

## Device programming and SMART pass algorithm activation in subcutaneous implantable defibrillator patients: data from a remote monitoring database

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**Background:** In subcutaneous implantable cardioverter-defibrillator (S-ICD) recipients, a previous study demonstrated very low rates of delivered shocks and inappropriate shocks on programming a conditional zone between 200 and 250 bpm and a shock zone for arrhythmias >250 bpm. The extent to which this programming approach is adopted in clinical practice has been little studied, as the activation status of the SMART Pass filter, that was implemented to reduce inappropriate shocks and enhanced over time.

**Purpose:** We assessed device programming during follow-up and the rate of detected arrhythmias in a cohort of consecutive S-ICD recipients.

**Methods:** We analyzed data from 670 S-ICD patients followed on the remote network at 17 Italian centers for a median of 31 months (25th-75th percentile: 16-51). The enhanced SMART Pass version was available for all patients after October 2022. It makes the deactivation monitor less sensitive to premature ventricular contractions or other transient amplitude changes while maintaining arrhythmia sensitivity and specificity, and it was expected to reduce unintentional deactivation rate.

**Results:** At the last remote data transmission, the median programmed conditional zone cut-off was set to 210 bpm (25th-75th percentile: 200-220), the shock zone cut-off was 250 bpm (25th-75th percentile: 240-250), and the SMART Pass was enabled in 586 (87%) patients. During follow-up, 194 automatic deactivation events (0.10/patient-year) were reported in 118 (18%) patients. The SMART Pass-disabled time was 13% of the total observation period. Shocks were delivered in 129 (19%) patients (rate: 0.13/patient-year), and untreated arrhythmias were recorded in 136 (20%) patients (rate: 0.14/patient-year). The rate of shocks was lower when SMART Pass was enabled – 0.12/patient-year (95% CI: 0.10-0.14) versus 0.20 (95%CI: 0.15-0.26) ( $p=0.002$ ), as it was the rate of untreated arrhythmias – 0.12/patient-year (95% CI: 0.11-0.14) versus 0.23 (95%CI: 0.18-0.30) ( $p=0.001$ ). The enhanced SMART Pass version was associated with a lower rate of deactivations – 0.04/patient-year (95%CI: 0.02-0.05) versus 0.14 (95% CI: 0.12-0.16) ( $p<0.001$ ), and with a reduction in treated and untreated arrhythmias (Incidence rate ratios: 0.40 (95%CI: 0.28-0.53) and 0.40 (95%CI: 0.30-0.55), respectively ( $p<0.001$ )).

**Conclusions:** In current clinical practice, S-ICD implantation centers often program high cut-off rates for arrhythmia detection. Most patients have SMART Pass consistently enabled during follow-up. This is associated with significantly lower rates of detected and treated arrhythmias. The enhanced SMART Pass version seems associated with lower deactivation rate, and with further decrease in treated and untreated detected arrhythmias.