An audit of the clinical biochemistry management of abnormal sodium in an inpatient setting

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Background

Measurement of blood sodium is one of the most commonly requested biochemistry tests, yet care provided to patients in hospital with abnormal sodium is not always consistent.

A review by the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) in October 2025 found that 47% of hyponatraemia patients should have had further investigations to determine the cause.[1]
Whilst training on hyponatraemia was provided in the majority of hospitals, only 14% provided training on hypernatraemia. Lack of further investigations may affect the quality and appropriateness of treatment provided, and delays in management of abnormal sodium may negatively impact patient outcomes. Variation across departments, hospitals and staff introduces significant risk to patient safety, as well as reducing efficiency and consistency in operating procedures.

Additional testing is key to determining the cause of hyponatraemia. Distinguishing between renal causes, heart failure and endocrine causes (e.g. adrenal insufficiency) is dependent on urine osmolality and fluid status.[2]

NICE also recommends investigation of adrenal insufficiency, hypothyroidism and liver disease. [2]
There is currently no guidance for the management of hypernatraemia.[1]

NCEPOD also found areas for improvement in assessment of fluid status, integration of point-of-care test results into electronic patient records, and reviewing of medications which may affect sodium level.

By comparing patients presenting as emergency to those in post-operative recovery, NCEPOD found that the main areas for improvement related to clinical rather than organisational issues. They suggest that specialist advice from endocrinologists and clinical biochemists would help inform diagnosis and treatment decisions.[1]

<u>NCEPOD Recommendations</u>

The NCEPOD report sets out 5 main recommendations to improve the management of abnormal sodium:

1. **Implement processes to reduce variation in the assessment and management of abnormal blood sodium**
2. **Develop clear standards for assessment and recording of fluid status**
3. **Integrate point-of-care testing results into patient records**
4. **Develop a national standard for the use of hypertonic saline**
5. **Raise awareness of the importance of documenting medication changes**

For this audit, we focused on Recommendation 1 as it concerns pathology testing. The aim was to determine if sodium management practices at Countess of Chester Hospital reflect those identified in the NCEPOD review, and identify areas for improvement.

Methods

An audit was carried out at Countess of Chester Hospital against the NCEPOD recommendations, to identify areas for improvement regarding management of patients after an abnormal sodium result. Data was gathered for all inpatients between July 2025 and March 2026 with a sodium result of <135 or >145 mmol/L. 6776 total patients were included, with 6088 hyponatraemia cases and 688 hypernatraemia cases.
Information was obtained about the following tests ordered after the initial sodium finding:

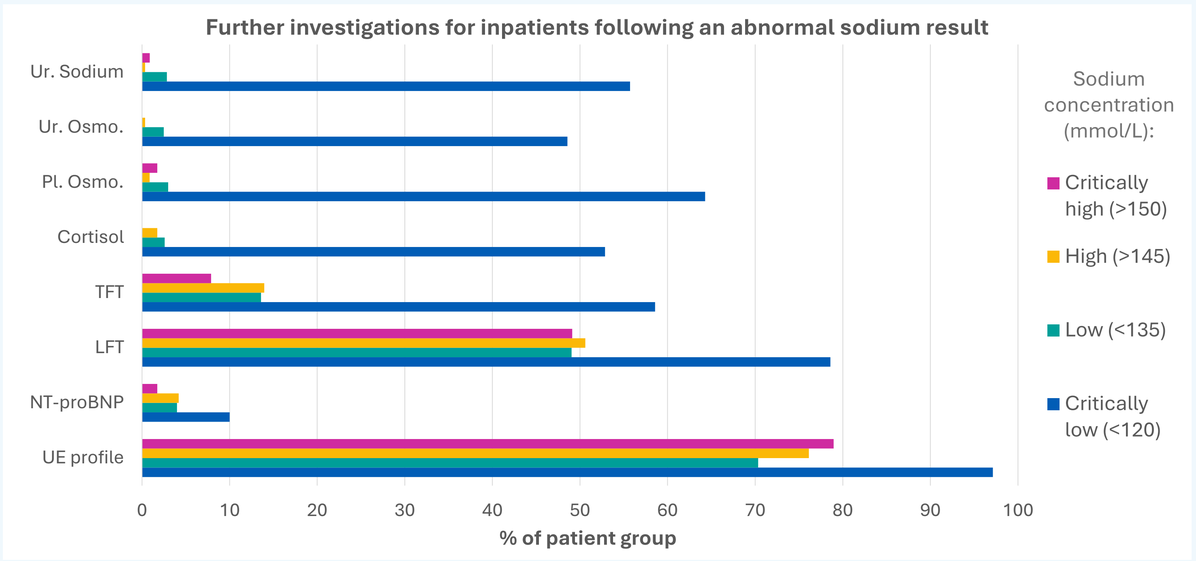
These were based on NCEPOD recommendations for further testing in the investigation of hyponatraemia.

- Urine sodium
- Urine osmolality
- Urine Osmolality
- Cortisol
- TFT
- LFT
- NT-proBNP
- UE profile

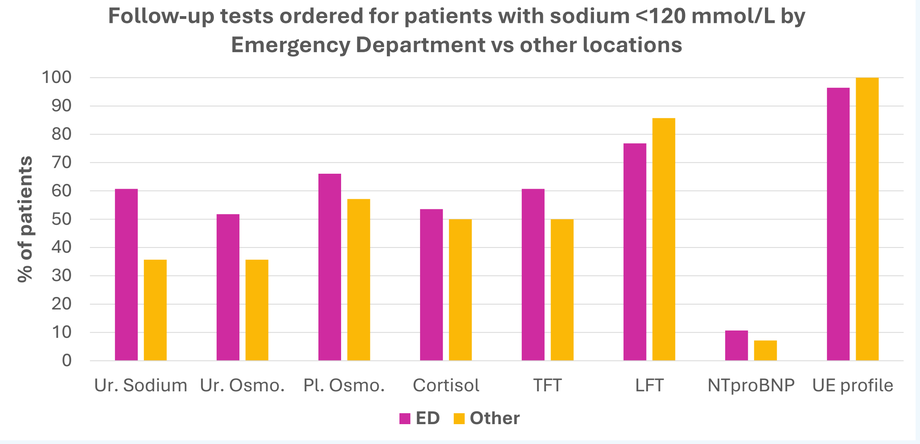
Data was sorted in groups by sodium concentration based on reference ranges and critical limits at the Countess of Chester, to evaluate management of patients with mild and severe hypo/hypernatraemia.

Results

The data showed inconsistent practices across the Trust. There was better management of hyponatraemia than hypernatraemia, but still over 45% of patients with critical hyponatraemia (<120 mmol/L) did not have a urine sodium or urine osmolality test.
Of patients with critically high sodium (>150 mmol/L), less than 2% had urine sodium or plasma osmolality measured. None of the 114 patients in this group had a urine osmolality or cortisol test.
Repeat UE profile (including sodium) was by far the most consistently ordered test, with 70% ordered for hyponatraemia patients and 76% for hypernatraemia patients.



The majority of patients with abnormal sodium were from the Emergency Department (ED), with 52% of the total. The next most common order location was Same Day Emergency Care (SDEC) with 8% of the total. Data was compared for ED and all other locations to identify differences in practices. The chart below shows the number of tests ordered for patients with critically low sodium in ED compared to other locations.



ED ordered more tests than other locations for all categories except liver function and UE profile. Overall, the data shows gaps in practice across all departments, with a high number of patients missing out on further investigations. For patients with critical hypernatraemia, numbers of tests ordered were too low to make a suitable comparison, with only 1 urine sodium and 2 plasma osmolality tests ordered across all departments.

Conclusions/Clinical Impact

The findings from this audit align with those identified by the NCEPOD review, and highlight gaps in patient care.

Further guidance is needed for the management of all abnormal sodium, but particularly hypernatraemia. Whilst investigation of osmolality and urine concentration is more pertinent to hyponatraemia management, it is still important to the determine of the underlying cause of hypernatraemia which will inform treatment decisions. The lack of national guidance for hypernatraemia introduces wide variation in practices between staff members and departments.

This data demonstrates that a high number of patients do not receive adequate further investigations following an abnormal sodium result. Treatment recommendations for hyponatraemia vary depending on the underlying cause and fluid status, so the lack of further testing could result in inappropriate treatment and risk patient safety.

Information gained from this audit will be presented to multidisciplinary teams as part of the review of NCEPOD guidance, with the aim to standardise management of abnormal sodium across the Trust.

References

1. National Confidential Enquiry into Patient Outcome and Death (NCEPOD). A Balanced Solution: Blood sodium. London, October 2025.
2. National Institute for Health and Care Excellence (NICE). Diagnosis and management of hyponatraemia. 2025