

The Cost Analysis of the Environmental Impacts of Surgical Site Infection from the Perspective of NHS England

Kocaman M¹, Galvain T²

¹Johnson & Johnson Medical SAS, Issy les Moulineaux, France, ²Global Health Economics, Johnson & Johnson Medical Devices, New Brunswick, NJ, USA

Introduction

- Surgical site infection (SSI) remains a common complication of surgical procedures. SSI leads to a significant burden in terms of patient morbidity and healthcare resource use (HRU).¹
- The environmental impact of treating SSI and its associated cost has not been evaluated.

Objective

To analyse the annual environmental impact of SSI and its associated HRU and cost for NHS England.

Methods

- A budget impact model was created from the perspective of NHS England. SSI incidence rates and HRU were sourced from Public Health England and the literature.²⁻⁵
- Environmental sustainability data were obtained from the Sustainable Care Pathways Guidance and cost data from the UK government greenhouse gas (GHG) emissions valuation guidance, a UK water supplier and the NHS waste management report undertaken by the Royal College of Nursing in the UK.⁶⁻⁹
- Outcomes assessed were total costs, GHG emissions, direct water use and waste generation due to additional hospital stay, outpatient appointments and A&E visits. Deterministic and probabilistic sensitivity analyses (DSA and PSA) were conducted.

Results

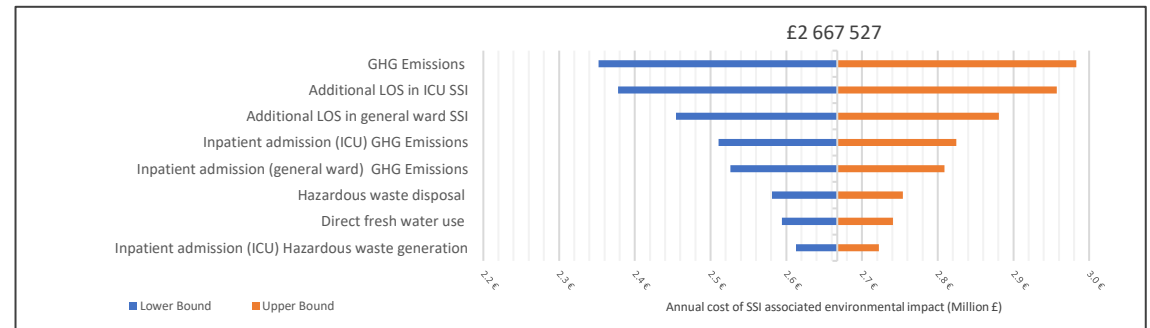
- Patients with SSI were associated with longer length of stay (LOS; +10 days), 4.1 more outpatient appointments and 22% more A&E visits compared to patients without SSI.
- The environmental impact of an SSI was estimated to incur 0.58 tonnes of CO₂e GHG emissions (equivalent to two return flights from London to Rome¹⁰), 5 m³ direct water use, 0.02 tonnes of hazardous and 0.04 tonnes of non-hazardous waste generation. The total cost of SSI associated environmental impact was estimated to be £67 per SSI (Table 1).
- The annual cost of SSI associated environmental impact was estimated to be £2,667,527. In the DSA, results were most sensitive to GHG cost per unit and LOS associated with SSI (Figure 1). According to the PSA, the mean (95% CrI) annual cost of SSI associated environmental impact was £2,670,487 (£2,151,365 -£3,193,724).

Results contd.

Table 1: The cost analysis of environmental impact of SSI

Environmental Metrics	per SSI	Cost per unit	Total Cost
GHG Emissions (tCO ₂ e)	0.58	£ 70.00	£ 40.50
Direct fresh water use (m ³)	5	£ 1.97	£ 9.40
Hazardous waste disposal (t)	0.02	£ 475.00	£ 11.08
Non-hazardous waste disposal (t)	0.04	£ 142.00	£ 6.13
Cost of SSI associated environmental impact (per SSI)			£ 67.11

Figure 1: Tornado Diagram - One-Way Sensitivity Analyses



Conclusion

SSI is associated with environmental impact and related costs. SSI prevention could lead to environmental benefits and reduce costs to NHS England.

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