ISSN 2380-548X

International Journal of Endocrinology and Metabolic Disorders

Review Article | Volume: 3.1 | Open Access

Too Pushed to Discharge? – Hyponatraemia and its Impact in Hospitalised Patients

Katreddy VMR[1]*, Nayak AU[1], and Clayton RN[2]

[1]*Consultant Physician, Department of Endocrinology and Diabetes, University Hospital of North Midlands NHS Trust, Stoke on Trent, UK*

[2]*Professor of Endocrinology, Department of Endocrinology and Diabetes, University Hospital of North Midlands NHS Trust, Stoke on Trent, UK*

***Corresponding author:** Dr. Venkata MR Katreddy MRCP (UK), Consultant Diabetes and Endocrinology, University Hospital of North midlands NHS Trust, Stoke on Trent, United Kingdom. ST4 6QG, **E-mail:** Venkata.katreddy@uhns.nhs.uk

Received date: 28 Jun 2016; **Accepted date:** 03 Oct 2016; **Published date:** 07 Oct 2016.

Citation: Katreddy VMR, Nayak AU, Clayton RN (2016) Too Pushed to Discharge? – Hyponatraemia and its Impact in Hospitalised Patients. Int J Endocrinol Metab Disord 3(1): doi http://dx.doi.org/10.16966/2380-548X.130

Abstract

Aim: To study the prevalence of hyponatraemia, its impact on length of stay (LOS), in-hospital mortality, and serum sodium at discharge.

Methods: We included 6,073 consecutive emergency medical admissions over a 3 month period, identifying those with hyponatraemia (n=101, 1.7%). Hyponatraemia was categorised as mild (Na: 126-132 mmol/L) (53.5%), moderate (Na: 121-125 mmol/L) (24.7%) and severe (Na: <121 mmol/L) (21.8%).

Results: Of n=101: their age 74.5 ± 14.2 years (mean ± sd), 59.4% being >75 years. Hyponatraemia on admission had a significant impact on the LOS (12.1 ± 10.5 vs. 7.2 ± 10.5 days, F 21.6, P<0.001). There appeared to be a graded association between LOS and the degree of hyponatraemia (Normal vs. mild vs. moderate vs. severe: 7.2 vs.10.1 vs. 13.8 vs. 15.0 days, F=8.7, P<0.001). On univariate analysis, hyponatraemia remained an independent predicator of LOS (F=17.7, P<0.001). In-hospital mortality was higher in those with hyponatraemia (12.9% vs. 6.7%, χ^2=5.9, P=0.019). 52 (51.5%) patients were discharged with Na<133 mmol/L; 13(12.9%) had Na ≤ 125 mmol/L on discharge. Majority (63%) discharged with Na<133 mmol/L were age >75 years.

Conclusion: We report the significant impact of hyponatraemia at admission on LOS, and its graded association with severity, and on in-hospital mortality. Further, we report the high proportion (13%) discharged with serum Na<125 mmol/L, majority of whom were elderly, which is known to be associated with adverse outcomes.

Keywords: Hyponatraemia; In-hospital mortality; Serum sodium concentration

Introduction

Hyponatraemia, defined as serum sodium concentration below the reference range, is the most frequently encountered electrolyte abnormality in hospitalised patients, occurring in up to 20% of acute hospital admissions [1]. Most patients are admitted with hyponatraemia itself, whilst a few develop during their stay [2]. Evaluation of hyponatraemia is challenging and diagnosis is based on clinical judgment and laboratory investigations [3]. Individuals at risk of hyponatraemia include elderly [4], people with chronic liver disease, respiratory tract infections, and those taking diuretics [5]. Symptoms of hyponatraemia may vary based on the degree of hyponatraemia and/or the rapidity of onset. Symptoms could be profound with significant neurological sequelae including seizures and impaired consciousness [6].

The impact of hyponatraemia at admission on morbidity, lengths of hospital stay and mortality in hospitalised patients has been demonstrated [2,7], but causality has not been established until recently [8]. We aim to study the prevalence of hyponatraemia on admission, its impact on the length of stay and on in-hospital mortality, as well as serum sodium at discharge at our large University hospital.

Methods

We included all consecutive emergency medical admissions at the University hospital over a 3 month period. Data on serum sodium levels was obtained from the clinical biochemistry department from their electronic database. Patients were identified by their hospital number and NHS number. The local laboratory normal reference range for serum sodium was 133 to 146 mmol/L. Hyponatraemia was defined as serum Na <133 mmol/L. Hyponatraemia was categorised as mild (serum Na: 126-132 mmol/L), moderate (serum Na: 121-125 mmol/L), and severe (serum Na: <121 mmol/L) based on the biochemical values. Their demographic and clinical parameters including laboratory results, diagnosis, length of stay, and in-hospital mortality were obtained from electronic patient records. Data was analysed using SPSS 19 software. Comparison between group means was done by one-way analysis of variance (ANOVA) and the differences between frequencies/proportions by chi-square test and for statistical significance P value of <0.05 was used.

Results

Altogether, 6,073 emergency medical admissions were recorded over the 3-month period, among whom 101 (1.7%) had hyponatraemia on admission. Their demographics: age 74.5 ± 14.2 years (mean ± sd) with 59.4% aged >75 years; Males 47.5%; and Caucasians 91.1%. The proportions with mild, moderate and severe hyponatraemia were 53.5%, 24.7%, and 21.8%, respectively.

Review of the investigations: Paired serum and urine osmolality in 23 (19.8%) patients; Urine sodium estimation in 14 (13.9%); Random cortisol in 15 (14.9%) patients; short synaecthen test in 10 (9.9%) patients; Thyroid function tests in 22 (21.8%); Chest X-ray in 89 (88.1%) and CT scan of the head in 26 (25.7%) patients. Management varied in individual patients depending on the cause of hyponatraemia. Aetiology varied

significantly but majority were attributed to hypovolemia (47%), followed by Syndrome of Inappropriate Anti-diuretic Hormone secretion (SIADH) (14.9%). Majority were treated with fluid replacement (62.3%). Only 19.8% had specialist endocrine input.

In 49 (48.5%) of the 101 patients with hyponatraemia on admission, serum sodium normalised by discharge. Remaining 52 (51.5%) patients were discharged home with sodium less than 133 mmol/L; 13 (12.9%) had sodium ≤ 125 mmol/L on discharge. The majority (63%) of those discharged with sodium <133 mmol/L were age above 75 years.

The mean length of stay (LOS) was significantly higher in those with hyponatraemia (12.1 ± 10.5 vs. 7.2 ± 10.5 days, F 21.6, P<0.001), and there appeared to be a significant graded association between LOS and the degree of hyponatraemia (Normal vs. Mild vs. Moderate vs. Severe hyponatraemia:: 7.2 vs.10.1 vs. 13.8 vs. 15.0 days, F=8.7, P 0.001). On univariate analysis correcting for age and gender, hyponatraemia remained an independent predicator of LOS (F=17.7, P<0.001) (Table 1).

In-hospital mortality was higher in those with hyponatraemia (12.9% vs. 6.7%, χ^2=5.9, P=0.019). However, on logistic regression analysis, correcting for other significant factors, hyponatraemia was not an independent predictor of in-hospital mortality.

Discussion and Conclusion

In this study we confirm the prevalence of hyponatraemia on admission in hospitalised patients, its significant impact on the length of stay and possibly in-hospital mortality. We further report the deficiencies in the management of hyponatraemia, especially the high proportion of patients being discharged without normalisation of hyponatraemia, which is well known to be associated with morbidity.

The prevalence of hyponatraemia at admission in hospitalised medical patients was 1.7%. All these patients, majority of whom were elderly, had hyponatraemia on admission, making the study exclusively community acquired hyponatraemia. Significant number of patients did not have appropriate investigations into the aetiology of hyponatraemia nor had specialist Endocrine input that may have aided in the appropriate management and early discharge.

Interesting finding from our study was that more than half (52.5%) of patients were being discharged without normalisation of serum sodium and some of them (about 13%) were discharged home with serum Na<125 mmol/L, the majority of whom were elderly. This is very worrying as studies have demonstrated increased risk of gait disturbances, falls and increased fracture risk in this age group [9,10]. The reasons for early discharge cannot be ascertained in this study.

Hyponatraemia Category	LOS in days	Mortality (%)
≥ 133 (n=5972)	7.2 ± 10.5	6.7%
126-132 (n=54)	10.1 ± 9.0	12.9%
121-125 (n=25)	13.8 ± 10.8	
≤ 120 (n=22)	15.0 ± 13.0	

Table 1: Length of stay (LOS) and in-hospital mortality in individuals categorised by degree of hyponatraemia

There were a large proportion of patients identified as hypovolemic and treated with fluid replacement. The assessment of hypovolemia is clinical and subjective, and variable based on clinicians experience, which is well known. All patients in our university hospital would have had a senior clinician review on daily basis and we suspect that would have negated the issue.

In conclusion, our study demonstrates the significant impact of hyponatraemia at admission on length of stay, its graded association with severity, and on in-hospital mortality. We also report the deficiencies in the investigation and management of patients with hyponatraemia. We also highlight the fact that significant numbers of patients are also being discharged early without normalisation of their sodium. Physicians should keep this in mind while managing patients with hyponatraemia in the current climate of hospital bed pressures.

References

1. Thompson CJ, Crowley RK (2009) Hyponatraemia. J R Coll Physicians Edinb 39: 154-157.
2. Wald R, Jaber BL, Price LL, Upadhyay A, Madias NE (2010) Impact of hospital-associated hyponatraemia on selected outcomes. Arch Intern Med 170: 294-302.
3. Huda MS, Boyd A, Skagen K, Wile D, van Heyningen C, et al. (2006) Investigation and management of severe hyponatraemia in a hospital setting. Postgrad Med J 82: 216-219.
4. Hawkins RC (2003) Age and gender as risk factors for hyponatraemia and hypernatremia. Clin Chim Acta 337: 169-172.
5. Spital A (1999) Diuretic-induced hyponatraemia. Am J Nephrol 19: 447-452.
6. Saeed BO, Beaumont D, Handley GH, Weaver JU (2002) Severe hyponatraemia: investigation and management in a district general hospital. J Clin Pathol 55: 893-896.
7. Asadollahi K, Beeching N, Gill G (2006) Hyponatraemia as a risk factor for hospital mortality. QJM 99: 877-880.
8. Tzoulis P, Bagkeris E, Bouloux PM (2014) A case-control study of hyponatraemia as an independent risk factor for inpatient mortality. Clin Endocrinol (Oxf) 81: 401-407.
9. Ayus JC, Negri AL, Kalantar-Zadeh K, Moritz ML (2012) Is chronic hyponatraemia a novel risk factor for hip fracture in the elderly? Nephrol Dial Transplant 27: 3725-3731.
10. Zaino CJ, Maheshwari AV, Goldfarb DS (2013) Impact of mild chronic hyponatremia on falls, fractures, osteoporosis, and death. Am J Orthop (Belle Mead NJ) 42: 522-527.