

Care burden associated with sternal wound surgical site infections after coronary artery bypass graft

Rhodri Saunders¹, Maximilian Blüher¹ and Julie Lankiewicz²

1. Coreva Scientific, Freiburg, Germany; 2. Cardinal Health Medical Affairs, Mansfield, MA USA

Background

- Surgical site infection following coronary artery bypass graft (CABG) is a costly complication occurring in 1.6-7.4% of CABG patients in the EU¹
- Most concerning are superficial and deep sternal wound infections (SWIs) as they increase patient length of hospital stay and readmissions²

Objective

- Quantify the EU-wide care burden of SWIs following CABG procedures to estimate the economic benefits of further reductions in SWI rates

Methods

- National surveillance data and peer-reviewed European publications were searched for the following parameters:



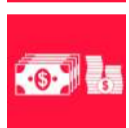
- CABG procedures per year



- SWI rate



- Ratio of superficial to deep SWIs
- Length of hospital stay for CABG patients



- Additional length of stay due to SWIs
- Cost per day of intensive care unit and general ward

- If no data were available for a country, proxy values were used based on known EU data
- A previously presented Markov model was adapted to estimate the yearly burden of SWIs after CABG procedures

Results

- From the EU-28, sufficient data were identified in Austria, Denmark, France, Germany, Italy, Netherlands, Portugal, Spain, Sweden, and United Kingdom (72.8% of the EU28 population)
- Rates of CABG ranged from 17.86 (Spain) to 64.75 (Denmark) per 100,000 population, while 2.4% (Germany) to 10.4% (Netherlands) of CABG patients were affected by SWIs (Fig. 1)
- In these ten countries, SWIs following CABG added
 - €96.92 million per year
 - 15,172 ICU days and 79,522 general ward days
 - 3,392 readmissions
- A 1%-point reduction in the 30-day SWI rate would result in savings of €18.03 million and 24,684 bed days
- SWIs increase the average cost of CABG by €418 (UK) to €1,720 (Netherlands, Fig. 2), which meant a 5.6% (UK) to 20.1% (Portugal, Fig. 3) increase of mean costs per procedure
- Extrapolating from the ten countries to the EU-28 we estimated a SWI burden of €117.87million per year

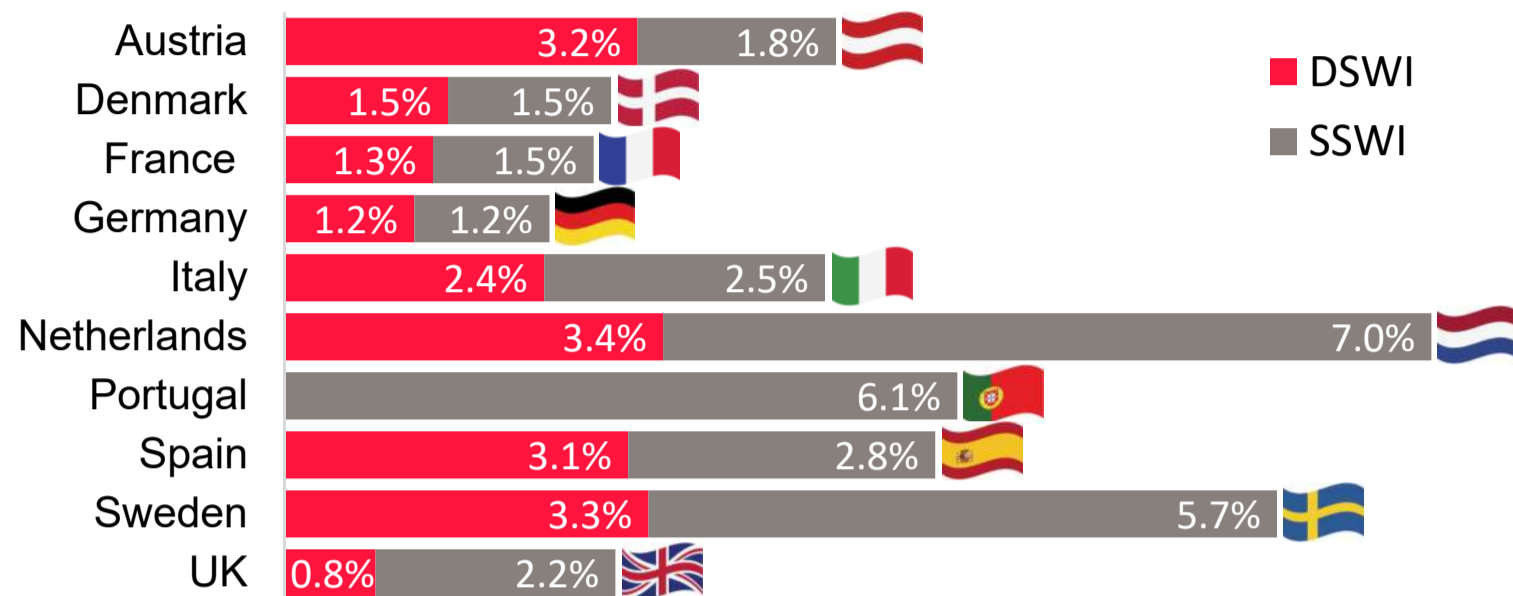


Fig. 1 SWI rates. DSWI: Deep sternal wound infection, SSWI: superficial sternal wound infection. For Portugal no data on DSWI rates was available.

Conclusion

- Superficial and deep SWIs after CABG procedures come at considerable cost to healthcare providers
- An SWI reduction of 1% at 30 days could substantially reduce bed occupancy and save costs

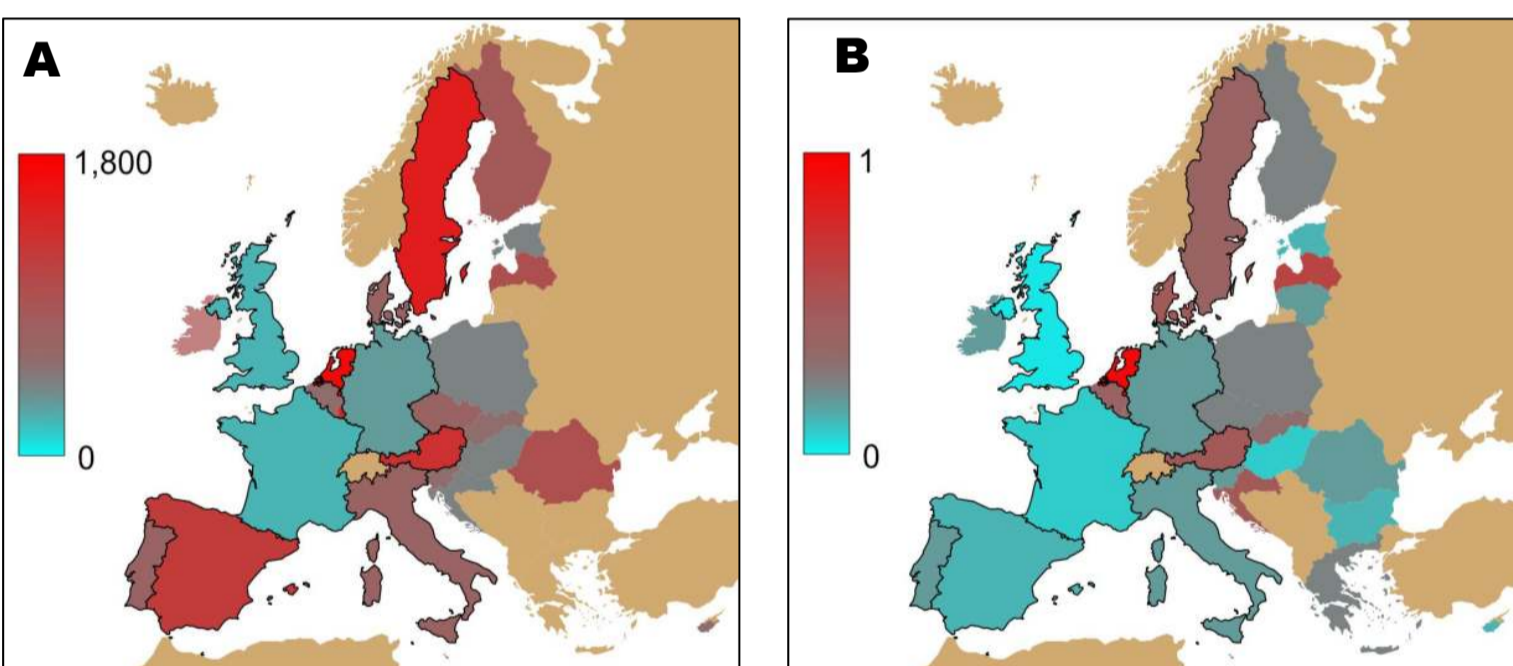


Fig. 2 Burden of SWIs following CABG. (A) average cost; increase per procedure. (B) per capita; black border: countries with sufficient data available; borderless: results through extrapolations based on data of other countries

Discussion

- A German costing study, not used in our analysis, was available to validate the model.³ An SSI case costs €7,051–8,342 more than a control case. Our model, using costs and incidences reported in this paper, estimated an increase of €7,711
- A group in the USA reduced their DSWI to zero (over 30 months and 590 procedures) after implementation of a Six Sigma assessment, in which they updated 15 of 42 perioperative processes and saved USD 600,000 compared with previous practice⁴
 - Key implementations were: Use of disposable ECG leads & wires, antibiotic-coated sutures, silver-impregnated dressings
- Disposable ECG leads were shown to reduce SSIs by 18.8% at 30-days post CABG (reaching significance at 90-days post CABG)⁵
 - The presented model indicates a cost saving of €16.03 million if this 18.8% reduction could be achieved across the EU-28

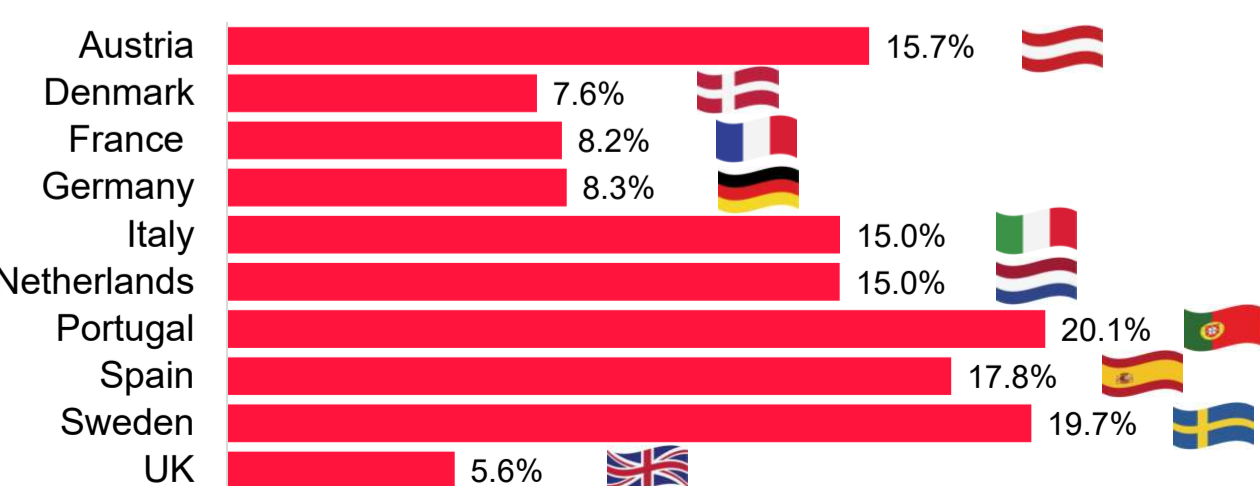


Fig. 3 SWI burden contribution to average CABG procedure cost.

References

1. European centre for disease prevention and control, Annual Epidemiological Report 2018, Healthcare-associated infections: surgical site infections
2. Jenks, P.J. et al. J Hosp Infect. 2014 Jan;86(1):24-33
3. Findeisen, A. et al. Eur J Cardiothorac Surg. 2018 Aug; 55(3):494–500,
4. Kles, CL et al. Dimens Crit Care Nurs. 2015 Sep Oct;34(5):265-72
5. Lankiewicz, JD et al. Am J Infect Control. 2018 Aug;46(8):949-951

Disclosure

RS is the owner and MB is an employee of Coreva Scientific, which received consultancy fees for this work, JL is an employee of Cardinal Health.