LIFE CYCLE ASSESSMENT COMPARING REUSABLE AND SINGLE-USE SPECULA IN A BELGIAN HOSPITAL

Background

The ongoing climate change poses an increasing threat to public health [1,2]. Whereas healthcare aims to heal and care for ill people, the healthcare sector is also responsible for about 6% of global greenhouse gas (GHG) emissions, hereby contributing substantially to climate change. Reasons such as cost, patient safety, etc. created an unlimited shift from reusable to single-use materials leading to more medical waste. It remains questionable whether this shift is justified taking environmental implications into account. The xx Hospital wanted to investigate the praxis of using throwaway medical material, using validated methods to one representative well-chosen medical device, the vaginal speculum. The study was financed by the Federal Public Service for Health, Food Chain Safety and Environment, the Directorate-General for the Environment.

Aim(s)

Evaluate the environmental impact of the use of reusable (RU) compared to three types of single-use (SU) vaginal specula using a cradle-to-grave life cycle analysis (LCA).

Methods

The functional unit was one pelvic examination by either a sterile stainless steel RU, or a SU speculum of three different types: one containing fossil plastics, one containing biobased plastic, and one consisting of two types of fossil plastics and sterilised with ethylene oxide. For the RU speculum, life cycle inventory data were collected from the xx Hospital, its sterilisation department, and its suppliers. Concerning the SU specula, data were collected from the suppliers. The ReCiPe 2016 v1.1 (H) method was used for the environmental impact assessment, and both midpoint results (e.g., global warming, water consumption, etc.) and endpoints results (e.g., damage to human health) were calculated.

Results

The most favourable option from global warming perspective, is the use of a reusable speculum producing 78% less GHG emissions than a SU speculum from fossil plastic, 65% less emissions than a SU biobased plastic speculum, and 74% less emissions than an ethylene oxide sterilised SU speculum. For the RU specula the packaging proved to have the greatest impact (76%), for the SU specula raw materials and manufacturing had the greatest impact on GHG emissions (between 57-72%). SU biobased plastic speculum had the least favourable outcome on two of the three endpoints.

Discussion

Our results demonstrated that a RU speculum is far better than SU types. Even for the RU type, further improvements are possible. Packaging accounted for most of the ecological footprint of RU specula, hereby questioning the necessity of double sterile packaging of RU specula [3]. SU specula made from biobased plastics have a smaller carbon footprint compared to SU made from fossil based plastic. At first glance, this could be the preferred option for SU specula and intuitively be considered as better for the environment, but our LCA has proven the opposite. The study demonstrated that a detailed and meticulously executed analysis leads to trustworthy results allowing decisions on the choice between SU or RU medical devices.

Implications and future perspectives

The following implications for practice emerged from the study: 1) packaging materials should be avoided or minimised whenever possible, as f.e. sterilisation bags have a large impact, 2) cautious use of bioplastics, 3) advise of an expert on sustainability, such as a sustainability coordinators, can help to make evidence based purchasing decisions 4) nurses need to be aware of the importance of sustainable choices. Further research on other frequently used medical items is needed to enable evidence based procurement decisions.

References

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