RWD75

USING REAL-WORLD DATA TO ESTIMATE THE COST OF CARDIAC IMPLANTABLE ELECTRONIC DEVICE (CIED) INFECTION IN A HIGH-RISK AUSTRALIAN POPULATION

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INTRODUCTION

Cardiac Implantable Electronic Devices (CIEDs), including permanent pacemakers (PPM), implantable cardioverter defibrillators (ICD), and cardiac resynchronisation therapy pacemakers (CRT-P) or defibrillators (CRT-D), deliver therapies including bradycardia and anti-tachycardia pacing, monitoring for arrhythmias, cardiac resynchronisation for heart failure, and defibrillation. Approximately 30,000 CIEDs are implanted annually in Australia, and that number is increasing[1]. Infection of a CIED is a serious complication, associated with significant morbidity and mortality, and although uncommon, rates are reportedly increasing, generating substantial healthcare costs.

OBJECTIVE

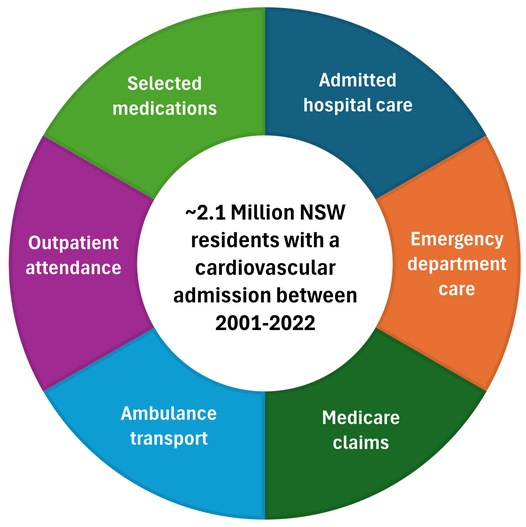
The aim of this study was to estimate the costs associated with CIED infection in a high-risk patient population treated in the Australian healthcare system.

METHODS

The dataset

Medtronic partnered with the Centre for Big Data Research in Health, University of New South Wales, to analyse the New South Wales Cardiovascular Cohort (NSWCVC), an existing dataset created through an NHMRC project grant[2].

Figure 1 The New South Wales Cardiovascular Cohort (NSWCVC) – Selected data elements



The study

Objectives

Primary objectives were to determine the costs to the healthcare system, and total cost of care for patients diagnosed and treated for CIED infection. Secondary objectives included estimating the incidence rate of CIED infection in NSW, comparison of patient characteristics of patients with CIED infection compared to those without, and examination of rates and predictors of mortality.

Patient selection

Patients were selected by the presence of ICD-10-AM/ACHI/ACS[3] codes, the clinical classification system used in all Australian hospitals.

Figure 2 Patient selection criteria

CIED patients	CIED infection
ACHI procedure codes CIED generator or lead insertion, revision or replacement procedures	**ICD-10-AM diagnosis code** T82.71 Infection and inflammatory reaction due to electronic cardiac device

Patients at high-risk of developing a CIED infection were defined according to criteria in a published randomised controlled trial[4] and included patients undergoing any of: CIED generator replacement, a system upgrade with or without new leads, CIED pocket or lead revision, or an initial CRT-D procedure.

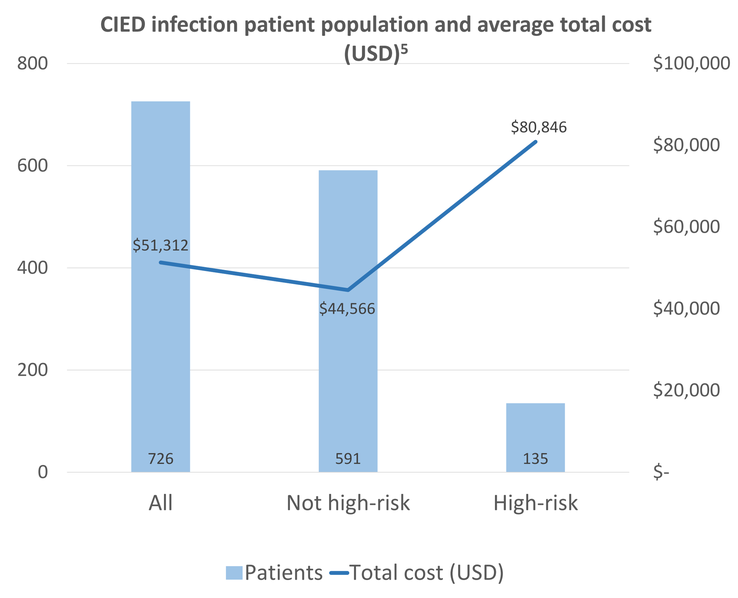
Treatment costs

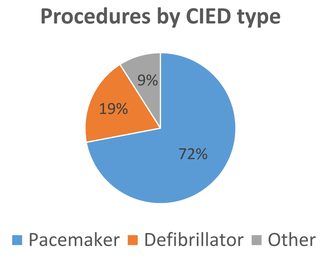
CIED infection treatment costs in the period from 28-days before to 42-days after CIED infection-related hospitalisations were calculated. Note that one patient may have multiple hospital stays.

The costs for high-risk patients were calculated from the costs for the overall cohort adjusted by the high-risk/not high-risk ratio. This method was used as the sample sizes decreased when breaking down the high-risk patients into device extraction/replacement groups.

RESULTS

This study generated real-world insights into the treatment pathways and cost burden of CIED infection. Average total costs (USD) across the patient care journey are presented.





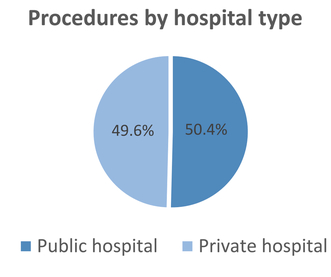


Table 1 Public hospital treatment only – patient population and average total cost of care per patient (USD[5]) by risk type

Item	Not high-risk	High-risk	Total/Average cost
Patient population	410 (88%)	54 (12%)	464 (100%)
Total cost of care per patient	$40,911	$67,929	$44,055

Table 2 Public & private hospitals or Private hospital treatment only – patient population and average total cost of care per patient (USD[5]) by risk type

Item	Not high-risk	High-risk	Total/Average cost
Patient population	181 (69%)	81 (31%)	262 (100%)
Total cost of care per patient	$52,847	$89,458	$64,165

High-risk status was one of several cost drivers that increased the total treatment cost per CIED infection patient. Other significant cost drivers included:

- intensive care unit (ICU) stays over 24 hours
- temporary pacing
- length of stay
- device type.

CONCLUSION

Access to real-world data provided population-specific insights into CIED infection, demonstrating the significant economic burden on the Australian healthcare system, particularly among high-risk patients. Key cost drivers of CIED infection were also identified.

This real-world evidence analysis may help guide clinical practice for proactive management of CIED infection risk through targeted strategies including antibiotic prophylaxis, antibacterial envelope utilisation, and enhanced wound care protocols, aimed at minimising avoidable CIED infections across patient risk profiles and thus mitigating substantial healthcare expenditure and resource utilisation.

References

1. Mond HG, Crozier I, Sloman JG. The Australian and New Zealand cardiac implantable electronic device survey: calendar year 2021: 50-year anniversary. Heart Lung Circ 2023;32:261-268.
2. NHMRC – National Health and Medical Research Council. NSWCVC - https://www.unsw.edu.au/research/cbdrh/our-research/our-research-programs/cardiovascular
3. ICD-10-AM/ACHI/ACS - International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM), Australian Classification of Health Interventions (ACHI), Australian Coding Standards (ACS) - https://www.ihacpa.gov.au/health-care/classification/icd-10-amachiacs
4. Tarakji KG, Mittal S, Kennergren C, et al; WRAP-IT Investigators. Antibacterial envelope to prevent cardiac implantable device infection. N Engl J Med 2019; 380: 1895-1905.
5. All costs are presented in USD, converted from AUD at an exchange rate of AUD 1 = USD 0.66