

Incidence and Identification of Dehydration in acute stroke: An Observational Study



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BACKGROUND

Worldwide, each year approximately 20 million people experience a stroke; of them, 5 million will die and 5 million will be disabled by their stroke¹. Without effective interventions, the number of global deaths is projected to rise to beyond 6.5 million².

Dehydrated stroke patients are four times more likely to worsen over the first 72 hours when compared with their adequately hydrated counterparts^{3,4}. Achieving adequate hydration post-stroke may prevent neurological deterioration by reducing the ischaemic penumbra and maintaining cerebral perfusion, and may reduce the risk of complications such as infection, constipation, delirium and venous thromboembolism. However, there is little evidence that any single symptom, sign or test - including many that clinicians customarily rely on - has diagnostic utility for dehydration.

This study aimed to identify how dehydration was diagnosed, how frequently dehydration occurred, and in whom, after acute stroke.

METHODS AND ANALYSIS

A retrospective case-note review within one NHS Hospital Trust in England. A consecutive sample of patients (>18yrs) admitted to hospital with a final diagnosis of stroke between March and June 2017 were included.

A research nurse reviewed case-notes, identified and retrieved by a member of the clinical audit team within the Trust, no identifiable data were recorded. Clinical characteristics collated included: demographics (age, sex); type of stroke; stroke symptoms; NIHSS score; result of nurse dysphagia screen; result of speech and language therapist swallow assessment; clinical observations; amount and duration of fluid delivery; status at discharge.

Data were analysed using SPSS and presented using descriptive statistics. Blood plasma osmolarity (pOsm), a valid and commonly used measure of hydration⁵, was calculated from routinely collected admission blood tests using the Khajuria & Krahn equation⁶. Common reference intervals for pOsm (<295 **adequately hydrated**; 295-300 **impending dehydration**; >300 **dehydrated**) informed diagnosis of dehydration.

MAIN FINDINGS



Clinical assessment, diagnosis, and management of dehydration were not documented.



At least 56% of stroke patients were dehydrated, or almost dehydrated, upon admission.



Those with upper-limb, lower-limb, or facial weakness were more likely to be dehydrated.

RESULTS

Table 1. Characteristics of the population, and frequency of clinical assessments.

Characteristic	Missing Data	Not Applicable	Not Documented	
Age (y)				75 (48-100)
Female (n)				25 (50%)
NIHSS score			18 (36%)	7.6 (0 to 31)
Length of stay (days)				10 (1 to 76)
Discharge Status				
Alive				49 (98%)
Deceased				1 (2%)
1st Nurse dysphagia screen completed			3 (6%)	44 of 47 (94%)
Nurse dysphagia screen failed	1 (2%)	3 (6%)	3 (6%)	15 of 43 (35%)
<i>Of failed Nurse dysphagia screen</i>				
Referred to SALT	1 (7%)			14 of 14 (100%)
Referred for swallowing			2 (14%)	11 of 12 (92%)
Bloods taken on admission		2 (4%)		48 (96%)
Osmolarity calculated		6 (12%)	3 (6%)	41 of 48 (82%)
Hydrated				18 (44%)
Impending Dehydration				14 (34%)
Dehydrated				9 (22%)
<i>Of Impending/Dehydrated</i>				
IV fluids			1 (4%)	9 of 22 (41%)
NG				3 of 22 (13%)

Data are mean (range) or N (%). Missing Data = not collected at the time of case-note review. Not applicable = test not requested/relevant. Not Documented = missing from case notes.

50 patients, mean age 75 years (range 48-100), 25 (50%) female, were included.

Clinical assessment, diagnosis, and management of dehydration were not documented.

One or both of the routine blood tests (urea and electrolytes; blood glucose) required to inform the osmolarity calculation were not requested for 9 (18%) patients. Of the remaining patients, **18 (44%) were hydrated**, **14 (34%) had impending dehydration**, and **9 (22%) were dehydrated**.

The most commonly used mode of fluid replacement was intravenous fluid therapy, with 41% of patients with impending dehydration or dehydration receiving a fluid prescription.

Impending or frank dehydration more commonly occurred in the presence of upper-limb, lower-limb, or facial weakness, although these were non-significant.

CONCLUSION

The findings support previous observations that dehydration is common in stroke patients admitted to hospital⁷. Dehydration or impending dehydration may occur in over half of hospitalised stroke patients, but assessment and diagnosis of dehydration is not routinely documented. Case-note review alone cannot describe how dehydration is identified and managed in clinical practice, therefore further qualitative work is currently ongoing to supplement these findings. Given the potential deleterious effects of dehydration on stroke outcome further work is necessary to identify optimum care pathways.

REFERENCES

- ¹ McMahon S. Introduction: the global burden of stroke. In: Chalmers J, editor. Clinician's Manual on Blood Pressure and Stroke Prevention. Science Press: London; 2002. p. 1-6. ² Strong K, Mathers C, Bonita R. Preventing stroke: Saving lives around the world. Lancet Neurology. 2007;6:182-7. ³ Kelly J, Hunt B, Lewis RR, et al. Dehydration and venous thromboembolism after acute stroke. Quarterly Journal of Medicine. 2004;97:5:293-296. ⁴ Royal College of Physicians. National Clinical Guidelines for Stroke. 5th Ed. 2016. London. RCP. ⁵ Rodriguez G, Cordina S, Vazquez G, et al. The hydration influence on the risk of stroke (THIRST) Study. Neurocritical Care. 2009;10:187-194. ⁶ Hooper L, et al. Diagnostic accuracy of calculated serum osmolarity to predict dehydration in older people: adding value to pathology laboratory reports. BMJ open. 2015;5:10. ⁷ Rowat A, Graham C, Dennis M. Dehydration in hospital admitted stroke patients: Detection, frequency, and association. Stroke. 2011;43:3:857-859.