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Impact of a structured educational intervention on attitudes and practice of heart failure in Latin America

Impacto de una intervención educativa estructurada en las actitudes y la práctica de la insuficiencia cardiaca en Latinoamérica

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Abstract

Objective: *The implementation of heart failure (HF) guidelines in actual practice is rarely adequate and most patients do not receive optimal treatments. Our aim was to assess changes in attitudes, knowledge, confidence, and care pathways of HF patients among physicians in Argentina after a structured educational intervention.* **Methods:** *Cross-sectional survey in 22 public and private health centers of physicians who participated in a comprehensive multi-module educational program (patient identification, classification/therapeutic options in advanced HF, structure/organization of the HF Day Hospital, education of patients in different stages/scenarios, and education of nursing staff in the management of patients at different stages/scenarios). Simple evidence-based roadmaps were created to address knowledge gaps.* **Results:** *The intervention improved physicians' confidence in the diagnosis of HF with preserved ejection fraction ($p < 0.001$), and prioritization of quadruple therapy for outpatients ($p = 0.01$) and patients with acute HF ($p < 0.001$). The proportion of "confident"/"very confident" physicians in identifying HF patients with reduced ejection fraction who could benefit from an implantable cardioverter-defibrillator increased significantly ($p = 0.01$), as did the relevance of hypertonic saline administration and intravenous iron infusions. The use of discharge checklists increased significantly after the intervention.* **Conclusions:** *This multifaceted, structured intervention was effective in improving physicians' confidence and attitudes, as well as their knowledge and care pathways of HF patients in Argentina.*

Keywords: *Heart failure. Educational intervention. Attitudes. Argentina.*

Resumen

Objetivo: *La implementación de las guías de insuficiencia cardiaca (IC) en la práctica real rara vez es adecuada y la mayoría de los pacientes no reciben tratamientos óptimos. Nuestro objetivo fue evaluar los cambios de actitudes, conocimientos, confianza y vías de atención de los pacientes con IC entre los médicos de Argentina tras una intervención educativa estructurada.* **Métodos:** *Encuesta transversal en 22 centros sanitarios públicos y privados a médicos que participaron de un programa educativo integral de múltiples módulos (identificación de pacientes, clasificación/opciones terapéuticas en IC avanzada, estructura/organización del Hospital de Día de IC, educación de pacientes en diferentes estadios/escenarios y educación del personal de enfermería en el manejo de pacientes en diferentes estadios/escenarios). Se crearon hojas de ruta sencillas*

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basadas en la evidencia para abordar las lagunas de conocimiento. **Resultados:** *La intervención mejoró la confianza en el diagnóstico de IC con fracción de eyección preservada (p < 0.001), y la priorización de la terapia cuádruple para pacientes ambulatorios (p = 0.01) y con IC aguda (p < 0.001). La proporción de médicos "seguros"/"muy seguros" en la identificación de pacientes con IC con fracción de eyección reducida que podrían beneficiarse de un desfibrilador cardioversor implantable aumentó significativamente (p = 0.01), así como la relevancia de la administración de suero salino hipertónico e infusiones intravenosas de hierro. El uso de listas de control al alta aumentó significativamente tras la intervención.* **Conclusiones:** *Esta intervención multifacética y estructurada fue eficaz para mejorar la confianza y las actitudes, así como los conocimientos y las vías de atención de los pacientes con IC entre los médicos de Argentina.*

Palabras clave: *Insuficiencia cardiaca. Intervención educativa. Actitudes. Argentina.*

Introduction

The prevalence rate of heart failure (HF) remains an important healthcare problem worldwide[1]. HF is characterized by significant morbidity and mortality rates, poor functional capacity, low quality of life, and high healthcare costs[2]. The importance of international[3-5] and local[6] clinical practice guidelines for the diagnosis and management of patients with HF is highlighted. Nevertheless, the implementation of clinical practice guidelines and their translation to real-world practice is seldom adequate and most patients do not receive an evidence-based optimal treatment[7,8].

The available data about physicians' opinions and attitudes regarding HF management are scarce in Latin America. The initial evidence from a multicenter, cross-sectional survey showed knowledge gaps both in the diagnosis and treatment of HF[9], highlighting the importance of implementing educational strategies to improve the quality of care of these patients and their clinical outcomes. According to the study findings[9], key aspects to focus educational strategies for physicians include the identification of the clinical profiles of patients with HF for foundational drugs and their importance, the most common problems that may occur when starting medications and their solution, the diagnosis of HF with preserved ejection fraction (HFpEF), and the importance of comorbidities in HF, particularly iron deficiency[10].

The aim of this study was to evaluate the subsequent changes of attitudes, knowledge, confidence, and care pathways of patients with HF among physicians in Argentina after an educational intervention.

Methods

Study design

The study design was thoroughly described in our pre-interventional report[9]. Briefly, we conducted a cross-sectional, self-administered survey to evaluate patterns, attitudes, and perceptions regarding the diagnosis, treatment, and follow-up of HF inpatients and outpatients in 22 public and private healthcare centers. Survey respondents were physicians who voluntarily participated in a comprehensive educational program for the care of patients with HF, conducted between March and July, 2021.

Survey characteristics

An online, self-administered, anonymous survey of 55 questions regarding the diagnosis, treatment, follow-up, and multidisciplinary, long-term management of patients with HF was sent to all participants using Google Forms® in March, 2021. The questions were developed based on the recommendations of contemporary clinical practice guidelines and expert opinions[9]. Self-reported confidence in practice decisions and knowledge was rated using a 5-point Likert scale (1: not confident at all; 2-4: somewhat confident; 5: completely confident).

Intervention phase

The aim of the educational intervention was to optimize the diagnosis and treatment of these patients, both in outpatient and inpatient settings, based on a training program in HF clinics with a total load of 30 h and a final exam.

The training program in HF clinics had multiple modules: identification of patients with HF, including epidemiology and risk stratification; classification and therapeutic options in advanced HF; structure and organization of HF Day Hospitals; education of the patient with HF at different stages and scenarios; and education of nurse staff in the management of patients with HF at different stages and scenarios.

Simple evidence-based roadmaps (including criteria for referral to HF specialists, anemia management, and

discharge preparation checklist, among others) were created to address the knowledge gaps identified in this pre-intervention phase.

Statistical analysis

Data obtained from multiple-choice questions were analyzed using descriptive statistics. Continuous variables were expressed as mean and standard deviation, or median and interquartile range (IQR), according to their distribution. Categorical variables were expressed as numbers and percentages. The Wilcoxon test was used for pre-post comparisons. A two-tailed p-value < 0.05 was considered significant. The statistical analysis was performed using the IBM® SPSS® Statistics 25.0 statistical package (IBM Corp., Armonk, NY, USA). Due to the study design, no sample size calculation was needed.

Ethical issues

Our study was designed to examine the perceptions and knowledge of physicians rather than to collect information from patients. In addition, an informed consent was not necessary. Due to the study design, an institutional or central review board was not necessary. Healthcare professionals did not receive any honoraria or incentives for their participation.

Results

Basal characteristics of physicians and patients

Fifty physicians from 22 healthcare centers in 11 Argentine provinces completed the survey and participated in the educational intervention. The mean age was 41 ± 8 years and 86% of them were cardiologists, with a median time since medical graduation of 13 years (IQR: 4-10). The main characteristics are summarized in table 1. The participant physicians assisted a median of 8 outpatients with HF (IQR: 4-10) per week, and 74% of the physicians who assisted hospitalized subjects saw a median of 4 patients (IQR: 2-6) with acute HF. Among the HF patients assisted, 40% (IQR: 30-60%) were 50 to 70 years old and 43% (IQR: 25-60) were older than 70 years. The most frequent comorbidities included diabetes mellitus (60%; IQR: 30-80%), anemia (30%; IQR: 15-50%), chronic kidney disease (30%; IQR: 20-50), and iron deficiency (20%; IQR: 10-40%). The proportion of patients with left ventricular ejection fraction < 40% was 60% (IQR: 45-75). The main etiologies of HF were ischemic heart disease (50%; IQR: 40-60%) and hypertension (20%; IQR: 10-35%).

Table 1. Main baseline characteristics

Physicians	
Age, mean ± standard deviation	41 ± 8 years
Time since graduation, median (IQR)	13 years (7-20)
Specialties, %	
Cardiology	86%
Internal medicine	12%
Endocrinology	2%
Working sector, %	
Private centers/social security	34%
Public centers	14%
Both private and public centers	52%
Centers	
Total number of beds/center, median (IQR)	65 (16-150)
Total number of beds/center for cardiovascular patients, median (IQR)	12 (8-25)
Centers with a critical care unit, %	80
Centers with an HF unit, %	28
Centers with a specific HF clinic, %	59
Centers with a palliative care service, %	18
Centers with a hospital day-case unit, %	12
Availability of natriuretic peptides determination and heart catheterization, %	60-70
Availability of heart transplantation, %	10
Availability of a ventricular assist service, %	15

IQR: interquartile range.

Synthesis of basal survey results

Full results of the survey have been previously published[9]. Briefly, the best-ranked signs and symptoms for HF diagnosis were paroxysmal nocturnal dyspnea, orthopnea, and pulmonary rales, while the most relevant diagnostic tests were determination of left ventricular ejection fraction and renal function. Among surveyed physicians, 44% reported feeling "very uncertain" about the diagnosis in patients with HF with preserved ejection fraction (HFpEF) and 24% felt "very uncertain" about the diagnosis of HF in subjects with comorbidities.

When asked about pharmacological treatment, physicians reported that the most frequent initial drug combination treatment was quadruple therapy with a beta-blocker, a sodium-glucose cotransporter-2 inhibitor (SGLT2i), a mineralocorticoid receptor antagonist (MRA), and an angiotensin-converting enzyme inhibitor (ACEI) or angiotensin II receptor blocker (ARB). Half of

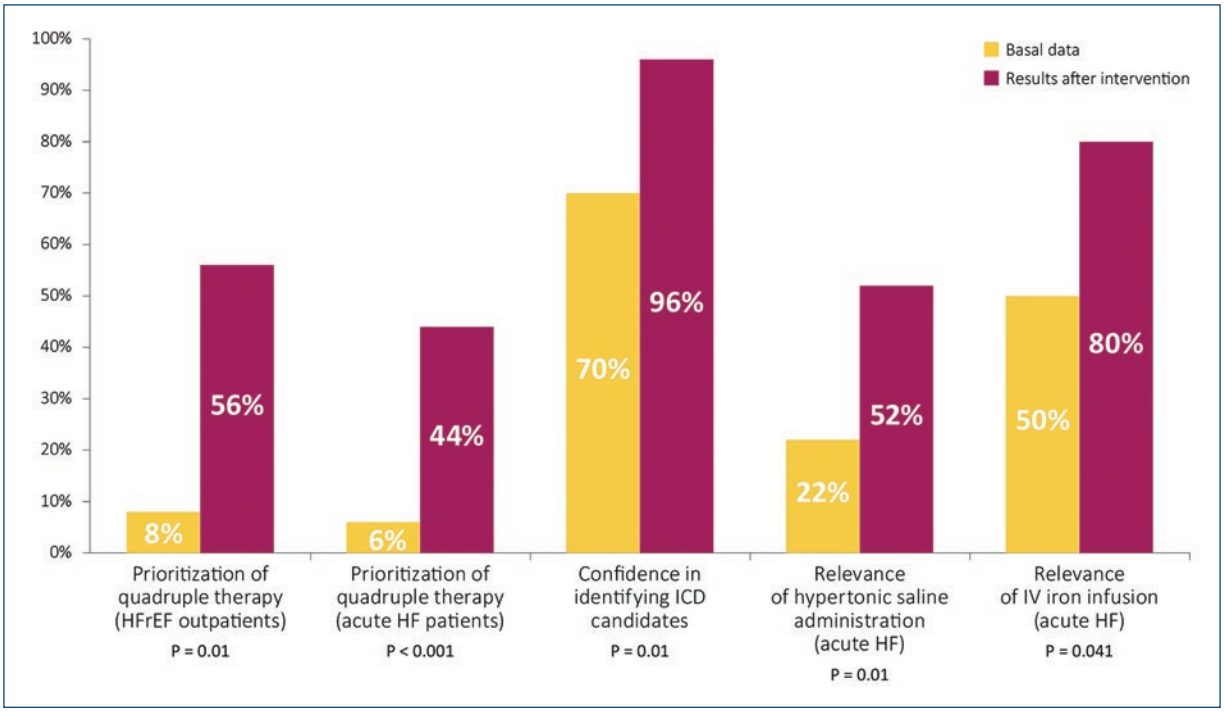

Figure 1. Main treatment changes after intervention. HF: heart failure; HRrEF: HF with reduce ejection fraction; ICD: implantable cardioverter-defibrillator. Quadruple therapy: beta-blocker (BB) + sodium-glucose cotransporter-2 inhibitor (SGLT2i) + mineralocorticoid receptor antagonist (MRA) + angiotensin receptor-neprilysin inhibitor (ARNI) or angiotensin-converting enzyme inhibitor (ACEI)/angiotensin II receptor blocker (ARB).

the participants felt confident to identify patients with an indication of cardiovascular rehabilitation and 20% felt confident to indicate cardiac transplantation.

Survey respondents reported a median time of 14 days (IQR: 7-15) from discharge to the first follow-up visit. Seventy-four percent of patents did not count with a discharge checklist.

Intervention results

The educational intervention significantly increased physicians' confidence in diagnosing HFpEF. Baseline survey results showed that 52% of participants felt "confident" or "very confident", while this proportion reached 84% after the intervention ($p < 0.001$).

Baseline prioritization of quadruple therapy (SGLT2i, MRA, beta-blocker, and angiotensin receptor-neprilysin inhibitor [ARNI]) for HF patients was 8% for outpatients with HFrEF and 6% for patients with acute HF. Both rates increased significantly after the intervention (56%, $p = 0.01$ and 44%, $p < 0.001$, respectively). No significant differences were found in the reported time to optimal medical treatment when comparing baseline and post-intervention data ($p = 0.7$).

The proportion of physicians who felt "confident" or "very confident" in identifying patients with HFrEF who may benefit from an implantable cardioverter-defibrillator (ICD) increased from 70% at baseline to 96% after the intervention ($p = 0.01$).

According to baseline data, the administration of hypertonic saline was considered "relevant" or "very relevant" by 22% of participants; this proportion increased to 52% ($p = 0.01$) after the intervention. The respective results for intravenous iron infusion were 50 and 80% ($p = 0.041$). All results are summarized in figure 1.

The use of a discharge checklist was reported by 26% of physicians in the baseline survey. This rate increased to 48% after the intervention ($p = 0.05$).

Discussion

This multifaceted, structured intervention was effective in improving attitudes, knowledge, confidence,

and care pathways of patients with HF among physicians, mostly cardiologists, in 22 centers in Argentina. These findings are worth noting when considering the reported gaps between local and international guideline recommendations and real-world therapeutic decisions, both for outpatient and inpatient settings. In addition, this simple, high-impact, reproducible strategy may lead to better management of patients with HF, improving outcomes in this population characterized by high morbidity and mortality rates.

As reported in the baseline survey, a low proportion of physicians felt confident in the diagnosis of HFpEF. This condition is increasingly common; nevertheless, compensated patients presenting with exertional dyspnea without overt clinical, radiographic, or biomarker evidence of congestion may represent a diagnostic challenge[11]. Higher confidence in this diagnosis would lead to earlier management, according to evidence-based recommendations, with better prognosis.

In the present guidelines, the comprehensive disease-modifying quadruple therapy (ARNI, SGLT2i, beta-blocker, and MRA) is considered the standard of care, leading to a 73% relative reduction in the mortality rate over 2 years[12]. However, difficulties and barriers for consistent implementation of these therapies in routine practice have been identified in real-world registries, including CHAMP-HF[8]. According to our baseline survey, a quadruple therapy was implemented in 24% of patients, while a triple therapy (mainly a combination of an ACEI/ARB, a beta-blocker, and a MRA) was the most used scheme (32%). Prioritization of a quadruple therapy for outpatients with HFrEF significantly increased among participant physicians after the intervention, both in outpatients and inpatients with acute HF. Present data support in-hospital initiation of quadruple medical therapy for patients with HFrEF as a practical, effective, and patient-centered strategy[13], possibly leading to better outcomes.

Quadruple guideline-directed medical therapy has also reduced sudden cardiac death rates; in addition, ICD therapy is indicated in a subset of patients with HFrEF[14]. Nevertheless, in recent European real-world registries, only 15.5% of patients with an indication for primary prevention ICD received this therapy[15]. Increasing the confidence in identifying candidates to ICD may lead to a reduced mortality rate in this vulnerable subset of patients with HFrEF.

Even though real-world evidence demonstrates that hypertonic saline administration is associated with increased fluid and weight loss, as well as improved diuretic efficiency in selected patients with acute HF[16], physicians' concerns are still considered a barrier for its implementation. In addition, adequately powered, multicenter, placebo controlled, randomized studies to fully assess the benefits of this strategy in patients with diuretic resistance on optimal HF therapy are still lacking. Of note, our intervention led to a significant increase in the relevance of this therapeutic strategy that may optimize clinical outcomes for inpatients with acute HF.

It is worth noting that awareness of the high prevalence of iron deficiency and anemia, as well as their clinical consequences in patients with HF, is increasing[17]. Randomized controlled trials have demonstrated benefits in correcting iron deficiency, irrespective of anemia status, in chronic HF patients treated with intravenous iron infusions[18]. The relevance of this treatment strategy has also significantly increased among participant physicians after the intervention.

Our analysis has several limitations. First, the study design was an observational survey. Second, physicians were part of a training program, which could represent a bias toward more motivated participants. Third, the interpretation of the initial questions in the survey was left to the discretion of the responding physicians. Fourth, the lack of a control group reduced the accuracy of our results. Fifth, due to the self-administered design of the survey, subjective and social desirability biases could not be excluded.

Nevertheless, several strengths are highlighted. First, due to its real-world nature, our patient population is far more representative than those recruited in randomized controlled trials. Second, its multicenter design allows the inclusion of large patient and physician samples, of heterogeneous characteristics. Third, our study is probably the first of its kind in Latin America and provides relevant insights to optimize the management of patients with HF in local settings. Fourth, our results are consistent with previous research in different settings, highlighting the important knowledge gaps in HF management[19].

Conclusion

A multifaceted, structured, reproducible educational intervention was effective in improving knowledge and attitudes about the diagnosis and management of patients with HF among physicians in Argentina. The results of the present study demonstrate that an educational intervention can increase their knowledge and improve clinical attitudes in the diagnosis of HFpEF, as well as the management of outpatients and hospitalized patients with HFrEF. Further studies are needed to determine the potential generalization of our results.

Funding

The information has been collected and analyzed by the researchers and AstraZeneca only participated in the publication process, for which the processes related to the collection and analysis of primary or secondary data were not carried out by the sponsor. AstraZeneca just found out an educational grant for the educational program, which included webinars, workshops, materials, courses, and all the contents of the educational intervention. This survey with the participation of healthcare professionals did not include patient data and no comparisons or specific mention of any AstraZeneca product was considered.

Conflicts of interest

Lucrecia Ma. Burgos, Ma. Lorena Coronel, and Jorge Thierer have received honoraria as speakers for AstraZeneca.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The study does not involve patient personal data nor requires ethical approval. The SAGER guidelines do not apply.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

References

1. Emmons-Bell S, Johnson C, Roth G. Prevalence, incidence and survival of heart failure: a systematic review. Heart. 2022;108:1351-60.
2. Savarese G, Becher PM, Lund LH, Seferovic P, Rosano GM, Coats AJ. Global burden of heart failure: a comprehensive and updated review of epidemiology. Cardiovasc Res. 2023;118:3272-87.
3. Heidenreich PA, Bozkurt B, Aguilar D, Allen LA, Byun JJ, Colvin MM, et al. 2022 AHA/ACC/HFSA guideline for the management of heart failure: a report of the American College of Cardiology/American Heart Association joint committee on clinical practice guidelines. J Am Coll Cardiol. 2022;79:e263-421.
4. McDonald M, Virani S, Chan M, Ducharme A, Ezekowitz JA, Giannetti N, et al. CCS/CHFS heart failure guidelines update: defining a new pharmacologic standard of care for heart failure with reduced ejection fraction. Can J Cardiol. 2021;37:531-46.
5. McDonagh TA, Metra M, Adamo M, Gardner RS, Baumbach A, Böhm M, et al. 2021 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. Eur Heart J. 2021;42:3599-726.
6. Fernández A, Thierer J, Fairman E, Giordanino E, Soricetti J, Belziti C, et al. Consenso de insuficiencia cardíaca 2022. Rev Argent Cardiol. 2023;91:1-80.
7. Lescano A, Soracio G, Soricetti J, Arakaki D, Corone L, Cáceres L, et al. Argentine registry of acute heart failure (ARGENIC). Evaluation of a partial cohort at 30 days. Rev Argent Cardiol. 2020;88:118-25.
8. Greene SJ, Butler J, Albert NM, DeVore AD, Sharma PP, Duffy CI, et al. Medical therapy for heart failure with reduced ejection fraction: the CHAMP-HF registry. J Am Coll Cardiol. 2018;72:351-66.
9. Burgos L, Coronel ML, Thierer J. Attitudes and clinical practice in heart failure among physicians in Argentina. Rev Argent Cardiol. 2022; 90:193-205.
10. Saldarriaga Giraldo CI. From guidelines to real world: knowledge as a solution to implement the evidence. Rev Argent Cardiol. 2022;90:163-64.
11. Reddy YN, Carter RE, Obokata M, Redfield MM, Borlaug BA. A simple, evidence-based approach to help guide diagnosis of heart failure with preserved ejection fraction. Circulation. 2018;138:861-70.
12. Greene SJ, Khan MS. Quadruple medical therapy for heart failure: medications working together to provide the best care. J Am Coll Cardiol. 2021;77:1408-11.
13. Bhagat AA, Greene SJ, Vaduganathan M, Fonarow GC, Butler J. Initiation, continuation, switching, and withdrawal of heart failure medical therapies during hospitalization. JACC Heart Fail. 2019;7:1-12.
14. Butler J, Talha KM, Aktas MK, Zareba W, Goldenberg I. Role of implantable cardioverter defibrillator in heart failure with contemporary medical therapy. Circ Heart Fail. 2022;15:e009634.
15. Schrage B, Lund LH, Benson L, Dahlström U, Shadman R, Linde C, et al. Predictors of primary prevention implantable cardioverter-defibrillator use in heart failure with reduced ejection fraction: impact of the predicted risk of sudden cardiac death and all-cause mortality. Eur J Heart Fail. 2022;24:1212-22.
16. Griffin M, Soufer A, Goljo E, Colna M, Rao VS, Jeon S, et al. Real world use of hypertonic saline in refractory acute decompensated heart failure: a U.S. center's experience. JACC Heart Fail. 2020;8:199-208.
17. Grote Beverborg N, Van Veldhuisen DJ, Van Der Meer P. Anemia in heart failure: still relevant? JACC Heart Fail. 2018;6:201-8.
18. Shamsi A, Cannata A, Piper S, Bromage DI, McDonagh TA. Treatment of iron deficiency in heart failure. Curr Cardiol Rep. 2023;25:649-61.
19. Gupta M, Bell A, Padarath M, Ngui D, Ezekowitz J. Physician perspectives on the diagnosis and management of heart failure with preserved ejection fraction. CJC Open. 2021;3:361-6.