Implant Waste and Associated Costs in Trauma and Orthopaedic Surgery: A Systematic Review

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Purpose: Trauma and orthopaedic (T&O) surgery relies heavily on single-use medical implants, such as screws, nails, and prostheses. Implants are opened and discarded for a variety of reasons, such as user error or implant defect, which makes it one of the most wasteful surgical specialties. This places an economic and environmental strain on health-care providers. Finding sustainable solutions is vital given globally increasing life expectancies and heavier dependency on invasive interventions for improved quality of life, such as knee or hip arthroplasties. Our primary outcome is to quantify the implant wastage across the literature, and secondarily investigate the associated costs in this specialty. We will also look at contributing factors that can be used to inform future guidelines to reduce waste and encourage sustainable practice.

Methods: Following Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines, we searched 3 databases (Scopus, PubMed, Embase) through MeSh terms, including “implant waste” and “trauma and orthopaedic surgery”. Cohort studies and randomised control studies were included where there was sufficiently reported implant waste in T&O surgical patients.

Results: Our final analysis included 15 articles, screened from a total of 2145 articles. 25,025 procedures were included, but there was sparse available quantitative data in the literature. Implant waste occurred in up to 25.1% of T&O procedures and cost on average $167,139.13 annually. Up to 30% implant waste was seen in trauma surgery, making it the most wasteful subspecialty. Although screws were the most wasted material (up to 91%) compared to nails (48%), intramedullary nails were the most costly material, making up 47.6% of the total wastage cost. Up to 95% of waste was attributable to human error.

Conclusion: Balancing operating room waste and hospital costs with patient safety is challenging for health-care providers. Human factors are the largest waste contributor, which makes it a key target for improvement. This is the first study to quantify implant wastage and costs in T&O surgery. We hope to see more institutions investigating and sharing their operating room wastage so we can identify key contributors and inform future guidelines.