Validity of the minimum data set for outcomes research in patients hospitalized for heart failure in Spain

Validez del conjunto mínimo básico de datos en la investigación de resultados de pacientes ingresados por insuficiencia cardiaca en España

To the Editor,

Heart failure (HF) is a complex syndrome. Its incidence is 2% in the European adult population but increases with age, affecting more than 10% of individuals older than 70 years.[1] In Spain, hospital attendance due to HF has increased as a result of population aging and, although the crude rate of in-hospital mortality has fallen, no significant differences are found after adjustment for risk.[2]

The care outcomes for patients hospitalized for HF in Spain have been investigated using clinical registries and administrative databases (ADs), such as the Registry of specialized healthcare activity-minimum data set (RSHCA-MDS),[2] the largest source for the study of in-hospital mortality. ADs are appropriate for studying health care outcomes because they offer longitudinal data on large populations and are readily obtained, but their usefulness depends on the accuracy of the data record, which is largely related to the quality of the diagnostic and procedural coding.

The usefulness of ADs for the study of HF has been internationally compared,[3] and the RSHCA-MDS has been used in Spain for investigating the outcomes of patients admitted for HF. Nonetheless, little information is available on its validity for this objective. To assess the implications of its use for this purpose in the Spanish National Health System, we adopted as a comparative reference the Heart Failure Registry of the Spanish Society of Cardiology (ICC-SEC).[4] The objective of this registry is to analyze the impact of adherence to the recommendations of Spanish Society of Cardiology guidelines on HF[1] and includes patients with a confirmed diagnosis of HF and admission to a HF unit in the cardiology department of a hospital with SEC EXCELENTE accreditation[5] in the HF process.

Because ICC-SEC and RSHCA-MBDS have different data models and scopes (ICC-SEC includes outpatient follow-up, unlike RSHCA-MDS) and because both registries lack shared attributes that would permit unambiguous matching of records corresponding to a single event (direct identifiers), we used indirect identifiers—birth date, admission date, sex, and treating hospital—to match events recorded in the 2 sources in 2019 and 2020. As a sensitivity analysis, the matching was widened by allowing differences of up to ± 2 days in birth and admission dates.

To assess the validity of the diagnoses coded in the RSHCA-MDS, we selected some of the most relevant variables for the risk adjustment of in-hospital mortality due to HF and calculated the main indicators of accuracy and concordance.

Of the 671 patients recorded in the ICC-SEC, 134 were excluded (20%): 109 (16.2%) because they were outpatients and 25 (3.7%) due to data inconsistencies. Of the 537 remaining patients, 385 could be matched (71.7%, mean age, 74.39 ± 11.83 years); 170 (44.2%) were women. No differences were found in age, length of hospital stay, or comorbidity profile between matched and unmatched patients (table 1). The crude rates of in-hospital mortality were 3.38% in the ICC-SEC and 3.12% in the RSHCA-MDS (P = .999).

Accuracy and concordance indicators are shown in table 2. Taken together, the comorbidities studied showed acceptable sensitivity, very high specificity, and substantial concordance. Considered separately, diabetes mellitus, chronic obstructive pulmonary disease (COPD)-asthma, and chronic kidney disease displayed better validity indices than the other 3 comorbidities (all with incidence rates < 5% in both registries). The concordance was insignificant for active cancer, lymphoma, and leukemia and for trauma and falls, moderate for dementia and chronic kidney disease, and almost perfect for diabetes mellitus. In the sensitivity analysis, 413 patients could be matched (76.9%) and the results were similar (table 2).

Table 1
Profiles of matched and unmatched patients

	Matched (n = 385)	Unmatched (n = 152)	*P*
Age, y	74.4 ± 11.9	74.08 ± 11.4	.779
Hospital stay, d	8.3 ± 8.4	11.7 ± 27.6	.134
Women	170 (44.2)	68 (44.4)	.952
Chronic kidney disease	165 (43.5)	52 (35.1)	.078
COPD/asthma	60 (15.7)	19 (12.9)	.415
Dementia	18 (4.7)	5 (3.4)	.453
Cancer/lymphoma	12 (3.2)	4 (2.7)	.793
Trauma/falls	15 (3.9)	5 (3.4)	.779
Diabetes mellitus	155 (40.7)	59 (39.9)	.863

COPD, chronic obstructive pulmonary disease.
Values are reported as mean ± standard deviation or No. (%).

Table 2
Validity and concordance indicators for the comorbidities studied

	Sensitivity, % (95%CI)	Specificity, % (95%CI)	PPV, % (95%CI)	NPV, % (95%CI)	Likelihood ratio, + (95%CI)	Likelihood ratio, – (95%CI)	κ (95%CI)
Original matching							
All comorbidities[a]	67.5 (62.8-72.1)	97.1 (96.4-97.9)	84.2 (80.1-88.2)	93 (91.8-94.1)	23.6 (18-30.9)	0.3 (0.3-0.4)	0.7 (0.7-0.7)
Active cancer, lymphoma, or leukemia[b]	16.7 (0-41.9)	99.5 (98.6-100)	50 (0-100)	97.4 (95.6-99.1)	31.1 (4.8-202.4)	0.8 (0.6-1)	0.13 (–0.12 to 0.4)
Dementia[b]	44.4 (18.7-70.2)	99.5 (98.6-100)	80 (50.2-100)	97.3 (95.6-99.1)	81.6 (18.6-356)	0.6 (0.3-0.8)	0.55 (0.33-0.78)
Diabetes mellitus	87.7 (82.3-93.2)	96.9 (94.5-99.4)	95.1 (91.2-99)	92.1 (88.6-95.7)	28.8 (13.9-59.9)	0.13 (0.1-0.19)	0.86 (0.8-0.9)
COPD-asthma	68.3 (55.7-80.9)	94.5 (91.8-97.1)	69.5 (56.9-82.1)	94.2 (91.5-96.9)	12.3 (7.6-19.9)	0.34 (0.23-0.49)	0.63 (0.52-0.74)
Chronic kidney disease	59.4 (51.6-67.2)	90.9 (86.9-94.9)	83.1 (75.9-90.2)	74.9 (69.5-80.3)	6.5 (4.2-10.1)	0.45 (0.37-0.54)	0.52 (0.44-0.61)
Trauma or falls[b]	13.33 (0-33.9)	98.6 (97.3-99.9)	28.57 (0-69.18)	96.6 (94.6-98.5)	9.9 (2.1-46.8)	0.9 (0.7-1.1)	0.16 (–0.1 to 0.38)
Sensitivity analysis matching							
All comorbidities	67.6 (63.2-2)	97.1 (96.4-7.9)	84 (80.1-87.9)	93.1 (92-94.2)	23.6 (16.7-19.8)	0.3 (0.3-0.4)	0.7 (0.7-0.7)

95%CI, 95% confidence interval; COPD, chronic obstructive pulmonary disease; NPV, negative predictive value; PPV, positive predictive value.
[a] All comorbidities is an instrumental variable comprising all records of all variables studied.
[b] Comorbidities with incidence < 5% in the Heart Failure Registry of the Spanish Society of Cardiology and in the Registry of specialized healthcare activity-minimum data set.

Although the failed matches are the main limitation of our study, we achieved considerably greater matching (71.7% vs 60.8%) than a previous study[6] of acute coronary syndrome (ACS) that used the DIOCLES clinical registry as reference; while our sensitivity (67.5% vs 85.1%) and concordance (κ = .7 vs κ = .86) were lower, our specificity was similar (97.1% vs 98.3%). These results indicate that the validity and concordance of the variables relevant for the adjustment of risk of HF events recorded in the RSHCA-MDS are generally reasonable and are in line with the expected results in ADs,[5] although somewhat lower than those found for ACS.

Our consideration of variables with very low incidence rates could partly explain the slightly lower validity and concordance for HF than previously found for ACS. However, independently of this factor, adjustments by risk of in-hospital mortality and readmission are usually worse for HF than for ACS. Accordingly, measures should be adopted to improve the recording and coding of HF events in the RSHCA-MDS, particularly for comorbidities with lower incidences.

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AUTHORS' CONTRIBUTIONS

Study design and manuscript drafting: J.L. Bernal, J. Elola, and M. Anguita. Data revision and statistical analysis: J.L. Bernal and N. Rosillo. Revision, editing, and manuscript approval: all authors.

CONFLICTS OF INTEREST

The authors report no conflicts of interest associated with this work.

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Home exercise intervention with the Vivifrail program in frail older patients with heart failure with reduced ejection fraction. The ExFRAIL-HF randomized trial

Intervención con ejercicio domiciliario con Vivifrail para ancianos frágiles con insuficiencia cardiaca y fracción de eyección reducida. El ensayo aleatorizado ExFRAIL-HF

To the Editor,

Frailty is a common syndrome in older patients with heart failure (HF) and is characterized by decreased functional reserve and associated risks of disability, hospitalization, and death.[1] Exercise rehabilitation programs have been demonstrated to improve the functionality of patients with HF.[2,3] However, the implementation of these structured programs is hindered by certain barriers. The REHAB-HF trial[2] improved Short Physical Portable Battery (SPPB) scores in 349 frail patients randomized after an acute HF episode. In the trial, patients attended 3 in-person weekly sessions for 12 weeks.

Although this protocol might seem ideal, its implementation in the real world is hampered by the resources needed. Another obstacle to the implementation of in-person treatments is the need for patients to travel from home, especially in older patients in suburban or rural areas. Furthermore, the patients studied were significantly younger than those in usual clinical practice in cardiogeriatrics and therefore the results of these clinical trials cannot be directly extrapolated to frail older patients.

Some exercise programs have been adapted to frail older patients, such as the Vivifrail program.[4] These programs have been shown to improve outcomes in these patients,[5] but have not been studied in patients with HF with reduced ejection fraction (HFrEF).