

BACKGROUND

- When extremely low, it becomes challenging for physicians to appropriately raise the serum sodium levels to the normal range while avoiding overcorrection.
- Rate of correction becomes very important once the brain has adapted to the hypotonicity set by chronic hyponatremia.
- Difficulties in determining the acuity of hyponatremia and patient's volume status can lead to Osmotic Demyelination Syndrome (ODS) from rapid correction of hyponatremia.
- Risk of iatrogenic injury is diminished by having a therapeutic goal sodium correction range to 4–6 mEq/L. ¹

OBJECTIVE

- To determine the causes for rapid correction of hyponatremia and to implement preventive measures for the same.

METHODS

- This is a *Quality Improvement (QI)* project devised as below:

A team was formed with Internal Medicine Resident Performance Improvement committee, the Chief Nephrologist, the Department Safety & Quality Officer and the Program Director

A Plan-Do-Study-Act (PDSA) worksheet was created

Residents were surveyed to identify the contributing factors for rapid correction of hyponatremia

After thorough analysis, recommendations were sent to all the residents

Residents were surveyed again after two months to determine the magnitude and effects from initial recommendations

- A case of rapid correction of hyponatremia was reviewed.
- Surveys were made anonymous through an online cloud based software.

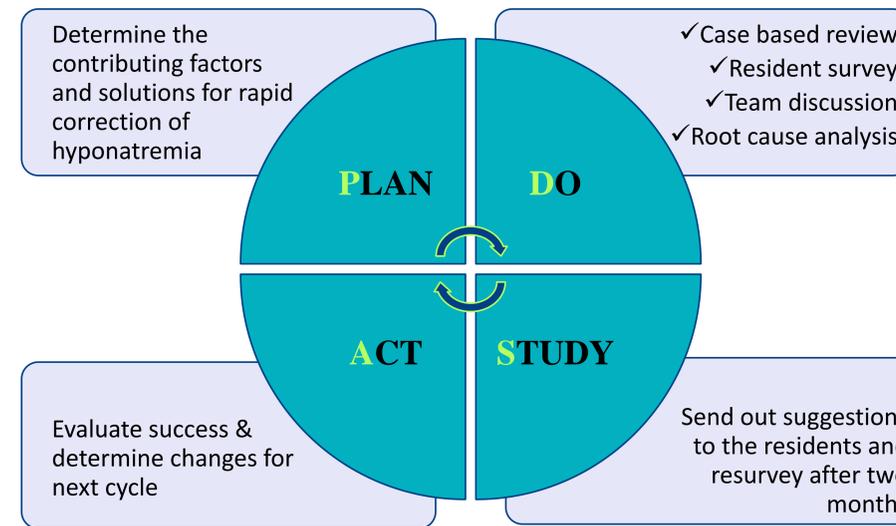


Fig 1. PDSA flowchart

RESULTS

- The most significant contributing factors were –

- Defective sign-outs between residents during change of shifts
- Delays in communication between residents, primary attending and nephrologist
- Delay in timely blood draws
- Lack of standardized protocols in electronic health record (EHR)
- Lack of use of desmopressin for patients at risk for water diuresis

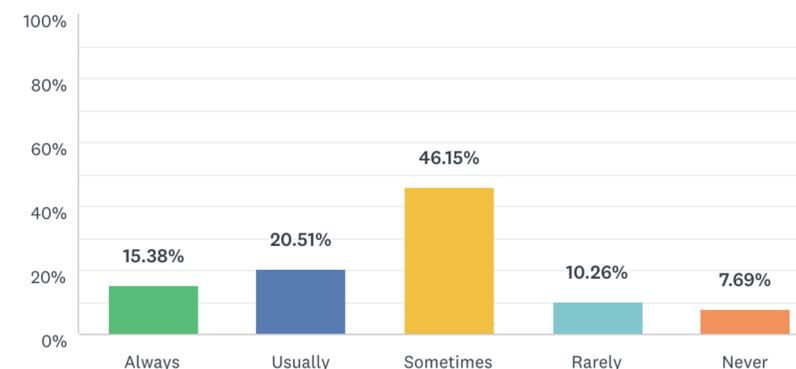


Fig 2. First survey, "Do attendings / nephrologists have different goal ranges and an individualized way of sodium correction?"

- The suggestions following root cause analysis were –
 - Sodium correction rate standardized for 4 to 6 mEq/L per day
 - Detailed resident sign-out sheets with goal sodium ranges and plans after patient hand-off
 - Residents/attendings should have the nephrologist in close loop
 - To consider hypertonic saline and desmopressin (DDAVP) in patients with high risk for ODS ²

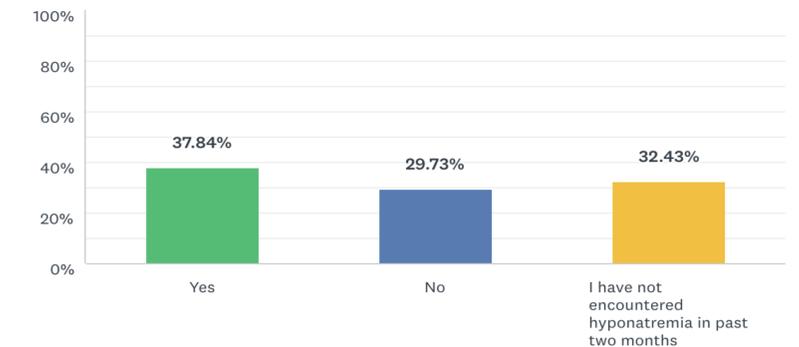


Fig 3. Second survey, "Have you encountered any rapid overcorrection of hyponatremia despite following the suggestions?"

- Of the 36 residents resurveyed, 91% felt that the suggestions were helpful.
- Around 80% noted that the sign-outs were detailed and 80% were able to contact nephrologist on a timely manner.
- Despite these changes, as high as 39% residents still encountered rapid correction of hyponatremia (> 6 mEq/L in 24hrs).
- Limitations – a) around 32% did not encounter any case of hyponatremia over a duration of two months, b) protocol for EHR could not be devised.

CONCLUSION

- Standardized goal rate of sodium correction and an increased resident awareness could drive in avoiding rapid correction of hyponatremia.
- The next PDSA cycle would be to adapt possible use of DDAVP for those at risk, adopt the previous changes and to test them for longer duration.

REFERENCES

- Sterns, R. H. (2018). Treatment of severe hyponatremia. *Clinical Journal of the American Society of Nephrology*
- Sood, L., Sterns, R. H. (2013). Hypertonic saline and desmopressin: a simple strategy for safe correction of severe hyponatremia. *American Journal of Kidney Diseases*