

# Effect of half-half solution on serum sodium level in neurosurgical patients

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## INTRODUCTION

Intravenous fluid (IVF) is one of the most administered medications in clinical practice. The choice of one IVF over another is often geographical and not evidence-based.[1] It is common practice to use half-half solution (Dextrose 2.5%, NaCl 4.5%) as a maintenance fluid for neurosurgical patients in Hong Kong. However, with half-half solution being a hypotonic solution once the dextrose is rapidly metabolised and commonly used as a treatment of hyponatremia, it is reasonable to hypothesize if it can induce hyponatremia in neurosurgical patients.

## OBJECTIVE

This retrospective cohort study examines the correlation of the use of half-half solution and reduction in serum sodium level in neurosurgical patients.

## METHODOLOGY

43 patients admitted to our neurosurgical unit (20 males, 23 females, average age 62 years) over a 2-week period were included in this study. The IVF use, initial serum Na level and first serum Na level after initial period of IVF were reviewed.

## RESULTS

27 patients (63%) were given half-half solution, 7 patients (16%) were given normal saline (NS) and 8 (19%) were not given any IVF. 6 of them had hyponatremia (serum Na  $\leq 135$ mmol/L) before any IVF. 17 patients (40%) did not have their Na level rechecked. Out of 27 patients given half-half solution, 19 of them have sodium level rechecked. Serum sodium level reduced in 10 of them, with average Na level change being  $-1.37$ mmol/L ( $p=0.0794$ ), and 5 of them ended up hyponatremic with serum sodium level below 136; Out of 7 patients given NS, 6 of them have sodium level rechecked. Average Na level change was  $+3.17$  ( $p=0.0906$ ).

## DISCUSSION

Half-half solution is a hypotonic solution due to rapid metabolism of dextrose. Hypotonic solutions are known to predispose patients to hyponatremia[2] which can have detrimental effect especially on neurosurgical patients. In our study, although not statistically significant, there is a tendency of decreasing serum sodium level in patients given half-half solution. The drop may be dose-dependent.

The use of NS is not routine practice in our unit and is commonly commenced when the patient has hyponatremia to begin with, which explains the lower average sodium level on admission in the NS group.

## LIMITATION

Limited by the small sample size we are unable to generate statistically significant results. 4 out of 7 patients given NS were hyponatremic to begin with. The amount of IVF given, the timepoint of rechecking sodium level and patient demographics has not been standardized.

## FUTURE PROSPECT

IVF has been the most commonly administered medication all around the world and our neurosurgical units are no exceptions. The use of hypotonic solution in Hong Kong is rather peculiar and its use requires justification by evidence. Larger, multicentre, prospective studies in the long run should allow us more insight into this topic and optimize the patient care and improve the outcome.

## CONCLUSION

Half-half solution may lower serum sodium level and may contribute to hyponatremia in neurosurgical patients. Further prospective studies are required to investigate the effect and outcome following use of different IVF.

## REFERENCES

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