

Programming Strategies Associated with Shock Reduction in 88,804 Implantable Defibrillator Patients

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Introduction: Controlled clinical studies have found that programming can reduce ICD shocks. We sought to determine the impact of programming strategies on ICD shocks in a large cohort of patients (pts).

Methods: An observational cohort analysis was performed on a de-identified database from CareLink. Pts were included if they had a CRT-D or dual chamber (DR) ICD. The primary endpoint was number of spontaneous all-cause shocked episodes per 100 pt years. A priori, 4 shock reduction programming strategies as well as clinical characteristics were entered into a multivariable model including: slowest VT/VF detection threshold, VF number of intervals to detect (NID), SVT discriminators On, ATP On for Fast VTs (FVT), AF with Rapid Ventricular Response (RVR): AF \geq 1 hr for \geq 1 day with average \geq 110 bpm, gender, age, ICD type, ICD replacement. A multivariate generalized estimating equations model was used comparing the event rates among categories within variables. A negative binomial model was used to account for differences in follow-up & shock frequency.

Results: The 88,804 pts in >2500 institutions had 2.5 ± 1.3 yrs follow-up, 75% male, 67 ± 12 years, 58% DR vs. 42% CRT, 33% replacement device, 12% had AF + RVR. The baseline programming included : 1) Slowest VT/VF detection: 33% \geq 188 bpm, 22% 168-187 bpm, 21% 151-167 bpm, 23% \leq 150 bpm, 2) VF NID: 37% 12/16, 59% 18/24, and 3% 24/32 or 30/40, 3) SVT discriminators On: 84%, 4) ATP On 86%. There were 19,458 pts (22%) who had a total of 72,239 shocked episodes. After adjusting for all variables (Figure): a slower VT/VF rate detection threshold (21% - 148% \uparrow), VF NID 12/16 (55% \uparrow), younger age (< 70 years) (23% - 57% \uparrow), AF (38% - 244% \uparrow w/RVR), and pts with replacement devices were associated with more shocks. VF NID 24/32 or 30/40 (17% \downarrow), SVT discriminators On (22% \downarrow), ATP On (28% \downarrow), females (19% \downarrow), and pts with CRT-D devices (23% \downarrow) were associated with fewer shocks.

Conclusions: Strategic programming of faster VT/VF detection thresholds, longer detection durations, SVT discriminators, and ATP for FVT reduced shocks. Clinical actions to reduce morbidity from shocks should include ensuring adequate rate control for pts with AF as well as programming to increase the VT/VF detection rate and duration thresholds.

Shocked Episodes per 100 Patient Years



