

Estimating the effects of single-patient use electrocardiogram monitoring as a means of infection prevention in saphenous vein grafts through a healthcare model

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Introduction

- Saphenous vein grafts (SVGs) are common during coronary artery bypass graft surgery (CABG).
- Surgical site infections (SSI) are rare but potentially dangerous and costly adverse events following CABG.
- SSI rates during CABG procedures using SVG were assessed for multiple UK healthcare centres and a published health-economic model was used to estimate the associated burden of these events.
- Single-patient use electrocardiogram (spECG) monitoring may contribute to the prevention of cross-contamination and help reduce the risk of an SSI: the cost-saving potential of spECG was also assessed.

Methods

- NHS Digital data for SVGs (K401-K404) taking place between March 2019 to February 2020 were assessed for SSIs (T814/T826/T827/T846) occurring during the index event or in the 90 days post discharge.
- We included 20 centres with >300 procedures.
- Combined outcomes data were used to update a published health-economic model of the CABG care pathway.¹
- Costs of care (Table 1) were sourced from published literature, national reports and manufacturer information.
- SSI burden is reported as additional length of stay (LOS), readmissions, and cost (2019 GBP, £).

Results

- A combined 11,770 SVG procedures were reported across the 20 centres, ranging from 315 to 1,115 procedures (Figure 1).
- SSIs occurred in 716 (6.1%, Figure 2) of procedures, which increased LOS by 17.7 days.
- The 351 (3.0%) SSI-related, post-discharge readmissions had a mean LOS of 11.6 days.
- Based on the inputs above, the estimated cost of care was £8,502 per patient; closely aligned to official reports of £7,830 to £8,784.²
- Introduction of spECG was estimated to reduce the cost of care to £8,372 per patient; a saving of £130 per patient.
- This translates to more than a 10-fold return on investment.
- The main drivers for these savings were fewer SSIs, resulting in reduced LOS and fewer readmissions.
- Individual hospital savings depended on the SSI rate reported.

Discussion

- The data that was used did not differentiate between superficial and deep SSIs despite considerable differences in clinical and financial implications
- Similarly, the high variance in SSI rates between hospitals (3.4 to 10.0%, Figure 2) may be partially explained by inconsistent definitions of what exactly constitutes SSIs.

References

1. Saunders R, Lankiewicz J. The Cost Effectiveness of Single-Patient-Use Electrocardiogram Cable and Lead Systems in Monitoring for Coronary Artery Bypass Graft Surgery. *Front Cardiovasc Med.* 2019 May 10;6:61
2. R040X: SPECIALTY GROUP COSTS - INPATIENTS IN ALL SPECIALTIES (EXC LONG STAY), cardiac surgery data used
3. On record with Cardinal Health

Disclosure

RS is the owner of Coreva Scientific, which received consultancy fees for this work.
EP is an employee of Cardinal Health, which funded this research

Conclusion

The model results estimate that the routine use of spECG may reduce the cost burden of SSIs following CABG using the SVG method

Parameter	Input
ICU cost per day	£2,488 ²
General ward cost per day	£551 ²
Reusable ECG cost per patient	£2.40 ³
spECG cost per patient	£9.50 ³
SSI reduction through spECG, Odds ratio (95% CI)	0.74 (0.62–0.89) ¹

Table 1 Cost of care used in the health-economic model; ICU: Intensive care unit; ECG: Electrocardiogram; SSI: Surgical site infection spECG: Single patient use Electrocardiogram

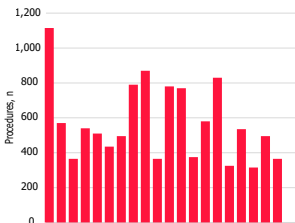


Figure 1 Number of procedures at the 20 included healthcare centres

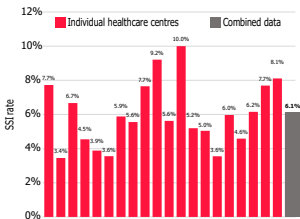


Figure 2 SSI rates of the 20 included healthcare centres and the combined patient population of all centres