

Antibiotic prophylaxis in cardiac implantable electronic device procedures: A potential role for the pharmacist?

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Background

- Australian and international guidelines recommend antibiotic prophylaxis (AP) for cardiac implantable electronic device (CIED) procedures.
- The level of adherence to these guidelines in Australia is unknown.

Aim

To investigate adherence to the *Australian Therapeutic Guidelines: Antibiotic Version 15*¹ for CIED AP and the infection rates at two teaching hospitals in Western Australia.

Method

- A retrospective, observational study of the hospital medical records of patients who underwent CIED procedures from January to December 2017.
- Adherence to the guideline was assessed for dose, choice and timing of AP (see Table 1).
- CIED infection was identified using patient follow-up documentation.
- Factors associated with guideline adherence and infection were identified using multivariate logistic regression analysis.

Table 1: Australian Therapeutic Guidelines: Antibiotic version 15: Surgical prophylaxis for cardiac implantable electronic devices¹

A single pre-operative dose of antibiotic prophylaxis is adequate; postoperative doses are not required.

Cefazolin 2g IV, within 60 minutes before incision

- For patients known to be, or at risk of being, colonised or infected with methicillin-resistant *S. aureus* (MRSA): **Add vancomycin 15mg/kg IV started 30 to 120 minutes before incision**
- For patients with immediate hypersensitivity to penicillins, use vancomycin as above plus: **Gentamicin 2mg/kg IV within 60 minutes before incision**

Results

Figure 1: Australian Therapeutic Guideline Adherence

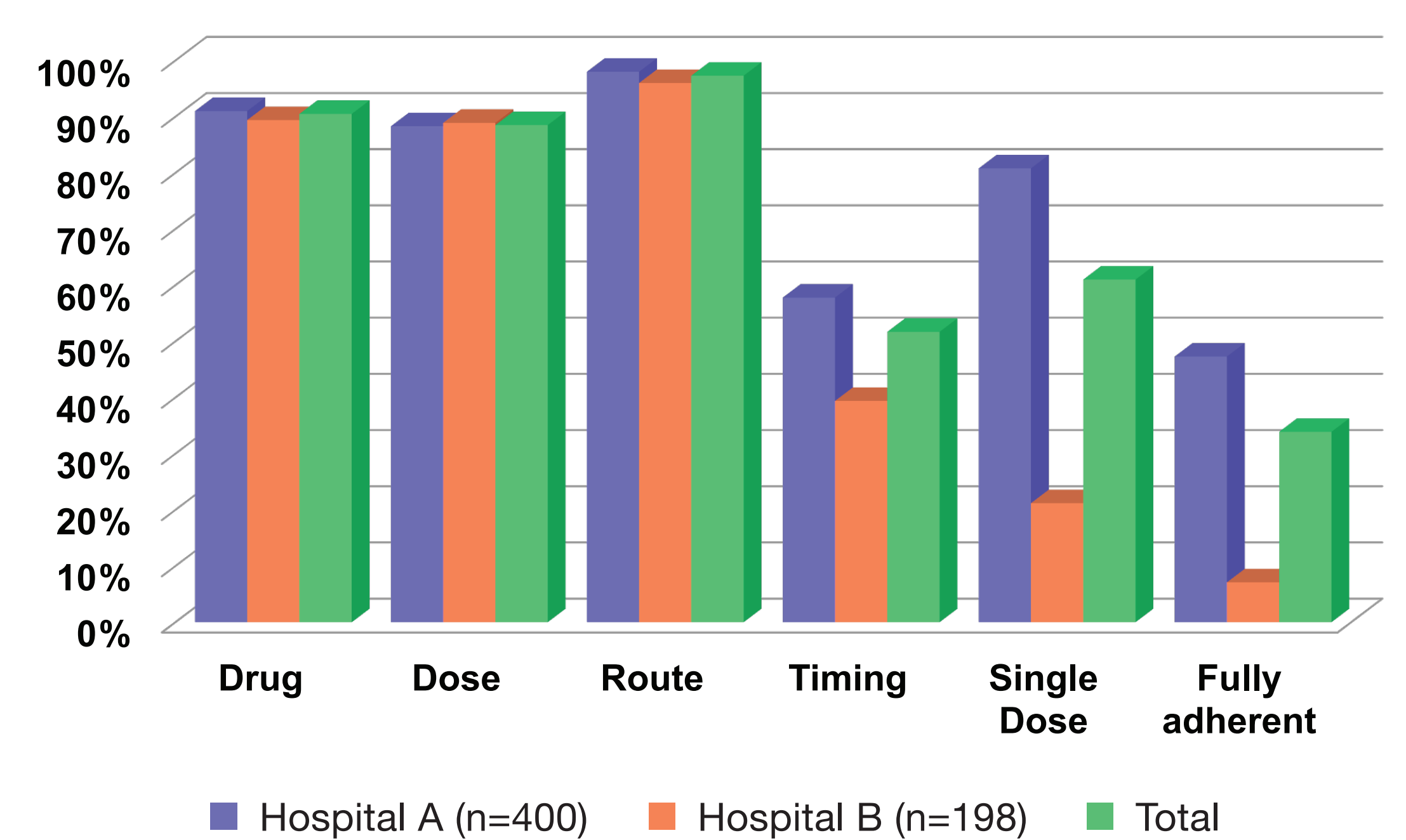


Figure 2: Antibiotic Prophylaxis Dose Timing (Hospital A)

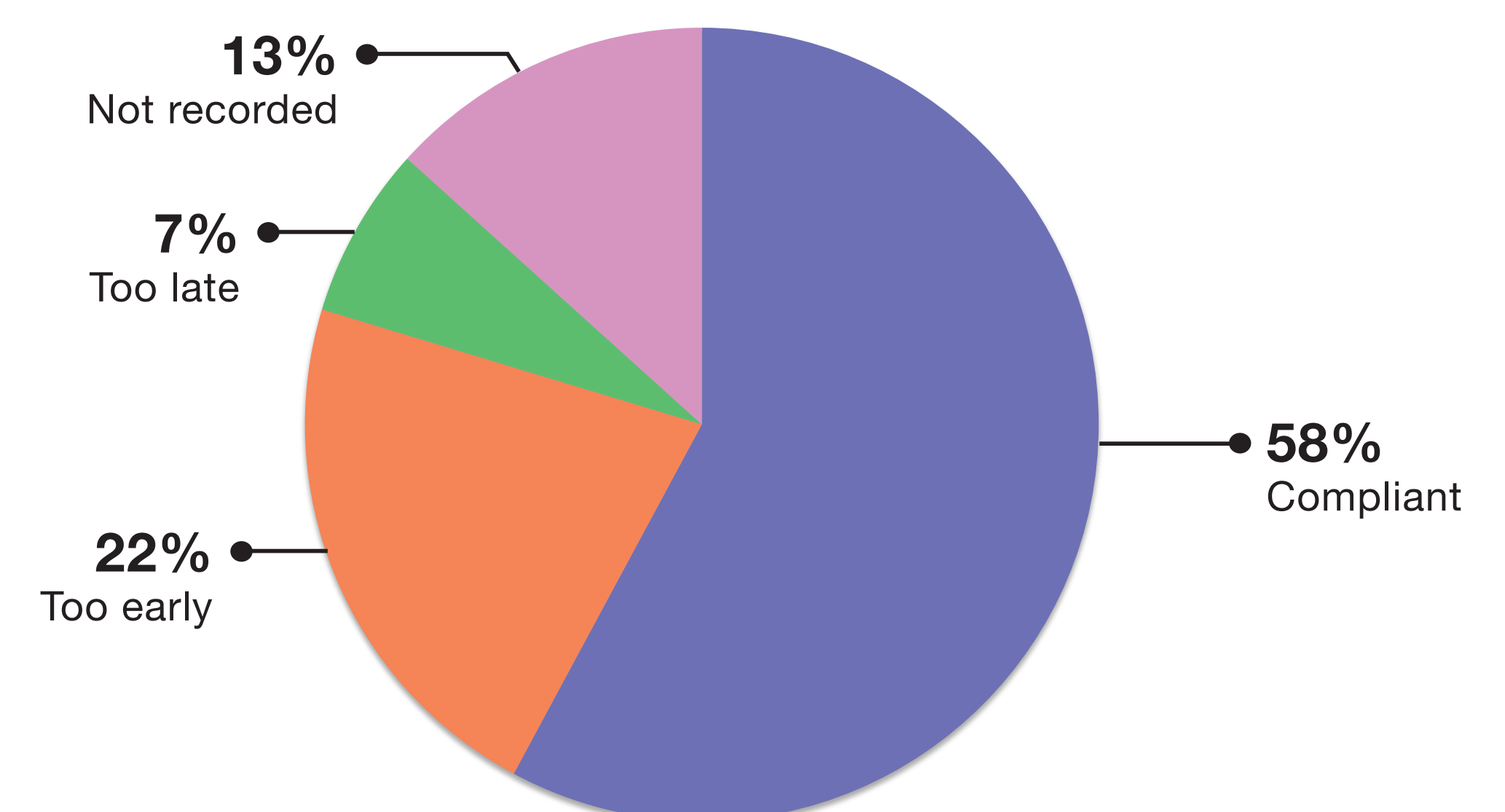
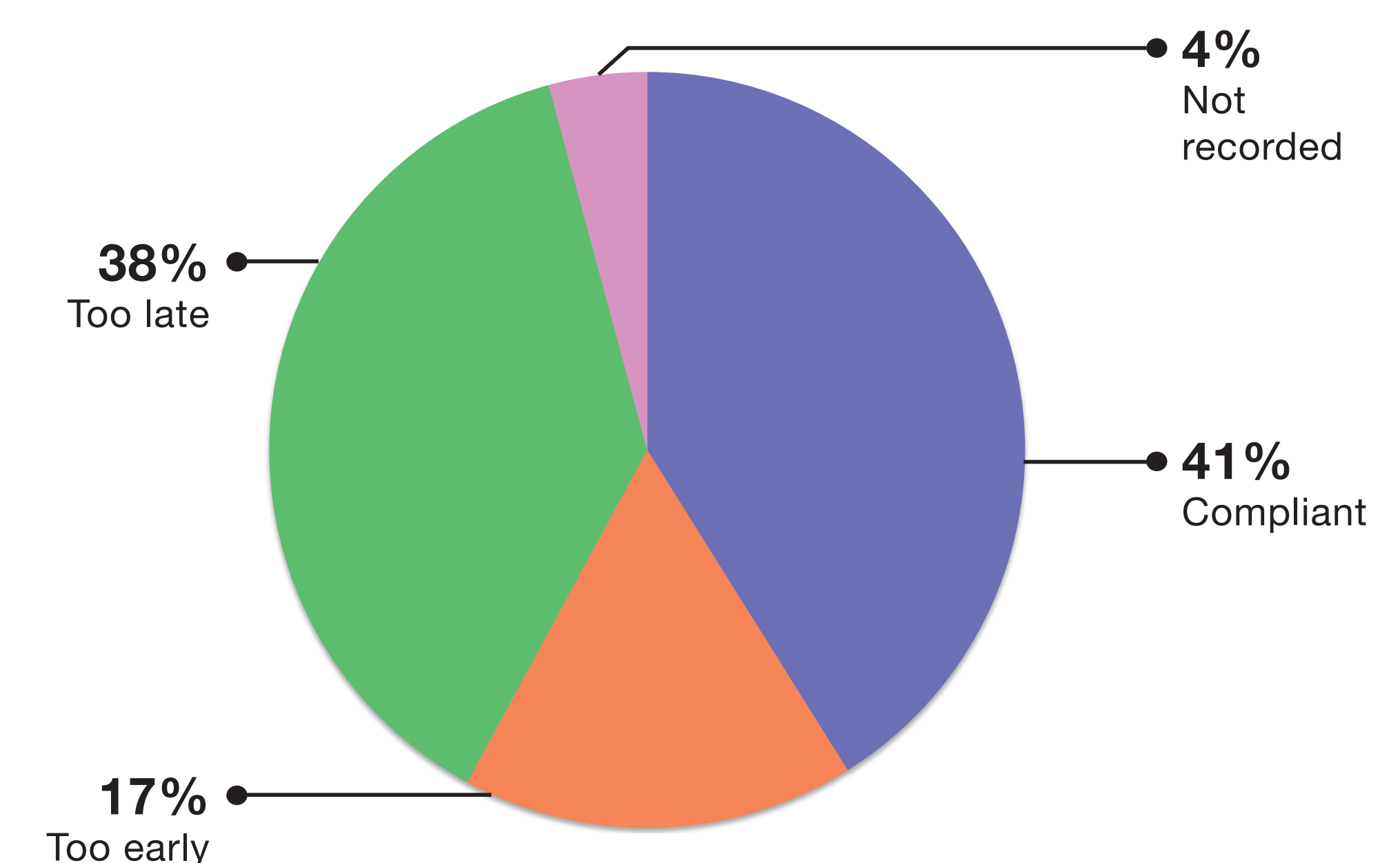


Figure 3: Antibiotic Prophylaxis Dose Timing (Hospital B)



- Medical records were reviewed for 598 patients (Hospital A: n=400, B: n=198).
- MRSA status was documented in 46 (7.7%) patients.
- Permanent pacemakers were the most frequently inserted device (465, 77.8%).
- The most common procedure was insertion of a new device (482; 80.1%).

Adherence

- AP was administered in 97.3% (582/598) of procedures.
- Full guideline adherence occurred in 33.9% (203/598) of procedures (Figure 1) and differed significantly between the hospitals (A: 47.3% vs. B: 7.1%, $p < 0.001$).
- The most common reasons for non-adherence were dose timing at Hospital A and administration of multiple AP doses at Hospital B (Figures 2 and 3).
- Guideline adherence was influenced by penicillin/cephalosporin allergy, MRSA status, renal function and procedure type.

Infection

- 20 infections were identified over 626.6 patient-years (PY) of follow-up (mean [SD] follow-up: 1.0 [0.3] years). The infection rate was 3.2 per 100 PY ($p = 0.99$ between hospitals).
- The pathogen was reported in 5 cases - 3 staphylococcal infections (2 methicillin-susceptible *S. aureus*), 1 *Ps. aeruginosa*, 1 *Proteus mirabilis*.
- Two devices were removed; no patients died from CIED infection.

Adherence vs Infection

- None of the patient, AP or procedural-related factors investigated were statistically significantly associated with infection.
- Infection occurred in 2.0% of AP guideline adherent and 4.1% of non-adherent cases ($p = 0.27$).
- There was no difference in infection rate between patients receiving single dose or multiple dose AP (3.3% vs 3.4%; $p = 1.00$).

Conclusion

- There was a numerical, though not statistically significant, association between infection rate and guideline non-adherence.
- A single dose of AP was as effective as multiple doses of AP in preventing infection.
- AP was suboptimal and CIED infection rates comparable with international literature.
- Practice varied significantly between hospitals, particularly with relation to the timing and number of AP doses.
- The role of the pharmacist prior to admission and in the cardiac catheter laboratory requires exploring.

Reference:

1. Surgical prophylaxis for implantable cardiac device insertion], revised 2014 June In: eTG complete [Internet]. Melbourne: Therapeutic Guidelines