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LIFE CYCLE ASSESSMENT OF SURGICAL GOWNS: REUSABLE AND DISPOSABLE

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Surgical gowns serve a critical role in the healthcare industry by protecting healthcare workers and patients from the transfer of microorganisms and body fluids. These and other medical textiles are available in reusable and disposable types. This report includes the results of a comparative environmental life cycle study of reusable and disposable surgical gowns.

In this study, surgical gowns were first defined as single-piece, size extra-large (XL) or one-size-fits-most, long-sleeve tie-up garments with ANSI/AAMI level 3 barrier protection rating. The functional unit, or basis of comparison, was 1,000 surgical gown uses in an operating room setting. For the reusable gowns, this was 16.7 new gowns each used for 60 cycles while for the disposable gowns this was 1,000 new gowns. The reusable surgical gown market was compared to the disposable surgical gown market based on a set of representative gowns. The representative reusable gowns weighed 474 g (17 oz.) and were composed primarily of woven polyester fabric in the non-critical zones. The critical zones contained a barrier material sandwiched between two layers of knit polyester fabric. Two barrier materials were considered and weighted based on market use: an expanded polytetrafluoroethylene (ePTFE) barrier and a breathable polyurethane (PU) barrier membrane. The impact of the barrier material used was small, because the barrier materials made up only 5% by weight of the gowns. The representative disposable gowns weighed 224 g (7.9 oz.) and were composed primarily of nonwoven polyester in the non-critical zones and laminated with polypropylene film in the critical zones.

The reusable and disposable gown systems were compared on a cradle-to-end-of-life basis. The starting point for analysis was natural resources in the earth, such as fossil materials and ores. The entire supply systems required to manufacture surgical gowns and packaging were included. The use phase included laundry and wastewater treatment for reusable gowns and sterilization for all gowns. The end-of-life phases included landfill for both reusable and disposable gowns. Recovery of lost instruments was also included for disposable gowns, as instruments are often sent to the landfill with disposable textiles such as drapes, towels, and gowns. A second end-of-life scenario was considered for reusable gowns in which the gowns were reused in other industries. Transportation was included within each of the applicable stages of the life cycle.

Selecting the reusable surgical gown system resulted in significant environmental benefits compared to selecting the disposable system, including a 64% reduction in natural resource energy consumption, 66% reduction in greenhouse gas emissions, 87% reduction in water consumption (blue water), and 84% reduction in solid waste generation at the hospital. Blue water is a measurement of water that is removed from the supply chain and not returned to stream quality via wastewater treatment.

ARTA LCA Committee and Sponsors

The study was organized by ARTA's LCA Committee, which contracted with the independent research firm Environmental Clarity. The research team includes Overcash, Eric Vozzola and Evan Griffing. The LCA Committee members and sponsors include:

- **Myles Noel** of International Healthcare Association for Textile Management (IAHTM)
- **Duane Houvener** of American Dawn
- **Janice Larson** of Encompass
- **Robert Long** of European Textile Services Association (ETSA)
- **Scott Delin** of Fashion Seal
- **Shelley Petrovskis** of Lac Mac Limited
- **Brendan O'Neill** of London Hospital Linen Service and ARTA President
- **Dan Sanchez** of Medline
- **Joe Ricci** of TRSA

ARTA was founded in 1982 with the mission to create greater awareness and appreciation for reusable textiles. Members represent all facets of the textile services industry — from manufacturers, suppliers, and distributors to profit and not-for-profit laundry operators, as well as allied associations. For more information: ***www.ARTA1.com.***

IAHTM was founded as the Association of Cooperative Hospital Laundries (ACHL) in 1969. The goal was to create an open environment where ideas and information could be shared for the mutual benefit of all members. IAHTM members provide service to approximately 7,000 healthcare facilities in the U.S and Canada and process more than 700 million pounds of clean linen each year, making it the largest healthcare central laundry organization in the world. For more information: ***IAHTM.org.***

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