

Regional Anesthesia for Perioperative Management of Subcutaneous Implantable Cardioverter-Defibrillator Insertion

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Background

- The subcutaneous implantable cardioverter-defibrillator (S-ICD) is an alternative to the transvenous implantable cardioverter-defibrillator (TV-ICD) for patients who do not require pacing.
- Advantages of the S-ICD include a lower risk of infection and lower risk of lead-related and vascular complications.¹
- Implantation of the S-ICD requires more extensive tissue dissection and tunneling of a lead.²
- S-ICD placement can result in significant postoperative pain and some patients require overnight admission for pain control.
- Many are performed under general anesthesia however several regional anesthetic techniques have also been employed.²
- Regional anesthesia for S-ICD placement requires coverage of the left anterolateral chest wall for the generator pocket and the left parasternal region for tunneling of the electrode.²

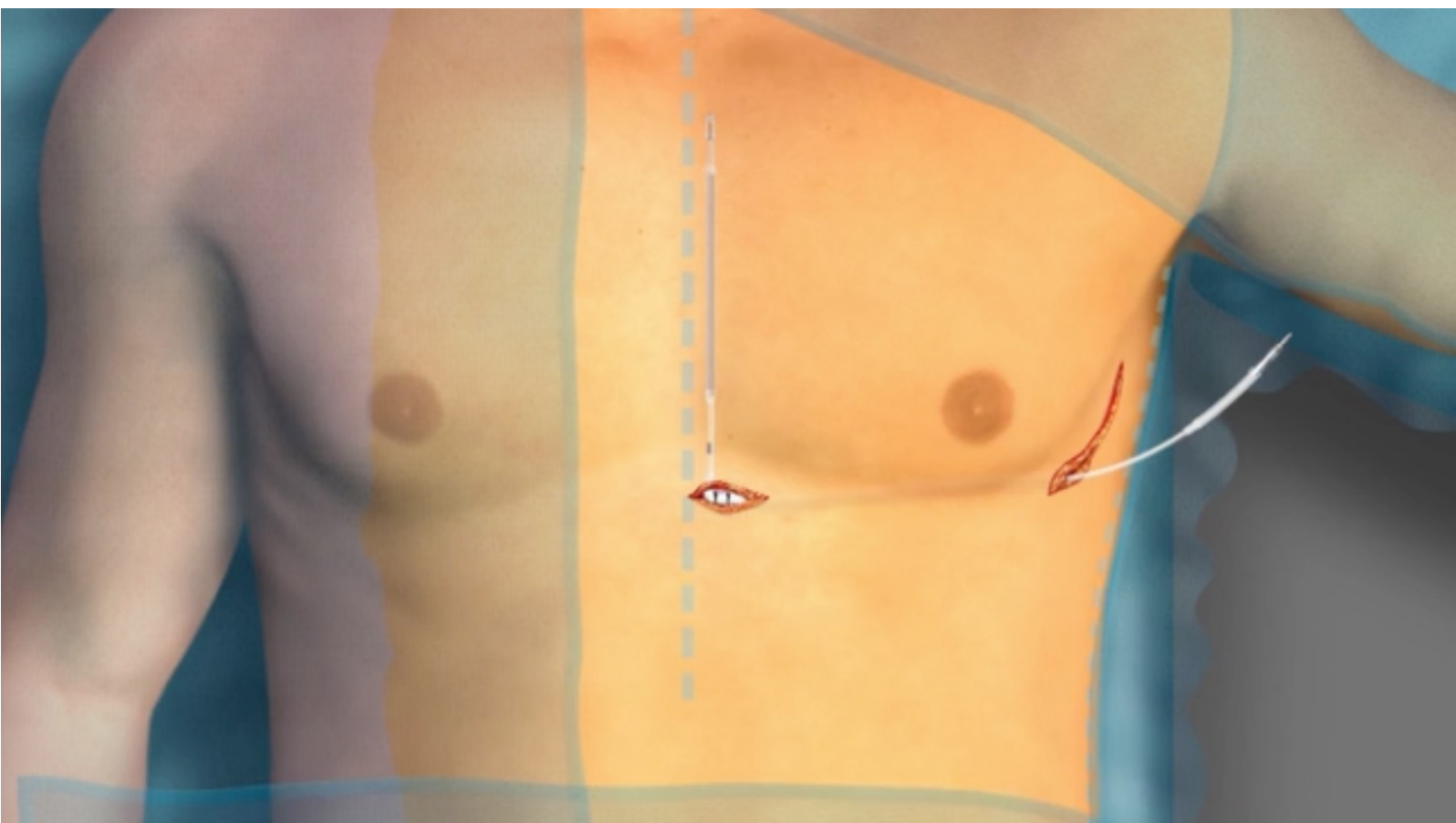


Figure 1. S-ICD insertion demonstrating the two chest incisions and tunneled electrode. The generator is inserted into a subcutaneous pocket at the level of the 5th and 6th intercostal spaces in the mid-axillary line through the lateral incision, sometimes under the latissimus dorsi.³

Methods

- Retrospective review of patients who received nerve blocks for S-ICD implantation 4/2021-10/2023.
- Primary outcomes were pain scores and opioid requirements in the first 24 hours post-procedure and hospital length of stay.

Patient demographics (n=49)	
Age	41 ± 15.0
Male	32 (65.3%)
BMI	30 ± 6.3
ASA status	2.8 ± 0.7

S-ICD regional anesthesia protocol:

- Patients received ultrasound-guided left serratus anterior plane block (SAPB) and left parasternal subpectoral plane block (PSPB). Local anesthetic type and volume varied based on anesthesiologist preference and patient weight.
- Nerve blocks were performed in the electrophysiology lab following marking of the planned generator pocket and lead placement sites by the proceduralist using fluoroscopy.
- Patients received either moderate sedation or general anesthesia prior to the nerve block.

Figure 2. Ultrasound image of left SAPB. Local anesthetic was injected between latissimus dorsi and serratus anterior (shown here) and also deep to the serratus anterior. SAPB anesthetizes the lateral cutaneous branches of the T2-9 intercostal nerves providing analgesia to the lateral thorax for the placement of the generator. IC: intercostal muscle, LD: latissimus dorsi, PL: pleura, R: rib, SA: serratus anterior

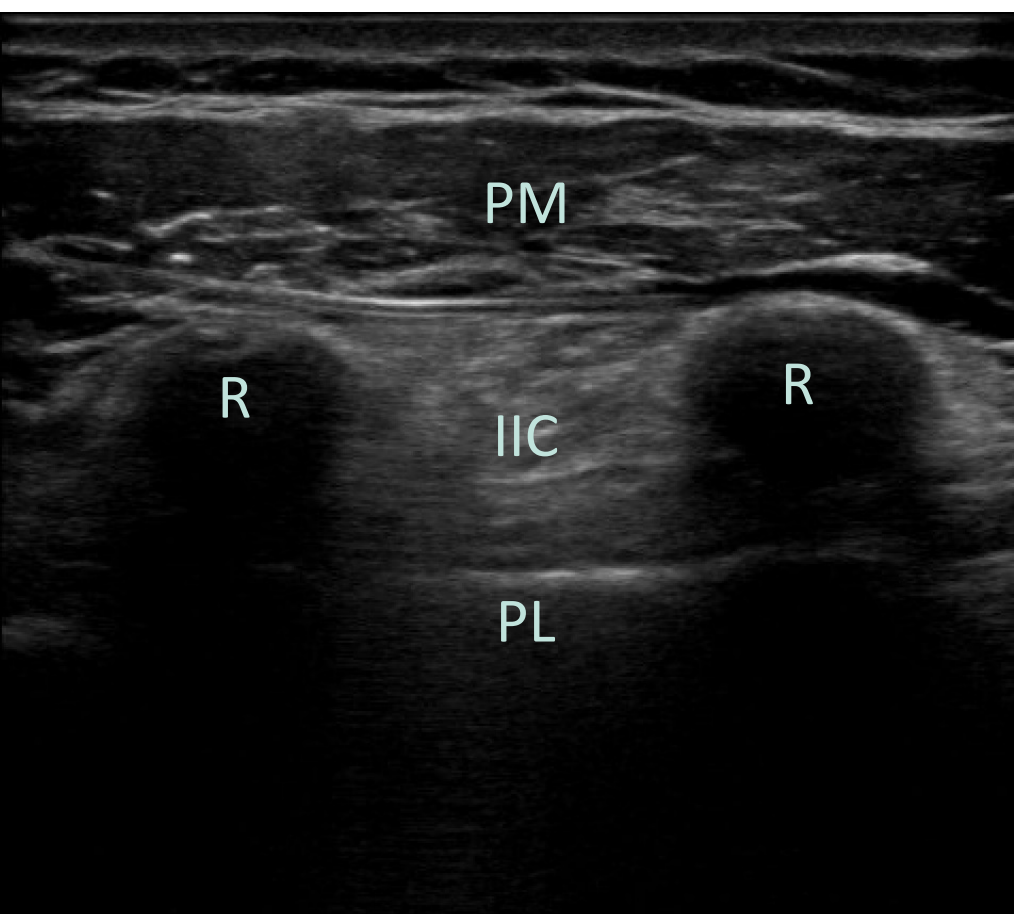
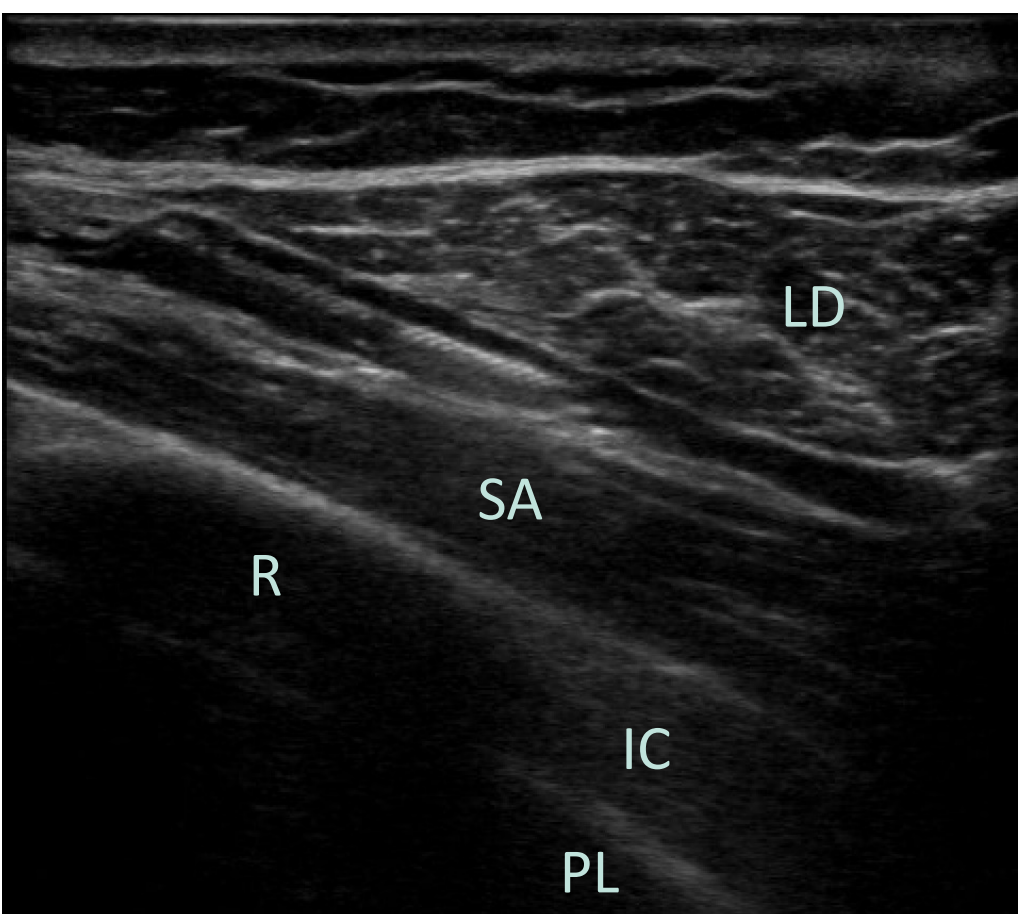


Figure 3. Ultrasound image of left PSPB. Local anesthetic was injected into the subpectoral fascial plane at multiple levels. PSPB targets the anterior cutaneous branches of T2-6 providing analgesia to the area along the sternum required for lead placement. IIC: internal intercostal muscle, PL: pleura, PM: pectoralis major, R: rib

Results

- Of the 49 patients who underwent regional nerve blocks for S-ICD insertion during the study period, 37 (75.5%) were discharged home the same day, 11 (22.5%) were discharged the next day, and 1 (2.0%) was admitted for >1 day.
- Patients receiving nerve blocks had an average pain score of 2.8 over the first 24 hours (or until discharge if <24 hours).
- About half of patients (n=25, 51.0%) did not require opioids prior to discharge. 14 patients (28.6%) reported no pain.
- Most patients (n=39, 79.6%) received nerve blocks and sedation for the procedure and 10 patients (20.4%) had general anesthesia (6 had a planned general anesthetic and 4 had conversion to general anesthesia during the procedure).

Figure 4. Maximum and average pain scores over the first 24 hours post-procedure (or until discharge if <24 hours)

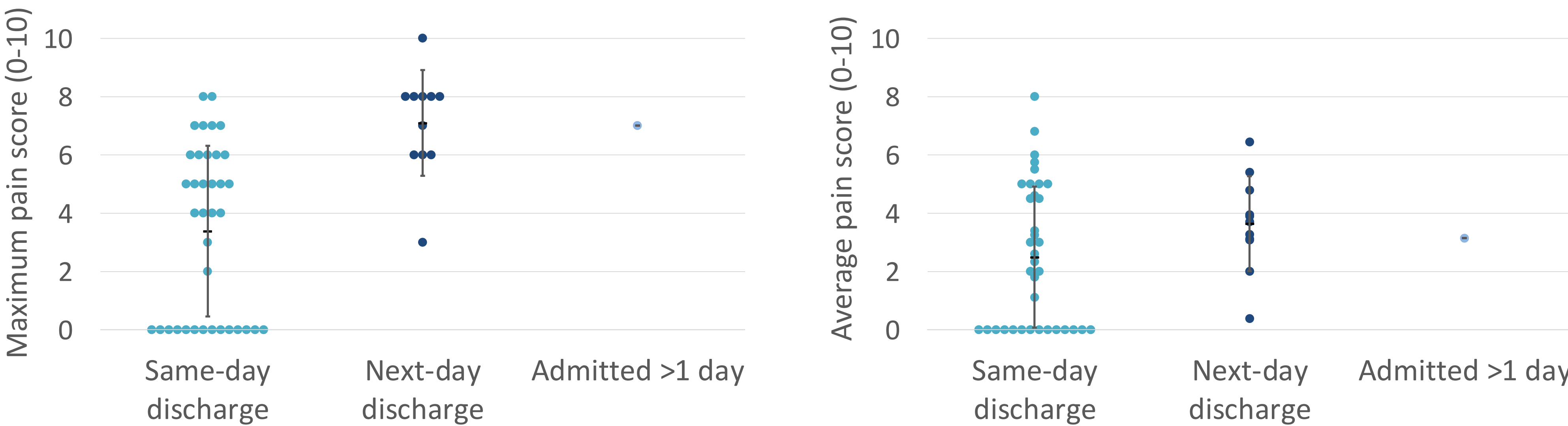
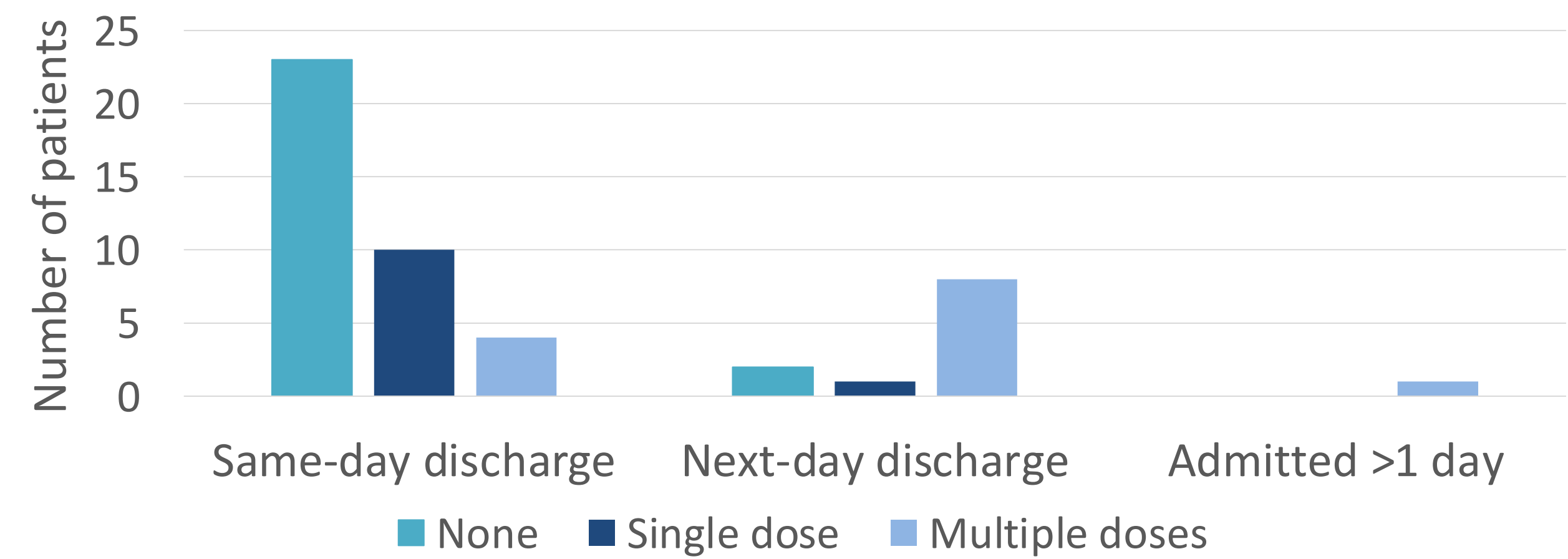


Figure 5. Opioid requirement prior to discharge



Discussion

- Prior to the implementation of nerve blocks for S-ICD insertion, same-day discharge (SDD) was rare at our institution.
- This protocol helped achieve a SDD rate of over 75%.
- Patients with increased pain were more likely to be admitted.
- The nerve blocks were the primary anesthetic for most patients, though a few (<10%) required conversion to general anesthesia.
- Other regional anesthesia techniques described for S-ICD placement include various combinations of transversus thoracic plane block, paravertebral block, SAPB, and parasternal block.^{2,4} The use of tumescent local anesthesia has also been reported.⁵

The combination of left serratus anterior plane block and left parasternal subpectoral plane block is a viable option both as a primary anesthetic for S-ICD placement and for postoperative analgesia facilitating same-day discharge.

References

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