Trends and Predictors of Implantable Cardioverted Defibrillator in Patients with Cardiac Arrest

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INTRODUCTION

- Sudden cardiac arrest (SCA) is a common cause of death in the United States and worldwide.
- In 2016, approximately 350,000 adult patients experienced SCA in the US with less than 15% chance of survival to hospital discharge.
- Based on superiority of Implantable Cardioverter Defibrillator (ICD) treatment, societal guidelines assigned a class IA indication for ICD implantation in survivors of SCA in whom no reversible etiology is identified
- However, there are limited available data on contemporary ICD utilization in this subgroup of patients

OBJECTIVE

- We evaluated a nationally representative sample of U.S. population to assess disparities in ICD usage across various subgroups in this patient population.

METHODS

- We identified patients ≥18 years of age with a primary discharge diagnosis of SCA (ICD 9: 427.5) from January 2003 to December 2014 using National Inpatient Sample (NIS)
- Patients who died during hospitalization and had previous ICD implant (ICD-9CM codes 37.97 and 37.98) were then excluded
- Furthermore, we excluded patients with any reversible causes of SCA from the final study cohort.
- Transmural myocardial infarction, tension pneumothorax, cardiac tamponade, pulmonary embolism, hypokalemia, hyperkalemia, hypothermia, and hypovolemia were defined as reversible causes of SCA.
- Baseline demographics and clinical features were studied.
- The primary outcome of interest was rates and trends of new ICD implants during the incident hospitalization.

RESULTS

- We identified a total of 623,257 patients with primary diagnosis of SCA and alive at hospital discharge.
- Of these, 73.2% had out of hospital CA (OHCA), and 33.6% had documented Ventricular Tachycardia/ Ventricular Fibrillation.
- The mean age of these patients was 64+/-15 years, 56.6% were males, and 70.6% were Caucasians.
- Out of this, only 43,323 (7.0%) patients were implanted with an ICD during incident hospitalization (Figure 1).
- There was a significant trend towards reduced ICD implantation during our study period (8.1%% in 2003 vs 6.5% in 2014, P trend < 0.0001) (Figure 1).
- OHCA, age< 65 years, male sex, Caucasians, and use of EP study were independently associated with higher ICD utilization.

Table 1: Baseline demographic and procedural characteristics of patients survived to hospital discharge after SCA

	Total SCA	IHCA	OHCA
SCA alive on hospital discharge	623,257	167,101 (26.8%)	456,156 (73.2%)
VT/VF	209,479 (33.6%)	52,514 (31.4%)	156,965 (34.4%)
Age; Mean (SD)	64 (15)	65 (15)	64(15)
Male (%)	352,766 (56.6%)	91,378 (54.7%)	261,388 (57.3%)
Caucasian (%)	369,459 (70.6%)	97,684 (66.6%)	271,775 (72.2%)
EP study (%)	10,533 (1.7%)	1,675 (1.0%)	8,858 (1.9%)
ICD implant on hospital discharge (%)	43,323 (7.0%)	6,955 (4.2%)	36,368 (8.0%)
ICD implant for VT/VF (%)	37011 (17.7%)	5,915 (11.3%)	31,096 (19.8%)

CONCLUSION

- The rates of ICD implantation in survivors of SCA due to irreversible cause are low and have also declined between 2003 and 2014
- Patients who did not receive an ICD were older and had a distinctive risk profile compared with those who received an ICD prior to discharge
- There is a need to identify barriers behind low ICD utilization in this vulnerable group and might have important health care policy implications.

LIMITATIONS

- Retrospective design of the study and possibility of varying coding practices of the hospital.
- NIS allows a detailed assessment of in-hospital outcomes. However, follow-up beyond hospital discharge is not available.
- We could not analyze the impact of certain important factors (medical staff awareness of the guidelines, patient's preference, etc.) on the utilization rates of ICD in this cohort

Figure 1: Trends in implantable cardioverter defibrillator implantation over study years, 2003–2014.

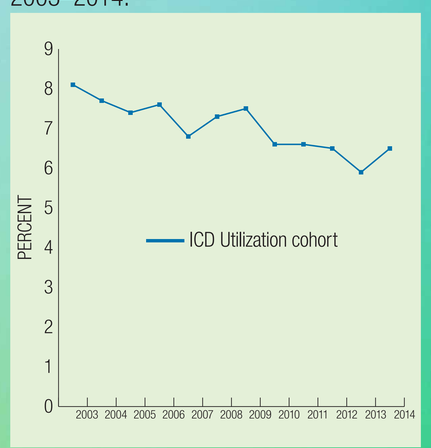
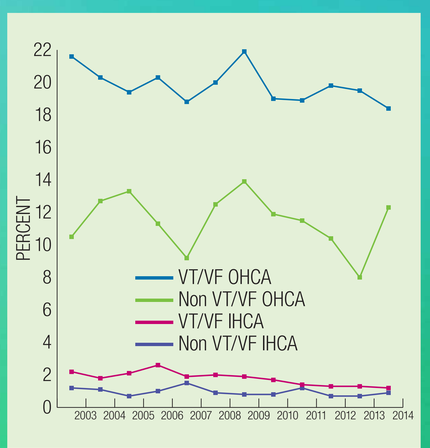


Figure 2: Trends in implantable cardioverter defibrillator implantation in subgroups



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