

## An Often Overlooked but Easily Correctable Cause of Hyponatremia

Arun Chawla<sup>1</sup>, Devang V Lodhavia<sup>1</sup> and Kenar D Jhaveri<sup>2</sup>

<sup>1</sup>Advocare Nephrology of South Jersey, USA

<sup>2</sup>Hofstra North Shore LIJ School of Medicine, USA

**\*Corresponding author:** Arun Chawla, Advocare Nephrology of South Jersey, USA, Tel: 856-873-2066; Email : arunchawlamd@gmail.com

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# Insights in Nephrology Research

Hyponatremia has been recognized as the most common electrolyte abnormality present in hospitalized patients and known to not only increase the length of hospital stay, but also mortality amongst hospitalized patients [1-5]. Several medications have been known to cause/worsen hyponatremia including but not limited to diuretics, antidepressants, antipsychotics, antiepileptics, antibiotics and non-steroidal anti-inflammatory drugs [6]. Among those, trimethoprim, a component of commonly used antibiotic trimethoprim-sulfamethoxazole (bactrim) is structurally related to amiloride and known to block reabsorption of sodium at the epithelial sodium channels leading to hyperkalemia, hyponatremia and metabolic acidosis [7-9]. Also, hyponatremia has been reported amongst human immunodeficiency virus (HIV) positive patients on intravenous bactrim use [10].

A 33 year old African American male with human immunodeficiency virus (HIV) was admitted with respiratory failure due to Pneumocystis Jiroveci (PCP) and was started on high dose intravenous bactrim along with other supportive care. Nephrology was consulted for hyperkalemia and hyponatremia. He had bilateral multifocal areas of consolidation and developed severe respiratory failure requiring mechanical ventilation. Serum sodium (Na) was 122mEq/l, serum potassium (K) at 5.9mEq/l, serum creatinine (Cr ) 0.8mg/dl. His TSH was 1.927IU/ml and cortisol 17.8mcg/dl, Urine Sodium was 107mmol/l, urine potassium was 7mmol/l, urine osmolarity 372 msom/l. Hyperkalemia was directly attributable to use of bactrim (trimethoprim) induced inhibition of distal secretion; hyponatremia was attributed to inappropriate secretion of antidiuretic hormone (SIADH) in the setting of PCP pneumonia and ventilator dependent respiratory failure by the medicine team.

While that would be the most common deduction from this case, a more careful review of Input and Output charting revealed an often missed etiology that exacerbated hyponatremia. In addition to trimethoprim induced renal salt wasting, hyponatremia was likely worsened from the diluent which was being used in all of the antibiotics and medications given to this patient - in this case D5W (dextrose 5% water). Prescribed dose trimethoprim 20mg/kg iv divided into 4 doses each of which dose was reconstituted by mixing each 365mg equivalent of trimethoprim-sulfamethoxazole with 500cc (each dose) of D5W adding upto daily intake of D5W of 2000cc. Besides, his midazolam drip and daily azithromycin were also being mixed in D5W accounting for another 375cc of intake. Change of the diluent fluid to 0.9% normal saline after discussion with pharmacy led to correction of the serum sodium to 129mEq/l in 24 hours while continuing iv bactrim at the same dose despite no change otherwise in his respiratory failure and overall condition. High dose iv bactrim with iv 0.9% saline is compatible and stable only if, administered within 12 hours of mixing and we made sure the pharmacy was mixing it fresh before routing the medicine to intensive care unit. Even though his hyponatremia showed continuing improvement over the next 72 hours, his bactrim had to be stopped due to refractory hyperkalemia.

Despite hyponatremia being the most common electrolyte abnormality in hospitalized patients, its etiology is frequently misdiagnosed [11]. Misdiagnosis often causes delay in effective care and prolonged hospital stay. The inability to find similar papers in literature emphasizes the lack of attention to this matter. Similar cases can be encountered in clinical practice when dealing with hypervolemia and diluents as 0.9% normal saline. In those cases, changing them to D5W would be prudent. This case highlights the importance of paying attention to the diluents and fluids being mixed to stabilize antibiotics/medicines and their role in affecting serum electrolyte abnormalities.

## Introduction

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