EE668

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The hypothetical Scenario-Based Comparative Assessment (SCAN) model: evaluating healthcare resource utilisation across treatment strategies for refractory or unexplained chronic cough

Placing a hypothetical agent earlier in the CHEST-aligned chronic cough pathway reduced specialist visits by up to 47% and RCC/UCC-related healthcare costs by up to 10%, despite only a modest assumed efficacy advantage

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Background

- Chronic cough affects about 5% of adults in the United States (US) and impairs quality of life, sleep and productivity[1]
- Refractory or unexplained chronic cough (RCC/UCC), identified in a subset of patients with chronic cough, is a diagnosis of exclusion that involves repeated visits, referrals and tests.[2,3] The diagnostic work-up for RCC/UCC has been reported in different studies, averaging 30 months[4,5]
- Before RCC/UCC can be diagnosed, the "Big-4" causes must first be treated or ruled out: upper airway cough syndrome, asthma, non-asthmatic eosinophilic bronchitis and gastro-oesophageal reflux disease[2,6]
- No therapy is approved in the US for RCC/UCC;[7,8] off-label neuromodulators, mainly gabapentin, are commonly used[9]
- The point at which a new therapy is introduced in the management pathway determines how many patients receive it, how quickly they receive it, and how much resource use is avoided[10]

Aim and Methods

Aim:

- To evaluate how alternative placements of a hypothetical agent within the American College of Chest Physicians (CHEST)-aligned pathway may influence downstream healthcare resource utilisation (HCRU) from a US payer perspective

Methods:

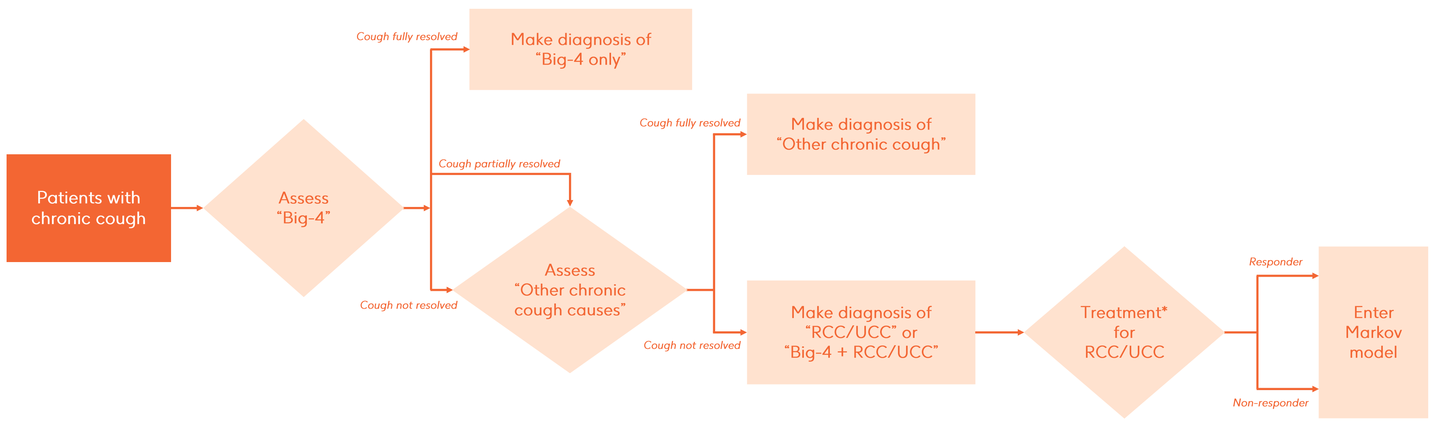
- SCAN is a hybrid decision-analytic model that links a short-term decision tree (**Figure 1**) to a lifetime Markov model (**Figure 2**)
- The decision tree covers "Big-4" evaluation, empiric management and further investigation
  - Patients diagnosed with RCC/UCC then enter the Markov model, which simulates long-term response, discontinuation and mortality (**Figure 2**)
- The model followed 1000 US adults with chronic cough in monthly cycles over a lifetime horizon, from a US payer perspective
- Four exploratory placement scenarios for the hypothetical agent, varying in timing and sequencing within the pathway, were compared with guideline-aligned standard care (**Table 1**)
- Patients who did not respond to the hypothetical agent given empirically completed the remaining work-up and were retried on standard care

Table 1: **Placement scenarios evaluated**

Scenario	Description	Treatment used
Standard care	Guideline-aligned pathway: full "Big-4" evaluation and further investigation before RCC/UCC treatment begins	Gabapentin (90%)/behavioural and cough suppression therapy (BCST) (10%)[11,12]
Empiric	Treatment immediately after failure of empiric "Big-4" therapy, without further testing	Hypothetical agent
Mixed	Half of unresolved patients receive the agent immediately after "Big-4"failure, as an Empiric; the remaining half complete the full work-up first and receive it once RCC/UCC is confirmed	Hypothetical agent
Intermediate	All unresolved patients treated immediately after "Big-4" failure, allocated evenly between the two treatments	Hypothetical agent or gabapentin (90%)/BCST (10%)
First-line	All patients treated before any "Big-4" evaluation	Hypothetical agent

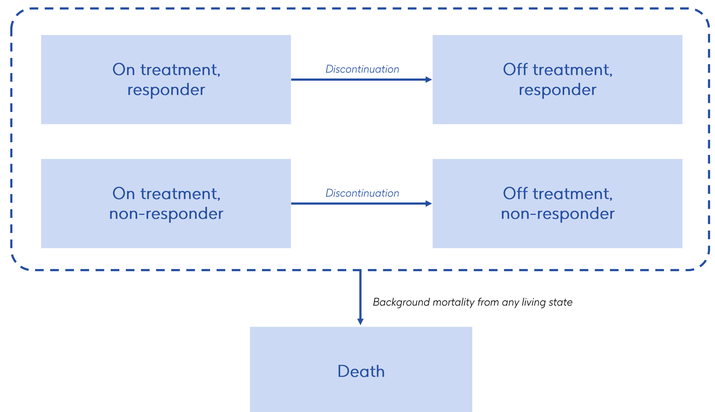
- Response and discontinuation inputs were drawn from published literature,[11,12] and the hypothetical agent was given only a modest response advantage over it (≈2.5% relative)
- Outcomes were reported per 1000 patients: primary care visits, specialist visits, diagnostic tests and total RCC/UCC-related HCRU costs

Figure 1: **SCAN model structure: the shared diagnostic and treatment pathway across all placement scenarios**



*Treatment may be the hypothetical agent or standard care, depending on the scenario evaluated.

Figure 2: **Health states and permitted transitions in the lifetime Markov model**



Cycle length is one month over a lifetime horizon. Self-transitions are permitted in every cycle and are not shown. Off-treatment patients accrue the non-responder utility in the base case, so treatment benefit does not persist after discontinuation.

Results

- All four placement scenarios reduced downstream HCRU relative to standard care; the reductions were largest where treatment was introduced earliest in the diagnostic pathway (**Table 2** and **Figure 3**)

Primary care visits
↓ 13–25% 476–953 visits avoided

Specialist visits
↓ 23–47% 1263–2582 visits avoided

Diagnostic tests
↓ 3–13% 71–262 tests avoided

RCC/UCC-related HCRU cost
↓ 6–10% $268,974–$411,227 avoided

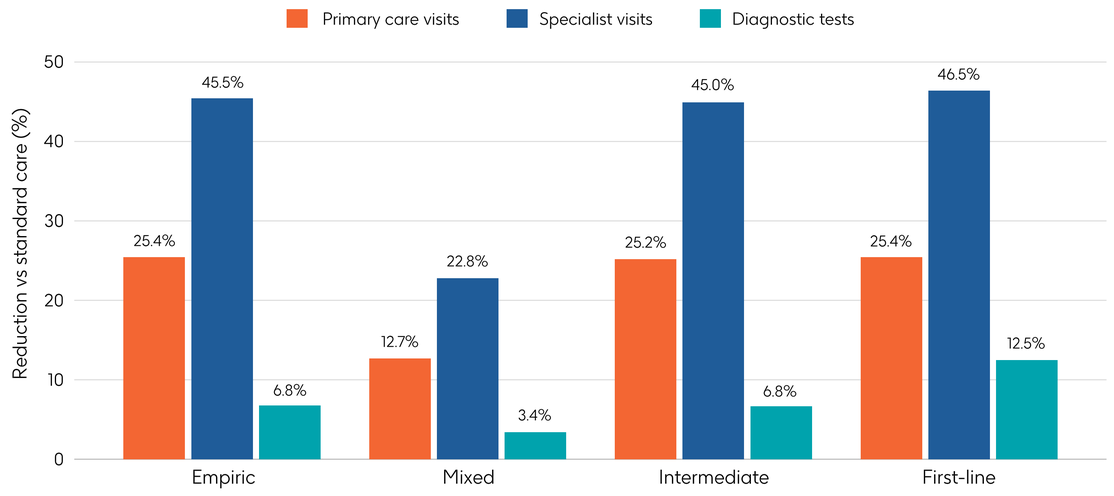
Per 1000 patients over a lifetime horizon, across the four placement scenarios.

Table 2: **HCRU by placement scenario, per 1000 patients over a lifetime horizon**

Outcome	Standard care	Empiric	Mixed	Intermediate	First-line
Primary care visits	3745	2792	3268	2802	2792
Specialist visits	5547	3022	4284	3049	2965
Diagnostic tests	2088	1946	2017	1947	1826
Reduction in primary care visits	–	25.4%	12.7%	25.2%	25.4%
Reduction in specialist visits	–	45.5%	22.8%	45.0%	46.5%
Reduction in diagnostic tests	–	6.8%	3.4%	6.8%	12.5%
Reduction in RCC/UCC-related HCRU cost	–	9.6%	6.3%	7.0%	9.6%

Scenarios are defined in Table 1. Reductions are relative to standard care. Cost reductions refer to total RCC/UCC-related HCRU costs, excluding non-RCC/UCC lifetime costs.

Figure 3: **Reduction in HCRU by placement scenario**



What drives the reduction

- The mean time to RCC/UCC diagnosis decreased from 30.3 months with standard care to 11–12 months with earlier placement
- Savings were driven by avoided visits and diagnostic tests rather than the assumed efficacy of the agent, with the largest reductions in specialist visits
- Earlier placement of the agent generated greater savings despite treating more patients who would not ultimately benefit from the agent

Conclusions

Earlier placement of a hypothetical agent in the CHEST pathway reduced diagnostic burden and RCC/UCC-related healthcare costs, suggesting that where a therapy enters a diagnosis-of-exclusion pathway may be as important as how well it works

The SCAN model provides a transparent framework for evaluating alternative therapy placements and can be used to inform clinical pathway design, evidence generation and value assessment as new treatments emerge in RCC/UCC

Abbreviations

BCST, behavioural cough suppression therapy; CHEST, American College of Chest Physicians; HCRU, healthcare resource utilisation; RCC, refractory chronic cough; UCC, unexplained chronic cough; US, United States.

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Disclosures

RH, **GN**, **EA**, **SB** and **SSh** are employed by, and hold financial equities in, GSK. **ZE**, **TA**, **SSa**, **EG** are employees of Value Analytics Labs; Value Analytics Labs received funding from GSK to conduct the study.

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