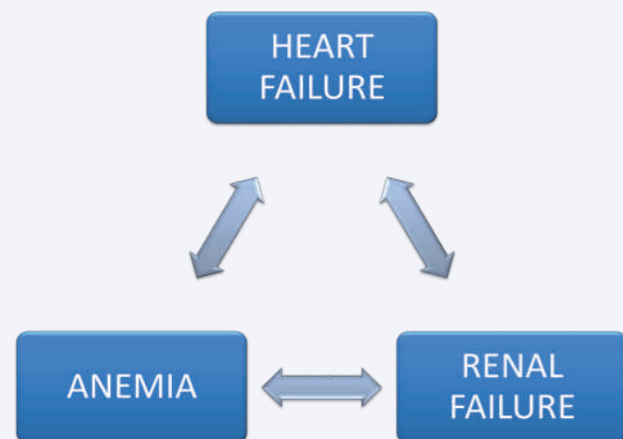




ANEMIA, RENAL IMPAIRMENT AND IN-HOSPITAL MORTALITY, IN ACUTE WORSENING CHRONIC HEART FAILURE PATIENTS

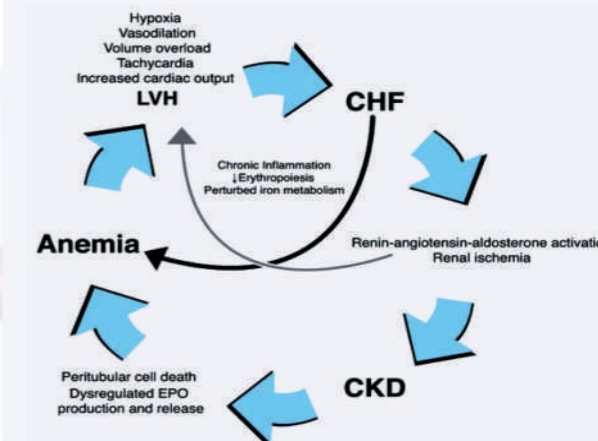


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INTRODUCTION

- Could one of the reasons for frequent rehospitalizations, high morbidity and mortality rate in chronic heart failure (CHF) patients, be anemia, co morbidity that is commonly associated with CHF?
- Chronic kidney disease (CKD) can cause or worsen both, anemia and CHF; CHF can cause or worsen anemia and CKD; and anemia can cause or worsen CKD and CHF.
- This interaction between the three conditions is known as **cardiorenal anemia syndrome**.



PURPOSE

The aim of our study was, to analyze the impact of anemia and renal impairment, on inhospital mortality (IHD), in patients with acute worsening chronic heart failure.

METHODS:

ANALYZED VARIABLES:

gender, age, risk factors and co morbidities: arterial hypertension (HTA), hyper/dyslipidemia (HLP), diabetes mellitus (DM), chronic obstructive pulmonary disease (COPD), coronary artery disease (CAD), peripheral artery disease (PVD), cerebrovascular disease, anemia and renal failure.

MEASURED VARIABLES:

heart rate (HR), systolic (SBP) and diastolic (DBP) blood pressure, serum Hgb, sodium, BUN, creatinine ($\mu\text{mol/L}$), ejection fraction (EF%), length of hospital stay.

STATISTICAL ANALYSIS:

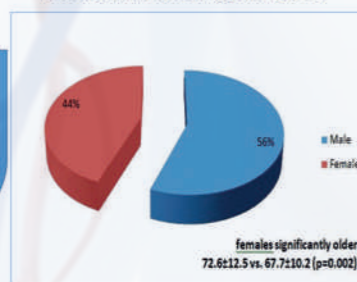
SPSS 17 statistical packed; descriptive and comparative analyze: t-test, Chi square test, univariate and multivariate linear regression (stepwise backward), and ordinal regression for categorical variables.

Anemia was defined as $\text{Hgb} \leq 10\text{mg/dl}$.

Comparative analysis was performed between patients with IHD and survivors, as a function of anemia and renal impairment.

Results 1

Patient distribution by age and gender



A cohort of 232 randomly selected patients admitted to ICCU because of symptoms of HF were retrospectively analyzed.

Comparative analysis of the variables as a function of IHD

variable	Death y/n	N	Mean	Std. Deviation	Sig. (2-tailed)
age	0	173	69.73	11.92	.881
	1	59	69.47	10.13	.872
HR	0	173	106.77	24.39	.573
	1	59	104.51	32.18	.623
DBP (mmHg)	0	173	87.66	23.16	.000
	1	59	72.80	31.70	.001
SBP (mmHg)	0	173	143.12	41.29	.000
	1	59	119.41	47.44	.001
Sodium (mol/L)	0	173	138.42	6.25	.253
	1	59	137.34	6.42	.261
Hgb (mg/dl)	0	173	16.94	20.22	.079
	1	59	12.28	2.68	.003
Creatinine (mg/dl)	0	173	1.46	1.12	.006
	1	59	2.03	1.92	.034
BUN (mol/L)	0	172	30.54	20.96	.005
	1	59	40.35	28.06	.016
EF (%)	0	165	43.43	10.84	.000
	1	59	37.14	8.29	.000
Hospital stay	0	173	7.87	4.57	.000
	1	59	3.85	7.93	.000

Results 2

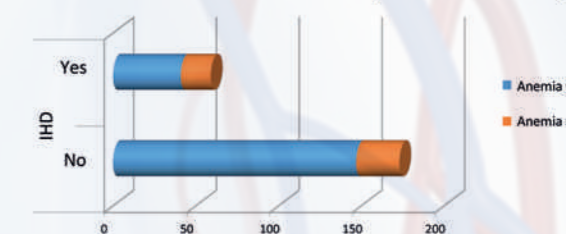
UNIVARIATE PREDICTORS of IHD were:

- ANEMIA (Exp B 2.48; $p=0.010$),
- Creatinine (beta .180; $p=0.006$),
- BUN (beta .184; $p=0.005$), and

Mean hospital stay was 6.8 ± 5.8 days, with significant difference between IHD and non IHD group (7.9 ± 4.5 vs. 3.8 ± 7.9 ; $p=0.000$), with the highest mortality rate during the first (37.3%) and second hospital day (44.1%).

Anemia was significantly associated with IHD, meaning that patients with anemia had OR 2,5 for IHD

Results 3. Anemia and In-hospital mortality:



(Fisher's Exact test 0.000, OR= 2.48; CI 1.7-5.4; Mantel-Haenszel OR $p=0.010$)

Results 4

MULTIVARIATE LOGISTIC REGRESSION

- Multivariate stepwise regression model (anemia, HRF, Hgb, BUN, creatinine, sodium) at step 3 (mean square .799, sig 0.002), identified **two independent predictors** Hgb (beta $-.148$, sig 0.028), and BUN (beta $.163$, sig 0.055).
- Multivariate model that included other known predictors of IHD (EF%, SBP, DBP, HRF, CAD, anemia, Hgb, BUN, creatinine, sodium) at step 8 (mean square 1.537, sig 0.000), identified **four independent predictors**: EF% (beta $-.204$, sig 0.002), SBP (beta $-.130$, sig 0.052) as markers of systolic dysfunction and again anemia (Exp B 2.2.06, sig 0.041), and BUN (beta $.200$, sig 0.002).

CONCLUSION

Anemia and renal impairment are well known comorbidities associated with HF, that have great impact on course of HF.

We confirmed that anemia and BUN, are significantly independent predictors of in hospital mortality in acute worsening CHF.