

# Impact of hyponatraemia in critically ill patients

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## Introduction

Hyponatraemia, defined as serum Sodium < 135 mmol/l is one of the commonest electrolyte abnormalities seen in patients admitted to acute hospitals and is associated with increased morbidity and mortality. Impact of this condition is not adequately measured in critically ill patients admitted to intensive care unit. The aim of this observational study was to assess the incidence and outcomes of patients admitted to Intensive care unit (ICU) in a UK based setting.

## Methods

This was a retrospective observational study that looked into the incidence of hyponatraemia and outcomes such as mortality, length of stay, ventilator days, renal days in patients admitted to ICU between January 2011 to March 2012. Sodium levels were evaluated at 4 distinct time frames that included admission to hospital, admission to ICU, discharge from ICU and discharge from Hospital. Appropriate statistical tests were applied for comparisons with hospital and ICU admission Na.

## Results

1289 patients were admitted during this time. Incidence of hyponatraemia at hospital admission was 27.5% and out of this 7.5% were moderately and severely hyponatraemic (<130 mmol/l). Incidence at ICU admission was 22.3 % of which 3.3% were in moderate or severely hyponatraemic. Patients with hyponatraemia (<135) at presentation to hospital had increased APACHE II and ICNARC scores ( $p < 0.0001$ ). Patients with hyponatraemia at admission to ICU also had increased APACHE II and ICNARC physiological scores. Overall there was increased mortality (35.9% vs. 21.2%,  $p < 0.0001$ ) and ICU length of stay, and increased ventilator days in hyponatraemic group compared to subjects with normal hospital admission sodium.

## Hyponatraemia vs normonatraemia (Hospital admission sodium) (<135 vs 135-144)

	Hyponatraemia (n=353)	Normonatraemia (n=874)	p-value
Age – mean (sd)	64.85 (16.35)	62.12 (17.65)	0.013
Gender – Male (n %)	210 (59.49%)	520 (59.50%)	0.998
APACHE II score - mean (sd)	18.26 (6.75)	15.02 (6.42)	< 0.0001
ICNARC model Physiology Score	18.24 (9.02)	14.73 (8.19)	< 0.0001
ITU length of stay – median (IQR)	3 (2, 6)	3 (2, 5)	0.27
Status at discharge from ITU : Alive	274 (77.6%)	756 (86.5%)	< 0.0001
Hospital Length of Stay – median (IQR)	12 (6, 29)	11 (6, 23)	0.32
Status at discharge from Hospital : Alive	231/273 (84.6%)	694/756 (91.8%)	0.001
Overall mortality %	122/340 (35.9%)	182/857 (21.2%)	< 0.0001
Advanced Respiratory days	0 (0, 2)	0 (0, 2)	
Advanced Cardiovascular days	0 (0, 0)	0 (0, 0)	
Renal Days	0 (0, 0)	0 (0, 0)	
Advanced Respiratory days > 0	131 (37.11%)	302 (34.55%)	0.40
Advanced CV days > 0	79 (22.38%)	156 (17.85%)	0.068
Renal Days > 0	66 (18.70%)	79 (9.04)	< 0.0001

## Hyponatraemia vs normonatraemia (ICU admission sodium) (<135 vs 135-144)

	Hyponatraemia (n=287)	Normonatraemia (n=894)	p-value
Age – mean (sd)	65.98 (15.82)	61.76 (17.71)	0.0003
Gender – Male (n %)	177 (61.67%)	525 (58.72)	0.38
APACHE II score - mean (sd)	17.40 (6.87)	15.32 (6.57)	<0.0001
ICNARC model Physiology Score	16.28 (8.98)	15.24 (8.44)	0.075
ITU length of stay – median (IQR)	3 (2, 4)	3 (2, 5)	0.032
Status at discharge from ITU : Alive	236 (82.23%)	777 (86.91%)	0.048
Hospital Length of Stay – median (IQR)	13 (6, 28)	11 (6, 23)	0.46
Status at discharge from Hospital : Alive	215/235 (91.49%)	703/777 (90.48%)	0.64
Overall mortality %	72/277 (25.99%)	193/873 (22.11%)	0.18
Advanced Respiratory days	0 (0,1)	0 (0,2)	
Advanced Cardiovascular days	0 (0, 0)	0 (0, 0)	
Renal Days	0 (0, 0)	0 (0, 0)	
Advanced Respiratory days > 0	74 (25.78%)	323 (36.13%)	0.001
Advanced CV days > 0	45 (15.68%)	160 (17.90%)	0.39
Renal Days > 0	33 (11.50%)	104 (11.63%)	0.95

## Discussion

This study confirms findings available in literature on the increased morbidity and mortality in patients presenting with hyponatraemia to hospital and ICU. However, whether this caused excess mortality and morbidity in these patients is difficult to ascertain and prospective studies are required to evaluate the effect of correction of sodium levels on mortality and morbidity.