International Journal of Medical Informatics 114 (2018) 76–80

Contents lists available at ScienceDirect

International Journal of Medical Informatics

journal homepage: www.elsevier.com/locate/ijmedinf

Impact of a hybrid decision support system to improve the adherence to implantable cardioverter defibrillator therapy guidelines for primary prevention of sudden cardiac death

Nicolás Vecchio[a,*], Diego Belardi[b], Mariano Benzadón[c], Leonardo Seoane[d], Gustavo Daquarti[e], Fernando Scazzuso[f]

[a] Electrophysiology Fellowship, Instituto Cardiovascular de Buenos Aires, Argentina
[b] Staff, Electrophysiology Service, Kaiser Permanente Colorado, United States
[c] Chief, Intensive Care Unit, Director of Quality, Safety and Patient Experience Instituto Cardiovascular de Buenos Aires, Argentina
[d] Staff, Intensive Care Unit, Instituto Cardiovascular de Buenos Aires, Argentina
[e] Nuclear Medicine Fellowship, Instituto Cardiovascular de Buenos Aires, Argentina
[f] Chief, Electrophysiology Service, Instituto Cardiovascular de Buenos Aires, Argentina

ARTICLE INFO

Keywords:
Hybrid decision support system
Implantable cardioverter defibrillator
Guidelines adherence
Health quality

ABSTRACT

Objectives: Despite the well-documented benefit of implantable cardioverter defibrillator (ICD) in patients with severe left ventricular dysfunction, there is a large number of patients who had not been offered this therapy.

The aim of this study is to evaluate the utility of a hybrid decision support system (hCDSS) to improve the adherence to indicate ICD therapy in our institution.

Methods: We conducted a retrospective, observational and single-center study. An hCDSS focused on patients with severe deterioration of the left ventricular function was implemented, creating a mandatory field containing the value of left ejection fraction and three options to choose: > 35%, ≤ 35% or unknown. When the option ≤ 35% is checked, an email is automatically sent to the electrophysiology section where the staff can contact the treating physician to discuss the indication of ICD therapy.

We measured the number of ICDs implanted before the alert (month 1–21), immediate post and late post alert (month 22–27 and 28–48 months respectively)

Results: The rate of ICD implantation increased from 1.76% per month in the pre-intervention period to 4.48% after the intervention ($p < 0.001$). This increase in the rate of ICD implantation remained stable between the immediate and late post-intervention period (4.6 vs. 4.4; $p = .8$)

Conclusion: The implementation of a hybrid decision support system was associated with improved adherence to clinical guidelines for prevention of sudden cardiac death, as evidenced by a rapid and sustained increase in the number of ICD implants in patients with severe left ventricular dysfunction.

1. Introduction

There is abundant evidence about the utility of implantable cardioverter-defibrillator (ICD) therapy to prevent sudden cardiac death in patients with severe left ventricular dysfunction [1–5].

According to local and international guidelines for primary prevention of sudden cardiac death in heart failure, ICD implant is a class I indication in patients with severe left ventricular dysfunction and heart failure [6–8]. However, the adherence to these guidelines is usually low.

The electronic medical record (EMR) and particularly clinical decision support systems (CDSS) are tools that aid clinical decision making and improve patient's quality of care when they are correctly designed and used. Several studies demonstrated that these tools improve the adherence to guidelines [9–13].

However, the impact of CDSS on adherence to ICD implant guidelines has not been documented yet.

The aim of this study is to evaluate the utility of a hybrid decision support system to improve the adherence to indicate ICD therapy in our institution.

* Corresponding author.
E-mail address: nvecchio@icba.com.ar (N. Vecchio).

https://doi.org/10.1016/j.ijmedinf.2018.03.016
Received 17 November 2017; Received in revised form 24 March 2018; Accepted 26 March 2018
1386-5056/ © 2018 Elsevier B.V. All rights reserved.

2. Methods

2.1. Study design and population

We conducted a retrospective, observational and single-center study (Instituto Cardiovascular de Buenos Aires, Argentina).

We included consecutively all patients older than 18 years who were attended at the outpatient clinic of our institution due to severe left ventricular dysfunction – defined as left ventricular ejection fraction (LVEF) less than or equal to 35%) – determined by echocardiogram, cardiac magnetic resonance or Gated SPECT, with implantation of an ICD device for primary prevention according to the last guideline on prevention of sudden cardiac death published by the Argentine Society of Cardiology and the 2008 AHA/ACC/HRS guideline [7,8].

Patients who were not evaluated in the outpatient clinic of our institution, or had been hospitalized for ICD generator change or with indication of ICD implant as secondary prevention of sudden cardiac death were excluded from the analysis.

2.2. Hybrid decision support systems

Our institution has an electronic medical record system based on the SQL language for both outpatient and inpatient settings.

The CDSS software provides suggestions of diagnosis or treatment based on the patient data entry. A hybrid clinical decision supporting system (hCDSS) was developed merging the CDSS (that acts from the EMR asking the LVEF), with an automatic consultation e-mail that allows the attending physician to discuss the indication of an ICD with a specialist. It was also developed following the principles of good system design: a precise intervention based on clinical practice guidelines widely accepted, preserving physician's autonomy while improving patient quality of care, with a simple user-centered design [14,15].

When entering a patient's EMR for the first time, it is mandatory to check certain risk factors as hypertension, smoking habits or diabetes, among others. In September 2012, a hCDSS was implemented to evaluate the likelihood of indicating ICD therapy, creating a mandatory field containing the value of left ejection fraction and three options to choose: > 35%, ≤ 35% or unknown (Fig. 1).

When the option ≤ 35% is checked, an email is automatically sent to the electrophysiology section where, after evaluating the clinical record, the staff can contact the treating physician to discuss the indication of ICD therapy (Fig. 2).

2.3. Data collection

The hCDSS was implemented in September 2012. The sample was divided into three periods: pre-intervention (month 1 to month 21; January 2011 – September 2012); immediate post-intervention (month 22 to month 27; October 2012 – March 2013) and late post-intervention (month 28 to month 48; April 2013 – December 2014) periods.

The ICD implantation rate per month was measured using the information contained in the data base of the electrophysiology unit. Other procedures, as ablation of arrhythmias or pacemaker implantation were also analyzed before and after the implementation of the hCDSS to determine if the higher implantation rate was associated with the use of the hCDSS or was due to higher volume of work in the electrophysiology unit.

The EMR of each patient was analyzed, confirming the date of the device was implanted, the correct indication and follow-up at the institutional outpatient clinic. The following data were collected: baseline characteristics of the population, procedure-related complications and medical treatment before and after the intervention in order to evaluate the indication of ICD implantation. Appropriate and inappropriate shocks were recorded during the post-intervention follow-up period at the outpatient clinic.

2.4. Statistical analysis

Discrete variables are expressed as percentages and continuous variables as mean with its corresponding standard deviation or median with its corresponding interquartile range, according to their distribution. The chi square test was used to compare discrete variables and

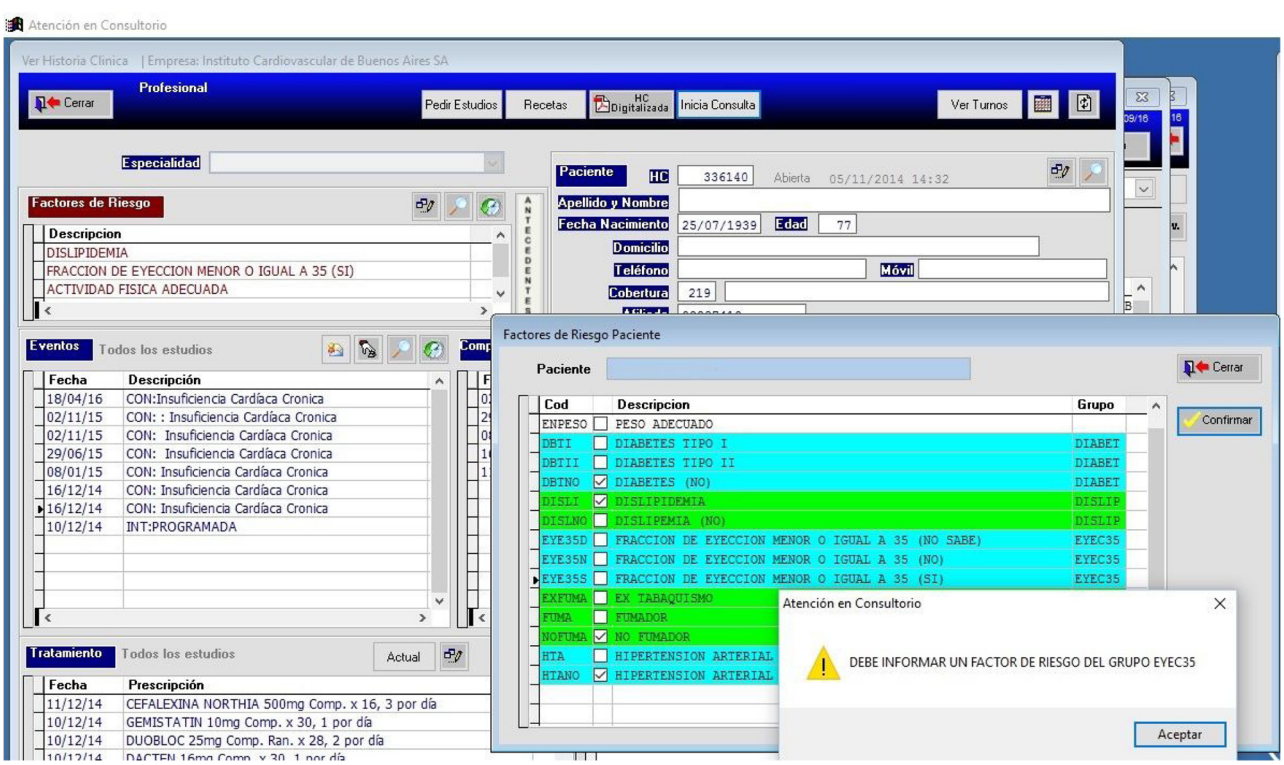

Fig. 1. Patient form where a warning box is observed reminding to enter the ventricular ejection fraction.

Download English Version:

https://daneshyari.com/en/article/6926255

Download Persian Version:

https://daneshyari.com/article/6926255

Daneshyari.com