-start model conceptualisation.
- Closely assess criticisms from previous TAs to build upon previous lessons learned.
- When diverging from precedent, support innovative approaches with adequate justification and quality evidence. Include established approach in scenario analysis for comparison.
- **Treatment pathway and sequencing**
- Consider limiting treatment sequencing to one or two total lines of treatment unless there is sufficient data to support differentiation of treatments by line of therapy.
- Consider using a basket of available treatments to capture the variety of possible pathways.
- If using a basket approach for later treatment lines, it may be preferable to assume that the basket remains consistent across first line comparators.

Treatment placement

- Be prepared for model results to put downward pressure on treatment price due to the large number of comparators.
- Consider assessing cost-effectiveness for specific subgroups defined by, for example, current treatment guidelines, disease severity, comorbidities, or other clinical indicators.

Definition of BSC

- If BSC is a relevant health state, consider modelling precedent in selecting data sources and modelling approach.
- If only dated evidence is available, consider undertaking evidence generation to update values, though it may be recommended to include the established data source to support a scenario analysis.

References: *(1) NICE UK. Deucravacitinib for treating moderate to severe plaque psoriasis. Available at: https://www.nice.org.uk/guidance/ta907, 2023. (2) CADTH. Deucravacitinib for moderate to severe plaque psoriasis. Available at: https://www.cadth.ca/deucravacitinib, 2023. (3) Pharmaceutical Benefits Advisory Committee (PBAC). Deucravacitinib Public Summary Document, 2023. (4) Institute for Clinical and Economic Review (ICER). Targeted Immunomodulators for the Treatment of Moderate-to-Severe Plaque Psoriasis: Effectiveness and Value. US: Institute for Clinical and Economic Review (ICER), 2018. (5) NICE UK. Bimekizumab for treating moderate to severe plaque psoriasis. Available at: https://www.nice.org.uk/guidance/ta723, 2021. (6) NICE UK. Upadacitinib for treating active psoriatic arthritis after inadequate response to DMARDs. Available at: https://www.nice.org.uk/guidance/ta768, 2022. (7) CADTH. CADTH Reimbursement Review: Upadacitinib (Rinvoq). Canadia Journal of Health Technologies 2021;1. (8) Pharmaceutical Benefits Advisory Committee (PBAC). Upadacitinib Public Summary Document, 2021. (9) NICE UK. Bimekizumab for treating active psoriatic arthritis. Available at: https://www.nice.org.uk/guidance/ta916, 2023. 10) CADTH. CADTH Reimbursement Review: Guselkumab (Tremfya). Canadia Journal of Health Technologies 2023;3. (11) NICE UK. Etrasimod for treating moderately to severely active ulcerative colitis in people aged 16 and over. Available at: https://www.nice.org.uk/guidance/ta956, 2024. 12) NICE UK. Mirikizumab for treating moderately to severely active ulcerative colitis. Available at: https://www.nice.org.uk/guidance/ta925, 2023. (13) Pharmaceutical Benefits Advisory Committee (PBAC). Mirikizumab Public Summary Document, 2023. (14) CADTH. CADTH Reimbursement Review: Mirikizumab (Omvoh). Canadia Journal of Health Technologies 2024;4. (15) Institute for Clinical and Economic Review (ICER). Targeted Immunomodulators for Ulcerative Colitis: Effectiveness and Value. US: Institute for Clinical and Economic Review (ICER), 2020*

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