Cost-Effectiveness Analysis: Lymph Node Transfer versus Lymphovenous Bypass for Breast Cancer Related Lymphedema

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Background

- Breast cancer-related lymphedema (BCRL) is a debilitating sequela of breast cancer surgeries with therapies associated with significant economic burden.
- Two major surgical options:
  1. **Lymph node transfer (LNT)**: transferred flap enhances lymphatic pathway recovery and promotes lymphangiogenesis.
  2. **Lymphovenous bypass (LVB)**: lymphatic fluid is redirected into the venous circulation to establish lymphatic drainage.

Objective: To compare the cost-effectiveness of LNT and LVB in the management of BCRL.

Methods

- Rates of surgical site infection (SSI), lymph leak, and failure (inability to cease conservative therapy) as well as costs to manage each of these complications were obtained from literature review.
- Procedural costs were calculated from Medicare reimbursement rates.
- Average utility scores for each health state were obtained via visual analog scale, then converted to quality-adjusted life years (QALYs).
- A decision tree was constructed and incremental cost-effectiveness ratio (ICER) was assessed at $50,000/QALY.
- Deterministic and probabilistic sensitivity analyses were performed to evaluate the robustness of our findings.

Results

- LNT was less costly ($22,464.71 vs $31,916.64) and more effective (31.83 QALY vs 29.24 QALY) than LVB (Figure 1).
- One-way (deterministic) sensitivity analysis demonstrated that LNT became cost-ineffective when its failure rate was >44.9%; LVB became more cost-effective than LNT when its failure rate was <21.4%.
- Probabilistic sensitivity analysis using Monte Carlo simulation demonstrated that even with uncertainty present in the variables analyzed, the majority of simulations (98%) favored LNT as the more cost-effective strategy (Figure 2).

![Figure 1. Decision tree analysis comparing LNT with LVB. The green shaded circle indicates that the LNT arm is the more cost-effective strategy.](image)

![Figure 2. Probabilistic Sensitivity Analysis Monte Carlo Acceptability at WTP $50,000.](image)

Discussion

Limitations:
- Cost-effectiveness analyses rely on utility scores, which in our case were based on responses to surveys given to BCRL experts at our institution and not to patients.
- Rates of complications were obtained from pooled data from a comprehensive literature review which may include heterogeneous populations.
- Costs were from the third-party payer perspective and not a societal perspective.

Conclusion

LNT is a dominant, cost-effective strategy compared to LVB for the treatment of BCRL.