

# Physicians' knowledge and attitudes in Saudi Arabia regarding implantable cardiac defibrillators



Tariq Alhogbani <sup>a,\*</sup>, Fuad A. Awwad <sup>b</sup>, Abdullah S. Aljasser <sup>c</sup>

<sup>a</sup> Cardiology Department, King Khalid University Hospital, King Saud University, Riyadh

<sup>b</sup> Quantitative Analysis Department, Business Administration College, Riyadh

<sup>c</sup> Department of Medicine, King Fahad Medical City, Riyadh

<sup>a,b,c</sup> Saudi Arabia

**Objectives:** To evaluate knowledge and attitude of physicians involved in the management of patients with heart failure regarding implantable cardioverter-defibrillator (ICD).

**Methods:** We conducted personal interviews with physicians involved in treating patients with heart failure. Between October 2015 and February 2016, the study was conducted in hospitals in the Riyadh region where no cardiac electrophysiology service was available. Every participant was met in person and received an oral questionnaire that aimed to assess basic knowledge regarding ICD indications and benefits.

**Results:** Sixty-three physicians were met from 13 hospitals (14 consultants and 49 specialists). Forty-one percent of participants use the recommended cut-off level of left ventricular ejection fraction (LVEF) which is  $\leq 35\%$  as the LVEF criterion for ICD referral in patients with cardiomyopathy. Only 50% of the consultants use  $\leq 35\%$  as the LVEF criterion for ICD referral. Seventy percent of the participants thought that ICD may improve heart failure symptoms. Forty-eight percent of physicians have a defined channel to refer patients to higher centers for ICD implant. There was no statistically significant difference between physicians' knowledge when we categorized them according to three different factors: (1) physician's specialty (cardiology vs. internal medicine); (2) physician's degree (consultant vs. specialist); and (3) physician's location (inside vs. outside Riyadh city).

**Conclusion:** There is a lack of knowledge of current clinical guidelines regarding ICD implantation for patients with heart failure at general hospitals in Saudi Arabia. This finding highlights the need to improve the dissemination of guidelines to practitioners involved in managing patients with heart failure in an effort to improve ICD utilization.

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\* Corresponding author at: Cardiology Department, King Khalid University Hospital, King Saud University, Riyadh 12376 King Abdullah Road, Saudi Arabia.

E-mail address: [tariqmfh@yahoo.com](mailto:tariqmfh@yahoo.com) (T. Alhogbani).



P.O. Box 2925 Riyadh – 11461KSA  
Tel: +966 1 2520088 ext 40151  
Fax: +966 1 2520718  
Email: [sha@sha.org.sa](mailto:sha@sha.org.sa)  
URL: [www.sha.org.sa](http://www.sha.org.sa)



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## 1. Introduction

Cardiovascular disease (CVD) is the leading cause of death in developed countries, with sudden cardiac death (SCD) accounting for ~45% of all cardiovascular deaths [1]. Implantable cardioverter-defibrillators (ICD) are more efficacious in preventing SCD than medical therapy in patients with ischemic and nonischemic cardiomyopathy [2–4]. The most recent guidelines issued by the American College of Cardiology and the American Heart Association (ACC/AHA) [5] recommend the implantation of an ICD for primary prevention of SCD in patients with ischemic and nonischemic cardiomyopathy, a left ventricular ejection fraction (LVEF) of 35% or less.

Research has highlighted the underutilization of ICD implantation [6,7]. Studies done in the United States [8,9], United Kingdom [10], New Zealand [11], and Sweden [12] showed an important awareness gap and a common discordance between referring physicians' knowledge and clinical guidelines of ICD implantation. There are no prior studies in Saudi Arabia to highlight this issue. If there is a lack of such knowledge, underutilization and inequality in the distribution of such life-saving technology among eligible patients may happen. The aim of our study was to evaluate knowledge and attitudes of physicians regarding ICD therapy.

## 2. Materials and methods

### 2.1. Study population

Physicians involved in the study were from different hospitals in Riyadh regions where cardiac electrophysiology service is not available. We did not include hospitals that have such a service because we think they are not the focus of our study question as cardiac devices implant is very common practice in those hospitals. Furthermore, we want to assess accessibility to the referral channels by physicians who do not have cardiac electrophysiology service at their hospitals. Physicians included in the study are those who manage or contribute in the management of patients with heart failure. At each hospital, we met either chief of medical staff or the head of the medical department to identify those physicians. All participants were aware that our survey was performed for research purposes and results might be published. The study was approved by the Research Ethics Committee at King Saud University, Riyadh, Saudi Arabia.

### Abbreviations

ICD	implantable cardioverter-defibrillator
LVEF	left ventricular ejection fraction
SCD	sudden cardiac death

### 2.2. Study survey

All physicians were met in person (Appendix 1). Prospectively, the survey took place from October 2015 to February 2016. None of the physicians had the chance to read our survey before the meeting. The survey was developed according to the latest ACC/AHA guidelines [5]. The first part of the survey included questions aimed to assess physician's knowledge required to identify illegible patients for ICD implant. The second part was a series of questions to ascertain physicians' attitude regarding ICD therapy beneficial effects. The last question was if the physician has a well defined access to refer the illegible patients to a center where cardiac devices are available for implant.

### 2.3. Statistical analysis

Physicians' answers were reviewed and analyzed as being correct or wrong. Descriptive statistics were used to describe the frequency of results. A participant's demographic and attitudes to ICDs were described using frequency analysis. Chi-square test of independence was used in order to test the association between physician's knowledge and demographic factors namely hospital's location, physician's specialty, and physician's degree. A *p* value <0.05 was considered significant.

## 3. Results

A total of 13 out of 15 hospitals were included from different cities in the Riyadh region. Two hospitals were not included because we could

Table 1. Physicians' demographic characteristics.

	Frequency	Percentage
<i>Hospital's Location:</i>		
Inside Riyadh	39	62%
Outside Riyadh	24	38%
<i>Physician's Specialty:</i>		
Cardiologist	16	25%
Internist	47	75%
<i>Physician's Degree:</i>		
Consultant	14	22%
Specialist	49	78%

Table 2. Frequency distribution of knowledge and awareness regarding ICD use.

Question	Correct response, n (%)
What is LVEF cut-off to consider ICD implant?	26(41)
Does ICD improve heart failure symptoms?	18(28)
Does ICD prevent sudden cardiac death due to arrhythmia?	51(81)
ICD might be beneficial regardless the etiology of heart failure (Ischemic versus nonischemic)	46(73)

ICD = implantable cardioverter-defibrillator; LVEF = left ventricular ejection fraction.

Table 3. Comparisons between physicians' knowledge according to certain factors. Two significant p-values were found (in bold) in favor of higher knowledge among participants work in cardiology.

	Hospital location (inside vs outside Riyadh)		Physicians' specialty (cardiology vs. internal medicine)		Physicians' degree (consultant vs. specialist)	
	Chi-square	p-value	Chi-square	p-value	Chi-square	p-value
LVEF criterion for ICD implant	0.51	0.472	0.12	0.73	0.43	0.5
Presence of a known referral channel to participants	0.55	0.46	6.44	<b>0.01</b>	0.65	<b>0.41</b>

ICD = implantable cardioverter-defibrillator; LVEF = left ventricular ejection fraction.

not get an appropriate permission to meet any physician in person. Included hospitals were six in Riyadh and seven in other cities (Almajmaah, Shagra, Alhotah, Alaflaj, Huraimela, Thadeg, and Duruma). Sixty-three physicians were met in person. All eligible physicians were met. The number of physicians was different in each hospital depending on its size. Table 1 shows physicians' demographic characteristics. All physicians named by their directors to participate in the study claimed that they manage patients with heart failure. We found that 11% of participants were not aware of ICD devices. Only 41% of participants who were aware of ICD devices used 35% or less as a cut-off LVEF criterion to consider a referral for ICD implant. The rest of the participants (59%) used either a higher or lower than the cut-off LVEF recommended by AHA/ACC guidelines. Table 2 shows the frequency distribution of knowledge regarding ICD use. Only 48% of participants have a well known channel to refer eligible patients to a higher center.

### 3.1. Factors associated with physicians' knowledge

Three possible factors were evaluated: (1) hospital location (inside vs. outside Riyadh); (2) participant's specialty (cardiology vs. internal medicine); and (3) participant's degree (consultant vs. specialist as categorized by participant's hospital). There was no statistically significant difference found among participants considering these factors independently regarding the current LVEF criterion for ICD implantation referral. There was not a statistically significant difference

between consultants and specialist regarding their knowledge regarding ICD. These results are summarized in Table 3.

Forty-eight percent of participants thought that they have available and trustworthy way to refer illegible patients to a higher center for device implantation. Table 3 (bottom row) shows differences in this regard between participants according to three factors as specified. Cardiologists had a clearer way for referral than those participants working in internal medicine.

## 4. Discussion

The study provides a real opportunity to evaluate the current state of physicians' knowledge in Saudi Arabia regarding ICD use at hospitals where cardiac electrophysiology service is not available. It reflects their current practice regarding referring patients for such important therapy in certain cases of cardiomyopathy. The results show an impairment in basic knowledge which is the key to determine eligible patients for implantation referral. For instance, 59% of participants did not know the recommended LVEF which is 35% or less to consider ICD therapy. Approximately half of them gave a lower cut-off value which means missing eligible patients. Surprisingly, the knowledge of those who practice cardiology only was not higher than internists regarding the recommended LVEF criterion to consider ICD use.

In addition to the major question regarding the indication for ICD implant, there were three ques-

tions to explore further basic knowledge (Table 2). Major clinical trials of ICD such as MADIT II (Multicenter Automatic Defibrillator Implantation Trial II) [3] and SCD-HeFT (Sudden Cardiac Death in Heart Failure Trial) [13] showed the benefit of ICD in preventing sudden cardiac death in both ischemic and nonischemic cardiomyopathy. Most of the participants were aware of this. However, this does not improve the correct patient referral rate. ICD does not improve heart failure symptoms as most of the participants thought.

Several potential factors may explain the lack of up-to-date knowledge among physicians. We think the most important factor is that most of the physicians who manage heart failure in the included hospitals were not cardiologists (75% were internists). Busy practice patterns and perception of these physicians in other specialties of internal medicine are also major factors.

Our study has several strong points. All physicians were met in person at their hospitals by our research assistants without a prior notification regarding the content of the survey. Participants were not selected randomly. They were named by their directors. Although this may result in a selection bias as the hospital director may want to present his institute by the best knowledgeable physicians in cardiology, this would not change the conclusion of the study which showed a lack of knowledge. Furthermore, there is no special local registration particularly at the level of specialists to guide us for the total number of eligible physicians. The survey assessed only essential knowledge that enable physicians make the appropriate indication and appreciation of such therapy. We included specialists as well as consultants as this reflects the real practice at some hospitals where a specialist is the primary physician of the patient.

Several studies were completed in different countries regarding physicians' knowledge of ICD. In the United states [8,9], ~60% of participants (family physicians and general cardiologist) use  $\leq 35\%$  as the LVEF criterion for ICD referral. One study in the United Kingdom [10] also showed a significant lack of knowledge among general practitioners regarding ICD implantation. Only 43% were aware of the UK ICD National Institute of Clinical Excellence guidelines. One study in New Zealand [11] showed that 62% of participants (family physicians and cardiologists) reported familiarity with international guidelines for ICD therapy. One study in Sweden [12] revealed only 15% of participants (internists and cardiologists) showed an acceptable awareness of

ICD indication which was predefined as recognizing that LVEF  $\leq 35\%$  alone, without a history of ventricular tachycardia, is sufficient to warrant a primary prophylactic ICD. Our study showed either similar or greater lack of knowledge among participants when compared with similar studies done in other countries.

In conclusion, there is a lack of knowledge of current clinical guidelines regarding indications of ICD implantation for patients with heart failure at general hospitals in Saudi Arabia.

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## Appendix A.

### Questionnaire (Via personal interview) Section A:

- Your Specialty:  
–Cardiologist –Internal medicine
- Degree:  
–Consultant – Specialist
- Do you see patients with heart failure? –Yes –No
- Do you manage or contribute in management of patients with heart failure? –Yes –No

### Section B:

- Do you know implantable cardioverter-defibrillator (ICD) device?  
–Yes – No
- ICD might be considered for LV EF that is:  
[ ]  $< 45\%$  [ ]  $< 35\%$  [ ]  $< 25\%$  [ ]  $< 15\%$  [ ] any heart failure [ ] Do not know
- ICD:  
– helps cardiac output by pacing –Yes –No – Do not know  
– improves heart failure symptoms –Yes –No – Do not know  
– Prevents sudden cardiac death due to arrhythmia –Yes –No – Do not know
- ICD might be beneficial regardless the etiology of heart failure (ischemic VS nonischemic) –Yes – No – Do not know
- If a patient needs ICD, do you know the available channels to refer patient? –Yes –No – If yes, brief explanation:

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