

Title

Reduction of medicine waste in the operating room; development of practical guidelines to improve sustainability and minimize environmental impact of pharmaceuticals.

Problem statement

A lot of attention is given to waste reduction/recycling of disposables, and the use of volatile anesthetics, but much less is known about the effects of medicinal waste. It is estimated however, that 18% of the healthcare CO₂ footprint results from the use of medicines. The LUMC therefore aims to minimize the amount of medicines in hospital waste and wastewater. However, we still need to bridge the gap between what was agreed in the “Nationale Ketenaanpak Medicijnresten” (Dutch national program to tackle drug residues) and daily practice, by developing practical guidelines that can be implemented, not only in the LUMC, but in other hospitals as well.

Research question(s)

The research questions are divided into two parts:

- 1) Investigate daily practice with regard to medicine waste in the operating room (OR); which route(s) of waste exist? What are the effects of this waste on overall pollution by the OR?
 - a. Quantify medicine spillage in the LUMC OR
 - b. Quantify medicine spillage in other hospitals' ORs
 - c. Investigate differences
 - d. What is the impact of ready-to-use syringes (prepared in the hospital pharmacy) on medicine waste, can we improve this process?
- 2) Investigate which pharmaceutical drugs are most ecotoxic, and are preferably avoided in the OR.
 - a. Quantify the amount of these drugs based on LUMC pharmacy stock data and using ecotoxicity benchmarks
 - b. Propose alternative medication schedule(s) or waste management to minimize ecotoxicity



Expected type of work

This research subject includes: observations in the OR, interviews with personnel, calculation of environmental footprints (CO₂ and ecotoxicity) and interpretation of research reports/guidelines.

Remarks

This research project is carried out in collaboration with the Dutch network 'de Groene OK' and the RIVM. Some basic knowledge about the use of pharmaceutical drugs is preferable.

References

- <https://degroeneok.nl/themas/anesthesiedampen-medicijnresten/>
- Avian scavengers and the threat from veterinary pharmaceuticals, Cuthbert et al <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4213586/>
- Carbon footprint impact of the choice of inhalers for asthma and COPD, Janson et al <https://thorax.bmj.com/content/75/1/82.long>
- [Ketenaanpak medicijnresten uit water | Beleidsnota | Rijksoverheid.nl](#)
- Rapport RIVM 'Geneesmiddelen en waterkwaliteit' <https://open.overheid.nl/repository/ronl-18d39eab-6a70-48f3-a2d2-e6683243ac38/1/pdf/rivm-rapport-geneesmiddelen-en-waterkwaliteit.pdf>

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