

Sustainable Surgery – Waste Management

Around the world, healthcare services can use a lot of resources. In most developed countries, hospital buildings are the second largest consumers of energy and one of the largest generators of waste. Their impact on the environment is noticeable. In the US, healthcare emits 8% of the US's total greenhouse gases, which cause global climate change and adversely impact human health. A large portion of material and energy use, waste, and costs come from the operating theaters, but at Aravind, the approach to surgery is different.

The goals of cataract surgery in all countries are still the same: to eliminate needless blindness. Aravind, however, has paid special attention to resource efficiency throughout the process, and this model is now part of a study looking at environmental emissions from cataract surgery.

From November 2014 through March 2015, Dr. Cassandra Thiel, a Fulbright-Nehru Scholar, studied the surgical system at Aravind Eye Hospital in Pondicherry. She collected data on the materials used: where they came from, how they were sterilized between cases, and how they were disposed after use. Dr. Thiel also looked at the costs of Aravind's material and energy use. With this data, Dr. Thiel has modeled the environmental emissions of cataract surgery, using a tool called environmental Life Cycle Assessment (LCA).

Because Aravind utilizes more reusable materials than most other healthcare systems, their carbon footprint is much smaller per surgery. A carbon footprint of phacoemulsification in the UK found that material-use there resulted in 63.5kg CO₂-equivalents per surgery (Morris, Wright et al. 2013). At Aravind, materials per surgery result in

just 0.8kg CO₂-equivalents! This is like driving a car a distance of 240km versus 3km!

Dr. Thiel is currently analyzing phacoemulsification with partners in the US, to compare to the Aravind system. Already, we know that Aravind generates far less solid waste. The US averages 2.25kg in the average phacoemulsification, while Aravind generates just 0.25kg! Her team hopes to use this study to make recommendations that will improve efficiency and reduce environmental impact of cataract surgery while maintaining high quality eye care. This study will be presented in video form at the American Society of Cataract and Refractive Surgery's (ASCRS) annual symposium, and has been submitted for presentation at other international ophthalmology meetings.



Figure 1: Waste from Cataract Surgery. A: One day's waste at Aravind Eye Hospital in Pondicherry (93 cases) weighs in at 0.25kg/surgery. B: One surgery's waste at a facility in the US (1 case) weighs in at 2.25kg/surgery.