The Clinical and Economic Impact of Extended Battery Longevity of a Substernal Extravascular Implantable Cardioverter Defibrillator

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Abstract

Background and Aims: The extravascular implantable cardioverter defibrillator (EV ICD) has an extended projected battery longevity compared to the subcutaneous implantable cardioverter defibrillator (S-ICD). This study used modeling to characterize the need for generator changes, long-term complications, and overall costs for both the EV ICD and S-ICD in healthcare systems of various countries . *Methods:* Battery longevity data were modelled using a Markov model from averages reported in device labelling for the S-ICD and with engineering estimates based on real life usage from EV ICD Pivotal Study patient data to introduce variability. Clinical demographic data of recipients were derived from published literature. The primary outcomes were defined as the number of generator replacement surgeries, complications, and total healthcare system costs due to battery depletion over the expected lifetime of patients receiving EV ICD or S-ICD therapy. A one-way sensitivity analysis of the model was performed for the US healthcare system. *Results:* Average modelled battery longevity was determined to be 7.3 years for the S-ICD compared to 11.8 years for the EV ICD. The probability of a complication after a replacement procedure was 1.4%, with an operative mortality rate of 0.02%. The use of an EV ICD was associated with 1.4-1.6 fewer replacements on average over an expected patient lifetime as compared to an S-ICD and a 24.3-26.0% reduction in cost. The US sensitivity analysis found use of an EV ICD resulted in a reduction in replacement surgeries of greater than 1 (1.1-1.6) along with 5-figure cost savings in all scenarios ($18,602-$40,948). *Conclusion:* The longer projected battery life of the EV ICD compared to the S-ICD has the potential to meaningfully reduce long-term morbidity and healthcare resources related to generator changes from the perspective of multiple diverse healthcare systems.

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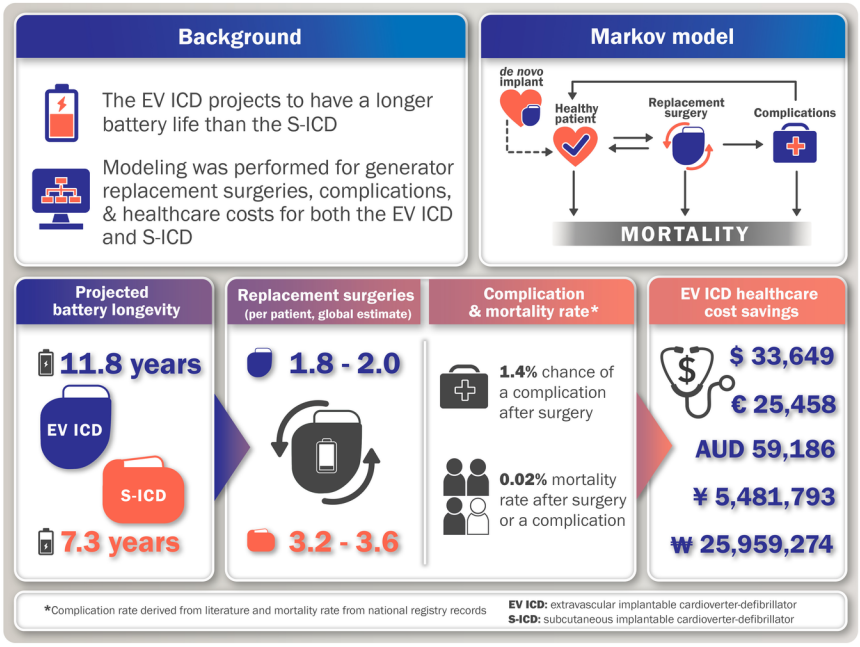

Figure 1

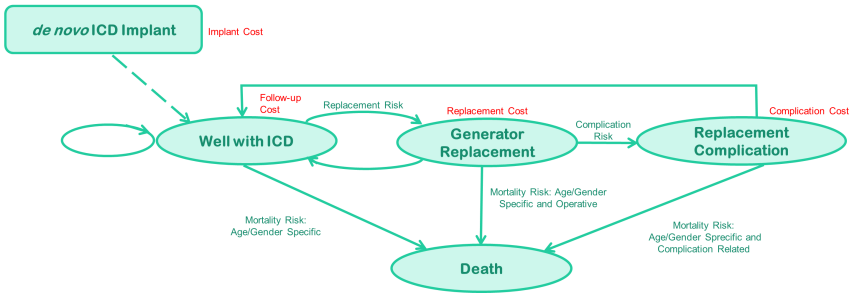

Figure 2

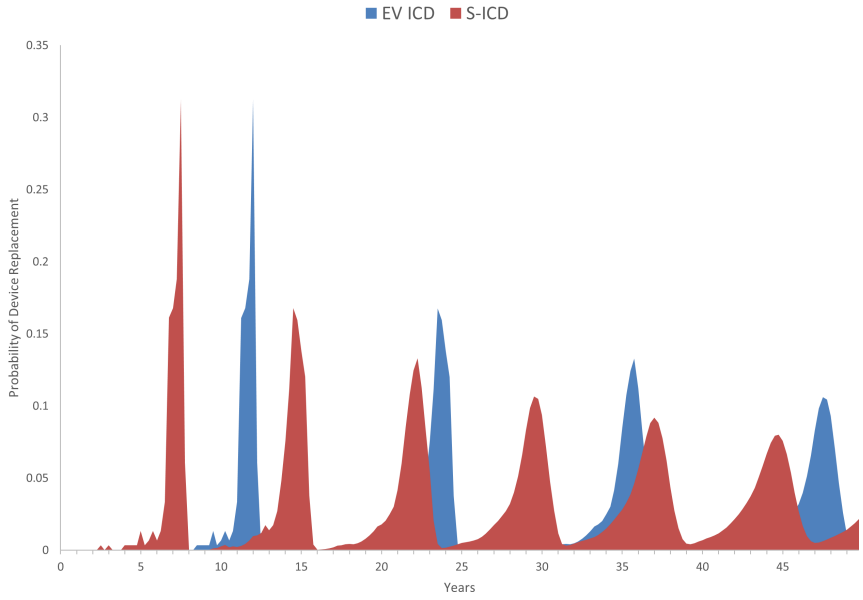

Figure 3 – A Panel

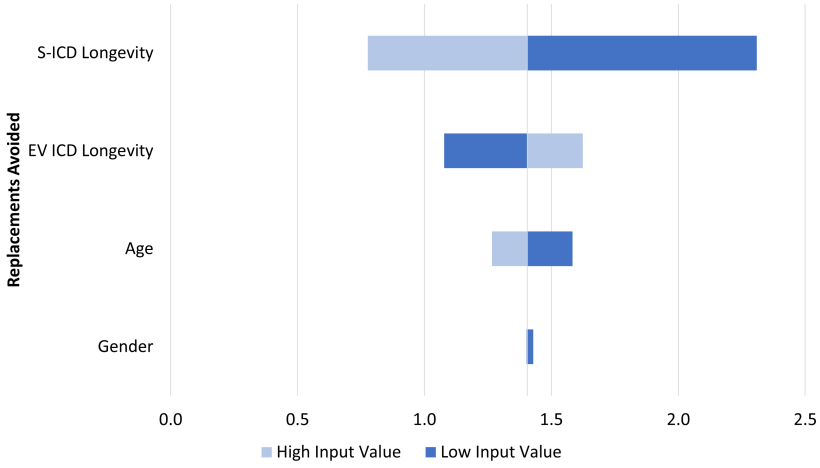

Figure 3 – B Panel