Applied Health Economics and Health Policy (2020) 18:597–599
https://doi.org/10.1007/s40258-020-00578-5

EDITORIAL

The Inclusion of Comparative Environmental Impact in Health Technology Assessment: Practical Barriers and Unintended Consequences

Brita A. K. Pekarsky[1]

Published online: 7 May 2020

1 Introduction

As health sector professionals, scientists and academics, we recognise that the health sector must contribute to greenhouse gas (GHG) emission-reduction targets. Audits of the health sector show that, in addition to the "usual suspects" (power, transport and waste), anaesthetic gases and propellants in metered dose inhalers are contributors to health sector GHG emissions [1, 2]. Furthermore, health services and technologies differ in their GHG profiles, therefore decisions between options can have implications for the health sector's GHG emissions.

Health economic evaluations (HEEs) and health technology assessments (HTAs) are often guided by the principle of inclusion rather than exclusion of consequences of value. It would appear inevitable that in the current climate, health economists are considering whether the net impact on GHG emissions should be included routinely in the assessments and evaluations. GHG accounting is not a recent phenomenon and at least some of the preconditions for ensuring an efficient and effective integration of the impact of GHG emissions into HEE/HTA have been met. Methods of accounting for GHG emissions are internationally validated [3] and, like health economic methods, subject to continual review and responsive to changes in evidence. There are strong similarities between the guidelines for calculating GHG emissions for a jurisdiction and the guidelines used by public health sector funders for HEE and HTA, most notably the reliance on evidence. While the question of the value of projected change in GHG emissions arising from a decision is subject to debate, there are established carbon markets and prices in many jurisdictions.[1] And GHG emission impacts are already incorporated in numerous decision processes in the public and private sector, including in the UK where the Treasury publishes guidance on how to calculate the cost effectiveness of climate change policies [8].

On face value at least, it appears that HEE/HTA could incorporate impacts of GHG emissions. This raises a number of important questions. What are the practical barriers to integrating GHG emission impacts into HEE/HTA methods? What would a set of "green" HEE/HTA guidelines look like? Would they be costly to implement? Would existing reimbursement processes become more or less at risk of gaming? And are there more effective ways for the health economists to contribute to GHG emission-reduction targets in the health sector?

2 Practical Barriers to Routine Inclusion of Greenhouse Gas (GHG) Emission Impacts

Despite the similarities in these two assessment processes, there are at least three practical barriers to routine integration of GHG emission impacts in HEE/HTA methods.

First, while GHG accounting methods and objectives are validated, transparent and applicable to all sectors of the economy, they are not completely aligned with HEE/HTA. GHG inventories for a sector or company potentially comprise Scope 1, 2 and 3 emissions, respectively: direct emissions from sources owned or controlled in that sector; indirect emissions from the generation of the power purchased by that sector; and all indirect emissions not included in Scope 2 that occur in the "value chain". Scope 1 GHG

✉ Brita A. K. Pekarsky
pekarskybak@gmail.com

[1] College of Medicine and Public Health, Flinders University, Adelaide, SA, Australia

[1] The European Union cap and trade scheme was established in 2005 and accounts for over 75% of international carbon trading [4]. China is in the early stages of developing markets [5]. Australia has three distinct carbon markets [6]. The effectiveness of existing and past markets in reducing emissions (environmental integrity) is contested [7].

emissions in the health sector include those from anaesthetic gases and on-site power generation in hospitals and health department buildings. The health sector's Scope 2 emissions are those arising from purchased energy. They are the Scope 1 emissions of the power generation sector, which could include both renewable and non-renewable energy. Scope 3 emissions in the health sector include those generated by a patient driving to an appointment and the manufacture of pharmaceuticals; Scope 1 emissions of other sectors. Validated formulas allow the GHG emissions from different gases, sectors and activity to be measured, standardised and expressed as a carbon dioxide equivalent (CO_2-e). Scope 1 and 2 emissions can be calculated with reasonable accuracy and estimates of Scope 3 emissions use many assumptions [9]. GHG and health economic assessment processes are both rigorous, but their objectives are not aligned. GHG accounting methods quantify the total in-scope emissions of an organisation, region, sector or country to track change, monitor compliance and identify opportunities to reduce emissions. In contrast, HHE/HTA mainly concerns the comparative impact for a cohort of patients of alternative interventions or programs. This lack of alignment in objectives can lead to inconsistencies in the assessment of impact. Consider a new pharmaceutical therapy that reduces the need for surgery and hence general anaesthetics (GAs) for a cohort of patients. Conventional HTA would include the health impact of a reduction in adverse events from GA and the financial savings from reduced admissions. Should the GHG impact of less GAs for this cohort be included in the HTA as an impact of change in practice and given an economic value? Probably not. Whole sector reductions in GHG emissions have value. If the newly available theatre time is used for additional patients, there will be no impact on the sector's GHG emissions, even if there are reductions attributable to a patient cohort.

Second, the differential regulatory requirements for new technologies in the GHG emissions reduction and health sectors can lead to asymmetry in evidence of the GHG compared to health impacts of medical technologies. In the case of asthma medications, the GHG-related evidence is readily available; the CO_2-e can be calculated for each type of inhaler by applying validated formulas to ingredients that are associated with GHG [10]. The current uncertainty appears to be in demonstrating comparative health outcomes of different inhalers in a post-market context [11]. It is unclear who should conduct and fund the trials to test equi-effectiveness of different inhalers. In contrast, consider a new and costly piece of anaesthetic equipment that is claimed to reduce the GHG emissions resulting from GAs by 10%. The existing health regulatory structures might require that the comparative safety and effectiveness of the medical equipment is demonstrated; however, there may be no requirement for the manufacturer to provide robust evidence supporting its GHG impact claim. If there is evidence, it might not be generalisable to a "real-life" setting.

And lastly, local, national and international GHG emission-reduction schemes already provide price signals and financial and regulatory incentives for manufacturers and purchasers, for example, directly through carbon prices for Scope 1 emissions or indirectly through electricity generation markets [4–6]. Introducing an additional payment to a manufacturer for the net reduction in GHG emission possible with a new health technology could lead to unintended interactions with GHG emission-reduction schemes. The manufacturer of the product with the comparatively larger GHG impact could have purchased carbon offsets for that product, in which case it could argue that the net GHG impact of that product should not be considered as part of the HTA as it is already included in the cost of manufacturing. The manufacturer of the product with the lower GHG impact may have already accessed payments under carbon markets, and emission-reduction incentive schemes have mechanisms that are intended to minimise the risk of double counting.

If routine integration to GHG assessment methods into HEE/HTA is likely to introduce additional costs and complexity, is a selective approach a useful compromise? For example, what if the GHG impacts were only included if they could potentially change the relevant decision?

3 Unintended Consequences of "Selective" Inclusion of GHG Emission Impacts

An assessment of alternative asthma inhalers that includes the net impact of GHG emissions is an example of an HEE/HTA of "selective" inclusion of a health technology impact, guided by a characteristic of the technology rather than established protocols; GHG emission impacts are not typically included in HEE/HTA. In this case, the assessments have been made in a post-market context where strong evidence of the differential GHG impacts of two options already in use may be the motivation. However, as noted above, there appear to be gaps in the evidence of comparative health effects of the two modes of delivery. In this case, selective inclusion on the basis of strong evidence of differential GHG impacts appears not to have overcome the practical difficulty of achieving a level of information symmetry between the health and GHG impacts that decision makers would require.

It is possible that if this selective approach is applied at the point of the initial HTA that the information asymmetry issues of post-market assessments might not apply. However, within the strategic context of HTA to inform reimbursement decisions, there is a risk that selective inclusion will create an opportunity for gaming and reduce the quality of decisions and possibly have no net impact on GHG emissions

over time. A manufacturer could choose to make strategic claims around the impact of GHG emissions, for example, only when this claim supports the reimbursement of that new technology at a higher price. This strategic behaviour will result in at least two negative consequences. The first is that distortions will eventually emerge if GHG emissions are quantified and assessed only if there are potential reductions and when their inclusion might increase the potential price of a health technology (and exclusion when they will increase emissions). The second is that the price of that technology could be higher than would otherwise be the case (no GHG emissions impact) and if the opportunity cost within health of this extra expenditure is not appropriately accommodated, there will be a deadweight loss in each decision [12]. Pharmaceutical and medical device companies could argue that a "paying-for-value" approach would justify this higher price. (Note the contrast between the claim that a lower GHG impact justifies a higher price for a new health technology because it is of higher value, and the research and development of the renewable technology sector, which often aims to reduce the costs of panels and batteries at the same time as increasing their effectiveness in reducing GHG emissions.)

4 Optimising the Contribution of Health Economics

If the objective of health economists is to make HEE/HTA more comprehensive in the scope of impacts that it assesses, then inclusion of GHG emissions and broader environmental impacts is the most appropriate course of action. Some of the complexities of this task are outlined above; integration could have a substantial impact on the costs and complexity of HEE and HTA and may not improve the quality of decisions.

However, if the objective of health economists is to contribute to GHG emission-reduction targets, their optimal contribution is most likely to be to work more closely with the GHG accountants and climate change economists. One opportunity is to estimate the impact on patient health outcomes of strategies to reduce overall activity, services and wastage in the health sector [1]. Another is to develop strategies and incentives that will reduce the footprint of the pharmaceutical and biomedical sectors [13].

The decisions that our HEE/HTAs inform over the next 10 years will influence the rate at which 2030 targets for reductions in GHG emissions will be achieved. The expansion of the health sector, its reliance on non-renewable energy and generation of waste will have an even greater influence on this rate. The unique skills of health economists might be best used in identifying opportunities to reduce overall emissions of the sector and overall costs, without impacting on the populations' health.

Compliance with Ethical standards

Funding No sources of funding were used to prepare this article.

Conflict of interest Brita Pekarsky was a member of the economic subcommittee for the Pharmaceutical Benefits Advisory Committee in Australia and the Principal Climate Change Economist in the Department for Environment, Water and Natural Resources, South Australian Government.

References

1. Health Care Without Harm with Arup. Health care's climate footprint: how the health sector contributes to the global climate crisis and opportunities for action. Climate-smart health care series Green Paper Number One; 2019 https://noharm-global.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_092319.pdf. Accessed 15 Jan 2020.
2. MacNeill AJ, Lillywhite R, Brown CJ. The impact of surgery on global climate: a carbon footprinting study of operating theatres in three health systems. Lancet Planet Health. 2017;1(9):e381. https://doi.org/10.1016/S2542-5196(17)30162-6.
3. Intergovernmental Panel on Climate Change, 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Institute for Global Environmental Strategies; 2006.
4. EU Emissions Trading Scheme; Policy; https://ec.europa.eu/clima/policies/ets_en#tab-0-0.
5. Zhou K, Li Y. Carbon finance and carbon market in China: progress and challenges. J Clean Prod. 2019;214:536–49.
6. https://www.cleanenergyregulator.gov.au/Infohub/Markets/Pages/About-Carbon-Markets.aspx.
7. Schneider L, La Hoz Tjeuer S. Environmental integrity of international carbon market mechanisms under the Paris Agreement. Clim Policy. 2019;3:386–400. https://doi.org/10.1080/14693062.2018.1521332.
8. Valuation of Energy Use And Greenhouse Gas: Supplementary guidance to the HM Treasury Green Book on Appraisal and Evaluation in Central Government; Department for Business, Energy and Industrial Strategy; UK; 2019; https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal. Accessed 02 Mar 2020.
9. Greenhouse Gas Protocol. A corporate accounting and reporting Standard. Revised edition. https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf. Accessed 15 Jan 2020.
10. Janson C, Henderson R, Löfdahl M, et al. Carbon footprint impact of the choice of inhalers for asthma and COPD. Thorax. 2020;75:82–4.
11. Levy M. Inhaler devices and global warming: flawed arguments; BMJ open; 7 November 2019. https://bmjopen.bmj.com/content/inhaler-devices-and-global-warming-flawed-arguments.
12. Pekarsky BAK. The new drug reimbursement game: a regulator's guide to playing and winning. Berlin: Springer; 2015.
13. Belkhir L, Elmeligi A. Carbon footprint of the global pharmaceutical industry and relative impact of its major players. J Clean Prod. 2019;214:185–94.