SESION BIBLIOGRAFICA 15-12-23

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Complejo Asistencial Universitario de León

Research

JAMA | Original Investigation

Effect of Dietary Sodium on Blood Pressure
A Crossover Trial

Deepak K. Gupta, MD, MSCI; Cora E. Lewis, MD, MSPH; Krista A. Varady, PhD; Yan Ru Su, MD; Meena S. Madhur, MD, PhD; Daniel T. Lackland, DrPH; Jared P. Reis, PhD; Thomas J. Wang, MD; Donald M. Lloyd-Jones, MD; Norrina B. Allen, PhD

IMPORTANCE Dietary sodium recommendations are debated partly due to variable blood pressure (BP) response to sodium intake. Furthermore, the BP effect of dietary sodium among individuals taking antihypertensive medications is understudied.

OBJECTIVES To examine the distribution of within-individual BP response to dietary sodium, the difference in BP between individuals allocated to consume a high- or low-sodium diet first, and whether these varied according to baseline BP and antihypertensive medication use.

DESIGN, SETTING, AND PARTICIPANTS Prospectively allocated diet order with crossover in community-based participants enrolled between April 2021 and February 2023 in 2 US cities. A total of 213 individuals aged 50 to 75 years, including those with normotension (25%), controlled hypertension (20%), uncontrolled hypertension (31%), and untreated hypertension (25%), attended a baseline visit while consuming their usual diet, then completed 1-week high- and low-sodium diets.

INTERVENTION High-sodium (approximately 2200 mg sodium added daily to usual diet) and low-sodium (approximately 500 mg daily total) diets.

MAIN OUTCOMES AND MEASURES Average 24-hour ambulatory systolic and diastolic BP, mean arterial pressure, and pulse pressure.

RESULTS Among the 213 participants who completed both high- and low-sodium diet visits, the median age was 61 years, 65% were female and 64% were Black. While consuming usual, high-sodium, and low-sodium diets, participants' median systolic BP measures were 125, 126, and 119 mm Hg, respectively. The median within-individual change in mean arterial pressure between high- and low-sodium diets was 4 mm Hg (IQR, 0-8 mm Hg; $P < .001$), which did not significantly differ by hypertension status. Compared with the high-sodium diet, the low-sodium diet induced a decline in mean arterial pressure in 73.4% of individuals. The commonly used threshold of a 5 mm Hg or greater decline in mean arterial pressure between a high-sodium and a low-sodium diet classified 46% of individuals as "salt sensitive." At the end of the first dietary intervention week, the mean systolic BP difference between individuals allocated to a high-sodium vs a low-sodium diet was 8 mm Hg (95% CI, 4-11 mm Hg; $P < .001$), which was mostly similar across subgroups of age, sex, race, hypertension, baseline BP, diabetes, and body mass index. Adverse events were mild, reported by 9.9% and 8.0% of individuals while consuming the high- and low-sodium diets, respectively.

CONCLUSIONS AND RELEVANCE Dietary sodium reduction significantly lowered BP in the majority of middle-aged to elderly adults. The decline in BP from a high- to low-sodium diet was independent of hypertension status and antihypertensive medication use, was generally consistent across subgroups, and did not result in excess adverse events.

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Original article

Ferric carboxymaltose for patients with heart failure in all-range ejection fraction

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ABSTRACT

Introduction and objectives: Iron deficiency (ID) is common in heart failure (HF) patients and is linked to exercise impairment, worse quality of life, and HF hospitalisation. Clinical practice guidelines recommend checking and correcting ID with ferric carboxymaltose (FCM). However, there is a lack of evidence in patients with left ventricular ejection fraction (LVEF) >40%.

Methods: We included all HF outpatients treated with FCM after ID diagnosis (ferritin <100 ng/mL or ferritin 100-299 ng/mL and transferrin saturation <20%). We analysed clinical and analytical parameters before FCM administration and at 3 months according to LVEF: preserved (>50%), mildly reduced (41-49%), and reduced (<40%).

Results: We included 235 patients (51.5% female) aged 73.5 ± 10.7 years. Ninety-six patients have reduced LVEF (40.8%), 41 mildly reduced (17.4%), and 98 preserved (41.7%). Patients with preserved LVEF have more anaemia (42.6% vs 26.8% vs 52.6%; $P = .02$). Less than 50% of patients received the correct dose of FCM, especially patients with preserved LVEF ($P = .004$). One patient (0.4%) presented a local exanthema with no other adverse effects. At 3 months, all analytical parameters significantly improved, except haemoglobin (12.9 vs 13.0 mg/dL; $P = .35$) and natriuretic peptides (3263 vs 3471 pg/mL; $P = .56$) in mildly reduced LVEF patients. The functional class did not improve in preserved LVEF patients, but it did in the rest.

Conclusions: FCM is safe and effective in correcting ID in HF patients regardless of LVEF. Natriuretic peptides are reduced in all patients except those with mildly reduced LVEF. Functional class improvement is less likely in patients with preserved LVEF.

Abbreviations: FCM, ferric carboxymaltose; HF, heart failure; HFmrEF, heart failure with a mildly reduced left ventricular ejection fraction; HFpEF, heart failure with a preserved left ventricular ejection fraction; HFrEF, heart failure with a reduced left ventricular ejection fraction; ID, iron deficiency.

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ORIGINAL INVESTIGATIONS

Relationship of Daily Step Counts to All-Cause Mortality and Cardiovascular Events

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ABSTRACT

BACKGROUND The minimal and optimal daily step counts for health improvements remain unclear.

OBJECTIVES A meta-analysis was performed to quantify dose-response associations of objectively measured step count metrics in the general population.

METHODS Electronic databases were searched from inception to October 2022. Primary outcomes included all-cause mortality and incident cardiovascular disease (CVD). Study results were analyzed using generalized least squares and random-effects models.

RESULTS In total, 111,309 individuals from 12 studies were included. Significant risk reductions were observed at 2,517 steps/d for all-cause mortality (adjusted HR [aHR]: 0.92; 95% CI: 0.84-0.999) and 2,735 steps/d for incident CVD (aHR: 0.89; 95% CI: 0.79-0.999) compared with 2,000 steps/d (reference). Additional steps resulted in nonlinear risk reductions of all-cause mortality and incident CVD with an optimal dose at 8,763 (aHR: 0.40; 95% CI: 0.38-0.43) and 7,126 steps/d (aHR: 0.49; 95% CI: 0.45-0.55), respectively. Increments from a low to an intermediate or a high cadence were independently associated with risk reductions of all-cause mortality. Sex did not influence the dose-response associations, but after stratification for assessment device and wear location, pronounced risk reductions were observed for hip-worn accelerometers compared with pedometers and wrist-worn accelerometers.

CONCLUSIONS As few as about 2,600 and about 2,800 steps/d yield significant mortality and CVD benefits, with progressive risk reductions up to about 8,800 and about 7,200 steps/d, respectively. Additional mortality benefits were found at a moderate to high vs a low step cadence. These findings can extend contemporary physical activity prescriptions given the easy-to-understand concept of step count. (Dose-Response Relationship Between Daily Step Count and Health Outcomes: A Systematic Review and Meta-Analyses; CRD42021244747) (J Am Coll Cardiol 2023;82:1483–1494) © 2023 by the American College of Cardiology Foundation.

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ARTÍCULO ESPECIAL

Resumen ejecutivo de la actualización 2023 del consenso de actuación básica durante el ingreso hospitalario por insuficiencia cardiaca aguda

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JAMA | Original Investigation

Effect of Dietary Sodium on Blood Pressure
A Crossover Trial

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OBJECTIVES To examine the distribution of within-individual BP response to dietary sodium, the difference in BP between individuals allocated to consume a high- or low-sodium diet first, and whether these varied according to baseline BP and antihypertensive medication use.

DESIGN, SETTING, AND PARTICIPANTS Prospectively allocated diet order with crossover in community-based participants enrolled between April 2021 and February 2023 in 2 US cities A total of 213 individuals aged 50 to 75 years, including those with normotension (25%), controlled hypertension (20%), uncontrolled hypertension (31%), and untreated hypertension (25%), attended a baseline visit while consuming their usual diet, then completed 1-week high- and low-sodium diets.

INTERVENTION High-sodium (approximately 2200 mg sodium added daily to usual diet) and low-sodium (approximately 500 mg daily total) diets.

MAIN OUTCOMES AND MEASURES Average 24-hour ambulatory systolic and diastolic BP, mean arterial pressure, and pulse pressure.

JAMA | Original Investigation

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Table. Enrollment Characteristics According to Allocation to High-Sodium Diet First or Low-Sodium Diet First

Characteristics	High-sodium diet first (n = 118)	Low-sodium diet first (n = 95)
Age, median (IQR), y	61 (56-64)	61 (58-65)
Sex, No. (%)		
Female	76 (64)	63 (66)
Male	42 (36)	32 (34)
Race, No. (%)		
Black	75 (64)	61 (65)
White	39 (33)	31 (33)
Other or unknown	4 (3)	3 (3)
Enrollment source, No. (%)		
CARDIA	85 (72)	70 (74)
Non-CARDIA	33 (28)	25 (26)
Location, No. (%)		
Birmingham	84 (71)	47 (49)
Chicago	34 (29)	48 (51)
Hypertension, No. (%)	59 (50)	44 (47)
No. of antihypertensive medications, No. (%)		
0	59 (50)	50 (53)
1	34 (29)	29 (31)
2	21 (18)	12 (13)
≥3	4 (3)	3 (3)
Use of antihypertensive medication, by drug class, No. (%)		
ACE inhibitor or ARB	31 (26)	27 (28)
β-Blocker	13 (11)	5 (5)
Calcium channel blocker	20 (17)	19 (20)
Diuretic	17 (14)	12 (13)
Systolic blood pressure, median (IQR), mm Hg[a]	128 (117-139)	127 (119-137)
Diastolic blood pressure, median (IQR), mm Hg[a]	80 (73-87)	77 (73-86)
Mean arterial pressure, median (IQR), mm Hg[a]	96 (88-104)	94 (88-103)
Pulse pressure, median (IQR), mm Hg[a]	47 (40-56)	49 (45-56)
Heart rate, median (IQR), /min[a]	69 (60-78)	68 (59-75)
Diabetes, No. (%)	22 (19)	23 (24)
Body mass index, median (IQR)[b]	31.2 (27.0-36.8)	30.7 (26.6-34.6)
24-h Urine volume, median (IQR), L[c]	1.47 (0.96-2.04)	1.54 (1.08-2.36)
24-h Urine sodium, median (IQR), g[c]	4.57 (2.57-5.73)	4.88 (3.16-6.62)
24-h Urine creatinine, median (IQR), g[c]	1.12 (0.76-1.46)	1.15 (0.84-1.53)

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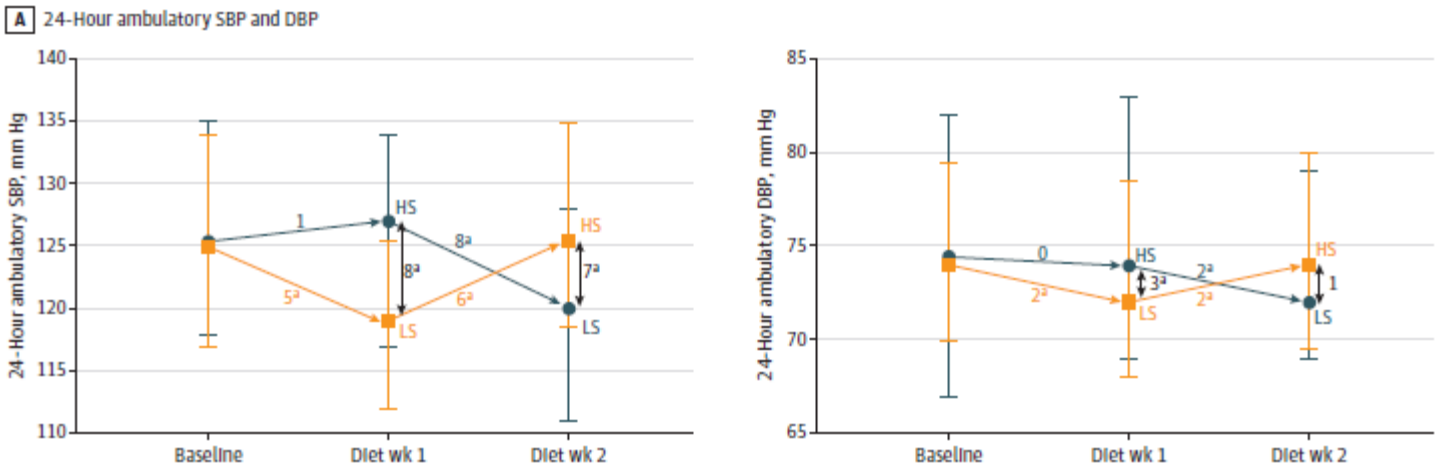
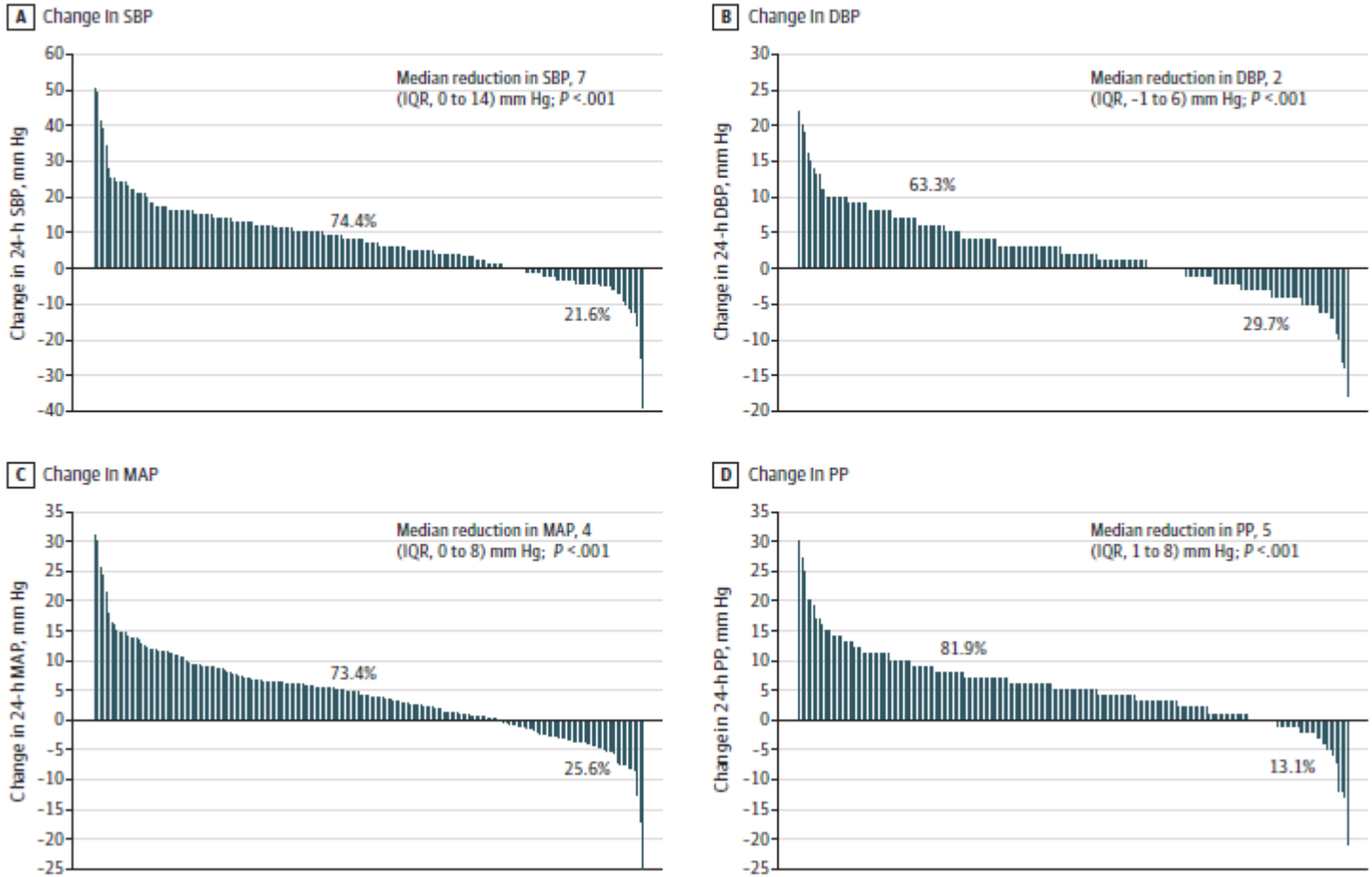
Figure 1. 24-Hour Ambulatory BP According to Allocated Diet Order and Study Visit



Effect of Dietary Sodium on Blood Pressure

Figure 2. Distributions of Within-Individual 24-Hour Ambulatory BP Response to Dietary Sodium Intake, Calculated From High-Sodium Diet Minus Low-Sodium Diet



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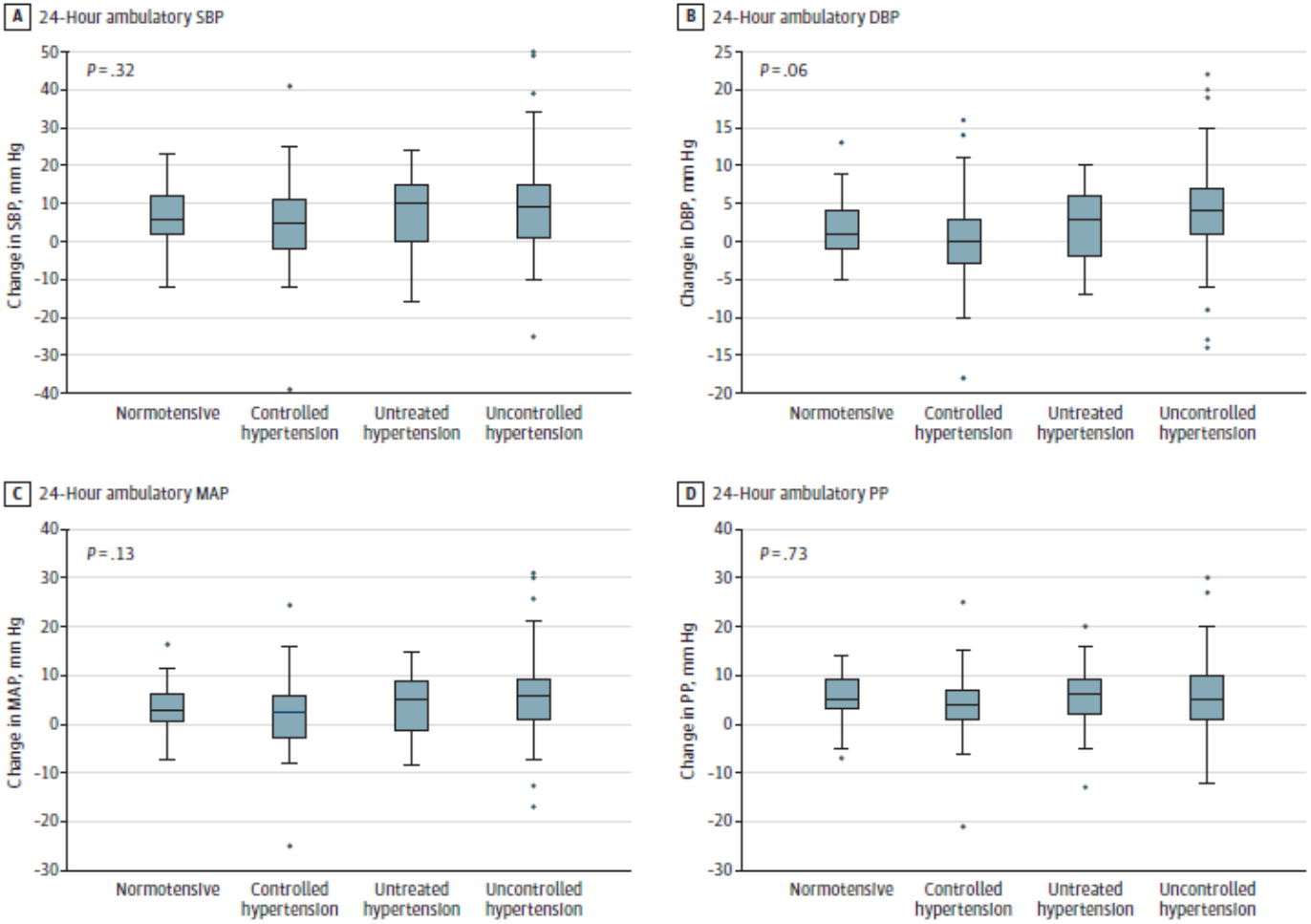
CONSIDERACIONES: Comparando una dieta común con una baja en sodio, la reducción es de 2.3 gr de mediana lo que supone una reducción de la PA de 6 mmHg (similar a 12,5 gr de htcz). Sin embargo no hay diferencia significativa en cuanto a la PA entre una dieta común y una rica en Na –

Por qué?????

La OMS recomienda una dieta de 2 gr al día aprox de sal. Probablemente la dieta normal de estos individuos ya está saturada de sal, ingieren unos 4,5 gr (productos procesados, precocinados…) por lo que una dieta rica en sal no parece tener efecto perjudicial mientras una baja en sodio si supone beneficio.

Figure 4. Within-Individual 24-Hour Ambulatory BP Response to Low-Sodium vs High-Sodium Diets Stratified According to Baseline Hypertension Status



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Effect of Dietary Sodium on Blood Pressure

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Conclusions

In conclusion, sodium reduction significantly lowered BP in the majority of middle-aged to elderly adults in this study. The decline in BP from a high-sodium diet to a low-sodium diet was independent of hypertension status and antihypertensive medication use, generally consistent across subgroups, and did not result in excess adverse events.

Relationship of Daily Step Counts to All-Cause Mortality and Cardiovascular Events

OBJECTIVES A meta-analysis was performed to quantify dose-response associations of objectively measured step count metrics in the general population.

METHODS Electronic databases were searched from inception to October 2022. Primary outcomes included all-cause mortality and incident cardiovascular disease (CVD). Study results were analyzed using generalized least squares and random-effects models.

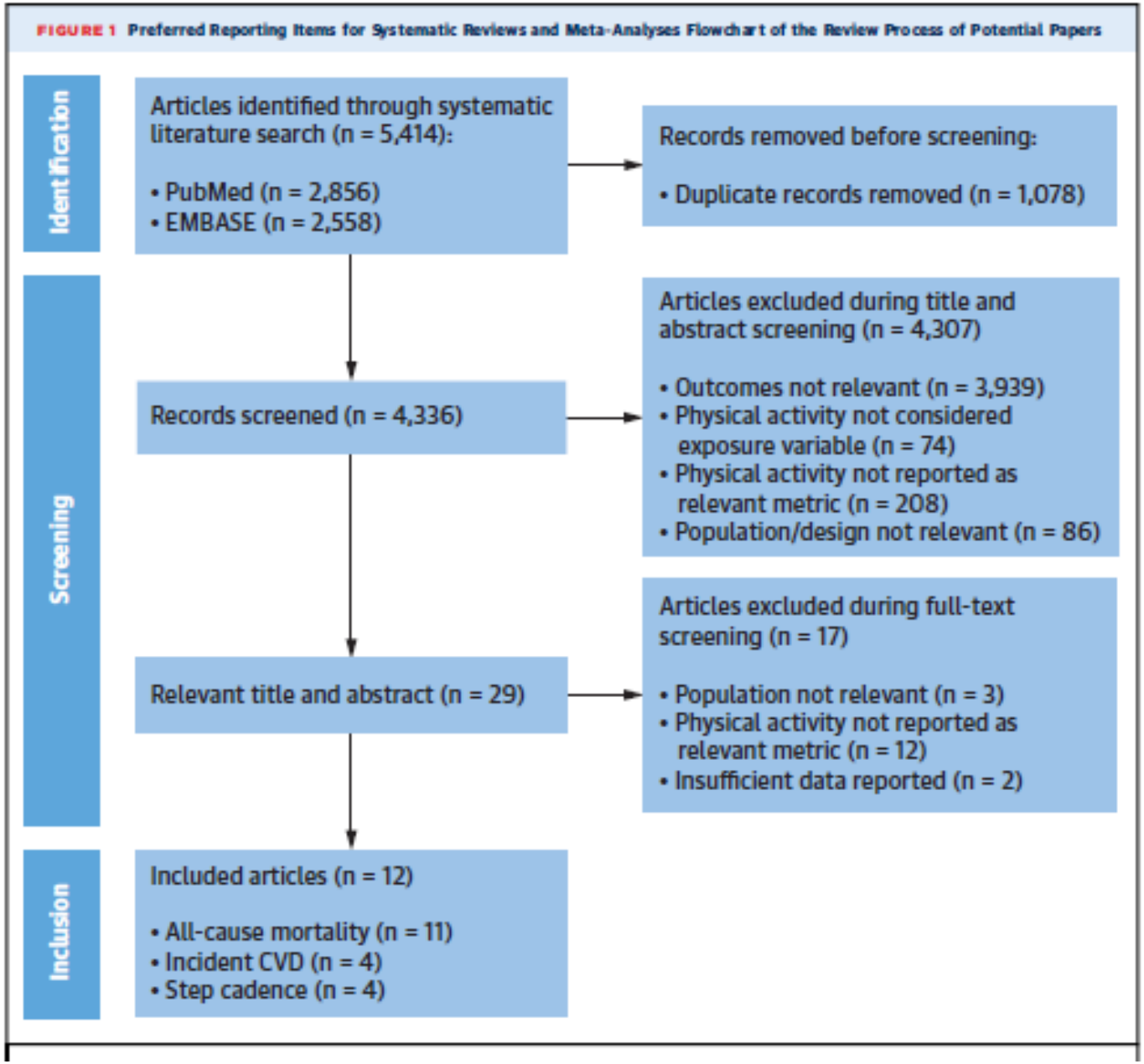
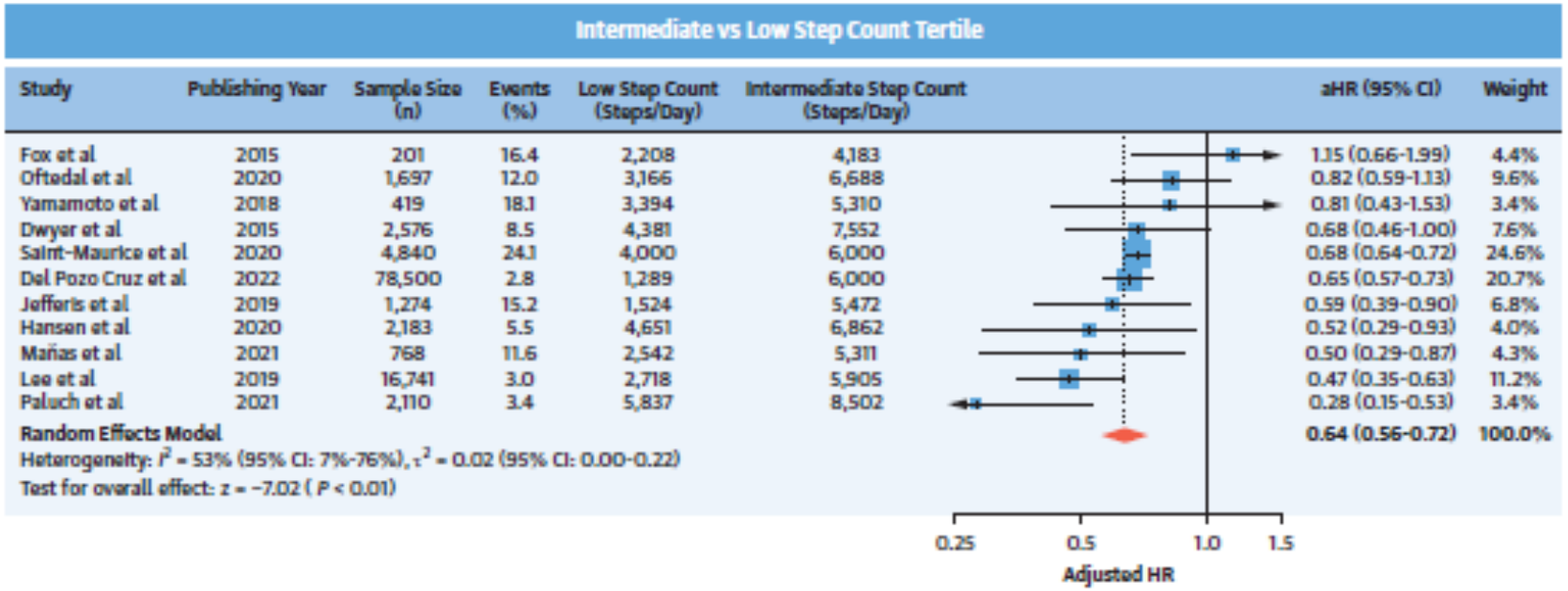


FIGURE 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses Flowchart of the Review Process of Potential Papers
Identification
Articles identified through systematic literature search (n = 5,414):
• PubMed (n = 2,856)
• EMBASE (n = 2,558)
Records removed before screening:
• Duplicate records removed (n = 1,078)
Screening
Records screened (n = 4,336)
Articles excluded during title and abstract screening (n = 4,307)
• Outcomes not relevant (n = 3,939)
• Physical activity not considered exposure variable (n = 74)
• Physical activity not reported as relevant metric (n = 208)
• Population/design not relevant (n = 86)
Relevant title and abstract (n = 29)
Articles excluded during full-text screening (n = 17)
• Population not relevant (n = 3)
• Physical activity not reported as relevant metric (n = 12)
• Insufficient data reported (n = 2)
Inclusion
Included articles (n = 12)
• All-cause mortality (n = 11)
• Incident CVD (n = 4)
• Step cadence (n = 4)



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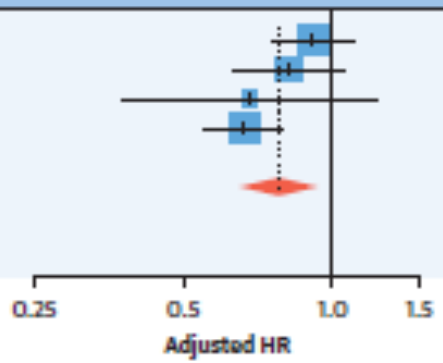
Intermediate vs Low Step Cadence Tertile

Study	Publishing Year	Sample Size (n)	Events (%)	Low Step Cadence	Intermediate Step Cadence	aHR (95% CI)	Weight
Saint-Maurice et al	2020	4,840	24.1	28 steps/min	63 steps/min	0.91 (0.76-1.10)	33.3%
Lee et al	2019	16,741	3.0	31 steps/min	63 steps/min	0.82 (0.64-1.06)	25.4%
Paluch et al	2021	2,110	3.4	59 steps/min	76 steps/min	0.68 (0.38-1.22)	7.9%
Del Pozo Cruz et al	2022	78,500	2.8	25 steps/min	68 steps/min	0.66 (0.55-0.79)	33.4%
Random Effects Model						**0.78 (0.65-0.93)**	**100.0%**

Heterogeneity: I^2 = 51% (95% CI: 0%-84%), τ^2 = 0.02 (95% CI: 0.00-0.38)

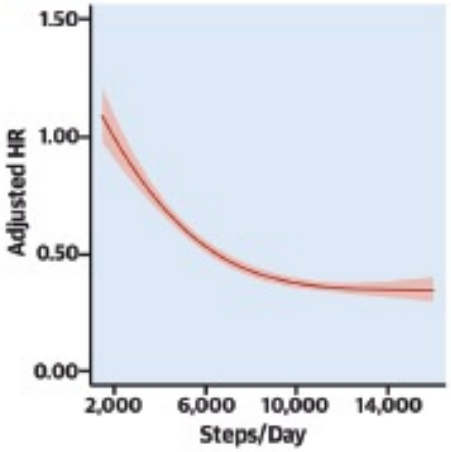
Test for overall effect: z = −2.76 (P < 0.01)



CENTRAL ILLUSTRATION Dose-Response Associations of Daily Step Count With Clinical Outcomes

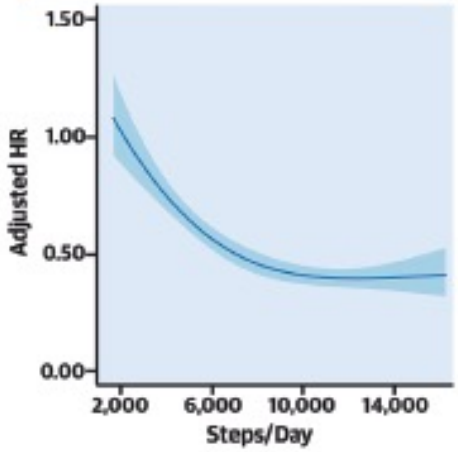
This systemic review and meta-analysis of 12 cohorts including 111,309 individuals from the general population identified minimal and optimum step count targets for reducing adverse health outcomes.

All-Cause Mortality



	Steps/day	Adjusted HR (95% CI)
Minimum dose	2,517	0.92 (0.84-0.99)
Optimum dose	8,763	0.40 (0.38-0.43)
Risk reduction at 16,000 steps	16,000	0.35 (0.30-0.40)

Incident CVD (Fatal and Nonfatal)



	Steps/day	Adjusted HR (95% CI)
Minimum dose	2,735	0.89 (0.79-0.99)
Optimum dose	7,126	0.49 (0.45-0.55)
Risk reduction at 16,000 steps	16,000	0.42 (0.33-0.53)

Step count targets were independent of:

Sex

Device wear location (wrist vs hip)

Additional health benefits with higher step cadence, irrespective of total step count

Stens NA, et al. J Am Coll Cardiol. 2023;82(15):1483-1494.

Relationship of Daily Step Counts to All-Cause Mortality and Cardiovascular Events

CONCLUSIONS

Lower risk for all-cause mortality and incident CVD may already be experienced after about 2,600 and about 2,800 steps/d, respectively. Additional increments of 1,000 steps/d (about 10 minutes of walking) enhance risk reductions in a nonlinear fashion. Optimal health benefits were achieved at about 8,800 steps/d for all-cause mortality and about 7,200 steps/d for incident CVD. A higher cadence provides additional health benefits beyond total step volume. As health benefits of daily steps were similar between men and women and step count targets were independent of wear location and device, the integration of uniform daily step targets in future physical activity guidelines may be relevant from a public health perspective, as "every step counts."

Original article

Ferric carboxymaltose for patients with heart failure in all-range ejection fraction

Introducción y objetivos: El déficit de hierro (DH) es frecuente en pacientes con insuficiencia cardiaca y se relaciona con una reducción en la capacidad del ejercicio, peor calidad de vida y hospitalizaciones por dicha insuficiencia. Las guías de práctica clínica recomiendan detectar y corregir el DH con carboximaltosa férrica (CMF). Sin embargo, existe poca evidencia en pacientes con fracción de eyección del ventrículo izquierdo (FEVI) >40%.

Métodos: Se incluyó a todos los pacientes ambulatorios con insuficiencia cardiaca tratados con CMF tras el diagnóstico de DH (ferritina <100 ng/ml o ferritina 100-299 ng/ml y saturación de transferrina <20%). Se analizaron los parámetros clínicos y analíticos antes de la administración de CMF y a los 3 meses según la FEVI: conservada (>50%), levemente reducida (41-49%) y reducida (<40%).

Table 1 – Baseline characteristics of HF patients with iron deficiency according to LVEF.

Parameter	All patients ($n=235$)	HFrEF ($n=96$)	HFmrEF ($n=41$)	HFpEF ($n=98$)	P
Age (years)	73.5 (10.7)	75.5 (10.0)	71.8 (11.4)	72.5 (10.9)	.08
Sex (female), n (%)	121 (51.5)	41 (42.7)	20 (48.8)	60 (61.2)	.03
BMI (kg/m^2)	25.9 (4.3)	25.6 (4.5)	25.0 (3.5)	26.6 (4.4)	.08
SBP (mmHg)	124.9 (18.3)	121.4 (16.2)	119.8 (19.2)	130.3 (18.7)	<.0001
DBP (mmHg)	70.2 (9.6)	70.4 (8.8)	69.7 (9.5)	70.3 (10.3)	.93
HR (bpm)	69.4 (12.2)	70.5 (12.1)	67.3 (12.4)	69.3 (12.2)	.39
Anemia, n (%)	101 (43.0)	40 (42.6)	11 (26.8)	50 (52.6)	.02
Absolute iron deficiency[a]*, n (%)*	184 (78.3)	72 (76.6)	32 (78.0)	80 (85.1)	.38
Functional class, n (%)					.17
NYHA I	8 (3.4)	3 (3.1)	1 (2.6)	4 (4.3)	
NYHA II	180 (76.6)	79 (82.3)	35 (89.7)	66 (71.7)	
NYHA III	39 (16.6)	14 (14.6)	3 (7.7)	22 (23.9)	
HF etiology, n (%)					.15
Ischemic	152 (64.7)	67 (69.8)	24 (58.5)	61 (62.2)	
Valvular	51 (21.7)	15 (15.6)	10 (24.4)	26 (26.5)	
Hypertensive	7 (3.0)	1 (1.0)	1 (2.4)	5 (5.1)	
Other	25 (10.6)	13 (13.5)	6 (14.6)	6 (6.1)	
LVEF (%)	44.5 (15.3)	29.4 (6.4)	43.8 (3.0)	59.7 (7.9)	<.0001
LVEF ≤45%[b]	124 (52.8)	96 (100)	28 (68.3)	0 (0)	
FCM dose (mg)	947.0 (154.2)	963.5 (130.7)	939.0 (165.7)	938.8 (164.7)	.47
Correct dose according to recommendations, n (%)	91 (59.1)	40 (42.6)	19 (46.3)	32 (33.7)	.29
Difference between the theoretical and administrated dose of FCM (mg)	−300.9 (301.0)	−95.7 (389.9)	−97.6 (406.5)	−273.7 (391.2)	.004

Table 3 – Clinical and analytical parameters at 3-month follow-up according to LVEF.

Parameter	HFrEF			HFmrEF			HFpEF		
	Basal ($n=96$)	3 months ($n=96$)	P	Basal ($n=41$)	3 months ($n=39$)	P	Basal ($n=98$)	3 months ($n=92$)	P
Hemoglobin (mg/dL)	12.7 (1.5)	13.2 (1.6)	.001	12.9 (1.5)	13.0 (1.3)	.95	12.1 (1.4)	12.7 (1.8)	.001
MCHC (pg)	29.2 (3.1)	30.6 (2.0)	.001	29.8 (2.7)	31.1 (2.1)	.04	28.9 (2.5)	30.1 (2.2)	.001
MCV (fL)	90.7 (9.4)	95.2 (5.9)	.001	89.7 (11.2)	95.2 (5.8)	.001	90.9 (6.9)	94.5 (5.2)	.001
Serum iron (mcg/dL)	57.0 (28.4)	86.8 (26.0)	.001	50.4 (21.9)	77.9 (28.0)	.001	55.1 (25.4)	76.3 (35.4)	.001
Ferritin (ng/mL)	86.2 (122.4)	312.1 (535.2)	.001	83.1 (109.9)	245.1 (166.2)	.001	58.5 (72.5)	255.1 (143.4)	.001
Transferrin (mg/dL)	267.7 (51.4)	225.8 (48.8)	.001	272.1 (59.9)	226.8 (48.3)	.001	293.8 (63.1)	232.4 (50.9)	.001
TSAT (%)	14.9 (7.5)	27.1 (9.8)	.001	13.1 (5.7)	24.5 (11.6)	.001	13.7 (6.5)	22.7 (11.8)	.001
TSAT <20%, *n* (%)	72 (81.8)	13 (13.5)	.001	38 (95.0)	9 (23.0)	.001	73 (82.0)	21 (22.8)	.001
Creatinin (mg/dL)	1.7 (3.3)	1.3 (0.5)	.30	1.2 (0.4)	1.3 (0.5)	.25	1.2 (0.5)	1.2 (0.5)	.66
GFR (mL/min)	54.4 (23.7)	55.1 (24.5)	.75	65.0 (22.7)	62.7 (24.6)	.02	57.7 (21.4)	59.8 (20.3)	.55
GFR <40 mL/min, *n* (%)	29 (35.4)	22 (22.9)	1	5 (13.9)	7 (17.9)	.30	19 (23.2)	13 (14.1)	.82
NTproBNP (pg/mL)	6229.1 (9929.2)	4133.0 (5070.2)	.04	3260.6 (3524.0)	3470.9 (4622.6)	.56	3182.2 (5141.7)	2389.7 (3198.3)	.04
Anemia, *n* (%)	40 (42.6)	19 (19.8)	.03	11 (26.8)	6 (15.4)	.75	50 (52.6)	25 (27.2)	.03
Absolute iron deficiency, *n* (%)	72 (76.6)	14 (14.5)	.001	32 (78.0)	4 (10.3)	.03	80 (85.1)	10 (10.9)	.001
NYHA I, *n* (%)	3 (3.2)	15 (15.6)	.03	1 (2.4)	10 (25.6)	.03	4 (4.1)	9 (9.8)	.150
NYHA II, *n* (%)	79 (82.3)	72 (75.0)		35 (85.4)	28 (71.8)		55 (56.1)	71 (77.2)	
NYHA III, *n* (%)	14 (14.5)	9 (9.4)		3 (7.3)	1 (2.6)		22 (22.4)	12 (13.0)	
Improved NYHA I grade, *n* (%)		20 (20.8)			11 (28.2)			19 (20.7)	
No changes in NYHA, *n* (%)		73 (76.0)			28 (71.8)			69 (75.0)	
Reported improvement after FCM, *n* (%)		69 (71.9)			30 (73.2)			63 (64.3)	

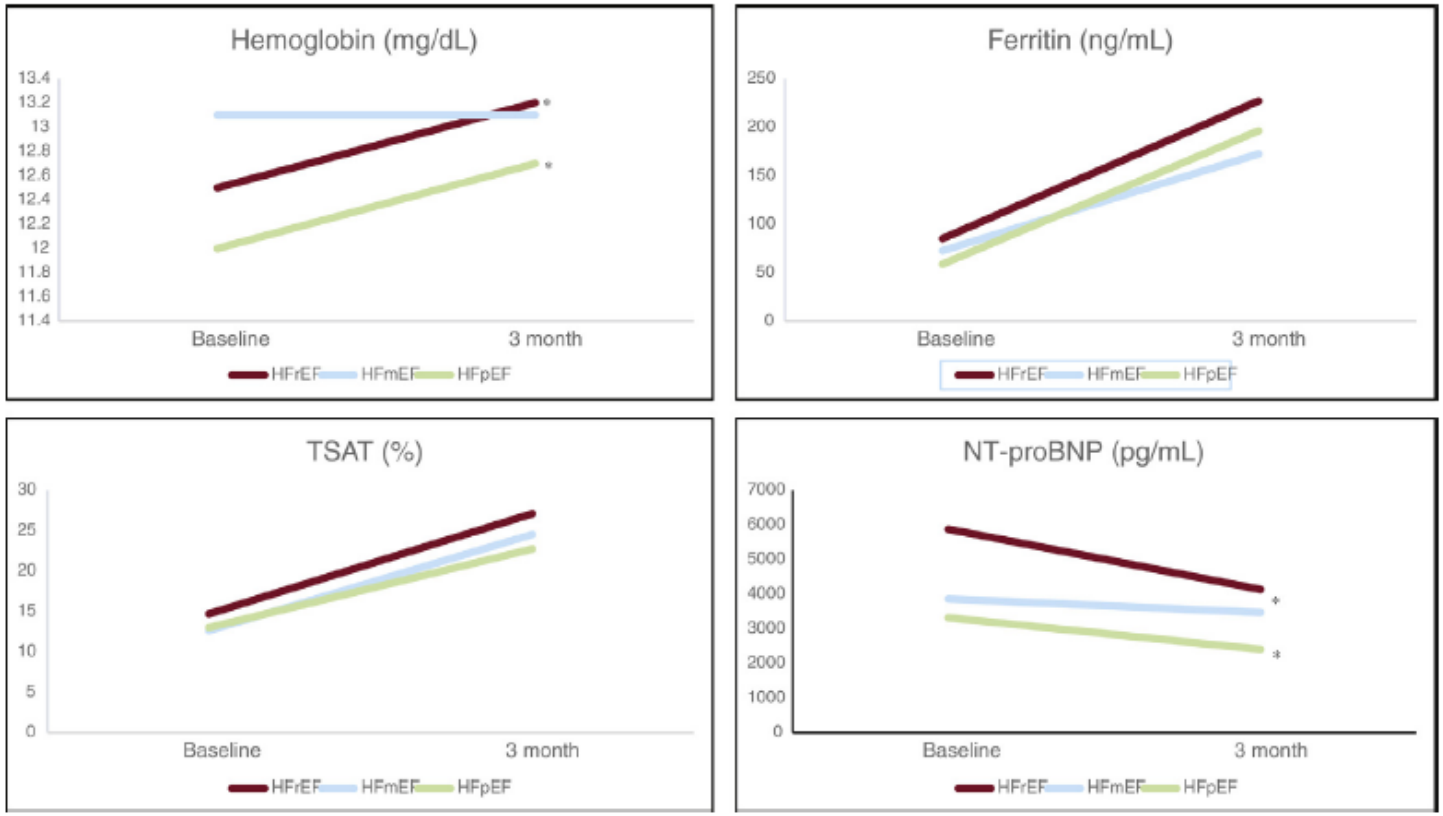


Fig. 1 – Changes in analytical parameters after FCM administration according to LVEF. FCM: ferric carboxymaltose; HFmrEF: heart failure with a mildly reduced left ventricular ejection fraction; HfpEF: heart failure with a preserved left ventricular ejection fraction; HfrEF: heart failure with a reduced left ventricular ejection fraction; LVEF, left ventricular ejection fraction; TSAT, transferrin saturation.

Original article

Ferric carboxymaltose for patients with heart failure in all-range ejection fraction

Conclusions

In conclusion, ID is frequent in HF patients regardless of LVEF and should be checked periodically. Correcting ID with FCM is a safe and effective option in all patients, improving ferric parameters. NTproBNP was reduced in HFrEF and HFpEF patients, and NYHA class improvement is less likely in HFpEF patients than in the rest of the groups.

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ARTÍCULO ESPECIAL

Resumen ejecutivo de la actualización 2023 del consenso de actuación básica durante el ingreso hospitalario por insuficiencia cardiaca aguda

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Consejería de Sanidad

Sacyl

Complejo Asistencial Universitario de León

Tabla 1 Pruebas diagnósticas iniciales en el paciente con ICA

Pruebas a realizar	Para identificar/descartar
Electrocardiograma	Arritmias cardiacas, isquemia miocárdica
Oximetría	Insuficiencia respiratoria
Radiografía de tórax	Congestión, infección pulmonar
Ecografía pulmonar	Congestión
Ecocardiografía	Congestión, disfunción cardiaca, causas mecánicas
Péptidos natriuréticos	Aumento de presiones de llenado y congestión (NT-proBNP > 450 pg/mL para < 50 años, > 900 pg/mL para 50-75 años y > 1.800 pg/mL para > 75 años); o BNP ≥ 400 pg/mL.
Analítica sanguínea	
Hemoglobina	Anemia
Creatinina/FGe	Disfunción renal
Urea	Disfunción renal/estado volémico
Sodio, potasio, cloro	Alteraciones electrolíticas
Transferrina/ferritina	Depleción de hierro
TSH	Alteraciones tiroideas
Dímero D	Embolia pulmonar y trombosis venosa profunda
Lactato	Acidosis láctica
Albúmina	Estado nutricional
pH	Acidosis/ alcalosis metabólica/respiratoria
Ca 125	Congestión, inflamación
Albuminuria	Congestión y daño endotelial
Iones (sodio y potasio) en orina	Respuesta diuréticos

FGe: filtrado glomerular estimado; ICA: insuficiencia cardiaca aguda; TSH: hormona estimulante de la tiroides.

CONSIDERACIONES AL INGRESO

INFORMACIÓN PACIENTE:

Edad: .....
Sexo: .....
Fecha Ingreso: .....

SITUACIÓN BASAL:

Barthel: .....
Cuidador: S/N
- Está educado en IC: S/N
- Familiar ☐ • Contratado ☐

Institucionalizado: S/N
Demencia: S/N
Hábitos tóxicos:
- Fumador: S/N • Alcohol: S/N

INFORMACIÓN IC PREVIA:

Debut IC: .....
Nº reingresos ICA 1 año antes: .....
Nº visitas urgencias 3 meses antes: .....
Fecha última ecocardiografía: .....
FEVI: .....
NYHA: .....

ETIOLOGÍA IC:

☐ Hipertensiva
☐ Isquémica
☐ Valvulopatía:
- Ya ha sido intervenida: S/N
- Posibilidad cirugía: S/N
- Válvula/s afectada/s: .....

☐ Tóxica:
- Enólica: S/N
- Tto. oncológico: S/N

☐ Idiopática
☐ Amiloidosis

COMORBILIDADES:

☐ Diabetes
☐ HTA
☐ Dislipemia
☐ ERC creat/FG .....
☐ EPOC/SAHS-SOH (CPAP)
☐ Post COVID19
☐ Obesidad
☐ Demencia
☐ FA
☐ Anemia (Hb) .....
☐ Déficit de Fe

TRATAMIENTO HABITUAL:

☐ Diuréticos:
- ☐ Furosemida ≥80 mg
- ☐ Tiazidas

☐ ARNI
☐ IECA/ARA-II
☐ β-Bloqueante
☐ ARM
☐ Ivabradina
☐ ISGLT2
☐ Digoxina
☐ Calcio-antagonistas
☐ Antiagregantes
☐ ACOD
☐ Dicumarínicos
☐ Antiarrítmicos
☐ Estatinas

EVALUACIÓN CONGESTIÓN Y EXPLORACIÓN FÍSICA:

☐ Síntomas y signos Índice EVEREST[a]
☐ Ortopnea ☐ DPN ☐ IY
☐ Edemas ☐ Crepitantes

Pruebas de imagen:
☐ Ecografía (Eco pulmonar/Vena Cava/Cardio)
☐ RX tórax

Biomarcadores:
☐ Ca125 ..... ☐ NT-proBNP .....
PA ..... FC ..... Ritmo sinusal: S/N
Peso ..... Altura ..... IMC .....

FACTOR DESENCADENANTE:

ANALÍTICA AL INGRESO:

- Creatinina/urea/FG
- Na^+/K^+ en sangre
- Na^+/K^+ en orina
- Hb, ferritina, IST
- Albúmina
- pH
- Saturación O_2
- TSH

MONITORIZACIÓN DIARIA NO INVASIVA:

- ☐ FC
- ☐ PA
- ☐ Sat. O_2
- ☐ Diuresis cada 8-24 h
- ☐ Peso diario

FÁRMACOS MODIFICADORES DE LA ENFERMEDAD (BB, ARNI, ARM)*:

Sólo retirar si:

- Inestabilidad hemodinámica
- Hiperpotasemia (K^+>6)
- Creat >2,5 / descenso del FGe del 50% respecto al basal

SOPORTE RESPIRATORIO: OXIGENOTERAPIA (si saturación O2 <90% o PaO2 <60 mmHg)

- pH 7,25-7,34
- 25 rpm
- Consciente

→ ☐ VMNI → BIPAP (Si acidosis respiratoria) / CPAP (Si $PaCO_2$<50)

- pH < 7,25 o
- Bajo nivel de consciencia o
- Saturación O_2<90% (o PaO_2<60) a pesar de VMNI

→ ☐ IOT

SOPORTE HEMODINÁMICO:

Nitroglicerina iv (en casos de ICA con hipertensión [PAs >160 mmHg] y/o EAP)

- Monitorización horaria de PA
- Si PAs <90 mmHg: retirar

PA<90 mmHg:

1. Retirada o reducción de dosis de antihipertensivos concomitantes.
2. Si asocia síntomas de hipoperfusión iniciar inotrópicos
   - LEVOSIMENDÁN (sobretodo si BB)
   - DOBUTAMINA

VASOCONSTRICTORES (si shock cardiogénico [PA <90 mmHg])

Hasta conseguir PA >90 mmHg, combinar con inotrópicos hasta la retirada de vasoconstrictores

Precisa monitorizar PA y ECG

- **NORADRENALINA (preferente)**
- DOPAMINA

Si fracaso, valorar dispositivos implantables

TRATAMIENTO DESCONGESTIVO: DIURÉTICOS

☐ **AL INGRESO: Furosemida iv (en la primera hora de asistencia)**

- No diurético previo: 20-40 mg bolo iv
- Sí diurético previo: de 1 a 2,5 veces la dosis de diurético previa, ahora iv

☐ **A LAS 2-6 HORAS: valoración respuesta**

Según valoración clínica:

- NO mejoría: dosis iv x 2/8-12h[b]
- SÍ mejoría: mantener dosis/8-12h[b]

Según valoración bioquímica orina:

- **2h**: Na^+ 50-70 meq/L o
- **6h**: volumen >100-150 mL/h

→ Mantener dosis/8-12h

- Por debajo de estos valores: 2 x dosis iv/8-12h

☐ **A LAS 24 HORAS (valorar congestión[c] y diuresis)**

Persiste congestión y diuresis <3 L/día.

Valorar opciones escalonadamente:

- 2 x dosis furosemida /24h (máx 400-600 mg)
- Bloqueo múltiple de nefrona:
  - Tiazidas
  - AA o acetazolamida (alcalosis)
- Protocolo suero salino hipertónico[d]
- Si no hay respuesta, valorar ultrafiltración

Mejoría congestión o diuresis >3L al día:

1. Continuar dosis hasta descongestión
2. Reducción dosis iv hasta mínima necesaria
3. VO ≥24 horas previo alta

*Los IECA o ARA-II se deben sustituir por ARNI, que ha demostrado un beneficio neto mayor en el paciente con IC-FEr tanto en paciente hospitalizado como ambulatorio.

[b]Se puede utilizar perfusión continua en vez de bolos

[c]Se recomienda valoración multimodal de la congestión utilizando signos, síntomas, ETT, ecografía de cava y pulmonar, Rx y biomarcadores

[d]Anexo de protocolo suero salino hipertónico.

2 Manejo del paciente con ICA en fase congestiva.

MANEJO FASE ESTABLE

DIURÉTICOS: Reducir hasta su paso a vía oral y a la dosis mínima eficaz

INICIO O AJUSTE DE FÁRMACOS MODIFICADORES DE LA ENFERMEDAD (IC-FEr de novo o previa)

- Mantener al ingreso o iniciar si la PA, FC, función renal y K^+ lo permiten
- Su retirada aumenta el riesgo de muerte o reingreso
- Vigilar PA, función renal y iones

En pacientes con IC-FEr:

- Máximo aumento de la supervivencia: ARNI y BB, con lo que son prioritarios
- Situación ideal sería iniciar la cuádruple terapia durante el ingreso: ARNI+BB+iSGLT2+ARM
- En fase congestiva: ARNI y empagliflozina
- Euvolémico: BB (con menos evidencia en fase aguda ARM)

En pacientes con FEVI ≥40% empagliflozina reduce la mortalidad y los ingresos por IC

En pacientes con FEVI entre 41-49% podría considerarse usar BB, ARNI, IECA, ARAII y ARM

☐ **ARNI**
  ☐ Se considerará el uso de IECA/ARAII en aquellos casos que no puedan tomar ARNI, por la causa que fuera

☐ **BETABLOQUEANTE** (Si la PA y FC lo permiten mantener al ingreso o iniciar)

- **Si RS → objetivo FC: 50-70 lpm** (no subir dosis de BB si FC <60 lpm)
- **Si FA → objetivo FC: 60-100 lpm** (óptima 70-90 lpm), máx 110 lpm (no existe un claro beneficio de BB)
- **Si RS y FC ≥70 lpm con BB** a dosis máxima tolerada → valorar ivabradina

☐ **ARM**: utilizar la dosis neurohormonal (25-50 mg/24h)

ASEGURAR EL MANEJO DE LAS COMORBILIDADES:

- Valorar ferroterapia IV durante la hospitalización, en base a resultados del estudio AFFIRM

EDUCACIÓN

AUTOCUIDADOS

- ☐ Control de peso frecuente
- ☐ Dieta pobre en sal
- ☐ Restricción de líquidos (sólo si indicación)
- ☐ Abstención de tabaco y alcohol
- ☐ Ejercicio físico
- ☐ Vacunación antigripal anual
- ☐ Vacunación antineumocócica PPSV23

SIGNOS DE ALARMA

- ☐ Aumento de la disnea
- ☐ Aumento de la ortopnea
- ☐ Aparición de disnea paroxística nocturna
- ☐ Dolor torácico
- ☐ Aumento de peso y/o edemas
- ☐ Sensación de plenitud

MEDICACIÓN

- ☐ Revisión con el paciente de la lista de medicación
- ☐ Control de adherencia terapéutica
- ☐ Evitar fármacos potencialmente peligrosos (p. ej.: AINES) y con alto contenido en sodio (p. ej.: paracetamol efervescente)
  En caso de duda preguntar
- ☐ **Ajuste de tratamiento,** aumentando dosis de diuréticos hasta estabilización clínica si:
  - Aumento de edemas o de la disnea
  - Aumento de 2 o más Kg en 3 días

GESTIÓN DEL PERIODO DE TRANSICIÓN POST-ALTA

2 Riesgo de reingreso*

Es esencial identificar los pacientes con mayor riesgo de reingreso. Se proponen los siguientes ítems:

Identificación de los pacientes de mayor riesgo de reingreso:

1. >2 ingresos en los últimos tres meses o >2 visitas a urgencias en el último mes
2. Mala situación clínica al alta: PAS <100 mmHg, >120 mg de furosemida oral/día, anemia, alteraciones iónicas (hipoNa, hiperK) y/o FGe <30 ml/min/1,73m^2
3. Aparición de algún síndrome geriátrico en el ingreso: sd confusional, fragilidad, desnutrición o sarcopenia
4. Mala situación social o riesgo de mala adherencia...

3 Continuidad asistencial

- Establecer el esquema terapéutico del paciente al alta, incluyendo:
  - Fármacos y dosis
  - Propuesta de optimización donde se precise
  - Retirada de la medicación sin evidencia o contraproducente
- Contacto con el Sistema Sanitario:
  - Contacto con Atención Primaria
  - Gestor de casos
  - Contacto telefónico proactivo
  - Sistemas de telemedicina

4 Implicación paciente/ cuidador principal

- Conciliación y adherencia terapéuticas (priorizar fármacos de posología única)
- Autocontrol (de constantes: PA, FC, peso)
- Identificación signos y síntomas de alarma
- Autocuidado (régimen flexible de diuréticos)

Tabla 2 Consideraciones antes del alta

1. ¿Se han identificado y controlado los factores precipitantes?
2. ¿Se han evaluado las comorbilidades?
3. ¿Está el paciente descongestionado?
4. ¿Se conoce la FEVI?
5. Si la FEVI es < 40% (valorar si < 50%), ¿se ha iniciado o considerado el tratamiento con:
   - RNI (en caso de que no pueda usarse, sustituir por IECA/ARA II)
   - BB
   - ARM
   - iSGTL2 (dapagliflozina/empagliflozina) independientemente de FEVI
   - Vericiguat: considerar si FEVI < 45% (FGe > 15 mL/min y PN < 8.000 pg/mL)
6. ¿Se ha revisado el resto de medicación?
7. ¿Se han valorado la función renal y los iones?
8. ¿Se conoce la PAS, el ritmo, la FC y la duración del QRS?
9. ¿Se ha educado sobre la enfermedad al paciente/cuidador y se han proporcionado recomendaciones?
10. ¿El paciente tiene programada una cita precoz en atención primaria y/o especializada?[a]

FELIZ NAVIDAD

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