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ORIGINAL RESEARCH

Evidence-based clinical standard for the diagnosis and treatment of chronic heart failure in adults in the outpatient setting

Estándar clínico basado en la evidencia para el diagnóstico y tratamiento de la insuficiencia cardíaca crónica en adultos en el escenario ambulatorio

Guillermo Mora-Pabón[1,2] John Contreras-Ceballos[1] Rubén Darío Cárdenas-Granados[2] Alejandro Vega-Molina[3] Sugeich Meléndez-Rhenals[1] Ángel Yobany Sánchez-Merchán[4,5] Dayan Amazo-Arias[6] Camilo Ernesto Povea-Combariza[7,8] Andrés Felipe-Guerrero[8] Harold Betancourt-Pérez[9] Ingrid Jany Guzmán[8] Romar Baquero-Galvis[10] Jaime David Navarro-Cárdenas[10] Javier Amaya-Nieto[10] Giancarlo Buitrago[10,11]

[1] Universidad Nacional de Colombia - Bogotá Campus - Faculty of Medicine - Department of Internal Medicine - Bogotá D.C. - Colombia.
[2] Hospital Universitario Nacional de Colombia - Hospitalization Care Process - Bogotá D.C. - Colombia.
[3] Universidad Nacional de Colombia - Bogotá Campus - Faculty of Medicine - Department of Diagnostic Imaging - Bogotá D.C. - Colombia.
[4] Universidad Nacional de Colombia - Bogotá Campus - Faculty of Medicine - Department of Pathology - Bogotá D.C. - Colombia.
[5] Hospital Universitario Nacional de Colombia - Clinical Laboratory and Pathology Care Process - Bogotá D.C. - Colombia.
[6] Universidad Nacional de Colombia - Bogotá Campus - Faculty of Nursing Department of Community Health - Bogotá D.C. - Colombia.
[7] Universidad Nacional de Colombia - Bogotá Campus - Faculty of Medicine - Department of Physical Medicine and Rehabilitation - Bogotá D.C. - Colombia.
[8] Hospital Universitario Nacional de Colombia - Rehabilitation and Human Development Care Process - Bogotá D.C. - Colombia.
[9] Hospital Universitario Nacional de Colombia - Pharmaceutical Service Care Process - Bogotá D.C. - Colombia.
[10] Universidad Nacional de Colombia Bogotá Campus - Faculty of Medicine - Clinical Research Institute - Bogotá D.C. - Colombia.
[11] Hospital Universitario Nacional de Colombia - Research and Innovation Department - Bogotá D.C. - Colombia.

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Corresponding author: Guillermo Mora-Pabón. Departamento de Medicina Interna, Facultad de Medicina, Universidad Nacional de Colombia. Bogotá D.C. Colombia.
E-mail: gmorap@unal.edu.co.

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Abstract

Introduction: Heart failure (HF) is a complex clinical condition caused by a structural or functional cardiac abnormality that results in elevated intracardiac pressures or inadequate cardiac output at rest or during physical activity. It is characterized by multiple symptoms that significantly affect the patient's quality of life. HF may present as acute or chronic (CHF). CHF relates to individuals with a confirmed diagnosis of HF or who exhibit a slower onset of symptoms. The global incidence and prevalence of HF have increased substantially and will continue to do so due to population aging.
Objective: To identify the clinical indications for the diagnosis and treatment of CHF in adults in the outpatient setting by developing an evidence-based clinical standard (EBCS) at a national referral university hospital in Bogotá, Colombia.
Materials and methods: Once the development group was created and the scope and objectives of the EBCS were defined, systematic searches were conducted in April 2021 in MEDLINE, Embase, and LILACS, as well as in development agencies and compilers of clinical practice guidelines (CPGs), to identify CPGs published within the last 5 years that met these objectives and scope. The quality of the selected CPGs was evaluated using the AGREE II instrument. A preliminary proposal for the EBCS (clinical algorithm and recommendations) was developed using the selected CPGs, which was then validated by means of an interdisciplinary consensus (modified Delphi methodology).
Results: Ten CPGs were selected. After reaching full agreement at the interdisciplinary consensus, a three-section clinical algorithm was developed: "diagnosis of outpatients with CHF," "classification and initial treatment of outpatients with preserved or mildly reduced CHF," and "treatment of outpatients with CHF with reduced left ventricular ejection fraction." Furthermore, key aspects were defined for implementing the algorithm and the clinical recommendations, as well as for evaluating and monitoring their implementation, referred to as checkpoints (section 4).
Conclusion: The evidence-based clinical recommendations included in this EBCS contribute to standardizing practices and actions related to the diagnosis and treatment of CHF in adult outpatients in Colombia and even in the region.

Resumen

Introducción. La insuficiencia cardíaca (IC) es una condición clínica compleja causada por una anomalía estructural o funcional cardíaca que resulta en presiones intracardiacas elevadas o un gasto cardiaco inadecuado en reposo o ejercicio y que se caracteriza por múltiples síntomas que afectan significativamente la calidad de vida del paciente. La IC tiene dos presentaciones clínicas: la aguda y la crónica (ICC). La ICC se refiere a personas con un diagnóstico confirmado de IC o que presentan un inicio más gradual de los síntomas. La incidencia y prevalencia globales de la IC han aumentado notablemente y seguirán aumentando debido al envejecimiento poblacional.
Objetivo. Identificar las indicaciones clínicas para el diagnóstico y tratamiento de la ICC en adultos en el escenario ambulatorio mediante el desarrollo de un estándar clínico basado en la evidencia (ECBE) en un hospital universitario de referencia nacional de Bogotá, Colombia.
Materiales y métodos. Una vez conformado el grupo desarrollador y definidos el alcance y los objetivos del ECBE, en abril de 24 de 2021 se realizaron búsquedas sistemáticas en MEDLINE, Embase y LILACS y en organismos desarrolladores y compiladores de guías de práctica clínica (GPC) para identificar GPC publicadas en los últimos 5 años que respondieran a dichos objetivos y alcance. La calidad de las GPC seleccionadas fue evaluada con el instrumento AGREE II. Con base en las GPC seleccionadas se desarrolló una propuesta preliminar de EBCE (algoritmo clínico y recomendaciones) que fue validada mediante un consenso interdisciplinario (metodología Delphi modificada).
Resultados. Se seleccionaron 10 GPC. Luego de lograr un acuerdo total en el consenso interdisciplinario se consolidó un algoritmo clínico de 3 secciones: "diagnóstico del paciente ambulatorio con ICC", "clasificación y tratamiento inicial del paciente ambulatorio con ICC preservada o ligeramente reducida" y "tratamiento del paciente ambulatorio con ICC con fracción de eyección del ventrículo izquierdo reducida". Además, se definieron aspectos claves para la implementación del algoritmo y las recomendaciones clínicas y para la evaluación y seguimiento de su implementación, denominados como puntos de control (sección 4).
Conclusión. Las recomendaciones clínicas basadas en la evidencia incluidas en este ECBE contribuyen a estandarizar las prácticas y acciones relacionadas con el diagnóstico y tratamiento de la ICC en pacientes ambulatorios adultos en Colombia e incluso la región.

Introduction

Heart failure (HF) is a complex clinical syndrome caused by a structural or functional cardiac abnormality that results in elevated intracardiac pressures or inadequate cardiac output at rest or during physical activity.[1] It is characterized by symptoms such as dyspnea (the most commonly reported symptom),[2] orthopnea, paroxysmal nocturnal dyspnea, fatigue, and reduced exercise tolerance, among others, which may be accompanied by clinical signs such as elevated jugular venous pressure, pulmonary crackles, or peripheral edema.[1]

The diagnosis and classification of HF is based primarily on the presence and severity of symptoms and on physical examination findings.[2] HF is typically divided into two clinical presentations: chronic heart failure (CHF) and acute heart failure (AHF). CHF refers to individuals with a confirmed diagnosis of HF or who exhibit a more gradual onset of symptoms.[1] When CHF worsens, either abruptly or gradually, the episode is described as "decompensated" HF.[1] AHF usually presents with signs of congestion. While patients with AHF generally experience overt respiratory distress, orthopnea, and paroxysmal nocturnal dyspnea, patients with CHF tend to reduce their physical activity, meaning that symptoms may go unnoticed in his scenario. As a consequence, it is essential to identify the factors that trigger acute decompensation, such as recent infections, poor adherence to cardiac drug therapy, use of nonsteroidal anti-inflammatory drugs (NSAIDs), or increased salt intake.[2]

The etiology of HF is variable and broad,[1,2] but it has been reported that coronary artery disease is its most common cause; however, other factors such as hypertension, valvular heart disease, and myocarditis also contribute to its development.[2] Identifying the etiology of the underlying cardiac dysfunction is imperative for diagnosing HF, as the specific condition may determine the treatment to be implemented.[1]

The overall management for HF aims to relieve systemic and pulmonary congestion and stabilize hemodynamic condition, regardless of the etiology. The specific treatment for these patients depends on the classification of HF based on left ventricular ejection fraction (LVEF) and its staging according to functional capacity and symptom severity (New York Heart Association classification - NYHA classification).[2] Regardless, treatment requires a multifaceted approach that includes patient education, optimal medication management, and reduction of acute exacerbation episodes.[2]

Furthermore, although the age-adjusted incidence of HF may be declining in developed countries,[1] the overall incidence has increased worldwide due to population aging,[1-5] since, irrespective of the cause or definition used to classify HF, its prevalence increases significantly with age.[2] This was demonstrated in the Framingham Study,[6] (prevalence of HF of 8 cases per 1 000 men aged 50-59 vs. 66 cases per 1 000 men aged 80-89) and in the European Society of Cardiology (ESC) clinical practice guidelines (CPG) for the diagnosis and treatment of acute and chronic heart failure (prevalence of around 1% in people under 55 and >10% in people aged 70 or over).[1] It has also been reported that, from the age of 65 onwards, the incidence of HF in men increases twofold with each 10-year increase in age, whereas it increases threefold in women.[2]

Worldwide, approximately 64.3 million people live with HF,[2,4] for a global prevalence of between 1% and 2% in the adult population.[1,3] In Europe, the incidence of this condition in adults is 5 cases per 1 000 person-years.[1] Nevertheless, it should be noted that the true prevalence is likely to be higher because the studies reporting these data usually include only recognized/diagnosed cases of HF.[1] Regarding the proportion of the different

types of HF based on LVEF, the ESC Heart Failure Long-Term Registry reports that 60% of patients with CHF have reduced HF, 24% have mildly reduced HF, and 16% have preserved HF in the outpatient setting.[1]

In addition to being a common condition worldwide, HF has high morbidity and mortality rates, contributing to increased healthcare costs and reduced functional capacity and quality of life for these patients. Concerning mortality, Tsao *et al.*,[7] conducted a study using data from the Framingham Heart Study (FHS) and Cardiovascular Health Study cohorts, reporting a mortality rate of 67.4% within the first 5 years following diagnosis.

In Colombia, unfortunately, epidemiological information on HF is scarce. Gómez,[8] in a study published in 2016, reported that the estimated prevalence of this condition in the country is 2.3% (around 1 097 201 patients) and that, according to data from the Social Protection Information System, the mortality rate from HF in 2012 was 5.54 per 100 000 inhabitants.

It is worth pointing out that although the prognosis for these patients has improved significantly since the publication of the first therapeutic trials several decades ago, their prognosis remains poor and the reduction in quality of life is still considerable.[1] This is the result of the fact that, despite the development of several pharmacological interventions in recent years, treatment has not led to an improvement in quality of life or a reduction in the number of hospitalizations.[2]

According to the ESC HF Long-Term Registry, adherence to CPG recommendations has a direct positive correlation with survival. In other words, the more recommendations are followed, the greater the likelihood of survival of these patients.[9]

Comprehensive care for adult outpatients with CHF involves health care professionals from various fields, namely internal medicine, cardiology (clinical and interventional), electrophysiology, physical medicine and rehabilitation, sports medicine, therapeutic support and rehabilitation, pharmacy, radiology, clinical laboratory, and nursing. For this reason, standardizing practices and actions involved in the diagnosis and treatment of these patients is essential to reduce management variability in this clinical setting, optimizing the use of resources and improving the quality of care provided to this population. According to the literature, accurately diagnosing and effectively treating the disease is essential to prevent recurrent hospitalizations, decrease morbidity and mortality, and improve patient outcomes.[2]

In light of the above, the objective of this article is to identify the clinical indications for the diagnosis and treatment of CHF in adults in the outpatient setting by developing an evidence-based clinical standard (EBCS) at a national referral university hospital in Bogotá, Colombia.

Materials and methods

This EBCS was developed through a sequential seven-phase process proposed by the Hospital Universitario Nacional de Colombia, in collaboration with the Universidad Nacional de Colombia and the Instituto de Investigaciones Clínicas (Clinical Research Institute) of the Universidad Nacional de Colombia. The phases are described below:

Formation of the development group

The development group comprised experts in cardiology, internal medicine, and clinical epidemiology (a methodological leader with experience in the development of clinical

standards, two health care professionals with training in evidence-based medicine, a second-year internal medicine resident, and a cardiology specialist with experience in the treatment of outpatients with CHF), who participated in online meetings to establish the methodological, technical, and thematic guidelines for the formulation of the EBCS recommendations. Prior to agreeing to join the development group, all members completed a conflict-of-interest disclosure form.

EBCS scope definition and objectives

The EBCS scope was established based on the following elements: i) target population on which the recommendations will be used; ii) special populations on which the recommendations can be used, such as indigenous peoples, Afro-descendant communities, rural populations, etc., to ensure health equity; iii) aspect of the condition or disease to be addressed (treatment, diagnosis, prevention, follow-up, etc.); iv) aspects of the condition or disease that are beyond the scope of the recommendations; v) health care context (outpatient consultation, inpatient service, surgery service, intensive care, etc.); and vi) specialties, areas, or health services involved in the implementation and use of the recommendations.

This EBCS is intended to develop a clinical algorithm for the diagnosis and treatment of adult patients with CHF treated in the outpatient department of a national referral university hospital in Bogotá based on the best available evidence. It should be noted that the EBCS does not contain recommendations for the pediatric population (<18 years of age) or pregnant women.

The recommendations included in the EBCS are aimed at healthcare workers involved in the care of adult patients with CHF (general practitioners, internal medicine physicians, cardiologists [clinical cardiology, electrophysiology, and interventional cardiology], radiologists, nurses, and specialists in physical medicine and rehabilitation, sports medicine, therapeutic support and rehabilitation, pharmacy, and clinical laboratory). Furthermore, it was established that the recommendations could also be used by health sciences students (undergraduate and graduate) who are involved in the care of these patients during their clinical practice, their professors, and the health care or administrative staff of the health care institutions in charge of making decisions regarding the treatment and follow-up of this population.

The general and specific objectives of this EBCS were defined based on a literature review, an analysis of the care areas involved in the management of these patients, and an interdisciplinary consensus. The formulated objectives clearly and succinctly describe the purpose of the EBCS. Checkpoints and guidelines for the dissemination and implementation of the EBCS were also included in its preparation.

Systematic review of clinical practice guidelines

Systematic searches in MEDLINE, EMBASE and LILACS, as well as in clinical practice guideline (CPG) development and compiling agencies were conducted using controlled language and sensitive electronic search strategies to identify CPGs that met the stated objective and scope (Supplement 1). Searches were conducted on April 24, 2021. The CPG screening and selection process was carried out taking into account the following eligibility criteria established by the development group:

Inclusion criteria

- CPGs on the diagnosis and treatment of CHF in adults.
- CPGs published in English or Spanish with full-text access.
- CPGs published within the last 5 years at the time of performing the searches.

Exclusion criteria

- CPGs with an overall quality assessment <6 according to the AGREE II instrument[10] and a score <60% in the methodological rigor and editorial independence domains.
- CPGs on the diagnosis and treatment of CHF in pediatric patients, pregnant women, and inpatients.

Evidence was screened by reviewing titles and abstracts, as well as the full text of the papers identified in the systematic searches. This process was performed independently by a member of the development team and a member of the methodology team. It was agreed that any discrepancies would be resolved by a third member (methodological leader): there was disagreement on the inclusion of two documents, which were ultimately excluded following the third reviewer's evaluation. The quality of the selected CPGs was assessed using the AGREE II instrument;[10] this process was also carried out independently by two members of the development group: a clinical expert and a methodological expert.

Preliminary algorithm development

The development group used the selected CPGs to draft a preliminary proposal of the EBCS (clinical algorithm plus checkpoints [key recommendations for implementing the algorithm and clinical recommendations and for evaluating and monitoring their implementation]). To extract the evidence contained in the 10 selected CPGs, an information extraction table was created using a domain system. After reviewing the evidence gathered during several meetings, the development group elaborated the proposed clinical algorithm and recommendations for the diagnosis and treatment of adult patients with CHF. These recommendations included the level of evidence for each of the CPGs used to formulate the recommendation. Importantly, the level of evidence is presented following the evidence grading system used in the CPG.

Developing an interdisciplinary agreement

After identifying the health areas/services involved in the comprehensive care process of adult patients with CHF, representatives of these services at the national reference university hospital where the EBCS was developed were appointed. They received the draft of the clinical algorithm for their assessment prior to attending a consensus meeting.

The consensus meeting took place on February 5, 2022, and was attended by representatives of the following hospital care services: internal medicine, cardiology, physical medicine and rehabilitation, nursing, pharmacy, radiology, clinical laboratory and pathology, physical therapy, and sports medicine. Clinical leaders were responsible for the presentation of the preliminary algorithm (flowcharts) and the meeting was moderated by a research methodologist.

Three sections of the EBCS (algorithm), as well as an additional section on checkpoints, were presented at the meeting. Using the modified Delphi methodology and a 9-point Likert scale, it was possible to evaluate the level of agreement among the participants with the information presented in each section. The results of the five polls confirmed that all participants of the interdisciplinary consensus group fully endorsed the use of the recommendations for the diagnosis and treatment of patients with CHF contained in the flowcharts presented below. More detailed information on this step is available in the full text of this EBCS.[11]

Final algorithm development

Once the interdisciplinary consensus was achieved, the development team met and consolidated the suggestions made at the consensus meeting and based on them, modified the preliminary algorithm of the document.

EBCS review and editing

The final activity of the process involved the revision of the document's wording and layout, resulting in the final version of the EBCS.[11] As in the preliminary proposal, the recommendations include the level of evidence for each CPG used to formulate the recommendation, and the level of evidence is presented in accordance with the evidence grading system used in each CPG.

Results

Systematic search for CPGs

The preliminary searches retrieved 613 records. After removing duplicates (n=46), a total of 567 studies were identified, of which 527 were excluded at the title and abstract review stage. Then, out of the 40 documents that were fully read, 10 CPGs were selected for quality assessment using the AGREE II instrument.[10] Lastly, during the methodological quality assessment stage, no CPGs were excluded. The 10 CPGs that met the eligibility criteria and were finally included for evidence review are listed in Table 1. The evidence search, screening, and selection process is summarized in Figure 1.

Table 1. Clinical practice guidelines identified in the literature search that met the eligibility criteria for the development of the evidence-based clinical standard.

Id	CPG Title	Development group	Country or continent	Language	Year
CPG1	Guía de Práctica Clínica sobre el Tratamiento de Falla Cardíaca Crónica.[12]	Unidad de Evaluación de Tecnologías Sanitarias de la Comunidad de Madrid	Spain	Spanish	2016
CPG2	Guía de práctica clínica para la prevención, diagnóstico, tratamiento y rehabilitación de la falla cardíaca en población mayor de 18 años, clasificación B, C y D.[13]	Departamento Administrativo de Ciencia Tecnología e Innovación - Colciencias / Instituto de Evaluación Tecnológica en Salud	Colombia	Spanish	2016

Table 1. Clinical practice guidelines identified in the literature search that met the eligibility criteria for the development of the evidence-based clinical standard. (Continued)

Id	CPG Title	Development group	Country or continent	Language	Year
CPG3	Chronic heart failure in adults: diagnosis and management (NG106).[14]	National Institute for Health and Care Excellence	United Kingdom	English	2018
CPG4	Cardiac rehabilitation: A national clinical guideline (SING CPG 150).[15]	Scottish Intercollegiate Guidelines Network	Scotland	English	2017
CPG5	Management of chronic heart failure: A national clinical guideline (SIGN CPG 147).[16]	Scottish Intercollegiate Guidelines Network	Scotland	English	2016
CPG6	2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) Developed with the special contribution of the Heart Failure Association (HFA) of the ESC.[17]	European Society of Cardiology	Europe	English	2016
CPG7	2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/ American Heart Association Task Force on Clinical Practice Guidelines and the Heart Failure Society of America.[18]	American College of Cardiology/American Heart Association	United States	English	2017
CPG8	National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand: Guidelines for the Prevention, Detection, and Management of Heart Failure in Australia 2018.[19]	National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand	Australia / New Zealand	English	2018
CPG9	2017 Comprehensive Update of the Canadian Cardiovascular Society Guidelines for the Management of Heart Failure.[20]	Canadian Cardiovascular Society	Canada	English	2017
CPG10	2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: Developed by the Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) With the special contribution of the Heart Failure Association (HFA) of the ESC.[1]	European Society of Cardiology	Europe	English	2021

CPG: Clinical practice guideline.

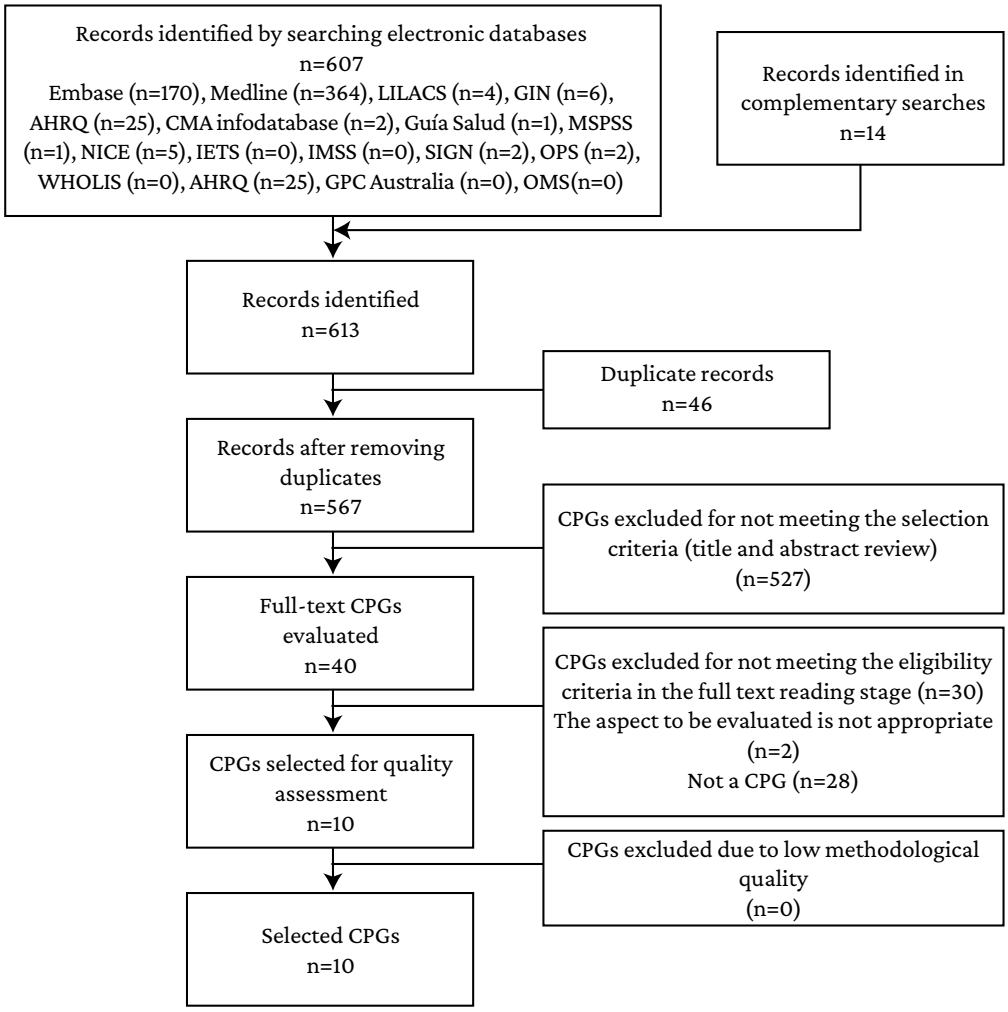

Figure 1. Systematic search for clinical practice guidelines.

Recommendations

The recommendations for diagnosing and treating patients with CHF are presented using the sections of the clinical algorithm formulated by the development group based on the evidence retrieved from the selected CPGs and the opinions of the expert members of the development group, as well as the experts involved in the interdisciplinary consensus (Figure 2). The results are described below:

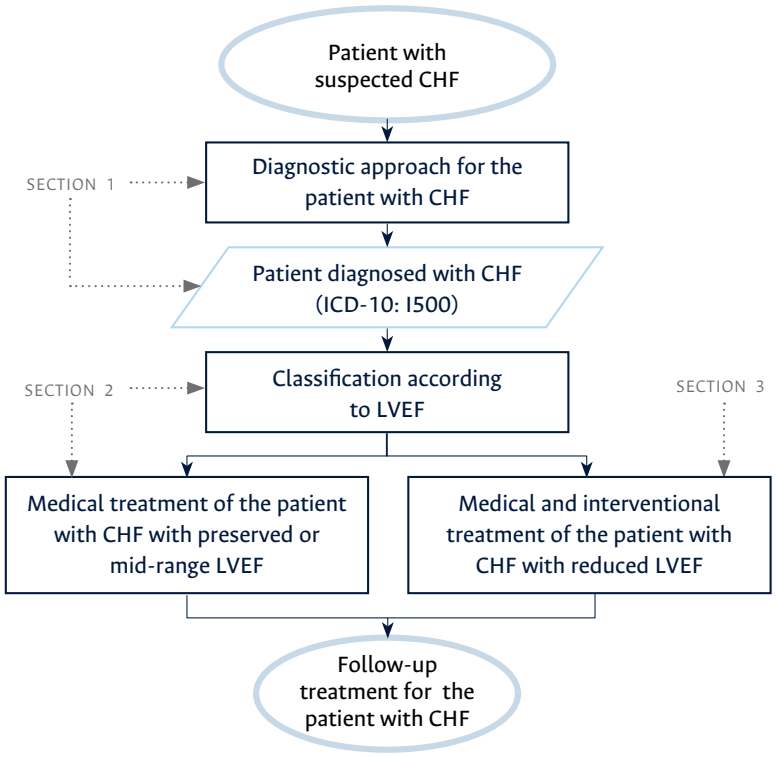

Figure 2. Flowchart for the diagnosis and treatment of adult outpatients with chronic heart failure (ICD-10: I500).
CHF: chronic heart failure; LVEF: left ventricular ejection fraction.

Section 1 - Recommendations for the diagnostic approach to outpatients with CHF

Context: CHF is a condition that cannot be diagnosed based only on the presence of suggestive symptoms and signs. Various diagnostic tests are available that, in addition to confirming its presence, make it possible to characterize it. Figure 3 illustrates the flowchart for Section 1.

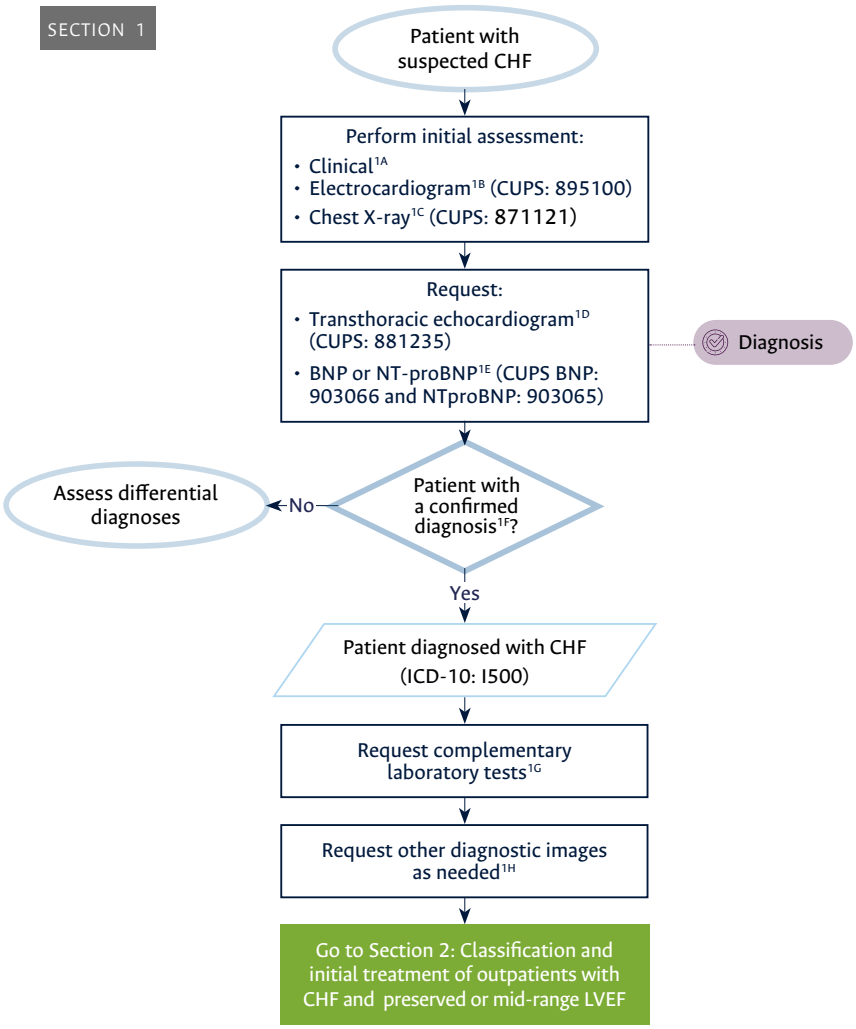

Figure 3. Flowchart for the diagnosis of outpatients with chronic heart failure.
BNP: brain natriuretic peptide; ICD-10: International Classification of Diseases and Related Health Problems, Tenth Revision; CUPS: unique code for healthcare procedures; CHF: chronic heart failure; LVEF: left ventricular ejection fraction; NT-proBNP: N-terminal pro-B-type natriuretic peptide.

Summary of recommendations:

1.A Clinical assessment: The patient's signs and symptoms are not specific enough to diagnose CHF based solely on their occurrence. However, this condition must be suspected in patients with signs and symptoms such as orthopnea, paroxysmal nocturnal dyspnea, bilateral ankle edema, third heart sound (S3), elevated jugular venous pressure, and displaced apex beat. Patients with a history of myocardial infarction, high blood pressure, peripheral artery disease, diabetes, alcohol abuse, chronic kidney disease, or cardiotoxic chemotherapy, and those with a family history of cardiomyopathy or sudden death, are more likely to be diagnosed with CHF (expert recommendation).
1.B Electrocardiogram: In patients with clinically suspected or recently diagnosed CHF, a 12-lead electrocardiogram (ECG) must be performed to assess heart rhythm, QRS complex duration, and the presence of underlying conditions such as myocardial ischemia or left ventricular hypertrophy. In the absence of any abnormalities on the ECG, the likelihood of CHF decreases, with a reported sensitivity and specificity of 81% and 61%, respectively[21] (LE: 2++; SIGN);[15] (LE: C; ESC);[16] (LE: low; GRADE);[18] (LE: low; GRADE);[19] (LE: C; ESC).[1]

1.C Chest X-ray: Chest X-ray must be performed in patients with CHF to detect or rule out pulmonary diseases or other differential diagnoses that may explain the patient's symptoms. This diagnostic imaging technique is also useful for identifying pulmonary edema or congestion in individuals with suspected acute decompensation (LE: 2++; SIGN);[15] (LE:C; ESC);[16] (LE: low; GRADE);[18] (LE: low; GRADE);[19] (LE: C; ESC).[1]

1.D Transthoracic echocardiogram: In patients with CHF or suspected CHF, a transthoracic echocardiogram must be performed to measure cardiac function, as it not only allows determining LVEF but also provides information on other parameters such as cardiac chamber size, right ventricular function, valve function, and diastolic function markers, as well as the presence of eccentric or concentric left ventricular hypertrophy, regional abnormalities in heart wall motion, and pulmonary hypertension (LE: moderate; GRADE);[12] (LE: 2++; SIGN);[15] (LE: C; ESC);[16] (LE: low; GRADE);[18] (LE: moderate; GRADE);[19] (LE: C; ESC).[1]

1.E Brain natriuretic peptide or N-terminal portion of the B-type natriuretic propeptide: Brain natriuretic peptide (BNP) or N-terminal pro-B-type natriuretic peptide (NT-proBNP) levels can be used to rule out the diagnosis of CHF with preserved LVEF in patients with symptoms suggestive of heart failure and transthoracic echocardiography findings of preserved LVEF (>50%). A BNP value <35pg/mL or NT-ProBNP <125pg/mL allows ruling out this diagnosis with a negative predictive value of 0.98, with a reported sensitivity and specificity of 98% and 35%, respectively (expert recommendation).[18,22] Elevated levels of BNP or NT-ProBNP are useful for establishing patient prognosis; however, therapeutic approaches do not change with increasing levels of these markers, so BNP or NT-ProBNP levels must not be used in this context. (LE: moderate; GRADE);[12] (LE: 2++;SIGN);[15] (LE: high; GRADE);[18] (LE: high; GRADE).[19]

1.F Diagnostic criteria for heart failure: Heart failure is defined as the presence of signs and symptoms suggestive of CHF, along with (expert recommendation):

- LVEF <40% as measured by echocardiography (CHF with reduced LVEF).
- LVEF between 40-49% (CHF with mildly reduced LVEF).
- LVEF ≥50% (CHF with preserved LVEF). In these cases, signs of structural heart disease or diastolic dysfunction must be evident in the image, in addition to elevated natriuretic peptide levels.

1.G Complement tests (paraclinical tests): The following laboratory tests must be requested: complete blood count, thyroid-stimulating hormone test, creatinine test, blood urea nitrogen test, urinalysis, serum electrolyte analysis, glycosylated hemoglobin test, and lipid profile (LE: C; ESC);[16] (LE: C; ESC).[1]

1.H Other imaging studies depending on the case:

- Cardiac magnetic resonance imaging must be performed when the cause of the CHF is not ischemic heart disease and the etiology cannot be established based on medical history and echocardiogram results (e.g., increased thickness of the left ventricular wall) (LE: low; GRADE);[12] (LE: C; ESC);[16] (LE: low; GRADE);[18] (LE: moderate; GRADE);[19] (LE: C; ESC).[1]
- Coronary angiography with left heart catheterization must be performed in patients with intermediate/high pretest probability of occlusive coronary artery disease or with evidence of ischemia on stress testing, if they are considered candidates for revascularization (LE: C; ESC);[16] (LE: C; ESC).[1]
- Coronary angiography must be performed in patients with low/intermediate pre-test probability of occlusive coronary artery disease or patients with inconclusive findings on stress testing to rule out coronary stenosis (LE: C; ESC);[17] (LE: C; ESC).[1]

Section 2 - Recommendations for the classification and initial treatment of outpatients with CHF with preserved or mildly reduced LVEF

Context: In cases of CHF with preserved or mildly reduced LVEF, a supervised medication and aerobic exercise plan must be devised to reduce the risk of hospitalization, complications, and death. This plan must take into account the patient's characteristics and clinical condition. Figure 4 shows the flowchart for Section 2.

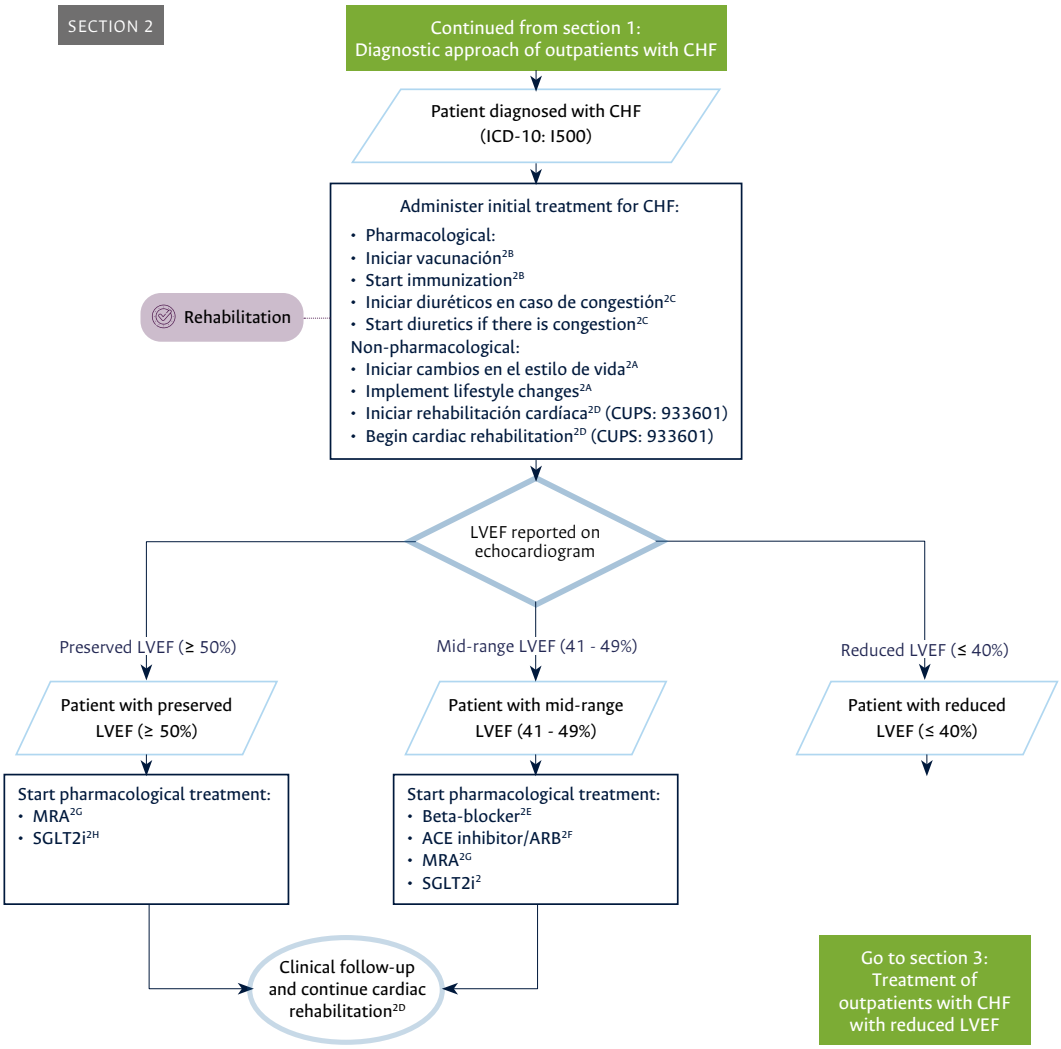

Figure 4. Flowchart for the classification and initial treatment of outpatients with chronic heart failure with preserved or mildly reduced left ventricular ejection fraction.
ARB: angiotensin II receptor blockers; MRA: mineralocorticoid receptor antagonist; ICD-10: International Classification of Diseases and Related Health Problems, Tenth Revision; CUPS: unique code for health procedures; CHF: chronic heart failure; LVEF: left ventricular ejection fraction; ACE inhibitor: angiotensin-converting enzyme inhibitor; SLGT2i: sodium-glucose cotransporter 2 inhibitor.

2.A Implementation of lifestyle changes: It is not necessary to restrict sodium or fluid intake in the patient's daily routine. For patients classified as New York Heart Association (NYHA) functional class III-IV, salt intake (between 3 and 5g/day) and fluid intake (between 1.5 and 2L/day) must be limited. It should be noted that there is insufficient evidence to support the benefits of using potassium salts. Smoking cessation must be promoted. It is recommended to promote continuous moderate-intensity physical

activity in patients with stable CHF, particularly those with reduced LVEF, to improve their physical function. The patient must be encouraged to refrain from excessive alcohol consumption or advised against it if the etiology of the CHF is related to such consumption (LE: moderate; GRADE);[12] (LE: 2++; SIGN);[15] (LE: C; ESC);[16] (LE: low; GRADE);[18] (LE: low; GRADE).[19].

2.B Immunization: Patients with CHF must be vaccinated against influenza once a year. They must also be vaccinated against pneumococcal disease (LE: 2++; SIGN),[15] starting with PPV13 and continuing with PPSV23 one year later. Finally, PPSV23 must be used as a booster every five years (expert recommendation).[22]

2.C Diuretics: The use of loop diuretics such as furosemide is recommended for patients with CHF who exhibit signs or symptoms of congestion (e.g., dyspnea, elevated jugular venous pressure, etc.) to alleviate these symptoms, improve their exercise capacity, and reduce the number of hospitalizations. The goal of diuretic therapy is to achieve and maintain euvolemia at the lowest possible diuretic dose. In some euvolemic/hypovolemic patients, it is possible to reduce or discontinue the use of diuretics (LE: very low; GRADE);[12] (LE: 1+; SIGN);[15] (LE: B; ESC);[16] (LE: low; GRADE);[18] (LE: low; GRADE);[19] (LE: B; ESC).[1] The recommended dose of furosemide is 20mg to 40mg once or twice daily. However, the dose must be adjusted to an effective dose to achieve the desired weight (LE: IB; ESC);[17] (LE: low; GRADE);[19] (LE: moderate; GRADE).[20]

2.D Cardiac rehabilitation: Patients with CHF benefit from regular supervised aerobic exercise, which is why it is necessary to request a cardiac rehabilitation assessment from the physical medicine and rehabilitation department. Each case must be evaluated individually in order to establish a specific care and intervention plan tailored to the patient's needs, with the aim of improving their quality of life and reducing hospital admissions (expert recommendation).

Considering that we are dealing with outpatients, a request for an initial consultation with a sports medicine specialist must also be requested (expert recommendation).

- Definition of cardiac rehabilitation: ensemble of physical activities required to ensure that individuals with cardiovascular disease achieve optimal physical, mental, and social well-being, so as to enable them to maintain their place in society as normally as possible (expert recommendation).[23]
- Components of cardiac rehabilitation: the core components of a cardiac rehabilitation program include initial patient assessment; nutritional counseling; lifestyle modification; management of risk factors for lipid disorders, high blood pressure, overweight or obesity, type 2 diabetes mellitus, and smoking; psychosocial interventions; and counseling on physical activity and exercise. It is worth noting that all of this must be adjusted to the specific needs of the patient (expert recommendation).[24]
- Benefits of cardiac rehabilitation in patients with CHF: physical exercise and cardiac rehabilitation in these patients have shown improvements in vasomotor and endothelial function, cardiac output, ventricular filling pressures, autonomic balance, skeletal muscle morphology and function, exercise tolerance, and quality of life. Furthermore, cardiac rehabilitation with physical exercise has demonstrated a reduction in the occurrence of dyspnea and a reversal or attenuation of ventricular remodeling and neurohormonal and inflammatory activation (expert recommendation).[24]
- Prescription of physical activity: it is recommended to use the FITT (frequency, intensity, type, and time) model for prescribing physical activity, always considering that this is an individualized intervention based on the patient's needs (expert recommendation).[25,26]

- Aerobic exercise:
  - F: 3 to 5 times a week.
  - I: starting between 40% and 50% of heart rate reserve and progressing to 70-80%. If there is atrial fibrillation or beta-blockade, a perceived exertion rating of 11-14 on the Borg scale of 6-20 must be used.
  - T: 20 minutes a day initially, increasing to 60 minutes a day.
  - T: treadmill, manual treadmill, and stationary bicycle.
  - In addition to aerobic exercise, resistance and flexibility exercises must also be performed.
- Resistance:
  - F: 1 to 2 non-consecutive days per week.
  - I: starting at maximum 40% of one repetition for the upper limbs and 50% for the lower limbs. After several weeks to months, the repetition must be increased to 70%.
  - T: 1 to 2 sets of 10-15 repetitions for large muscle groups.
  - T: dumbbells, elastic bands, and body weight.
- Special considerations:
  - Everything mentioned above must be considered bearing in mind the specific needs of the patient.
  - Exercise intensity must be monitored based on heart rate or perceived exertion measured using the Borg scale.
  - In order to determine maximum heart rate, calculate heart rate reserve, assess chronotropic and pressor response, and safely prescribe exercise for patients with CHF, it is necessary to have the results of the symptom-mediated exercise test at baseline beforehand.
  - If exercise stress test results are not available, the target heart rate during physical activity must be approximately 20 to 30 beats above the resting heart rate. Likewise, the patient must have a score of 11 to 14 on the Borg perceived exertion scale.
- Absolute contraindications for prescribing physical exercise: decompensated heart failure, complex ventricular arrhythmias, systolic blood pressure (SBP) >190mmHg or diastolic blood pressure (DBP) >120mmHg, decompensated type 2 diabetes mellitus, or acute infection.

Patients with NYHA functional class I may be candidates for an outpatient cardiac rehabilitation program that is prescribed using the FITT principle and as specified above (expert recommendation). Patients with NYHA II-III may be offered a supervised moderate-intensity training program (LE: low; GRADE);[12] (LE: 1+; SIGN);[14] (LE: 1+; SIGN);[15] LE low; GRADE);[18] (LE: low; GRADE).[19] Finally, only supervised cardiac rehabilitation programs must be prescribed for patients with NYHA functional class IV, provided that heart failure is compensated. Such patients, if their condition so permits, may engage in supervised mild intensity physical activity and/or low intensity resistance exercises. In any case the intervention must be tailored to the specific patient's needs (expert recommendation).

2.E Beta blockers: Beta blockers are indicated to improve the symptoms of CHF, reduce the risk of hospitalization, and increase survival in these patients. They must be administered starting at low doses and titrated to the maximum tolerated dose (doubling the maximum dose every two weeks). Signs of intolerance to these drugs include worsening symptoms or signs of CHF and increased episodes of dyspnea, fatigue, edema, and weight gain (LE: high; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1]

The following beta blockers have been shown to be effective in the management of these patients (LE: A; ESC);[16] (LE: A; ESC):[1]

- Bisoprolol: initial dose of 1.25mg once daily; target dose of 10mg once daily.
- Carvedilol: initial dose of 3.125mg twice daily; target dose of 25mg twice daily (the target dose is 50mg twice daily if the patient weighs more than 85kg).
- Metoprolol succinate (CR/XL): initial dose of 12.5mg to 25mg once/day; target dose of 200mg once/day.
- Nebivolol: initial dose of 1.25mg once daily; target dose 10mg once daily.

These drugs must be used with caution in patients with second- or third-degree atrioventricular block (in the absence of a permanent pacemaker), critical limb ischemia, asthma (relative contraindication), and known allergic reactions (LE: high; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1]

2.F Angiotensin-converting enzyme inhibitors/angiotensin II receptor antagonists: If the patient is intolerant to angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor antagonists (ARBs) must be prescribed. These agents must be administered starting at low doses and titrated to the maximum tolerated dose (doubling the maximum dose every two weeks) (LE: high; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1]

ACE inhibitors that have proven effective in the management of these patients are (LE: A; ESC);[16] (LE: A; ESC):[1]

- Captopril: initial dose of 6.25mg three times/day; target dose of 50mg three times/day.
- Enalapril: initial dose of 2.5mg twice daily; target dose of 10mg to 20mg twice daily.
- Lisinopril: initial dose of 2.5.5mg once daily; target dose of 20mg to 35mg once daily.
- Ramipril: initial dose of 2.5mg once daily; target dose of 10mg once daily.

ACE inhibitors must be used with caution in patients with a history of angioedema, bilateral renal artery stenosis, in pregnant women, and in patients with known allergic reactions (LE: high; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1]

2.G Mineralocorticoid receptor antagonists (MRA): The administration of spironolactone must be initiated at an initial dose of 25mg/day (target dose of 50mg/day). The use of this drug is contraindicated in patients with a glomerular filtration rate (GFR) <30mL/min/1.73m² or blood potassium concentration >5mEq/L. In cases of gynecomastia, eplerenone must be started at a dose of 25mg/day (target dose of 50mg/day) (LE: high; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1]

2.H Sodium-glucose cotransporter 2 inhibitors (SGLT2i): Treatment with dapagliflozin or empagliflozin must be initiated in patients with CHF to reduce the risk of hospitalization and death (even if the patient does not have type 2 diabetes mellitus). The SGLT inhibitors that have been shown to be effective in these patients are (expert recommendation):[23]

- Dapagliflozin: initial (and target) dose of 10mg once daily (titration is not necessary).
- Empagliflozin: initial (and target) dose of 10mg once daily (titration is not necessary).

These drugs must be used with caution in pregnant women and in patients with known allergic reactions, with GFR <20mL/min/1.73m², and with symptoms of hypotension or SBP <95mmHg (LE: A; ESC).[1]

Section 3 - Recommendations for the treatment of outpatients with CHF and reduced LVEF

Context: Outpatients diagnosed with CHF with reduced LVEF must be prescribed drug treatment tailored to their needs and assessed to determine whether they could benefit

from additional medical procedures. Similarly, regular check-ups must be scheduled. Figure 5 illustrates the flowchart for Section 3.

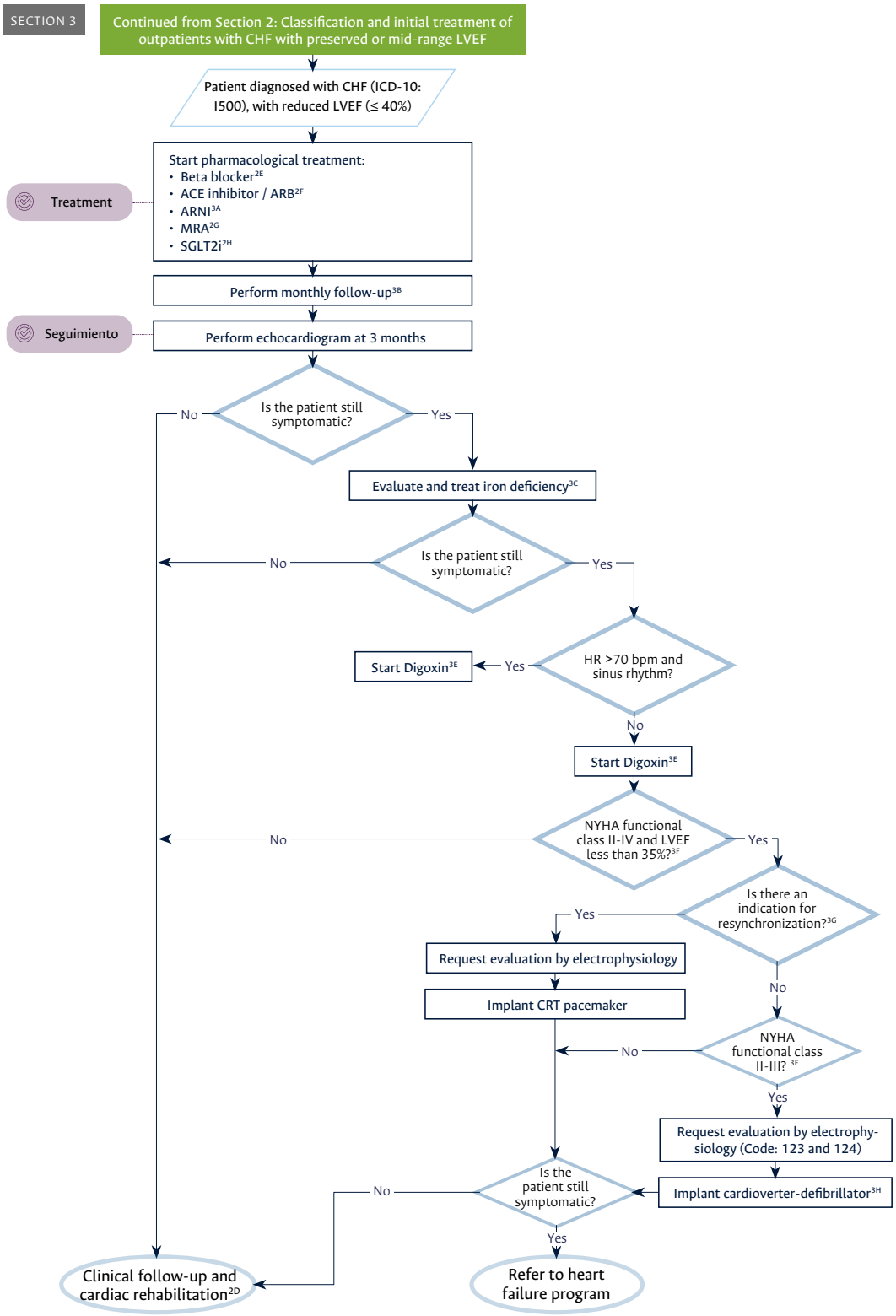

Figure 5. Flowchart for the treatment of outpatients with chronic heart failure and reduced left ventricular ejection fraction.
ARB: angiotensin II receptor blocker; MRA: mineralocorticoid receptor blocker; ICD-10: International Classification of Diseases and Related Health Problems, Tenth Revision; CUPS: Unique Health Procedure Code; CHF: chronic heart failure; LVEF: left ventricular ejection fraction; ACEi: angiotensin-converting enzyme inhibitor; ARNI: angiotensin receptor and neprilysin inhibitor; SGLT2i: sodium-glucose cotransporter 2 inhibitor; bpm: beats per minute; NYHA: Escala New York Heart Association; CRT: cardiac resynchronization therapy.

3.A Beta blockers: The use of beta blockers is indicated to improve the symptoms of CHF, reduce the risk of hospitalization, and increase survival in these patients. Administration must be started at low doses and titrated to the maximum tolerated dose (doubling the maximum dose every two weeks). Signs of intolerance to these agents include worsening symptoms or signs of CHF, increased episodes of dyspnea, fatigue, edema, and weight gain (LE: high; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1]

Beta blockers that have been proven effective in the management of patients with CHF with reduced LVEF are (LE: A; ESC);[16] (LE: A; ESC):[1]

- Bisoprolol: initial dose of 1.25mg once daily; target dose of 10mg once daily.
- Carvedilol: initial dose of 3.125mg twice daily; target dose of 25mg twice daily (the target dose is 50mg twice daily if the patient weighs more than 85kg).
- Metoprolol succinate (CR/XL): initial dose of 12.5mg to 25mg once daily; target dose of 200mg once daily.
- Nebivolol: initial dose of 1.25mg once daily; target dose of 10mg once daily.

These drugs must be used with caution in patients with second- or third-degree atrioventricular block (without a permanent pacemaker), critical limb ischemia, asthma (relative contraindication), or known allergic reaction (LE: high; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[19] (LE: high; GRADE);[20].

3.B ACE inhibitors/ARB: ACE inhibitors/ARB: ARBs must be prescribed if the patient is intolerant to ACE inhibitors (cough). These drugs must be started at low doses and titrated to the maximum tolerated dose (doubling the dose, maximum every two weeks) (LE: high; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1]

ACE inhibitors that have been shown to be effective in the management of patients with CHF with reduced LVEF are (LE: A; ESC);[16] (LE: A; ESC):[1]

- Captopril: initial dose of 6.25mg three times/day; target dose of 50mg three times/day.
- Enalapril: initial dose of 2.5mg twice daily; target dose of 10mg to 20mg twice daily.
- Lisinopril: initial dose of 2.5-5mg once daily; target dose of 20mg to 35mg once daily.
- Ramipril: initial dose of 2.5mg once daily, target dose of 10mg once daily.

ACE inhibitors must be used with caution in patients with a history of angioedema, bilateral renal artery stenosis, in pregnant women, and in patients with known allergic reactions (LE: high; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1]

3.C MRA: Spironolactone must be initiated at a starting dose of 25mg/day (target dose 50mg/day). The use of this medication is contraindicated in patients with an estimated glomerular filtration rate (eGFR) <30mL/min/1.73m² or blood potassium concentration >5mEq/L. In cases of gynecomastia, eplerenone must be administered at a dose of 25mg/day (target dose of 50mg/day) (LE: high; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1]

3.D Neprilysin and angiotensin receptor inhibitor (ARNI): ARNI must be replaced by ACE inhibitors/ARBs in patients with persistent symptoms of CHF despite receiving optimal therapy (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1] Similarly, initiating sacubitril/valsartan may be considered in patients with HF with reduced LVEF who have not been treated with ACE inhibitors (i.e., de novo treatment) (LE: B; ESC).[1] These medications must initially be administered in low doses and then titrated depending on the patient's tolerance (doubling the maximum dose every 2 weeks): initial dose of 51/49mg twice/day; target dose of 97/103mg twice/day. Patients starting treatment with sacubitril/valsartan must have adequate blood pressure

and an estimated glomerular filtration rate (eGFR) >30mL/min/1.73m². In addition, if they were receiving ACE inhibitors, they must discontinue their use 36 hours before starting ARNI administration. If they were being treated with ARBs, ARNI must be used as the next dose of treatment (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1]

3.E. SGLT2i: Dapagliflozin or empagliflozin must be administered to patients with CHF with reduced LVEF to reduce the risk of hospitalization and death (even if the patient does not have type 2 diabetes mellitus). SGLT2i that have been demonstrated to be effective in these patients are (expert recommendation):[27]

- Dapagliflozin: initial (and target) dose of 10mg once daily (titration is not necessary).
- Empagliflozin: initial (and target) dose of 10mg once daily (titration is not necessary).

These drugs must be used with caution in pregnant women and in patients with known allergic reactions, GFR<20mL/min/1.73m², symptoms of hypotension, or SBP<95mmHg (LE: A; ESC).[1]

3.F Monthly follow-up: A monthly follow-up must be performed while the patient is in the optimization phase of drug management toward the maximum tolerated dose specified for each medication (expert recommendation).

3.G Evaluation and treatment of iron deficiency: Ferric carboxymaltose must be administered intravenously to patients with hemoglobin levels <13.5 and serum ferritin <100µg/L or ferritin between 100 and 299µg/L and transferrin saturation <20% (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: moderate; GRADE);[18] (LE: moderate; GRADE);[19] (LE: A; ESC).[1]

3.H Ivabradine: Ivabradine must be initiated in patients with stable symptomatic CHF (NYHA II-IV), LVEF <35%, sinus rhythm, and resting heart rate >70bpm. The initial dose of this medication is 5 mg twice daily, and the target dose is 7.5mg twice daily. Ivabradine is contraindicated in patients with acute coronary syndrome, stroke or transient ischemic attack, severe hypotension, atrial fibrillation, severe hepatic impairment or renal dysfunction (no safety or pharmacokinetic data available for creatinine clearance <15mL/min/m²), pregnancy, breastfeeding, or known allergic reaction (LE: high; GRADE);[12] (LE: 1++; SIGN);[15] (LE: B; ESC);[16] (LE: high; GRADE);[18] (LE: high; GRADE);[19] (LE: A; ESC).[1]

3.I Digoxin: Treatment with digoxin must be initiated in patients with CHF with symptomatic reduced LVEF in sinus rhythm, even if they are being treated with an ACE inhibitor (or ARNI), a beta blocker, and an MRA, to reduce the risk of hospitalization (both due to CHF and any other cause). The plasma levels of digoxin must be monitored for 5 to 7 days after starting oral administration; these levels must be maintained between 0.5 and 0.8ng/mL (LE: low; GRADE);[12] (LE: 1++; SIGN);[15] (LE: B; ESC);[16] (LE: low; GRADE);[18] (LE: low; GRADE);[19] (LE: A; ESC).[1]

3.J NYHA functional classification: NYHA functional class is defined as:[12]

- I: No limitations in normal physical activity. Regular physical activity does not cause symptoms of HF.
- II: Mild limitation in physical activity. Regular physical activity does not cause symptoms of HF.
- III: Marked limitation in physical activity. Asymptomatic at rest, but physical activity below normal levels causes symptoms of HF.
- IV: Severe limitation to perform any type of physical activity without experiencing discomfort. Symptoms of HF even at rest. If any type of physical activity is performed, the discomfort increases.

3.K Indication for cardiac resynchronization therapy: This therapy must be implemented when the patient has received optimal medical treatment for 3 months and has an LVEF <35%, a NYHA functional classification of II-IV, and left bundle branch block

with a QRS complex duration >130ms (if there is no left bundle branch block, the QRS must be >150ms). Pacemaker implantation is indicated in patients with atrioventricular block, LVEF <50%, and right ventricular pacing >40% (LE: low; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: low; GRADE);[18] (LE: baja; GRADE);[19] (LE: A; ESC).[1]

3.L Implantable cardioverter-defibrillator: A cardioverter-defibrillator must be implanted to reduce the risk of sudden death and all-cause mortality in patients with symptomatic CHF (NYHA II-III) and LVEF ≤35% despite having been on medical therapy for 3 months or more with optimal results, provided that they are expected to survive more than one year with good functional status (LE: A; ESC).[17]

An important advantage of the cardioverter-defibrillator is that, in the absence of reversible causes, implantation of the automatic defibrillator can reduce the risk of sudden death and all-cause mortality in patients who have recovered from a ventricular arrhythmia that resulted in hemodynamic instability and who are expected to survive more than one year with good functional status (LE: low; GRADE);[12] (LE: 1++; SIGN);[15] (LE: A; ESC);[16] (LE: low; GRADE);[18] (LE: low; GRADE);[19] (NE: A; ESC).[1]

3.M Follow-up by the cardiology service: The patient must be scheduled for a follow-up appointment with the cardiology service every three months (expert recommendation).

Section 4 - Checkpoints

The checkpoints for the EBCS, which were defined considering key moments in the comprehensive care of patients with CHF and were chosen jointly by the members of the development team considering the suggestions made at the interdisciplinary consensus meeting, are presented below:

1. Performance of echocardiogram and BNP or NT-proBNP testing on all outpatients with suspected CHF.
2. Cardiac rehabilitation for all patients with a confirmed diagnosis of CHF.
3. Treatment with ACE inhibitors/ARBs/ARNI plus a beta blocker plus SGLT2i plus MRA for all CHF patients with reduced LVEF.
4. Follow-up echocardiography for all CHF patients with reduced LVEF and on appropriate drug therapy.

Implementation and updating

A multi-stage approach is proposed to implement the EBCS and evaluate adherence to these recommendations. First, an interdisciplinary team will be created, comprising members of the development group and representatives of the administrative and clinical areas of the referral university hospital who can support the implementation process; priority will be given to information technology staff. This team will be key to identifying barriers and facilitators of the implementation process.

Subsequently, two approaches will be adopted to address possible EBCS implementation actions. The first will focus on the dissemination of the clinical algorithm and its checkpoints through educational activities, such as face-to-face and pre-recorded educational talks, and dissemination using social networks and institutional billboards. The second approach will focus on developing administrative strategies that utilize

information technology and electronic health record software to generate interactive prompts and reminders that are incorporated into educational activities.

Finally, the assessment of adherence to the EBCS will include three components: i) assessment of EBCS knowledge; ii) assessment of adherence using administrative information sources; and iii) evaluation of impact (clinical, financial, and patient-reported) through additional studies in priority areas of the hospital. The implementation process will take place in stages other than those of the development process, thereby allowing the identification of the best implementation solutions for this EBCS.

The EBCS will be updated in accordance with the stipulated institutional processes. To this end, the development group has set a time limit of 3 to 5 years for updating the EBCS, taking into account various critical aspects: i) the volume of evidence currently available, ii) the availability of new evidence that may have an impact on the comprehensive care of patients with CHF, iii) the quality of the evidence available at the time of EBCS development, and iv) the availability of institutional resources for the implementation and updating of the standard.

Conclusions

The evidence-based clinical recommendations included in this EBCS are intended to standardize practices and actions related to the diagnosis and treatment of adult outpatients with CHF in Colombia, and even the region. In this sense, the algorithm and clinical recommendations presented here aim to optimize the use of resources and improve the quality of care provided to this population and, therefore, their health outcomes. Finally, it is worth noting that this document can also be used as an educational tool in undergraduate and postgraduate studies for health professionals involved in the care of patients with this condition.

Conflicts of interest

Harold Betancourt-Pérez declares a conflict of interest with Janssen Cilag Laboratories, where he acts as a speaker for the Daratumumab line in all its presentations, as well as with Abbott Laboratories INC as a result of international representation in Barcelona, Spain, within the framework of an immersion education program.

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Supplement 1. Search strategy reporting tables

Database: MEDLINE

Search type	Clinical practice guidelines
Database	Medline
Platform	PubMed
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	None
Search strategy	(((((adult[MeSH Terms]) OR ("adults"[Title/Abstract])) OR ("adultos"[Title/Abstract])) AND ((((((((((((((heart failure[MeSH Terms]) OR (Cardiac Failure[Title/Abstract])) OR (Heart Decompensation[Title/Abstract])) OR (Decompensation, Heart[Title/Abstract])) OR (Heart Failure, Right-Sided[Title/Abstract])) OR (Heart Failure, Right Sided[Title/Abstract])) OR (Right-Sided Heart Failure[Title/Abstract])) OR (Right Sided Heart Failure[Title/Abstract])) OR (Myocardial Failure[Title/Abstract])) OR (Congestive Heart Failure[Title/Abstract])) OR (Heart Failure, Congestive[Title/Abstract])) OR (Heart Failure, Left-Sided[Title/Abstract])) OR (Heart Failure, Left Sided[Title/Abstract])) OR (Left-Sided Heart Failure[Title/Abstract])) OR (Left Sided Heart Failure[Title/Abstract])) OR ("insuficiencia cardiaca"[Title/Abstract]))) AND ((((((((((Diagnosis[MeSH Terms]) OR (Diagnoses[Title/Abstract])) OR (Diagnose[Title/Abstract])) OR (Diagnoses[Title/Abstract] AND Examinations[Title/Abstract])) OR (Examinations[Title/Abstract] AND Diagnoses[Title/Abstract])) OR (Antemortem Diagnosis[Title/Abstract])) OR (Antemortem Diagnoses[Title/Abstract])) OR (Diagnoses, Antemortem[Title/Abstract])) OR (Diagnosis, Antemortem[Title/Abstract])) OR ("diagnostico"[Title/Abstract])) OR (((((((Therapeutics[MeSH Terms]) OR (Therapeutic[Title/Abstract])) OR (Therapy[Title/Abstract])) OR (Therapies[Title/Abstract])) OR (Treatment[Title/Abstract])) OR (Treatments[Title/Abstract])) OR ("tratamiento"[Title/Abstract]))) OR ((("rehabilitation"[MeSH Terms]) OR ("habilitation"[Title/Abstract])) OR ("rehabilitacion"[Title/Abstract]))))) AND (((((Practice Guideline[MeSH Terms]) OR (Clinical Guidelines[Title/Abstract])) OR ("clinical practice guideline"[Title/Abstract])) OR ("guia de practica clinica"[Title/Abstract])) OR ("clinical protocols"[MeSH Terms])) Filters: in the last 5 years
References obtained	364
References without duplicates	363

Database: EMBASE

Search type	Clinical practice guidelines
Database	Embase
Platform	Elsevier
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	None
Search strategy	('adult'/exp OR adult) AND ('heart failure'/exp OR 'heart failure') AND ('clinical protocol'/exp OR 'clinical protocol') AND ('diagnosis'/exp OR 'diagnosis' OR 'therapy'/exp OR 'therapy' OR 'rehabilitation'/exp OR 'rehabilitation') AND [2016-2021]/py
References obtained	170
References without duplicates	168

Database: LILACS

Search type	Clinical practice guidelines
Database	LILACS
Platform	VHL Regional Portal
Date of search	01/05/021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	data base:("LILACS")
Search strategy	(heart failure) AND (adults) AND (diagnosis OR therapeutics OR rehabilitation) AND (clinical protocol) year_cluster: [2016 TO 2021]
References obtained	4
References without duplicates	4

Compiler: Guidelines International Network (GIN)

Search type	Clinical practice guidelines
Database	GIN
Platform	GIN
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	None
Search strategy	Heart failure, Chronic heart failure.
References obtained	6
References without duplicates	6

Compiler: CMA infodatabase

Search type	Clinical practice guidelines
Database	CMA infodatabase
Platform	CMA infodatabase
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	None
Search strategy	Chronic heart failure, heart failure.
References obtained	2
References without duplicates	1

Compiler: Agency for Healthcare Research and Quality (AHRQ)

Search type	Clinical practice guidelines
Database	AHRQ
Platform	AHRQ
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	“In the title of the page”, file format: Adobe Acrobat PDF .pdf
Search strategy	Heart failure
References obtained	25
References without duplicates	20

Developer: Biblioteca Guía Salud

Search type	Clinical practice guidelines
Database	Biblioteca Guía Salud
Platform	Biblioteca Guía Salud
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	None
Search strategy	Falla cardiaca crónica
References obtained	1
References without duplicates	1

Developer - Ministerio de Salud y Protección Social de Colombia (MSPSS)

Search type	Clinical practice guidelines
Database	MSPSS
Platform	MSPSS
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	None
Search strategy	Falla cardiaca
References obtained	1
References without duplicates	1

Developer: National Institute for Health and Clinical Excellence (NICE)

Search type	Clinical practice guidelines
Database	NICE
Platform	NICE
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	None
Search strategy	Chronic heart failure
References obtained	5
References without duplicates	4

Developer: Instituto de Evaluación Tecnológica en Salud (IETS)

Search type	Clinical practice guidelines
Database	IETS
Platform	IETS
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	None
Search strategy	Insuficiencia cardiaca, falla cardiaca.
References obtained	0
References without duplicates	0

Developer: Instituto Mexicano del Seguro Social (IMSS)

Search type	Clinical practice guidelines
Database	IMSS
Platform	IMSS
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	Category: Cardiology, Internal Medicine
Search strategy	-
References obtained	0
References without duplicates	0

Developer: Scottish Intercollegiate Guidelines Network (SIGN)

Search type	Clinical practice guidelines
Database	SING
Platform	SING
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	Title: Chronic heart failure, Cardiac rehabilitation
Search strategy	-
References obtained	2
References without duplicates	2

Developer: Pan American Health Organization (PAHO)

Search type	Clinical practice guidelines
Database	PAHO
Platform	PAHO
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	Topic: Cardiovascular diseases
Search strategy	-
References obtained	2
References without duplicates	2

Developer: WHOLIS

Search type	Clinical practice guidelines
Database	WHOLIS
Platform	WHOLIS
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	Keywords: Chronic heart disease, adults Resource type: Clinical practice guidelines manuals
Search strategy	-
References obtained	0
References without duplicates	0

Developer: Australian Clinical Practice Guidelines (CPG)

Search type	Clinical practice guidelines
Database	Australian Clinical Practice Guidelines
Platform	Australian Clinical Practice Guidelines
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	None
Search strategy	Heart failure, Chronic Heart failure
References obtained	0
References without duplicates	0

Developer: World Health Organization (WHO)

Search type	Clinical practice guidelines
Database	WHO
Platform	WHO
Date of search	24/04/2021
Search date range	Last 5 years
Language restrictions	None
Other restrictions	None
Search strategy	Heart failure [MeSH term] Adults [MeSH term]
References obtained	0
References without duplicates	0