

Multi-Comparator ICERs in Cost-Effectiveness Analysis to Account for Changes in Clinical Practice After the Introduction of a New Technology

Hughes R¹, Mountain G¹, Weston G¹

¹Adelphi Values PROVE, Bollington, Cheshire SK10 5JB, United Kingdom



EE312

Introduction

- > Current health technology appraisal (HTA) practice for intervention value assessment often considers the impact of reimbursement from an individual patient, against a single standard of care comparator.
- > Focusing the analysis on incremental changes on the margin between two treatment options may fail to capture the wider population health and budget policy impact of bringing an intervention to market.
- > Policy modelling approaches are developed to allow for providing more contextualised results that can be used to provide value messaging that is closely aligned to the challenges faced by the decision makers.
- > The Policy, Affordability and Cost-Effectiveness (PACE) model provides an alternative approach to estimating and reporting budget and health outcomes for a new intervention and provides a more comprehensive assessment of value which contextualises the outcomes and facilitates discussion around dynamic policy investment.(Add references)
- > This study utilises the previously developed PACE methodological approaches to develop a case study exploring the treatment of pulmonary arterial hypertension (PAH).
- > The PACE framework utilises a mix of approaches taken across both cost-effectiveness and budget impact analyses, this allows for exploring both the financial and health outcomes across the target population.

Methods

- > The PACE framework aligns the approaches taken in traditional cost effectiveness and budget impact analyses by comparing a new treatment against all displaced treatments used in clinical practice, and not just the standard of care or 'next-best' option.
- > This non-marginal evaluation of a product provides an estimation of the average effect of an intervention which considers the extent of the change to clinical practice caused by the intervention entering the market.
- > In the case study, the value of Sildenafil was assessed against all comparators in the market as a new intervention in Canadian clinical practice for functional class II PAH. Within this disease area there is a large gap between the outcomes seen across the available treatments in different classes of products.
- > The model used the population of Ontario as the base case population. Within this a rate of 26 cases of PAH per million population members was applied to provide the target population size. This was selected as the upper bound provided from within the referenced study.¹
- > Published discounted cost and quality-adjusted life year (QALY) inputs were used to conduct the study.² The treatment options analysed in the publication were included and were Sildenafil (intervention), Tadalafil, Supportive care, Ambrisentan 5 mg, Ambrisentan 10 mg, Riociguat, and Bosentan. Ambrisentan 10 mg was omitted from the study as Ambrisentan 5mg was the dominant dosing option and would have greater market share.

Table 1. Market share data

- > Market share values for the treatment options were estimated based on the relative proportion of QALY gains.
- > This involved weighting each comparator treatment option as a relative percentage of the total QALY gains estimated for all comparator treatments.

	Reference	New
Sildenafil	0.0%	18.9%
Tadalafil	20.1%	16.2%
Supportive care	16.1%	13.1%
Ambrisentan 5 mg	23.1%	18.8%
Riociguat	21.2%	17.2%
Bosentan	19.5%	15.8%
Totals	100.00%	100.00%

Reference scenario does not include Sildenafil, the New scenario represents the availability of Sildenafil in the market

Conclusions

- > The PACE framework explores the broader value of a new treatment across an entire population to inform dynamic investment discussions by providing a contextualised analysis.
- > By considering all market relevant comparators, the framework allows an understand of both affordability and cost-effectiveness for changes to clinical practice that may have a non-marginal impact.
- > Decision makers are often faced with highly complex markets when a new treatment becomes available. Developing models that can reflect the nature of these markets can therefore allow for the decision makers to have access to the data to fully assess the implications of the reimbursement decisions made.
- > When making healthcare resourcing decisions, it is important to estimate the value new technology based on real world impact, through scenarios reflecting healthcare budget spending and overall population health outcomes.

References

1. Tran K, Coyle K, Jabr MF, et al. Drugs for Pulmonary Arterial Hypertension: Comparative Efficacy, Safety, and Cost-Effectiveness. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; March 2015.;
2. Coyle K, Coyle D, Blouin J, et al. Cost Effectiveness of First-Line Oral Therapies for Pulmonary Arterial Hypertension: A Modelling Study. *Pharmacoeconomics*. 2016;34(5):509-520. doi:10.1007/s40273-015-0366-8

Results

Table 2. Key model results for the treated patient population and the average patient

3 year average	Population			Treated Patient		
	Reference Scenario	New Scenario	Impact	Reference Scenario	New Scenario	Impact
Cost	\$112,286,336	\$101,309,433	-\$10,976,903	\$304,601	\$274,823	-\$29,777
QALYs	1,494.61	1,537.34	42.73	4.05	4.17	0.12
ACER	\$75,127	\$65,899	-\$256,895	\$75,127	\$65,899	-\$256,895

- > For a population of 14,178,260 in Ontario it was expected that there would be a prevalent PAH population of 369 patients, of which 69.7 would be expected to receive Sildenafil in each year.
- > The new scenario, which includes the reimbursement of Sildenafil, versus the reference scenario, where Sildenafil is not available for use in clinical practice, would provide 42.73 additional QALYs and a cost reduction of \$10,976,903 across the population.

Table 3. Health and budget outcomes with the introduction of Sildenafil

	QALYs			Cost		
	Reference scenario	New scenario	Difference	Reference scenario	New scenario	Difference
Sildenafil	0.00	325.05	325.05	\$0	\$10,195,196	\$10,195,196
Tadalafil	296.23	239.44	-56.80	\$11,343,435	-\$2,174,875	-\$13,518,310
Supportive care	190.68	154.81	-35.87	\$9,193,626	-\$1,729,562	-\$10,923,187
Ambrisentan 5 mg	395.41	320.98	-74.43	\$32,184,366	-\$6,057,953	-\$38,242,319
Riociguat	331.65	269.25	-62.40	\$30,359,076	-\$5,712,414	-\$36,071,489
Bosentan	280.64	227.82	-52.82	\$29,205,833	-\$5,497,295	-\$34,703,128
Total (all treatments)	1494.61	1537.34	42.73	\$112,286,336	-\$10,976,903	\$123,263,238

- > Alternatively, for the average treated patient, the reimbursement of Sildenafil would provide 0.12 additional QALYs at a cost of -\$29,777. This showed that the inclusion of Sildenafil as an available treatment options would provide both greater health outcomes and a reduced treatment cost for patients.
- > Figure 1 below demonstrates that Sildenafil dominates each comparator treatment option, with lower cost and higher QALY gains, situated in the southeast quadrant of the cost-effectiveness plane.

Figure 1. Cost-effectiveness plane of the included treatment options per patient

