PREDICTORS OF IN-HOSPITAL MORTALITY IN PATIENTS WITH ACUTE OR ACUTE WORSENING CHRONIC HEART FAILURE

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BACKGROUND

- Effective risk stratification in acute heart failure patints can guide clinical decision-making on every day basis.
- There are several risk scores for chronic HF patients, but not so much for In-Hospital mortality in patients with acute, or acute worsening CHF.
- American Heart Association Get With the Guidelines Program, designed one in 2009, applicable in patients with REF HF and PEF HF.
- The Get With the Guidelines–Heart Failure (GWTGHF) risk score uses commonly available clinical variables to predict in-hospital mortality (seven clinical variables: race, age, systolic blood pressure, hear rate, sodium
- This is a validated tool for in-hospital mortality risk stratification that is applicable to a broad spectrum of heart failure patients, including those with preserved left ventricular systolic function.

GWTG-HF risk score

Systolic BP	Points	BUN	Points	Sodium	Points	Age	Points
50-59	28	≤9	0	≤130	4	≤19	0
60-69	26	10-19	2	131	3	20-29	3
70-79	24	20-29	4	132	3	30-39	6
80-89	23	30-39	6	133	3	40-49	8
90-99	21	40-49	8	134	2	50-59	11
100-109	19	50-59	9	135	2	60-69	14
110-119	17	60-69	11	136	2	70-79	17
120-129	15	70-79	13	137	1	80-89	19
130-139	13	80-89	15	138	1	90-99	22
140-149	11	90-99	17	≥139	0	100-109	25
150-159	9	100-109	19			≥110	28
160-169	8	110-119	21				
170-179	6	120-129	23				
180-189	4	130-139	25				
190-199	2	140-149	27				
≥200	0	≥150	28				

Heart Rate	Points	Black Race	Points	COPD	Points
≤79	0	Yes	0	Yes	2
80-84	1	No	3	No	0
85-89	3				
90-94	4				
95-99	5				
100-104	6				
≥105	8				

Total Score	Probability of Death
0-33	<1%
34-50	1-5%
51-57	>5-10%
58-61	>10-15%
62-65	>15-20%
66-70	>20-30%
71-74	>30-40%
75-78	>40-50%
≥79	>50%

American Heart Association.

Peterson P N et al. Circ Cardiovasc Qual Outcomes. 2010;3:25-32

AIM OF THE STUDY

- The aim of our study was to identify predictors of in-hospital mortality in patients with cute or acute worsening chronic heart failure.
- We also aimed to validate the discriminate function of GWTG-HF score (Get with The Guidelines Program of AHA), in our own patient cohort.

PATIENTS AND METHODS:

- **ANALYZED VARIABLES:**

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

- **MEASURED VARIABLES:**

heart rate (HR), systolic (SBP) and diastolic (DBP) blood pressure, serum Hgb, sodium, BUN, creatinine (μmol/L), ejection fraction (EF%), length of hospital stay, and GWTG-HF score (calculated from the seven clinical variables in that score).

- **STATISTICAL ANALYZE:**

SPSS 17 statistical packed; descriptive and comparative analyze with t-test, Chi square test, univariate and multivariate linear regression analysis (stepwise backward), and binary logistic regression for categorical variables, and ROC Curve for testing the discriminate function of GWTG-HF score.

A cohort of 355 randomly selected patients admitted to ICCU because of symptoms of acute or acute worsening chronic HF were retrospectively analyzed.

- We comparatively analyzed patients with in-hospital mortality (IHM) vis a vis survivors, and
- We tested the discriminative function of GWTG-HF risk score in the total patient cohort in prediction of in-hospital mortality.

RESULTS -DESCRIPTIVES

CLINICAL VARIABLES	N /%	MEASURED VARIABLES	Mean	SD
GENDER • Males • Females	355 (100%) 205(58%) 150(42%)	HR	69.7	11.5
AGE	70.1±10,9	DBP	106.2	26.5
COPD	56 (24,1%)	SBP	83.9	26.3
DM	90 (38,8%)	Sodium (mmol/l)	137.1	44.1
HLP	79 (34,1%)	Hgb	138.1	36.3
HTA	168 (72,4%)	Creatinine (mg/dl)	1.60	1.39
PAD	36 (15,5%)	BUN (mmol/l)	33.0	23.3
CAD	101 (43,5%)	EF (%)	42.8	10.6
Prior MI	79 (34,1%)	Hospital stay	6.3	5.3
Anaemia	25 (10,8%)	In-hospital mortality	82(23,1%)	
Renal failure	31 (13,4%)	In-hospital mortality in the first 48h (% of total IHM)	40.4%	
GWTGHF	38.9±10.1			

UNIVARIATE PREDICTORS of IHM

- prior MI (beta -.490; p 0.041),
- PVD (beta -1.01; p 0.007);
- anemia (OR 1,89; p 0.044);
- REF-HF (OR 2.43; CI 1.7-3.6; p 0,000);
- EF (beta -.258; p=0.000);
- SBP (beta -.299; p=0.000),
- DBP (beta .315; p=0.000);
- Hgb (beta -.142; p=0.007),
- sodium (beta -.107; p 0.045);
- creatinine (beta .184; p=0.000),
- BUN (beta .199; p=0.000), and
- GWTG-HF score (beta .279; p 0.000).

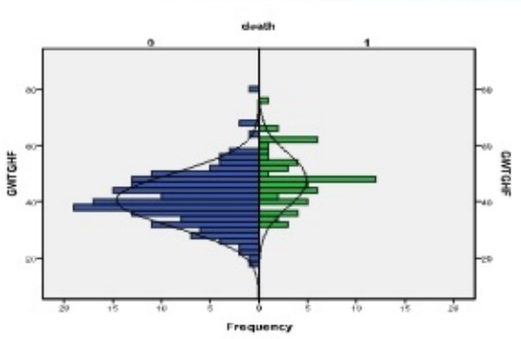
Mean hospital stay was 6.35.3 days, with significant difference between IHD and non IHD group (7.94.5 vs. 3.87.9; p=0.000), with the highest mortality rate during the first 48 hours (40.4% of total in-hospital mortality).

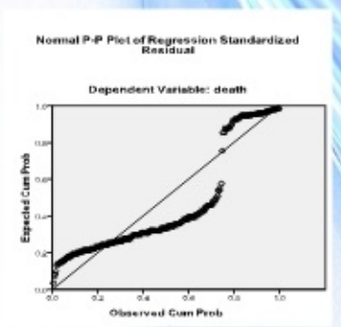
MULTIVARIATE LOGISTIC REGRESSION

(backward) (R Square .223; p=0.000) with all of the univariate predictors entered in the model, identified **several independent predictors:** SBP (beta -.014; p 0.020) and anemia (ExpB 3.668; p 0.019); as positive, while prior MI (ExpB -2.753; p 0.050); PVD (ExpB -1.348; p 0.005) and DBP (beta .034; p 0.003) as negative predictors for in-hospital mortality.

Group Statistics +Linear regression

	death	N	Mean	sig	Correl (r)	sig	Beta	sig
GWTG HF	0	273	**37.3 ±9.3**	.000	.312	.000	.312	.000
	1	82	**44.0 ±11.0**					

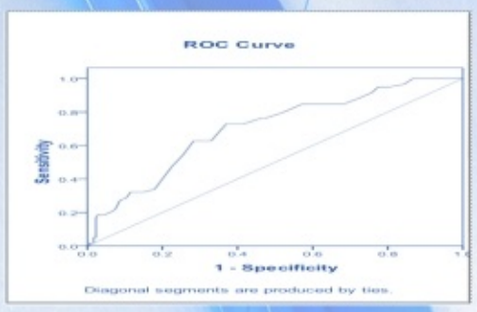




- Mean GWTG-HF score was 38.9 ±10.1 (37.3 ±9.3; 44.0 ±11.0; p 0.000, non-IHD vs IHD pts).

It had excellent discriminate function (ROC Curve: Area under the Curve .694, p< 0.000 (CI .627-.778), in predicting IHM.

GWTG-HF score showed excellent discriminate function in identifying patients with increased risk for in-hospital mortality.



CONCLUSION:

- Low sodium, high BUN and creatinine are predictors of IHM, but only anemia, reduced EF and low systolic BP were identified as independent predictors of IHM.
- GWTG-HF score is a powerful tool for prediction of IHM in acute or acute worsening CHF patients.
- But, adding other easily measurable variables (biochemical such Hgb) and LV systolic function, can increase predictive capability of the model.

DECLARATION OF INTEREST I declare no conflict of interest for this paper.