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Why doesn't environmental impact play a bigger role in health economic evaluation and health technology assessment – a systematic literature review

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Introduction

In 2010, NHS accounted for ~4% of total national emissions, with pharmaceuticals as the major contributor. The US healthcare system accounts for a significant fraction of the national air pollution emissions, paradoxically accounting for 405,000-470,000 DALYs in 2013.

Pharmaceutical production and usage in sites with poor wastewater management have resulted in ecological and human health risks due to high concentrations of active pharmaceutical ingredients within 26% of studied rivers.

Objective

This systematic review aims at clarifying how health economic evaluation (HEE) and health technology assessment (HTA) can be utilized to mitigate the environmental impact (EI) of health care.

Methods

A systematic literature review was conducted within PubMed, Google Scholar, and the International HTA Database on 16th June 2022 to identify papers assessing or discussing EI along with HEE or HTA.

The review followed PRISMA 2020.

Data extraction included:

1. Which environmental impact category was assessed in accordance with the EN15804 (A1+A2) standard for life cycle assessment (LCA)
2. Study type
3. Suggested implementation of EI into HEE or HTA.

Results

289 records were screened. Nine articles were included.

Six articles assessed the environmental impact of interventions, of these three assessed the CO2 equivalent, two assessed the eco-toxicity of freshwater and one conducted a full LCA.

Three papers presented perspectives to consider regarding the implementation of environmental impact into HEE and HTA.

Future perspectives

Even-though the EI of health care is significant, only 9 identified papers addressed EI together with HEE or HTA. To integrate EI into HTA, method development is needed. Methods could include implementation of EI as an independent category in HTA; or potentially an updated HEE method, including EI health effects, adoption of a uniform EI measure, cross-sectoral approach with EI as separate sector or adding an environmental cost indicator.

To reach this goal and investigate the feasibility, further evidence generation on trade-off and WTP is needed along with more EI+HEE feasibility studies.

Studies assessing Environmental impact and Health economic evaluation

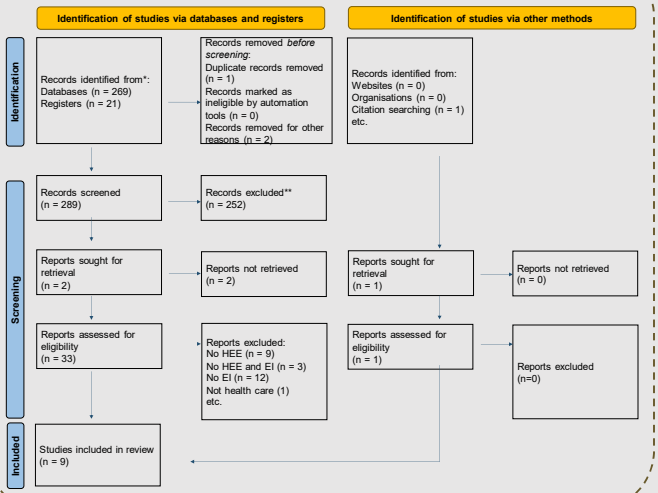
Study	Type	Intervention	Comparator	Environmental Impact Category	Entire life-cycle
CADTH, 2019	HTA	Community Water Fluoridation	N/A	Eco-toxicity	No
CADTH, 2018	HTA	Composite resin	Amalgam	Eco-toxicity	No
Starup-Hansen et al., 2020	Review	DPI	pMDIS	Climate change	Yes
Marsh et al., 2016b	CUA	Insulin-OAD regimen	OAD-regimen	Climate change	Yes
Venkatesh et al., 2016	Review	Phacoemulsification	Manual small-incision cataract surgery and Femtosecond laser assisted cataract surgery	Climate change	Yes
Jensen et al., 2015	CEA	New Nordic Diet	Current standard	EN15804 (A1+A2) compliant*	Yes

*Climate change, Ozone depletion, Acidification, Eutrophication – freshwater, Eutrophication – marine, Eutrophication – terrestrial, Depletion of abiotic resources – minerals and metals, Depletion of abiotic resources – fossil fuels, Human toxicity – cancer, non-cancer, Eco-toxicity – freshwater, Water use, Land use, Ionising radiation human health , Particulate matter emissions

Papers discussing implementation of EI in HEE and HTA

Study	Type	Expert Opinion on implementing Environmental impact into Health Economic Evaluation or Health Technology Assessment
Polisena et al., 2019	Review	Finds that EI needs more transparency, enable repeatability, and integrate components or evidence into a single outcome to include into HTA.
Marsh et al., 2016 a	Concep-tual framework	**Potential Measure the environmental impact via:** a. LCA b. Environmentally extended input-output analysis c. Process analysis of environmental impact across the life cycle. **Suggested evaluation methodologies:** a. Enriched CUA b. CBA c. MCDA **Future research:** a. Trade-off of decision makers and consumers to achieve improvements in environmental outcomes. b. Pilot to determine the feasibility of estimating health care interventions environmental impact and subsequent health effects and other effects related to the environmental impact. c. Estimate value of data on environmental outcomes to health care decision makers, impact of data on decisions and modelling and reporting preferences.
Pekarsky, 2020	Editorial	**Practical barriers to implement GHG in HEE/HTA:** a. Lack of alignment in objectives between GHG accounting objectives and HEE objectives can lead to inconsistencies in the assessment of impact. b. Regulatory requirements for GHG emission of new health technologies can lead to asymmetry in evidence between GHG reduction and health outcome. c. Additional pay to manufacturers of health technologies with reduced GHG emissions could lead to unintended interactions with already instated GHG emission-reduction schemes. **Optimizing the contribution of health economics by working closely with resource and environmental economists to:** a. Estimate the health economic outcome of activity and wastage reducing strategies. b. Develop strategies and incentives to reduce the environmental footprint of the pharma and medical device sector.

Prisma



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