

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

A life cycle and economic assessment

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BACKGROUND

- Ongoing climate change poses an increasing threat to public health [1,2]
- Healthcare sector is responsible for 6% of global greenhouse gas emissions [2]
- Use of single-use items, such as a vaginal specula, is still increasing [3]
- Single-use items can cause additional health damage due to the human toxicological impact of all stages of their product's life cycle

AIMS

Evaluate the potential environmental and financial impact of the use of reusable versus single-use vaginal specula

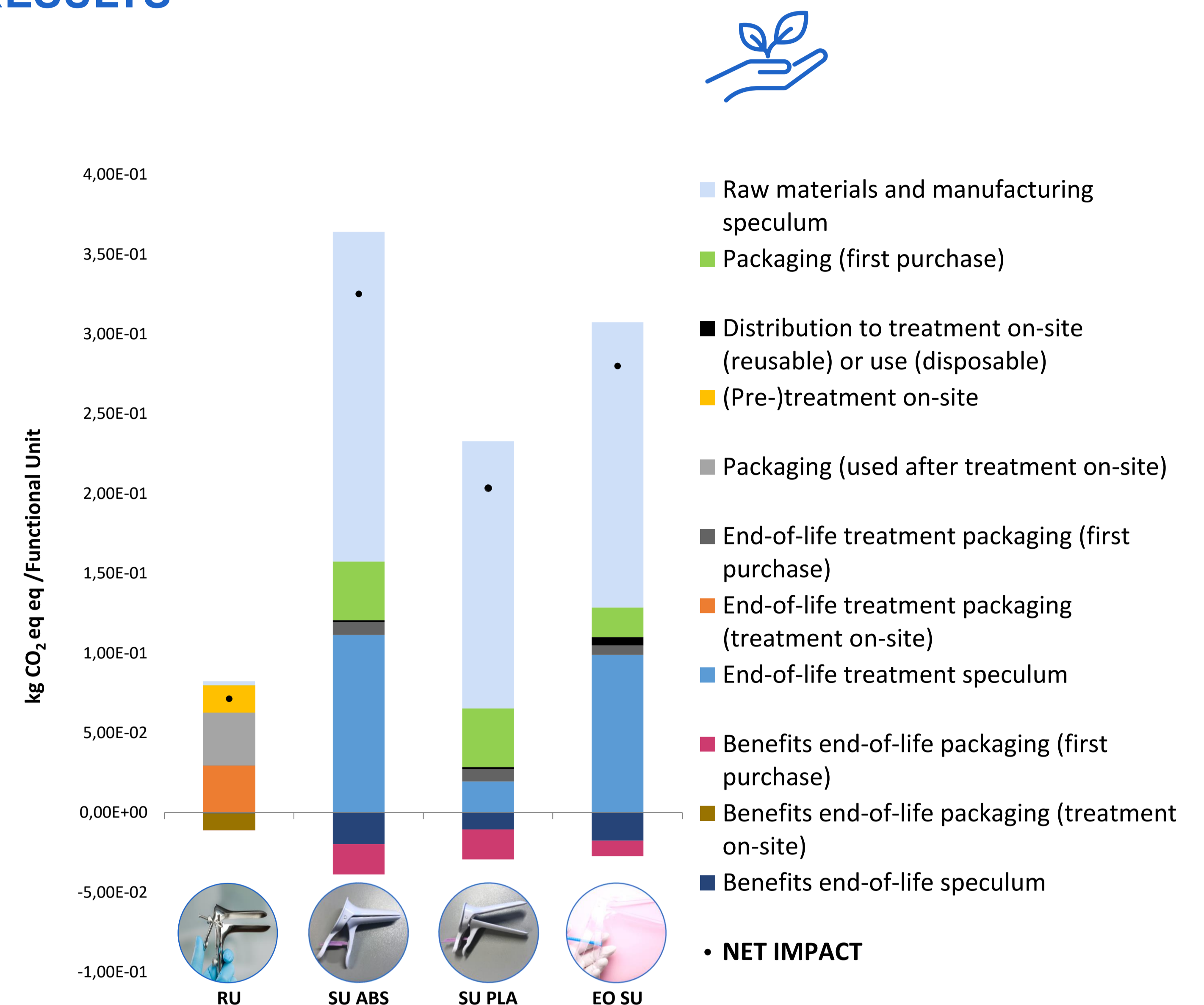
MATERIALS & METHODS

The functional unit was one pelvic examination by either

- RU: sterile stainless steel reusable
- SU ABS: single-use speculum containing fossil plastics acrylonitrile butadiene styrene
- SU PLA: single-use speculum containing biobased plastic of polylactic acid
- EO SU: single-use speculum consisting of polystyrene blades and polyethylene bolt and sterilised with ethylene oxide

- LCA 18 midpoint & 3 endpoint impact indicators
- ISO 14040/14044 guidelines & modelled by SimaPro 9.4.0.2
- Hospital perspective
- Purchase cost & charged rate of central sterilisation

RESULTS



Life cycle greenhouse gas emissions (kgCO₂ eq) of one pelvic examination

Endpoint impact indicators	RU	SU ABS	SU PLA	EO SU
Human Health (DALY's)	1.65E-07	4.76E-07	5.16E-07	4.53E-07
Ecosystem Quality (species.yr)	4.09E-10	1.14E-09	1.351E-09	1.05E-09
Resource Scarcity (USD2013)	7.90E-03	3.37E-02	1.65E-02	2.71E-02

Figures are expressed according to LCA-standards; E-01= x 0.1; E-02= x 0.01; E-03= x 0.001; E-04= x 0.0001; ...; E+01= x10; E+02= x 100; E+03= x 1000; E+04= x 10 000; ...

Overview of endpoint estimates for reusable and single-use specula

Indicator	RU	SU
Total cost of RU specula	€ 0.91 – € 1.16 / use	€ 0.75 – € 1.34/ use

Overview of total cost estimates for reusable and single-use specula

CONCLUSIONS

- RU specula produced the **least GHG emissions**, with packaging as major contributor to the environmental impact
- Use of **renewable energy** sources and **waste steam** was jointly responsible for the limited impact of sterilisation process
- **Biobased plastics** are often presented as more environmentally friendly, but this may **not be the case**
- **Total cost of RU & SU was comparable**



ACKNOWLEDGMENTS

This study was commissioned by the Federal Public Service for Health, Food Chain Safety and Environment, the Directorate-General for the Environment.

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