Health Economic Models for Systemic Therapies in Atopic Dermatitis: A Systematic Review of Model Structures and Key Assumptions

Tessa Vernooij[1], Cornelis Boersma[2-4], MD, PhD, Marjolein S. de Bruin-Weller[1], MD, PhD, Marlies de Graaf[1], MD, PhD, Lisa de Jong, MD, PhD [2,3]

[1] Department of Dermatology and Allergology, National Expertise Center for Atopic Dermatitis, University Medical Center Utrecht, Utrecht, the Netherlands
[2] Department of Health Sciences, Unit of Global Health, University Medical Center Groningen, Groningen, the Netherlands
[3] Health-Ecore, Zeist, the Netherlands
[4] Department of Management Sciences, Open Universiteit, Heerlen, the Netherlands

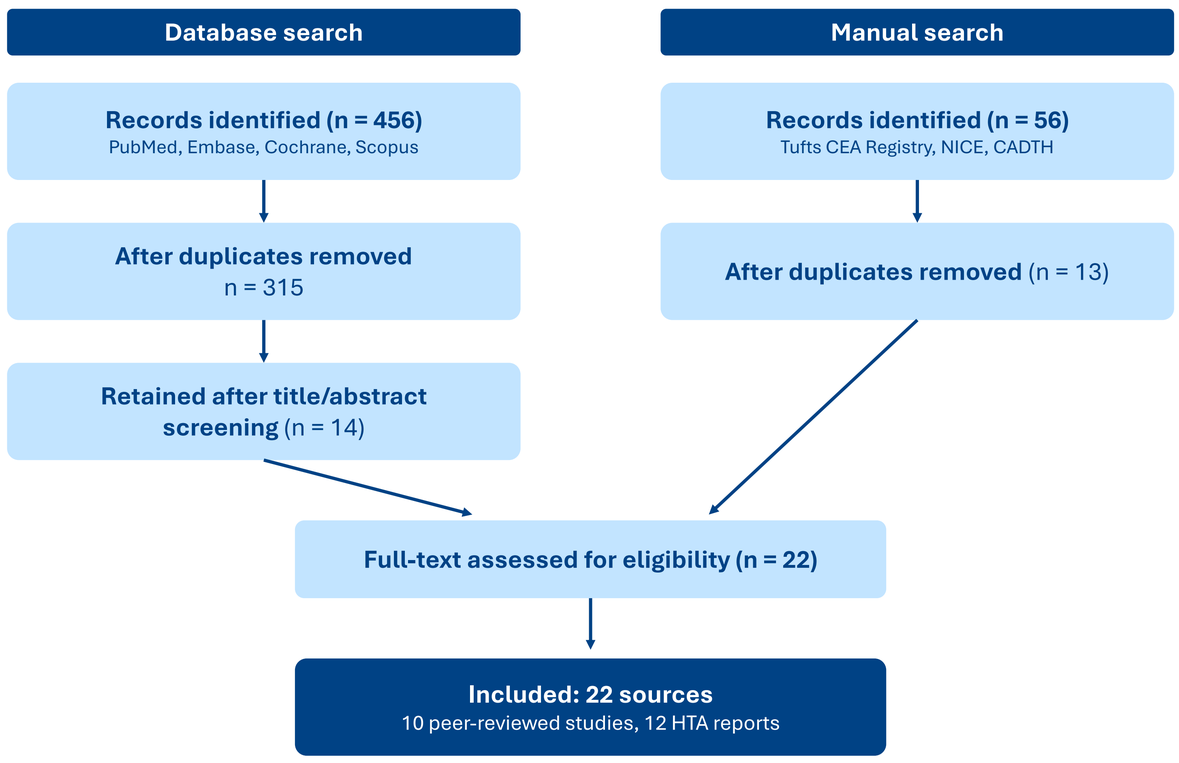
Background

Since 2017 several new systemic therapies have been approved for moderate-to-severe atopic dermatitis (AD). Health economic models are used to decide on reimbursement of these therapies. Earlier reviews mainly compared the outcomes (ICERs) of these models, but not how the models are built. The aim of this review was to describe how health economic models for advanced systemic treatments in AD are built, in terms of model structure, data sources and key assumptions, and to identify gaps for future models.

Methods

- Systematic review following PRISMA 2020; protocol registered on PROSPERO (**CRD420261419329**)
- Databases: PubMed/MEDLINE, Embase, Cochrane Library and Scopus, plus Tufts CEA Registry and HTA agencies (NICE, CADTH)
- English-language studies from 2017 onwards (first targeted systemic AD therapy approved)
- Included: model-based economic evaluations of advanced systemic AD therapies reporting ICERs or QALYs
- Screening by two independent reviewers; data extraction by one reviewer, fully checked by a second
- Risk of bias assessed with the ECOBIAS checklist

Figure 1. PRISMA flow diagram of study selection



Results

- **Included studies:** 22 sources were included (10 peer-reviewed studies, 12 HTA reports), covering models from 10 countries and 7 advanced systemic therapies
- **Model structure:** 18 out of 22 models used a hybrid decision tree–Markov structure, build on the first dupilumab appraisal (**Figure 2**)
- **Waning:** 15 studies assumed long-term loss of treatment effect (waning). This assumption was not based on observed data, but was taken from earlier dupilumab models, based on expert opinion.
- **Treatment pathway:** most models assumed that patients who stop an advanced treatment go to supportive care.
- **Clinical data:** 15 of 22 studies relied on an indirect comparison for relative efficacy, mostly a network meta-analysis (n = 12).
- **Utilities:** 20 studies used trial EQ-5D utilities. 10 of these came from dupilumab trials, even when the model included other treatments.

Scan for the full list of included studies

22 studies (9 database search and 13 grey literature)
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Key findings

20/22
models share one hybrid decision tree–Markov structure

15
studies used an unvalidated waning assumption

2
Studies modeled flares and sequencing

Figure 2. Common model structure (18 of 22 models)

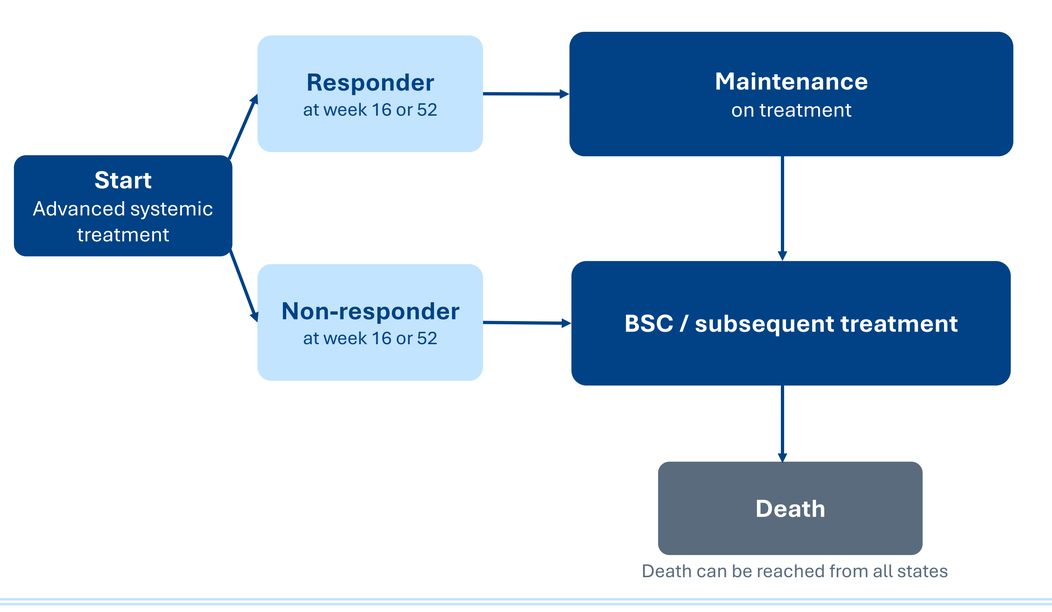


Table 1. Gaps in current health economic models for AD

Gap	What we found	What is needed
Static model structure	18 of 22 studies used the same responder/non-responder structure from 2018	Structures that allow flares and losing and regaining disease control
No treatment switching	Only 2 models allowed switching to another advanced treatment	Model real-world treatment sequences
Unvalidated waning	13 studies included waning, mostly reusing expert opinion from 2018; never validated	Use real-world discontinuation due to ineffectiveness instead
Flares underestimated	13 studies included the costs of flares, but only 1 their effect on utilities	Include the quality of life impact of flares
Same utilities for all treatments	10 studies used dupilumab utilities for other treatments	Treatment-specific utilities, including side effects
Children and adolescents	Few models for younger patients, mostly based on adult data	Models based on paediatric data

Conclusion

- Most health economic models in AD are still built on the same template as the first dupilumab models from 2018, with key assumptions that were never validated.
- Recent models are slowly evolving by adding flares and treatment sequencing.
- With more treatments available, the treatment landscape is becoming more complex, and models need to adapt to reflect how patients switch, stop and respond to treatments.
- Real-world data can help to validate assumptions such as waning and to model real treatment sequences. These findings are the starting point for a new Dutch AD model based on real-world data from the BioDay registry.

t.m.vernooij-2@umcutrecht.nl