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Commentary

Incorporating Measures of Sustainability Into Guideline Development

Introduction

Choosing the "best" intervention in health care is critical, and guidelines are key to this process. Guideline development is a well-understood process[1,2] which prioritises the efficacy of interventions. Other measures such as patient preference and cost-effectiveness can also be factored into the final recommendation.

Environmental sustainability is not routinely considered when developing clinical guidelines. The most recent Intergovernmental Plan on Climate Change (IPCC) report highlights the challenging path ahead for planetary health,[3] and health care systems are a major contributor to the global environmental footprint.[4]

With growing evidence of the potential harm of health care systems and processes, it is time to advocate for incorporating environmental impact assessments into evidence-based guidelines. In the business world, sustainable business strategy considers the triple bottom line, often referred to as "people, profit, and planet."[6] In the health care world, this term also can be applied; decisions we make for patients should be clinically effective, cost-effective for health care systems, and environmentally effective for the well-being of the planet and global population.

There is an acceptance and understanding that sustainability impacts should be incorporated into guidelines[5,6]; however, there is no description or methodology for their incorporation into guideline development. Where sustainability impacts have been considered, this has been post hoc.[7]

In this paper, we will highlight the importance and potential impact of incorporating sustainability impacts at the start of the guideline development process. We will describe the different methods of measuring sustainability and outline how these could be incorporated into guidelines. To illustrate this process, we will use the NICE guidance on use of hand rubs and liquid soaps[8] and consider how these recommendations might have changed if sustainability impact data of the different types of hand hygiene had been considered (as reported by Duane et al[9]). Currently, the NICE recommendation is as follows:

"Decontaminate hands preferably with a handrub (conforming to current British standards), except in the following circumstances, when liquid soap and water must be used."

Incorporating sustainability into guideline development

The methodology of guideline development is well understood and codified, with the GRADE Evidence to Decision (EtD) framework probably the most widely used.[10] Incorporation of additional considerations into the guideline development process is allowed for, and economic considerations are commonly used and applied when producing guidelines.[11]

The environmental impact of an intervention could be presented to guideline developers in the same way and at the same time as economic data, that is, before recommendations have been made. We propose a 3-stage process. The first stage is selection of an appropriate and relevant sustainability measurement. The second stage is production of system boundaries of the intervention or care pathway being assessed. Third is selection of outcomes and presenting these to the guideline committee in an understandable way. These stages are explored further below.

Choosing measures of environmental sustainability

Life cycle analysis (LCA) is a commonly used measure in health care to quantify total environmental sustainability impacts. It measures the impact of a product or system from the first step in creating a product to its final destruction. LCA allows the environmental impact across a range of measures to be assessed, including not just carbon emissions but also impacts as diverse as water quality, ozone layer depletion, or ecosystem quality. LCAs normally report on 16 impact factors covering climate change, human health, ecosystem health, and resource use.[12]

An alternative to the LCA methodology is carbon footprinting. This is a more simplistic and quicker way of understanding the climate change impact of a product by using carbon footprinting methodology. There are 3 main carbon footprinting methods: the process model, the input-output model, and a hybrid model using both methods.

Choosing between LCA and a carbon footprinting methodology should be decided early on in the guideline development process, as it will determine the outcomes that will be presented to the guideline development committee. Organisations or governments often use specific impacts to set targets; within the NHS the national target is to deliver "net zero" (ie carbon) health care.[12] Therefore, in these circumstances it might make sense to use a carbon footprinting approach so that the outcomes match organisational objectives. However, just using carbon carries the risk of oversimplifying the environmental impact; LCAs allow a much wider range of environmental impacts to be considered, and therefore we believe these should be the standard.

Several issues will influence the quality of an environmental impact assessment. The first is the quality of the available

data. At present, manufacturers of health care technologies or products do not routinely provide information on all their products. Therefore, to calculate an environmental impact of a product, researchers have to make assumptions around the inputs into the system boundaries which might affect the accuracy of the final assessment. Ideally, manufacturers should be encouraged (or better yet, compelled) to provide detailed life cycle data. In the absence of this information, the assumptions made to calculate any environmental impact must be made clear.

The second related factor is the skill of researchers employed. The guideline development process is usually supported by a technical team who will carry out and deliver the evidence search and economic assessment. This team should ideally also include someone who is able to carry out the LCA or carbon footprinting as required and then present those data in a clear and understandable way to support the guideline development committee.

The third is the use of recognised environmental impact-reporting tools. Standards exist, and the EU Product Environmental Footprint category rules guidance[13] sets out standards for the methodology and reporting of an LCA. These should be followed where possible.

Defining system boundaries

System boundaries should be identical for any interventions assessed and should compare the same functional unit (eg, the quantified production/performance of a product or system; Figure 1). These boundaries must be clear to the guideline committee and ideally should be specified at an early stage of the guideline development process. In the example we are using here, the system boundary analysis makes it clear that alcohol-based hand rubs are not just a single group of products. Some are made from ethanol and others from isopropanol. This has significant implications when considering the environmental impacts of this intervention.

Selection and presentation of outcomes

Once the sustainability assessment is complete, these data need to be presented to the committee in a way that will help them come to a decision. Potential outcomes that can be presented will depend on whether an LCA or carbon footprinting approach has been used.

Carbon

Carbon footprinting can be expressed in equivalent kilograms of carbon. This is the approach taken by NICE in their proof-of-concept guideline on medicines optimisation and is straightforward for people to understand. Focussing on key sustainability impacts like carbon allows organisational targets to be directly addressed and is potentially easier to understand. However, it runs the risk of oversimplifying the environmental impacts of a health intervention, which is why an LCA might be preferred.

LCA

LCA results can be presented per intervention for each impact; however, this can produce large amounts of data, which can be difficult to interpret without expert support.

One method of presenting LCA data to support understanding is by normalising the results. Normalised results provide an impact of a product proportional to that which an average person would be expected to contribute from their daily lives in 1 year and allows all the impacts for each intervention to be viewed in a single figure, which can aid understanding of which impact categories are the most important.

Alternatively, LCA data can be expressed in terms of the cost to global human health. This can be expressed in disability-adjusted life years (DALYs) or quality-adjusted life years.

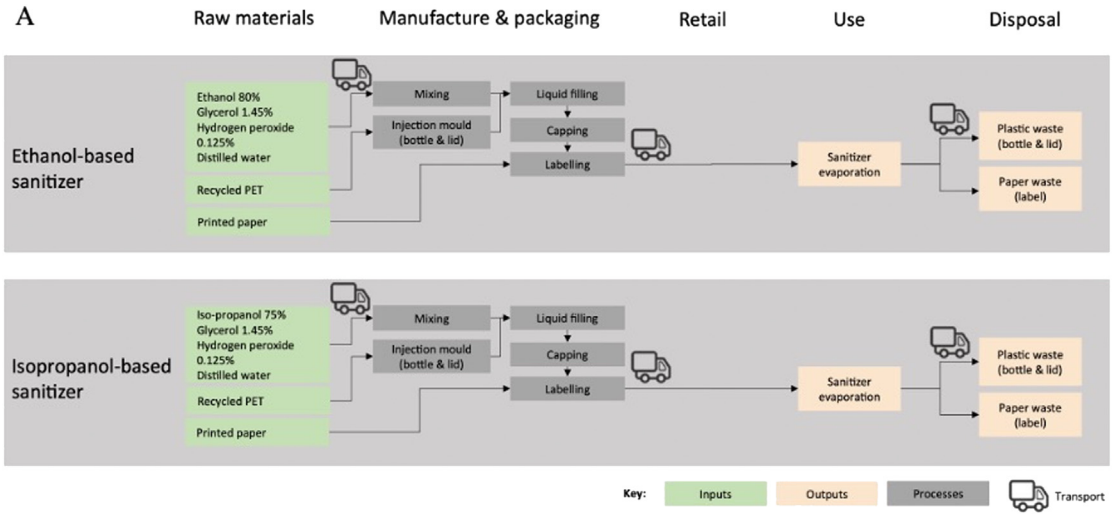

Fig. 1 – Example system boundaries for a life cycle analysis (LCA) comparing hand hygiene with hand sanitiser. Reproduced from Duane et al 2021.[9] Licensed under Creative Commons Attribution 4.0 International License https://creativecommons.org/licenses/by/4.0/. No changes were made.

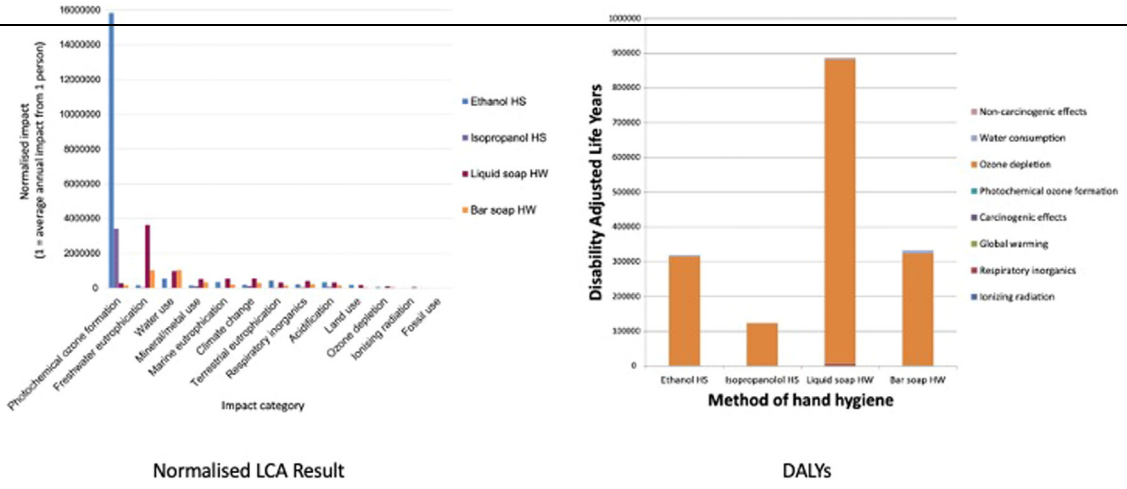

Fig. 2 – Normalised life cycle analysis (LCA) results comparing hand hygiene with hand sanitiser and DALY contributions comparing hand hygiene with hand sanitiser. Reproduced from Duane et al 2021.[9] Licensed under Creative Commons Attribution 4.0 International License https://creativecommons.org/licenses/by/4.0/. No changes were made.

These are the present discounted value of future years of healthy life lost due to both morbidity and disability within future years of life lost to premature mortality.[14] DALYs can be calculated from an LCA, using the human health–related impact categories (climate change, ionising radiation, non-carcinogenic effects, carcinogenic effects, ozone layer depletion, water scarcity, respiratory inorganics, photochemical ozone formation). They can be expressed either per environmental impact factor or as a total score by adding up the values for each factor. There are 2 drawbacks to using DALYs. First, they rely on assumptions including age-weighting, time discounting, and sex differentiation, which are continuingly being revised. Second, there are potential errors associated with our knowledge of how environmental impacts affect health.

Examples of normalised LCA results and DALYs are presented side-by-side in Figure 2 for ethanol-based sanitisers vs isopropanol sanitisers. From the normalised LCA data, we can see that ethanol was responsible for much higher levels of photochemical ozone formation than normalised isopropanol sanitiser; that is, ethanol sanitiser had a greater negative impact on the environment. Using DALY data, it is clear that the adverse impact on human health of ethanol-based sanitisers is greater than for isopropanol-based sanitisers.

Hand hygiene guidance: potential impact of incorporating sustainability measures from the start

What are the implications of incorporating measures of environmental impact on guideline recommendations? At present, clinical and economic data are usually presented to the guideline committee in the form of evidence statements. These summarise the clinical and economic evidence in a format that the committee can easily digest. We can explore the potential impact of this using the NICE guidance on use of hand rubs and liquid soaps[8] by considering how these recommendations might have changed if sustainability impact data of the different types of hand hygiene had been considered (as reported by Duane et al[9]).

If sustainability impacts had been considered at the start of this guideline development, then the system boundary analysis would have shown that there were 2 important subcategories: ethanol-based sanitisers and isopropanol-based sanitisers. Currently, the NICE guidance only presents data for all sanitisers,[17] and conflating these 2 types hides the significant difference in environmental impact between them.

The next step would have been to choose sustainability measures and then present these to the guideline committee alongside the clinical and economic summaries for the 2 subtypes of sanitiser and soap. LCA and DALY data from the Duane et al LCA analysis[9] (Figure 2) clearly shows that isopropanol sanitisers have less impact on the environment than do ethanol sanitisers.

Considering this additional information, the guideline committee may well have come to a different recommendation. Instead of recommending "Decontaminate hands preferably with a handrub," the guideline would have said "Decontaminate hands preferably with an **isopropanol handrub**." It is difficult to calculate the potential impact of this change, however given the widespread use of sanitisers across health care settings in England and elsewhere, it is likely that it would have been significant. It is only possible to develop this sustainability-influenced guideline if sustainability is considered at the start, not at the end.

Summary

Planetary health is in crisis, and health care is a significant contributor to the issue. Health care decisions must consider sustainability alongside efficacy and economic cost if environmental targets are to be met. The importance of available environmental impact data should be considered and developed at an early stage in the guideline development process.

Environmental impact outcomes and system boundaries need to be defined to ensure that they meet the needs of the population and the relevant commissioning body.

Conflict of interest

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