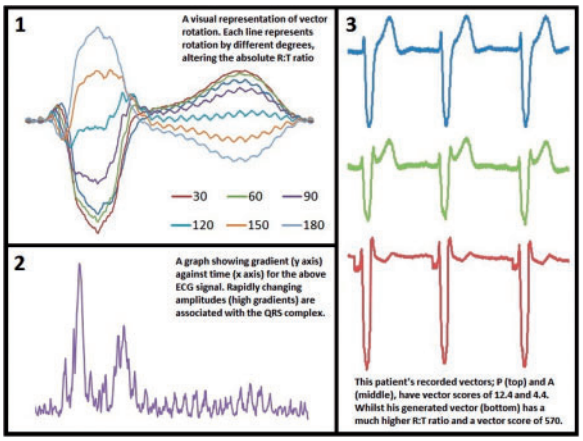
any individual, the largest R wave vector (Rmax) and the smallest T wave vector (Tmin) can be generated. We hypothesise that combining these signals, using a gradient filter to identify periods of rapidly changing signal amplitude, will significantly increase both R:T ratio and vector scores. Application of this programming to a cohort of patients, who are currently S-ICD ineligible, has the potential to produce universal device eligibility.
Methods: Standardised S-ICD screening of adult ICD patients (<1% RV paced) identified an S-ICD ineligible cohort, who underwent two channel Holter recordings to simultaneously capture their P and A vectors for 60 seconds. Simulated clockwise rotation of the recorded vector (P,A) was performed at 5 degree intervals (0 - 180 degrees) using the formula $Pz = [P \times \cos z] + [A \times \sin z]$, where z = degrees of clockwise rotation. 36 new vectors were generated, with Rmax and Tmin identified visually. A generated vector (G) which combined Rmax and Tmin was produced using a gradient filter to differentiate periods of rapidly changing signal amplitude (QRS complexes) from background signal (T waves, noise). R:T ratio and vector scores for both the recorded and generated vectors were calculated using a simulator and compared statistically (t-test). Vector scores > 100 were deemed to be suitable and overall eligibility was calculated.
Results: 92 patients (age 64.9 ± 2.7 years, 79% male, 33% EF<0.35) underwent S-ICD screening and 5.4% were found to have no suitable vector. Mean R:T ratios increased from 2.62 (2.48 - 2.76) in their recorded vectors, to 6.93 (5.03 - 8.83) in the generated vectors, p<0.001. Mean vector scores increased from 23.52 (21.58 - 25.46) to 374.86 (188.61 - 561.11), p<0.001, with all the generated vector scores being > 100. Overall S-ICD eligibility was therefore 100% (n=92).
Conclusions: Mathematical vector rotation using a gradient filter significantly increases R:T ratio and vector scores in an S-ICD ineligible cohort. Universal eligibility is generated, increasing the available treatment options for patients at risk of sudden cardiac death and eliminating the need for pre-implant S-ICD screening.



Abstract P911 Figure.

P912

Subcutaneous implantable cardioverter defibrillator in patients with arrhythmogenic right ventricular cardiomyopathy: a single center italian experience

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Background: arrhythmogenic right ventricular cardiomyopathy (ARVC) is an inherited heart disease associated with life-threatening ventricular arrhythmias. The only effective way to prevent sudden cardiac death (SCD) in ARVC patients is implantable cardioverter defibrillator (ICD). Subcutaneous implantable cardioverter defibrillators (S-ICDs) has been developed to avoid risks associated with transvenous defibrillators leads and they are an attractive technology for young patients with ARVC. However, there are limited data focused on S-ICD in ARVC.
Purpose: to evaluate the safety and effectiveness of S-ICD in ARVC patients.
Methods: 9 patients diagnosed with ARVC according to 2010 Task Force Criteria and at high risk of SCD referred for consideration of an ICD between 2014 and 2017, received an S-ICD. All patient were screened for potential oversensing by surface electrocardiography, obtained at rest and during effort, evaluated with the manufacturer-provided tool.
Results: in 5 patients (55%) S-ICD was implanted for primary prevention and in 2 cases (22%) S-ICD was implanted after extraction of a previous transvenous ICD (T-ICD) because of lead failure or device infection. At implant, defibrillation theresold (DT) was performed at 65J and ventricular fibrillation was terminated in all patients without complications. During a median follow-up of 27 ± 18 months, 2 patients (22%) had appropriate shocks on VT storm and 2 patients (22%) had inappropriate shocks because of T/P wave oversensing or myopotential noise. In one case we decided to replace the S-ICD with a T-ICD, in the other one the problem was solved by updating the device software which was able to improve the device sensing.
Conclusions: in the high-risk ARVC patients without pacing indication, S-ICD implantation is an effective alternative to T-ICD.

P913

Optimization of cardiac resynchronization therapy device selection guided by cardiac magnetic resonance imaging is cost-effective

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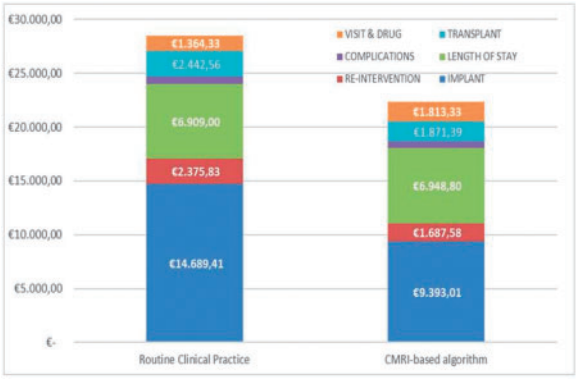
Introduction: In patients with criteria for cardiac resynchronization therapy (CRT), selection of appropriate device (pacemaker, CRT-P, vs. internal cardioverter-defibrillator, CRT-D) remains a field of uncertainty. The recent GAUDI-CRT trial demonstrated how characterization of myocardial scar by cardiac magnetic resonance imaging (cMRI) can predict life-threatening ventricular arrhythmia (VA) and sudden cardiac death (SCD) in patients with CRT and help in the decision making.
Purpose: To estimate the cost-effectiveness of a cMRI-based algorithm applying thresholds for prediction of VA/SCD derived from the GAUDI-CRT trial (scar mass >10 g + borderzone mass >5.3 g indicated high risk for VA/SCD) compared with routine clinical practice in patients with indication for CRT.
Methods: Patients with low risk receiving CRT-D were classified as overprotected, patients with high risk receiving CRT-P as underprotected. An incidental Markov model was developed to simulate the lifetime progression of a HF patient cohort. Key health states included in the model were New York Heart Association (NYHA I-IV), hospitalization and deaths. Costs, survival and Quality-adjusted life years (QALYs) were assessed. The annual discount rate was 3% for costs and effects.
Results: Complete information was available for a total of 181 patients of the GAUDI-CRT study. The use of the algorithm showed a rate of overprotection of 63% and underprotection of 8.1% during a follow-up of 4.6 years. Applying the algorithm compared to clinical practice showed a lower cost per patient of -€5,296.41 for an initial implant, –€688.25 for re-intervention, –€571.17 for a heart transplant and –€60.86 for device-related complications (figure 1). The net monetary benefit per QALY was €6,884.61.
Conclusion: The use of a cMRI-based algorithm for decision making in the assignment of CRT-P vs. CRT-D for patients with indication for CRT is cost-effective compared to routine clinical practice.



Abstract P913 Figure.

P914

Health Care Consumption after ICD/CRT-D replacement: preliminary results from the DECODE registry

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Background: Previous studies provided evidence about the clinical implications of the replacement of cardiac implantable devices and the associated risk of

complications. Data about the health-care resources consumption (HCC) after defibrillator (ICD/CRT-D) replacement is scarce.
Purpose: To assess HCC over 12 months after ICD/CRT-D replacement in a large real-world population.
Methods: We prospectively analyzed all HC utilizations of the patients who underwent ICD/CRT-D device replacement/upgrade in the DECODE registry from 2013 to 2015. Events considered in the analysis were hospitalization requiring at least 1 overnight stay (HS), unplanned in-hospital visits (UHV) and emergency room accesses (ERS). Primary discharge diagnosis, length of stay and type of procedures performed were recorded prospectively.
Results: We included 983 consecutive patients (median age 71 years, 76% male, 55% ischemic, 47% CRT-D). After 12 months, 163 (17%) patients had $\geq$1 HC utilizations (139 pts had HS, 41 pts UHV and 84 pts ERS). A total of 425 HC utilizations were reported: 217 HS, 67 UHV and 141 ERS. 66 died and 3 underwent heart transplantation. Of the 217 HS, the admission path included an UHV in 3% (n=6) and an ERS in 48% (n=104) of the cases, in the remaining 49% (n=107) of cases the HS was prescribed by the heart failure clinician or an electrophysiology/implanting clinician. In patients with HS the mean number of HS was 1.6 per patient and ranged from 1 to 7 HS (mean length of stay = 9.6 days). The total number of nights in hospital was 2286 (16.4 days per patient year). The primary discharge diagnoses were: 41 (19%) related to the device or the replacement procedure; 133 (61%) related to cardiovascular disease (of which 74 for symptoms of HF) and 43 (20%) for other reasons. The primary procedures comprised 80 (36.8%) surgical actions taken (of which 45 system related); 69 (31.8%) intensive/infusive medical therapy; 38 (17.5%) pharmacological or antimicrobial treatment and 30 (13.9%) diagnostic examination.
Conclusions: The present analysis of the post-operative course of patients who underwent ICD/CRT-D replacement revealed high levels of HCC over 12 months after the procedure. As only 20% of HCC is related to device therapy, the heavy economic burden imposed by this population is mainly related to the underlying cardiovascular disease and to other co-morbidities.

P915

Reducing the burden of inappropriate ICD shocks - lessons learned from inappropriate S-ICD therapies

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On behalf of: DZHK

Introduction: Inappropriate shocks (IAS) remain a challenge for patients and physicians during the follow-up of the subcutaneous defibrillator (S-ICD), as programming options are strongly limited. Episodes of IAS were retrospectively analyzed in a large monocentric cohort of S-ICD patients.
Methods: 239 patients were implanted with an S-ICD between 2010 and 2017 for primary and secondary prevention. Follow-up data of at least 6 months was analyzed. Ischemic, non-ischemic and hypertrophic cardiomyopathy accounted for the majority of indications (n=177; 74%), while other cardiomyopathies as well as channelopathies constituted the remainder (n=62; 26%). Permanent sensing vectors were programmed postoperatively after exercise testing. Primary vector was programmed in 49%, secondary in 37% and alternate in 14%.
Results: During a mean follow-up of 1063±488 days a total of 68 shocks occurred in 38 patients. 43 (63%) shocks were considered appropriate due to VT/VF, while 25 (37%) were inappropriate and occurred in 19 patients (8%). Myopotentials were the most frequent cause of inappropriate shocks (n=8), followed by T wave oversensing (n=6) and undersensing of the QRS, resulting in extreme lowering of the automatic gain and inappropriate shock (n=5). 74% of all IAS occurred on the primary vector, while no IAS occurred on the alternate vector. Seven of eight IAS (88%) related to myopotentials have occurred on the primary sensing vector, which may be related to the proximity to the pectoral muscle and the diaphragm. IAS caused by extreme gain of the sensitivity due to undersensing of QRS was related to air entrapment inside the generator pocket or defibrillator lead and accounted for 100% of IAS within the first 24 hours after successful implantation.
Conclusion: Inappropriate therapies are less frequent on the alternate sensing vector, which should encourage physicians to consider it more frequently. Primary sensing vector seems to be unfavorable with regard to oversensing caused by pectoral or diaphragmatic myopotentials. Larger studies are needed to define the optimal sensing vector in patients with a subcutaneous defibrillator system (S-ICD).

P916

Subcutaneous implantable cardioverter defibrillator implantation: an analysis of the Italian clinical practice and its evolution

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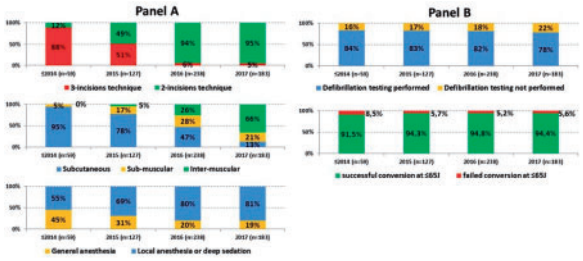
Background: The subcutaneous implantable cardioverter defibrillator (S-ICD) is a relatively novel alternative to the transvenous ICD for the treatment of life-threatening ventricular arrhythmias and is currently adopted in the clinical practice of several centers.
Purpose: The aim of this analysis was to describe current Italian practice associated with S-ICD implantation and its evolution over the years.
Methods: We analyzed 607 consecutive patients (78% male, 48±16 years) who underwent S-ICD implantation in 38 Italian centers from 2013 to 2017.
Results: Structural cardiomyopathy was present in 78% of patients and 30% of patients received their device for secondary prevention. The proportion of patients with dilated cardiomyopathy and with left ventricular ejection fraction $\leq$35% increased from $\leq$2014 to 2017 (from 38% to 58%, from 33% to 53%, respectively; both $p<0.05$). 97% of procedures were performed in the EP lab. Over the last 4 years (Panel A), the procedure evolved toward a wide adoption of the 2-incision technique, with the sub- or inter-muscular positioning of the generator, under local anesthesia or deep sedation ($\leq$2014 versus 2017: all $p<0.001$). Defibrillation testing was performed in 81% of patients. Shock energy of $\leq$65J was successful in 93.9% of patients and the overall cardioversion success rate with $\leq$80J was 99.8%. The use of testing slightly decreased over time, while the rate of successful conversion at $\leq$65J remained stable ($\leq$2014 versus 2017: both $p>0.05$; Panel B).
Conclusions: Our analysis confirmed that the S-ICD continue to be preferably adopted for specific patients (younger, less frequently with dilated cardiomiopathy and low ejection fraction, etc.). Nonetheless, over the years we noticed a trend to wider use of S-ICD. The implantation technique evolved and novel approaches were adopted. Nonetheless, the acute efficacy of the system remained stably high.



Abstract P916 Figure.

P917

Evaluation of a new automated screening tool for the assessment of the eligibility for a subcutaneous implantable-cardioverter defibrillator

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Background: The eligibility for subcutaneous implantable defibrillator (S-ICD) system relies on a pre-implant ECG-screening. A new ECG screening tool, automatic screening tool (AST), has been developed which makes manual ECG-screening unnecessary.
Purpose: To determine the eligibility for S-ICD system using both methods (conventional manual ECG-screening versus AST) in different patient categories in an academic center.
Methods: We prospectively evaluated the ECG suitability for an S-ICD in patients at our outpatient clinic between February and June 2017. The primary endpoint of our