

CARDIAC ARRHYTHMIAS

CARDIAC IMPLANTABLE ELECTRONIC DEVICES IN LEBANON

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ABSTRACT • Objectives: The 2017 European Heart Rhythm Association (EHRA) White Book was published with cardiac implantable electronic device (CIED) data on European Society of Cardiology (ESC) member countries. Three countries (Lebanon, Libya and Syria) of the 56 ESC member countries did not have data. Hence, there was an unmet need to have CIED data estimate in Lebanon. **Methods:** Data from companies providing CIEDs in Lebanon was collected to have trends on CIED implants in Lebanon from the beginning of 2013 till the end of 2017. **Results:** In 2017, the total number of CIED implants was 1656: 983 (59.4%) were pacemakers and 673 (40.6%) were ICDs. Most CIED implants are dual chamber pacemakers. There has been a rise in the implantation of ICDs in Lebanon from 2013 till 2017. For instance, in 2013 the prevalence of CRT-D, dual chamber ICD, and single chamber ICD were 214, 64, and 268. In 2017, the prevalence of the different types of ICD became 243, 75, and 355. **Conclusion:** CIED implants have increased over the last several years in Lebanon in parallel with the number of cardiac electrophysiologists. It is important to have a national registry of CIED implants in Lebanon which will require financial support for its maintenance.

Keywords: pacemakers; implantable cardioverter defibrillators; ICDs; cardiac implantable electronic devices; CIEDs

RÉSUMÉ • Objectifs: Le livre blanc 2017 de l'European Heart Rhythm Association (EHRA) a été publié avec les données des dispositifs électroniques à implantation cardiaque (CIED) dans les pays membres de l'ESC (Société européenne de cardiologie). Trois pays (Liban, Libye, Syrie) parmi les 56 pays membres de l'ESC n'avaient pas de données. Il était donc nécessaire de disposer d'une estimation du nombre de CIED au Liban. **Méthodes:** Les données des entreprises fournissant des CIEDs au Liban ont été collectées pour dégager les tendances des CIEDs au Liban du début de 2013 à fin 2017. **Résultats:** En 2017, le nombre total d'implants CIED était de 1656: 983 (59,4%) étaient des stimulateurs cardiaques et 673 (40,6%) des défibrillateurs. La plupart des CIEDs sont des stimulateurs cardiaques à double chambre. Il y a eu une augmentation du nombre de défibrillateurs automatiques implantables (DAI) au Liban de 2013 à 2017. Par exemple, en 2013, la prévalence du DAI à triple chambre, DAI à double chambre, DAI à chambre unique était 214, 64 et 268. En 2017, la prévalence des différents types de DAI est devenue 243, 75, et 355. **Conclusion:** Les implants CIED ont augmenté au cours des dernières années au Liban et connu une croissance parallèlement au nombre de rythmologues. Il est important de disposer d'un registre national d'implants CIED au Liban, ce qui nécessitera un soutien financier pour son entretien.

Mots-clés: stimulateurs cardiaques; défibrillateurs automatiques implantables; ICDs; dispositifs électroniques à implantation cardiaque; CIEDs

INTRODUCTION

Sudden cardiac death (SCD) is a rising and a major public health concern in developed and developing countries. In the US, SCD claims around 450,000 victims annually [1]. Many studies have established the efficacy and importance of implantable cardioverter defibrillator (ICD) therapy in the prevention and reduction of mortal-

ity from SCD [2-4]. However, despite the established guidelines about the ICD in SCD, the implantation rates vary between countries.

Lebanon is considered part of the European Society of Cardiology (ESC) as a non-European ESC country and has been involved in the statistics released by the society concerning ICD prevalence, implantation rate, and indications. According to the statistics released by the ESC on 2013, Lebanon has 73 implantations of ICD per million inhabitants which is below the median (82) and the mean (100) compared to other European countries [5]. Lebanon falls in the lower half of the ESC countries regarding the incidence of ICD implantations per year. There are several explanations of the discrepancies in ICD implantation rates between countries. One could be that countries implanting more ICDs per year have higher replacement rates in the subsequent years.

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Another explanation could be that countries with highest ICD implantation rates are those with a healthcare system favorable of SCD prevention.

There is an absence of an official registry regarding cardiac implantable electronic devices (CIEDs) [Pacemakers and implantable cardioverter defibrillators] in Lebanon. It was estimated that around 900 CIED implantations are performed yearly in Lebanon. Among the 900 yearly implanted devices, around 300 are ICD and/or CRT-D (cardiac resynchronization therapy with defibrillator). In addition, device implantations including ICD are done mainly by cardiologists and around one third are performed by surgeons.

Device follow-ups are performed by electrophysiologists in around 60% of the cases, while the remaining are performed by industry technicians and non-electrophysiologist physicians [6].

The 2017 European Heart Rhythm Association (EHRA) White Book was published with CIED data on ESC member countries [7]. Three countries (Lebanon, Libya and Syria) of the 56 ESC member countries did not have data. Hence, there was an unmet need to have CIED data estimate in Lebanon

METHODS

Data from companies providing CIEDs in Lebanon was collected to have trends on CIED implants in Lebanon from the beginning of 2013 till the end of 2017.

RESULTS

In 2017, the total number of CIED implants was 1656: 983 (59.4%) were pacemakers and 673 (40.6%) were ICDs. Most CIED implants are dual chamber pacemakers (Figures 1 and 2).

There has been a rise in the implantation of ICD in Lebanon from 2013 till 2017 (Figure 3). For instance, in 2013 the prevalence of CRT-D, dual chamber ICD, and single chamber ICD were 214, 64, and 268. In 2017, the prevalence of the different types of ICD became 243, 75, and 355 (Figure 3).

DISCUSSION

This study fills an unmet need and fills the gap of providing recent data on CIED implants in Lebanon. The 2017 EHRA White Book was published with CIED data on ESC member countries with no data on Lebanon. Three countries (Lebanon, Libya and Syria) of the 56 ESC member countries did not have data in the 2017 EHRA White Book [7]. Hence, there was an unmet need to have CIED data estimate in Lebanon.

Our study shows a rise in CIED implants in Lebanon over the last few years with most CIED implants being dual chamber pacemakers. None of the implanted pacemakers in 2017 and in prior years was leadless. In August 2018, the first leadless pacemaker (Micra) in Lebanon was implanted at the American University of Beirut Medical

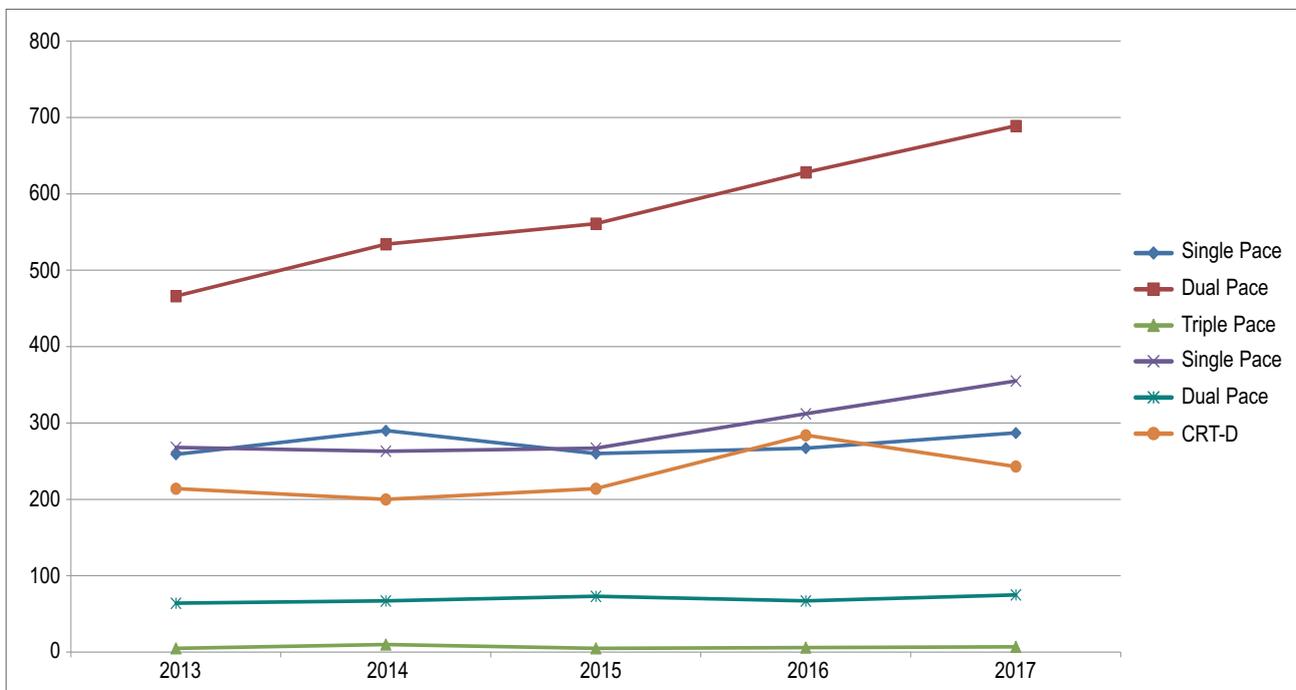


Figure 1. CIED implantation in Lebanon (2013-2017)

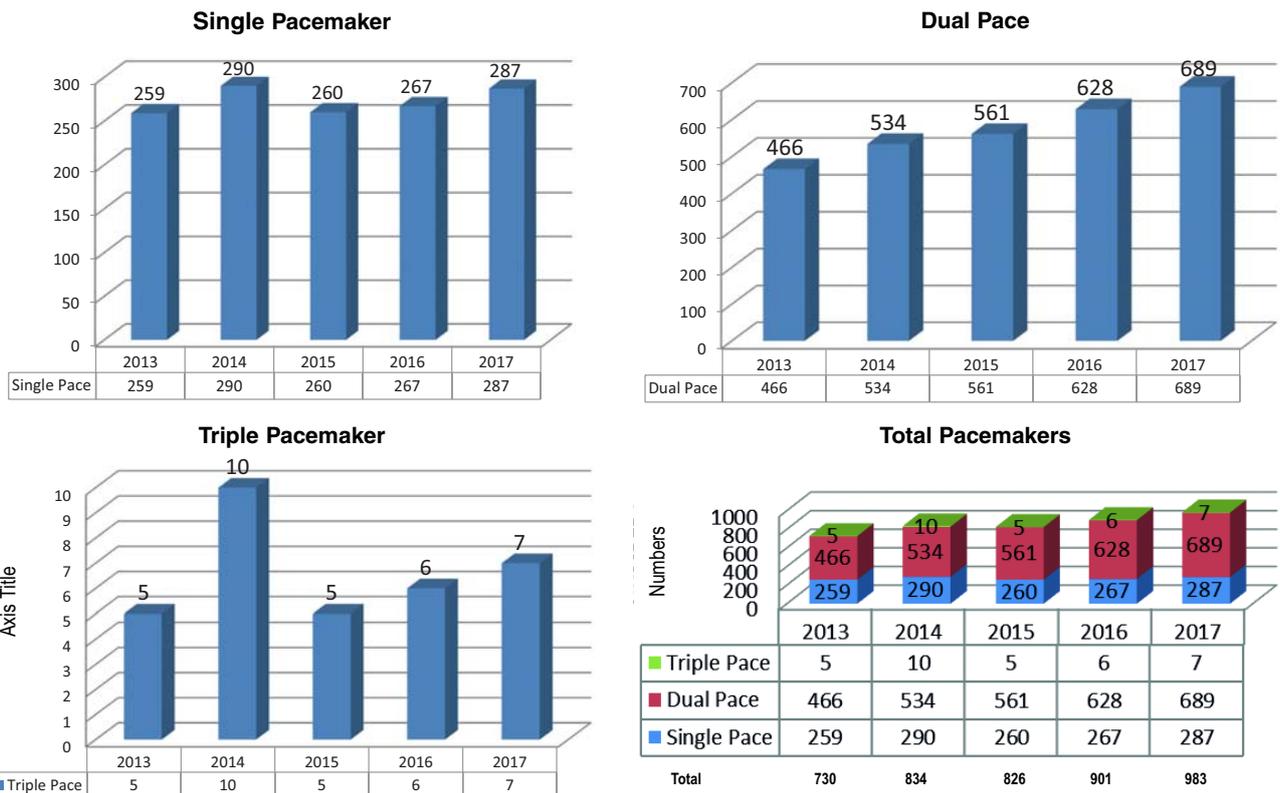


Figure 2. Pacemaker implantation in Lebanon (2013-2017)

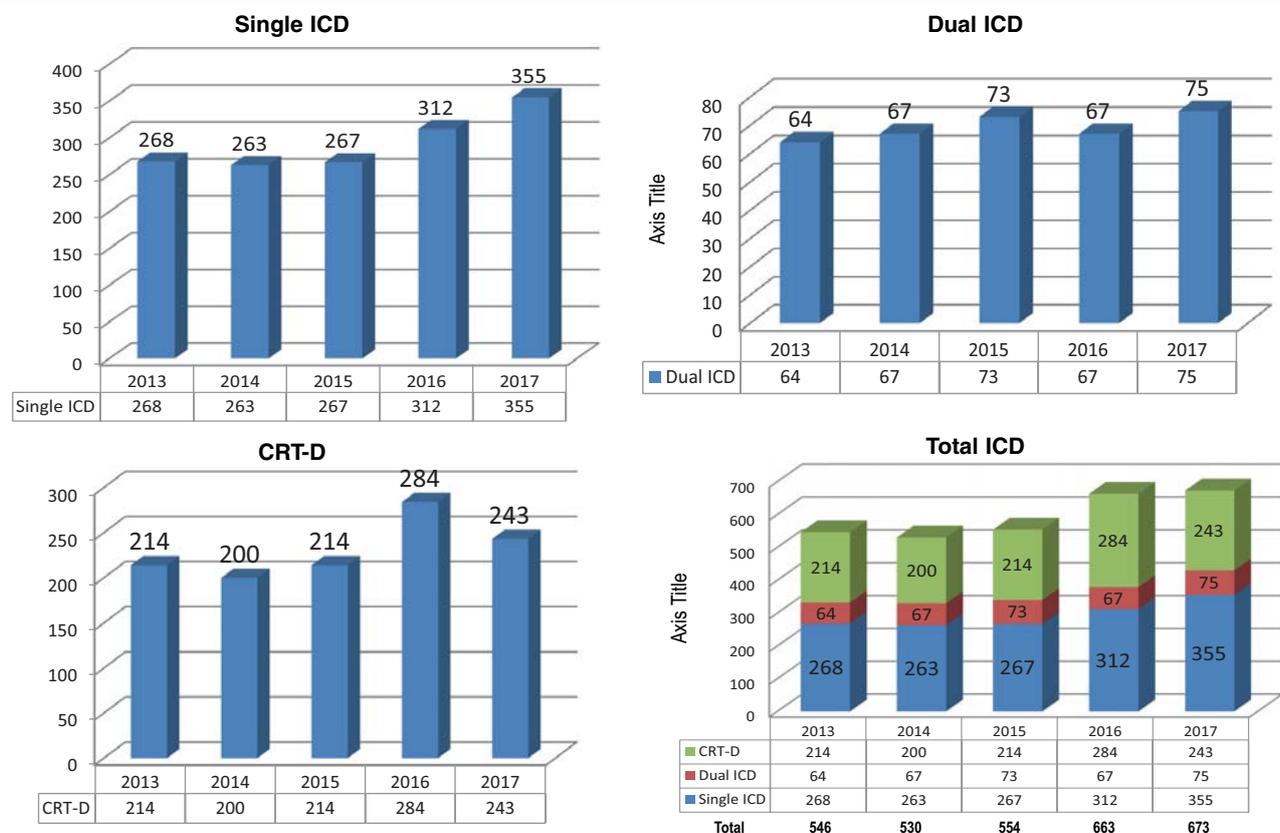


Figure 3. Implantable cardioverter defibrillator implantation in Lebanon (2013-2017)

Center (AUBMC). In April 2019, the first permanent HIS bundle pacemaker in Lebanon was successfully implanted at AUBMC.

This study shows an increase in the utilization of ICD in the Lebanese population which can be due to several reasons which include: population on the rise, increase in the lifespan of the population, better healthcare, improved diagnostic and procedural skills. A significant number of CIEDs in Lebanon are not supervised afterwards by a cardiac electrophysiologist [8].

There is a need of post implant device interrogation and programming to be always supervised by of a cardiac electrophysiologist to prevent complications [9].

There is sufficient evidence in the literature about the importance of ICD implantation in primary and secondary prevention of SCD. ICD implantation was shown to improve survival in patients with life-threatening ventricular arrhythmia. Several trials have investigated the role of ICD in secondary prevention of SCD, most notably were the Antiarrhythmics vs. Implantable Defibrillators (AVID) trial, the Cardiac Arrest Study Hamburg (CASH), and the Canadian Implantable Defibrillator Study (CIDS) [10-12]. Furthermore, the role of ICD implantation in primary prevention has been investigated and proven. Recent evidence suggests that ICD implantation improves survival in patients with left ventricular ejection fraction (LVEF) of 35% or less and New York Heart Association class II or III heart failure and those with a history of myocardial infarction and LVEF of 30% or less [4,13-14].

An ESC analysis has shown a significant correlation between the incidence of ICD implantation per million and the GDP ($r = 0.68, p < 0.0001$), the GDP per capita ($r = 0.79, p < 0.0001$), and the expenditure on health ($r = 0.69, p < 0.0001$). The type of the implanted ICD (single or dual chamber) was not significantly correlated to the GDP and expenditure on health. In addition, a weak correlation was found between ICD implant rates and the density of physicians. There was also a correlation between life expectancy rates and ICD implantation rates.

There was no association between healthcare indices like number of hospital beds and ICD implantation rates. Also, there was a significant influence of the presence of cardiac electrophysiology specialty on the ICD implantation rates [15]. CIED implants have increased over the last several years in Lebanon along with the number of cardiac electrophysiologists which reached around 20 [16].

CONCLUSIONS

CIED implants have increased over the last several years in Lebanon along with the number of cardiac electrophysiologists. It is important to have a national registry of CIED implants in Lebanon which will require financial support.

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