

Tailoring diuretic therapy in acute heart failure: insight on early diuretic response predictors.

João Pedro Ferreira, MD¹, Mário Santos, MD¹, Sofia Almeida, PhD², Irene Marques, MD¹, Paulo Bettencourt, MD, PhD³, Henrique Carvalho, MD, PhD¹

¹ Centro Hospitalar do Porto, ² Climate Change Impacts, Adaptation and Mitigation Research Group (CC-IAM), Faculdade de Ciências, Universidade de Lisboa, ³ Centro Hospitalar de São João



Purpose: Few data exist to help physicians how to use diuretics in the acute heart failure setting, in order to provide the greatest symptomatic benefit with the least adverse effect and to select which subset of patients require a more aggressive diuretic strategy and monitorization. The aim of this study is to identify early predictors of diuretic response in a selected group of patients with acutely decompensated chronic heart failure (ADCHF).

Methods: Observational, prospective study including 100 patients admitted to a tertiary hospital with ADCHF.

Results: Mean \pm standard deviation (SD) age was $76,0 \pm 10,9$ years. Sixty-one patients were female. Due to the persistence of congestive signs after three days of inpatient treatment, 16 (16%) patients maintained or increased i.v. furosemide dose during the study period - slow diuretic response (SDR) group. The other 84 patients had greater congestion relief and decreased i.v. furosemide dose or switched to oral furosemide - fast diuretic response (FDR) group. Admission day factors predicting SDR were: higher levels of pUr (mean \pm SD, $69,6 \pm 20,9$ vs $52,5 \pm 19,8$, $p = 0,002$); higher levels of pUr / pCr ratio (mean \pm SD, $58,3 \pm 15,2$ vs $49,6 \pm 15,1$, $p = 0,036$); higher levels of albuminuria (median [IQR], $131,5$ [396,9] vs $47,1$ [143,6], $p = 0,011$) – *Figure 1*; higher levels of RDW (median [IQR], $16,0$ [1,9] vs $15,1$ [1,5], $p = 0,039$); lower levels of HgB (mean \pm SD, $11,5 \pm 1,8$ vs $12,6 \pm 2,1$, $p = 0,04$); and higher levels of hsTnT (median [IQR], $0,05$ [0,05] vs $0,03$ [0,03], $p = 0,026$) - *Table*. By multivariate analysis the strongest independent early predictors of SDR were: pUr (OR [95%CI], $1,04$ [1,01 – 1,07], $p = 0,006$), and red-cell distribution width (RDW) (OR [95%CI], $1,47$ [1,07 – 2,02], $p = 0,018$). During the first three days of hospitalization the strongest independent factor associated with SDR was NTproBNP increase or decrease by less than 30% from day 1 to day 3 (OR [95%CI], $4,84$ [1,14 – 20,55], $p = 0,032$) – *Figure 2*. Use of high dose spironolactone (50 to 100 mg/day) is associated with FDR (OR [95%CI], $0,17$ [0,03 – 0,85], $p = 0,031$).

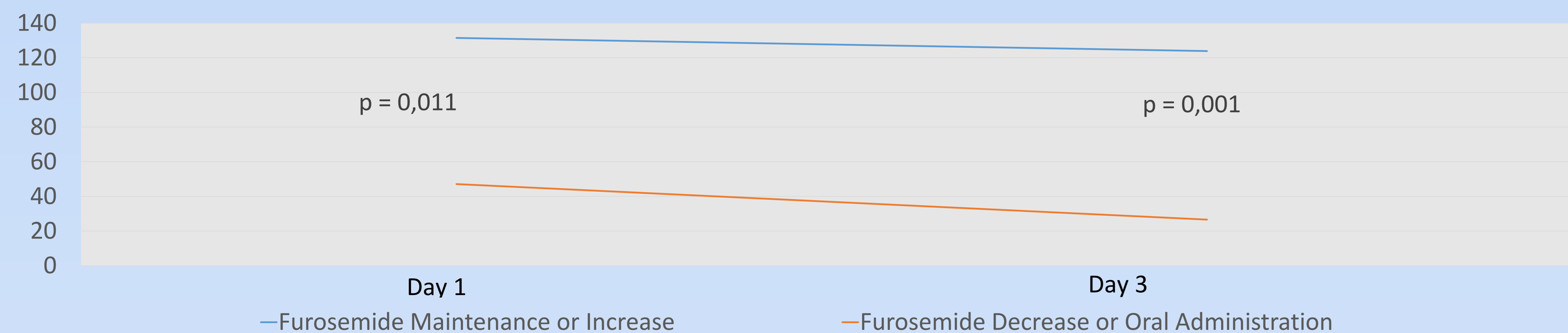


Figure 1. Comparison of Albuminuria (mg/g) in Slow versus Fast Diuretic Responders During The Initial 3 Days of Hospitalization.

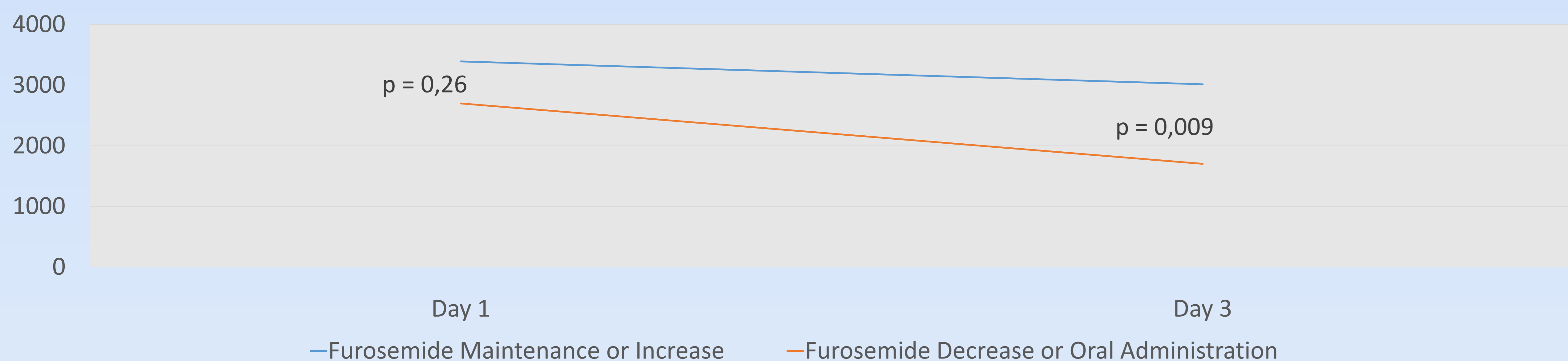


Figure 2. Comparison of NTproBNP (pg/ml) in Slow versus Fast Diuretic Responders During The Initial 3 Days of Hospitalization.

Conclusions: High RDW and high levels of pUr at admission are strong predictors of SDR in ADCHF. No change or increase in NTproBNP in the first three days of inpatient treatment is associated with SDR. Spironolactone was associated with FDR in this study. Further studies are needed to explore the role of Spironolactone in this clinical setting.

	Furosemide Maintenance or Increase	Furosemide Decrease or Oral Administration	p Value
IV Furosemide at Day 1 (mg)	72,5 \pm 20,5	76,4 \pm 21,8	0,51
pCr (mg/dL)			
Day 1	1,21 \pm 0,28	1,06 \pm 0,28	0,06
Day 3	1,40 \pm 0,46	1,1 \pm 0,36	0,004
pUrea (mg/dL)			
Day 1	69,6 \pm 20,9	52,5 \pm 19,8	0,002
Day 3	79,7 \pm 24,9	59,0 \pm 24,3	0,002
pUrea to pCr ratio			
Day 1	58,3 \pm 15,2	49,6 \pm 15,1	0,036
Day 3	58,8 \pm 12,4	54,3 \pm 16,7	0,32
Albuminuria (mg/g)			
Day 1	131,5 [396,9]	47,1 [143,6]	0,011
Day 3	123,9 [358,4]	26,4 [85,2]	0,001
HgB at Day 1 (g/dL)	11,5 \pm 1,8	12,6 \pm 2,1	0,04
RDW at Day 1	16,0 [1,9]	15,1 [1,5]	0,039
NTproBNP (pg/mL)			
Day 1	3390 [4511]	2698 [4577]	0,26
Day 3	3013 [4116]	1701 [2563]	0,009
NTproBNP Decrease by Less than 30% or Increase from Day 1 to Day 3 – no. (%)	6 (37,5)	11 (13,1)	0,017
hsTnT (ng/mL)			
Day 1	0,05 [0,05]	0,03 [0,03]	0,026
Day 3	0,06 [0,04]	0,03 [0,03]	0,004
Inpatients on Spironolactone – no. (%)	2 (12,5)	48 (57,1)	0,001
Inpatients on ACEi – no (%)	7 (43,8)	37 (44)	0,98
Inpatients on Beta-Blockers – no (%)	7 (43,8)	30 (35,7)	0,54
Time to Oral Furosemide (days)	5,9 \pm 1,7	3,6 \pm 2,2	<0,001
Hospital Length of Stay (days)	10,9 \pm 3,2	8,5 \pm 3,3	0,008

Table. Univariate Analysis for Furosemide Response Predictors, Furosemide Response Associations, Time to Oral Furosemide and Hospital Length of Stay.

Disclosures: The authors have no conflicts of interest to disclose.