

30-day Mortality in Acute Non-surgical Patients Admitted with Hyponatremia

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Conflicts of interest:

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References:

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Background

Hyponatremia (serum sodium <135 mmol/l), the most common electrolyte disorder encountered,¹ has been associated with increased mortality in patients with particularly cancer, heart failure, chronic kidney and liver disease.²⁻⁵ However, evidence of the prognostic impact in broader populations is scarce, and uncertain due to confounding from preexisting disease.

Objective

To examine the association between admission-hyponatremia and 30-day mortality in a large heterogeneous population of acute non-surgical patients.

Methods

We conducted a population-based cohort study in North and Central Denmark Regions, comprising approximately 1.8 million inhabitants.

- We identified all patients acutely admitted to non-surgical departments from January 1, 2000 to December 31, 2009, for whom serum sodium was measured on the day of admission using individual level linkage of the Danish National Patients Registry, the Danish Civil Registration System and the Clinical Laboratory Information System.
- Admission-hyponatremia was categorized as mild (130-134.9mmol/l), moderate (125-129.9mmol/l) and severe (<125mmol/l).
- Thirty-day mortality for normonatremia and levels of admission-hyponatremia were estimated using the Kaplan-Meier method. Hazard ratios (HR) were estimated using a Cox regression model, adjusting for age, gender and Charlson comorbidity level.

Table 1. Characteristics of non-surgical patients stratified on serum sodium level at admission

	Hyponatremia (<135 mmol/l) n (%)	Normonatremia (135 -145mmol/l) n (%)	Hypernatremia (>145mmol/l) n (%)
Total	55,185 (100)	241,150 (100)	5,976 (100)
Age at hospitalization			
<18	1,095 (1.9)	6,417 (2.7)	201 (3.4)
18-39	4,209 (7.6)	40,447 (16.8)	1,147 (19.2)
40-49	4,327 (7.8)	28,575 (11.9)	660 (11.1)
50-59	7,883 (14.3)	38,240 (15.8)	802 (13.4)
60-69	11,154 (20.2)	42,760 (17.7)	794 (13.3)
70-79	13,243 (24.0)	44,599 (18.5)	993 (16.6)
80+	13,274 (24.1)	40,148 (16.7)	1,379 (23.1)
Gender			
Female	29,797 (54.0)	119,551 (49.6)	2,812 (47.1)
Male	25,388 (46.0)	121,599 (50.4)	3,164 (52.9)
Charlson comorbidity score at hospitalization			
0	29,653 (53.7)	159,717 (66.2)	3,950 (66.1)
1-2	17,996 (32.6)	62,779 (26.0)	1,567 (26.2)
3+	7,536 (13.7)	18,654 (7.7)	459 (7.7)

Figure

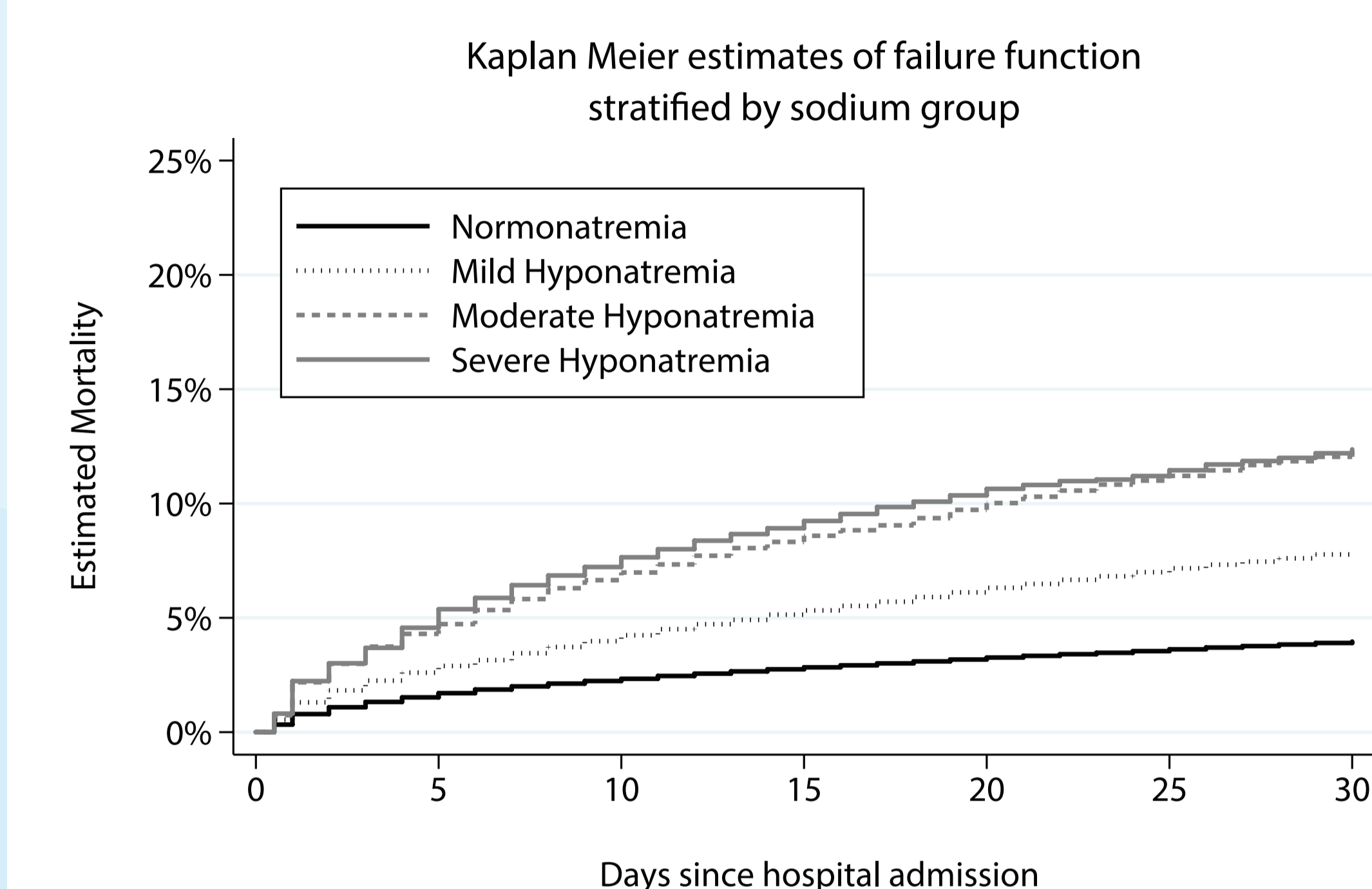


Table 2. 30 day mortality in acute non-surgical patients stratified on serum sodium level at admission.

	Cumulative % (95% CI)	HR - Crude (95% CI)	HR - Adjusted [§] (95% CI)
Normonatremia	4.1 (4.0 - 4.2)	Reference	Reference
Hyponatremia	9.7 (9.5 - 10.0)	2.43 (2.35 - 2.52)	1.87 (1.80 - 1.93)
Mild	8.6 (8.3 - 8.9)	2.14 (2.06 - 2.23)	1.67 (1.61 - 1.74)
Moderate	12.2 (11.6 - 12.9)	3.10 (2.93 - 3.29)	2.27 (2.14 - 2.41)
Severe	12.4 (11.6 - 13.2)	3.15 (2.92 - 3.40)	2.35 (2.18 - 2.53)

[§]Adjusted for age, gender and comorbidity level

Results

We identified 302,311 acute non-surgical patients, with a sodium measurement on the first day of admission.

- Admission-hyponatremia was present in 55,185 patients (prevalence = 18.3%).
- Patients with hyponatremia at admission were older (median age 69.1 years (interquartile range: 55.9-79.6) vs. 61.6 years (interquartile range: 44.9-75.5)) and had higher comorbidity levels compared to patients with normonatremia.
- Cumulative 30-day mortality for patients with admission-hyponatremia was 9.7% (95% CI: 9.5-10.0) compared with 4.1% (95%CI: 4.0-4.2) in patients with normonatremia. Mortality was increased throughout the period.
- The adjusted HR was 1.87 (95%CI: 1.80-1.93) for any admission-hyponatremia compared with normonatremia. Adjusted HR for mild, moderate and severe hyponatremia compared with normonatremia was 1.67 (95%CI: 1.61-1.74), 2.27 (95%CI: 2.14-2.41) and 2.35 (95%CI 2.18-2.53), respectively.

Conclusions

- Admission-hyponatremia was associated with increased risk of death for all levels of hyponatremia, despite adjustment for older age and higher comorbidity level in hyponatremic patients.
- Risk of death increased with decreasing sodium levels.
- Even moderate hyponatremia was associated a more than 2-fold increased risk compared to normonatremia.

