

Integration of Environmental Considerations in Economic Evaluations: Significant Shift or Token Gesture? Insights from Severe Asthma Treatments

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BACKGROUND

Health Technology Assessment (HTA) agencies are showing growing interest in incorporating environmental considerations into their value appraisal processes. Despite the benefits of integrated evaluation approaches, their use remains limited due to their complexity and additional data required. As such, determining the appropriate level of effort remains difficult, due to their unclear influence on reimbursement decisions.

OBJECTIVES

This study explores the relevance and feasibility of integrating environmental impacts into a cost-utility analysis of severe asthma treatments, and the extent to which it can influence efficiency appraisals.

METHODS

- ▶ A cost-utility analysis was conducted comparing tezepelumab plus standard of care (SOC) to SOC alone, using the published ICER Analytics™ model. Two inhalers which have notable different carbon footprints were considered as SOC in scenario analyses: ADVAIR HFA™ 250/25 (2 inh BID) and ADVAIR DISKUS™ 500/50 (1 inh BID), assuming comparable efficacy results and unit costs.
- ▶ Inputs for the model were drawn from ICER Analytics™ base case analysis [1], with the addition of the monetary valuation of CO₂ emissions resulting from treatments, emergency visits and hospitalizations.
- ▶ CO₂ emissions were extracted from the literature and converted into monetary units (USD) using the social cost of carbon (SCC) as determined by the U.S. Interagency Working Group on Social Cost of Greenhouse Gases. [2] Both the average (\$51 per ton of CO₂) and the 95th percentile (\$152 per ton of CO₂) SCC estimates were tested, with model outcomes compared to ICER Analytics™ base case analysis excluding environmental considerations.
- ▶ In the absence of life cycle data specific to tezepelumab, emissions were assumed to be comparable to those of ADVAIR DISKUS™, given that both medications are packaged as disposable devices (a pre-filled pen or syringe and an inhaler, respectively), that must be discarded monthly.
- ▶ Emissions for ADVAIR HFA™ and ADVAIR DISKUS™ were taken from the PRESCQIPP report on inhaler carbon footprint. [3]

RESULTS

- ▶ As illustrated in the figures below, the annual carbon footprint per patient amounted to 237 kg of CO₂ for ADVAIR HFA™ compared to 11 kg for ADVAIR DISKUS™ alone. The addition of tezepelumab to SOC resulted in an annual carbon footprint per patient that ranged from 22 kg of CO₂ to 248 kg of CO₂. In monetary units, these emissions represent annual social costs between \$12.06 to \$35.95 for ADVAIR HFA™, \$0.56 and \$1.67 for ADVAIR DISKUS™ and ranging from \$1.12 to \$37.62 for tezepelumab + SOC, respectively. The carbon footprint associated with medical resource use was 14 kg of CO₂ per emergency visit and 531 kg of CO₂ for a 14-day hospitalization.

Figures 1 and 2. CO₂ emissions associated with model inputs in kg of CO₂ (left) and in monetary units, considering the social cost of carbon (right)

Figure 1

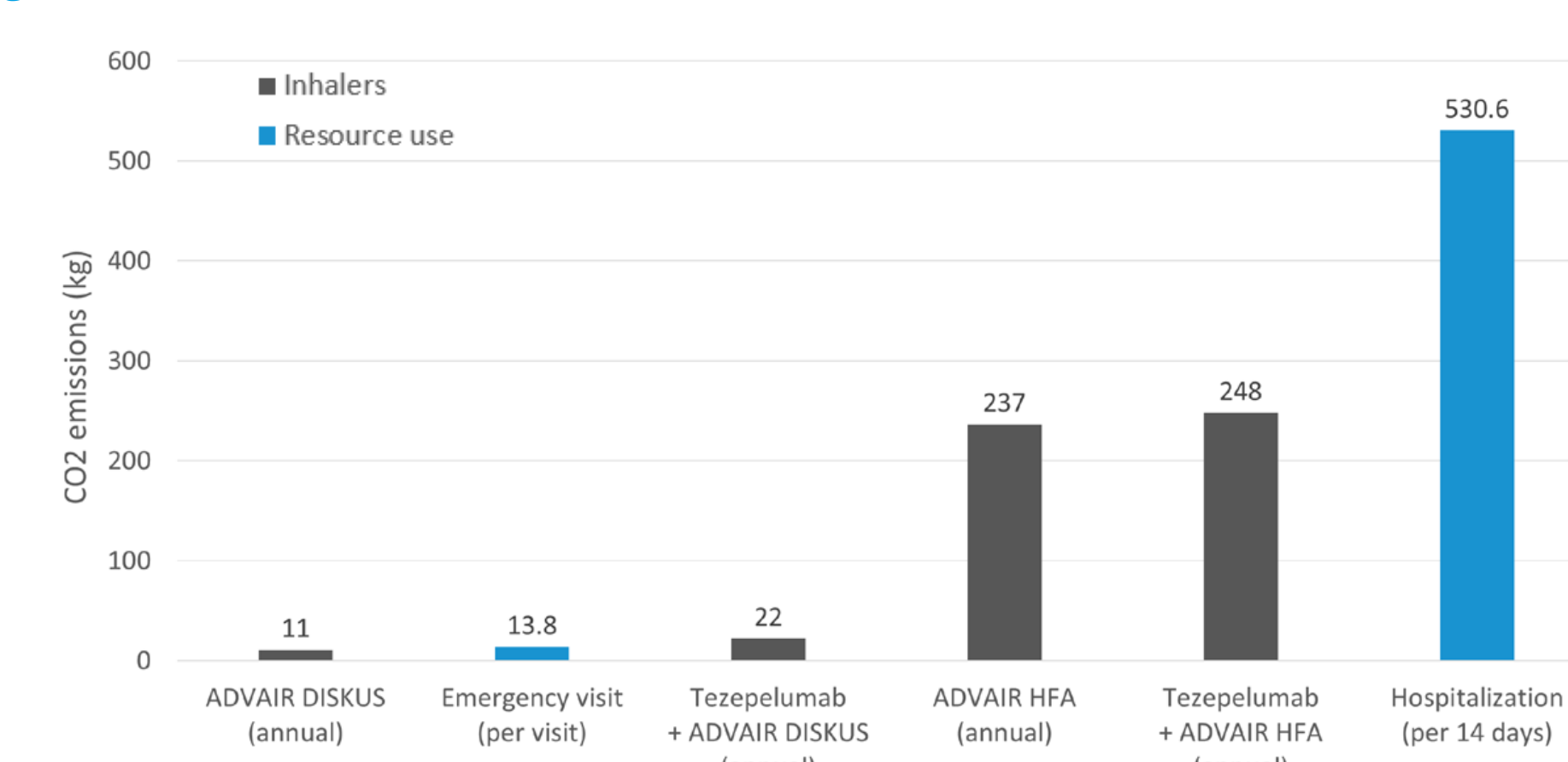


Figure 2



Table 1. Cost-effectiveness results over a patient's lifetime horizon, with SOC as ADVAIR HFA™ (left) and SOC as ADVAIR DISKUS™ (right)

Regimen	Total costs	Total QALYs	ΔCosts	ΔQALYs	ICER
Reference case analysis – ICER's base case analysis excluding environmental considerations					
ADVAIR HFA™ (SOC)	\$228 299	13.91	-	-	-
Tezepelumab+SOC	\$696 840	15	\$468 541	1.09	\$430 352/QALY
Inclusion of environmental considerations based on average social cost of CO ₂ emissions					
ADVAIR HFA™ (SOC)	\$228 652	13.91	-	-	-
Tezepelumab+SOC	\$697 106	15	\$468 454	1.09	\$430 272/QALY
Inclusion of environmental considerations based on 95 th percentile social cost of CO ₂ emissions					
ADVAIR HFA™ (SOC)	\$229 356	13.91	-	-	-
Tezepelumab+SOC	\$697 635	15	\$468 279	1.09	\$429 840/QALY

Regimen	Total costs	Total QALYs	ΔCosts	ΔQALYs	ICER
Reference case analysis – ICER's base case analysis excluding environmental considerations					
ADVAIR DISKUS™ (SOC)	\$228 299	13.91	-	-	-
Tezepelumab+SOC	\$696 840	15	\$468 541	1.09	\$430 352/QALY
Inclusion of environmental considerations based on average social cost of CO ₂ emissions					
ADVAIR DISKUS™ (SOC)	\$228 437	13.91	-	-	-
Tezepelumab+SOC	\$696 887	15	\$468 450	1.09	\$430 268/QALY
Inclusion of environmental considerations based on 95 th percentile social cost of CO ₂ emissions					
ADVAIR DISKUS™ (SOC)	\$228 710	13.91	-	-	-
Tezepelumab+SOC	\$696 979	15	\$468 269	1.09	\$430 102/QALY

- ▶ At the 95th percentile social cost of CO₂, incorporating environmental considerations increased the total costs of ADVAIR HFA™ and ADVAIR DISKUS™ by \$1,057 and \$411, respectively. These incremental costs included \$675 for ADVAIR HFA™, \$29 for ADVAIR DISKUS™, \$375 for hospitalizations, and \$7 for emergency visits. For the tezepelumab + SOC arms, the incremental costs were \$716 for tezepelumab + ADVAIR HFA™, \$60 for tezepelumab + ADVAIR DISKUS™, \$78 for hospitalizations, and \$1 for emergency visits.
- ▶ Although ADVAIR HFA™ generated 20 times more carbon emissions per year than ADVAIR DISKUS™, the total cost differences between the two SOC arms were marginal, even when accounting for the 95th percentile social cost of CO₂ emissions (\$228,710 vs. \$229,356, Δ\$646 solely due to inhalers). This corresponds to savings of 4.25 tons of CO₂ by switching from ADVAIR HFA™ to ADVAIR DISKUS™ over a lifetime.
- ▶ When compared to the base case analysis, incorporating environmental impacts in monetary units led to a reduction in incremental costs ranging from \$87 to \$262 (SOC as ADVAIR DISKUS™) and \$91 to \$272 (SOC as ADVAIR HFA™) using the average and 95th percentile estimates of SCC, respectively. Nonetheless, the overall impact of integrating environmental considerations on the incremental cost-effectiveness ratio remained minimal (<1%).

CONCLUSION

This study demonstrates the feasibility of incorporating environmental impacts as costs into economic evaluations for severe asthma treatments, contingent upon the availability of relevant data. While the overall impact on cost-effectiveness model outcomes may be minimal, conclusions are closely tied to the social cost of carbon. In fact, a recent study suggests that this cost could rise as high as \$1,367 per ton of CO₂. [4] Nonetheless, quantifying the CO₂ emissions saved or added by the evaluated treatment provides valuable insights. Additional research is needed to determine optimal methods and preferred sources for integrating environmental factors into economic evaluations.

REFERENCES

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