RECOMMENDATIONS

These recommendations have been formed by a consensus exercise involving all those listed in the acknowledgements. The recommendations have been independently edited by medical editors experienced in developing recommendations for healthcare audiences to act on.

The recommendations in this report support those made previously by other organisations, and for added value should be read alongside:

- Society for Endocrinology: Emergency management of severe and moderately severely symptomatic hyponatraemia in adult patients
- NICE Clinical Knowledge Summary: Hyponatraemia
- European Society of Endocrinology Clinical guideline for the management of hyponatraemia
- NICE Clinical Guideline CG174: Intravenous fluid therapy in adults in hospital

1	Implement processes to reduce variation in the assessment and management of abnormal blood sodium levels.* • Develop national care bundles. • Develop training for all healthcare professionals to be able to assess and treat patients with abnormal blood sodium levels and recognise when to escalate to specialists. **Promote existing information on hyponatraemia from the Society for Endocrinology and develop it into the care bundle*
FOR ACTION BY	Department of Health and Social Care/NHS England, Welsh NHS, Health Department of Northern Ireland, Government of Jersey
RATIONALE FOR THE RECOMMENDATION	The care and outcome of patients with an abnormal blood sodium may be improved through timely and appropriate identification and investigation. While there is guidance from the Society of Endocrinology and others on what investigations to do and how to manage hyponatraemia (low sodium), delays and omissions in the appropriate investigations being undertaken for patients were common in this study. Furthermore, patients admitted with conditions that might cause abnormal blood sodium levels should raise a concern and be investigated. There are currently no national guidelines for managing hypernatraemia (high sodium).
ASSOCIATED GUIDANCE	Recognition of the patient presenting with severe and moderately severe, symptomatic hyponatraemia Society for Endocrinology: Emergency management of severe and moderately severely symptomatic hyponatraemia in adult patients NICE: Hyponatraemia scenario management

	European Society of Endocrinology Clinical guideline for the management of hyponatraemia
ADDITIONAL STAKEHOLDERS	Society for Endocrinology, Royal Colleges of Physicians, Royal College of Emergency Medicine, Royal College of Pathologists, Society for Acute Medicine, Royal College of Surgeons, Association of Surgeons, Royal College of Nursing, Faculty for Intensive Care Medicine, Intensive Care Society, Association for Laboratory Medicine, Royal Pharmaceutical Society, UK Kidney Association

IMPLEMENTATION SUGGESTIONS	▪ Care bundles for **acute kidney injury**, **falls** and **sepsis** have been shown to improve patient care by providing clinicians with clear information on what investigations and treatment need to be undertaken and the timeframe in which this should happen. A clear definition is needed on which staff groups deliver which component of these care bundles, along with 'tick boxes' to indicate completion to improve compliance. In addition, the senior responsible clinician for ensuring delivery of the care bundle should be clearly indicated
	▪ There would need to be appropriate guidance on determining which investigation(s) should be done to prevent over-investigation
	▪ These items, including documentation of the time it was done could be considered as part of the care bundle
	  ▪ Fluid assessment
	  ▪ Initiation of fluid balance monitoring
	  ▪ Medication review
	  ▪ Urine/plasma osmolality
	  ▪ Urine sodium
	  ▪ 08:00-09:00 cortisol and other tests as needed such as liver function, thyroid function and NTproBNP
	▪ Local service level agreements should be put in place specifying turnaround times for urgent investigations and these should be regularly audited
	▪ Development of eLearning training packages for non-specialist healthcare professionals to assess and treat patients with abnormal blood sodium levels, including 'red flags' for escalation to specialists.

2	Develop clear standards and tools for the assessment and recording of fluid status in all patients with abnormal blood sodium levels including, when appropriate, the use of point-of-care ultrasound.* **Point-of-care ultrasound is relatively new so should be considered as further research in its use is published and standards are developed*

FOR ACTION BY	Department of Health and Social Care/NHS England, Welsh NHS, Health Department of Northern Ireland, Government of Jersey
RATIONALE FOR THE RECOMMENDATION	Initial and subsequent clinical assessment of fluid status, along with ongoing monitoring of fluid balance after admission were not undertaken well or documented clearly. These assessments should be part of routine clinical care provided by all relevant healthcare professionals. Failure to do these can impact on the appropriateness of the hyponatraemia and hypernatraemia treatment. In addition, there is now interest in the use of point-of-care ultrasound (PoCUS) alongside clinical assessment to improve the quality of the fluid status assessment. Currently this is not widely used due to the lack of availability of technology and appropriately trained clinicians and the most appropriate way to use PoCUS has not been agreed amongst specialists.
ASSOCIATED GUIDANCE	NICE Clinical Knowledge Summary: Hyponatraemia scenario management British Medical Ultrasound Society: Focused and Point-of-Care Ultrasound
ADDITIONAL STAKEHOLDERS	Royal College of Nursing, Royal Colleges of Physicians, Royal College of Emergency Medicine, Royal College of Pathologists, Society for Acute Medicine, Royal College of Surgeons, Faculty for Intensive Care Medicine, Intensive Care Society, Society for Acute Medicine, Royal College of Radiologists, trusts/health boards, Royal Pharmaceutical Society, UK Kidney Association (clinical) British Society for Echocardiography, Intensive Care Society - Focused Ultrasound in Intensive Care (FUSIC), Consortium for the Accreditation of Sonographic Education and Medical Schools/Universities (training) National Institute for Healthcare Research (NIHR) (research into the use of point-of-care ultrasound)
IMPLEMENTATION SUGGESTIONS	▪ Communications from national bodies to remind healthcare professionals to accurately record fluid balance (all fluid intake and output), and regular local auditing of completeness of fluid balance documentation ▪ Electronic patient record procurement criteria should include a requirement for intuitive access to fluid balance data, including ease of integrating it into clinical assessment ▪ Improved training for medical students, resident doctors and other clinical staff on how to undertake an appropriate clinical assessment of a patient's fluid status ▪ Development of appropriate training and accreditation for clinicians to expand the use of PoCUS alongside clinical assessment of fluid status ▪ Consensus agreement on how and when PoCUS should be used to complement clinical fluid status assessment ▪ Trusts/health boards to consider business planning to cover any additional technology required to deliver PoCUS testing

	▪ National improvement programmes to understand the challenges of consistently recording fluid balance, what might help to overcome those challenges, and to understand if there are any acceptable options to fluid balance monitoring (e.g. daily weights) ▪ NIHR to consider a themed call around the clinical trials comparing standard (clinical assessment) to PoCUS directed fluid therapy in the management of patients with an abnormal blood sodium.

3	Integrate point-of-care testing results into patient electronic records.
FOR ACTION BY	Commissioners/integrated care boards with the hospitals in their trusts/health boards
RATIONALE FOR THE RECOMMENDATION	Point-of-care analysis, such as blood gas analysers, can enable clinicians to have an initial blood sodium result more rapidly than laboratory results. This allows faster determination if additional investigations and/or specific treatment of hyponatraemia or hypernatraemia is required. Frequently, results from point-of-care testing are not directly linked into the hospital laboratory electronic reporting system and require clinicians to transcribe or include them in the patient's medical records. This may not happen, so they are 'lost', and therefore are not available for review during the current or subsequent admissions, which would allow trends in blood sodium levels to be determined. It is essential that testing done using point of care analysers is validated and quality controlled to ensure the validity and consistency of the reported results.
ASSOCIATED GUIDANCE	Integrating in vitro point-of-care diagnostics: guidance for urgent community response and virtual ward services Royal College of Pathologists: The retention and storage of pathological records and specimens (draft 6th edition) Point of Care Testing: National Strategic Guidance for at Point of Need Testing
ADDITIONAL STAKEHOLDERS	Royal College of Nursing, Royal Colleges of Physicians, Royal College of Emergency Medicine, Royal College of Pathologists, Society for Acute Medicine, Royal College of Surgeons, Faculty for Intensive Care Medicine, Intensive Care Society, Society for Acute Medicine, Royal College of Radiologists, Association for Laboratory Medicine, Electronic Patient Record providers,
IMPLEMENTATION SUGGESTIONS	▪ Hospital executives, supported by clinical and laboratory staff, should talk to their local business intelligence units (or equivalent) to determine how this integration of point-of-care testing can be achieved.

	▪ Undertake regular audit of adherence to entering full demographic data on point of care analysers to facilitate linkage to patient's electronic records, and identification of when exemption may be indicated (e.g. identity of patient unknown, mass casualty events).

4	Develop a national standard for the use of hypertonic saline in the management of hyponatraemia. This should include: • The indications for its use • The dose, route and location of administration • Monitoring the blood sodium levels, including the rate of correction • Actions to be taken if over-correction occurs • A consensus on the strength of hypertonic saline stocked in hospitals.
FOR ACTION BY	Society for Endocrinology
RATIONALE FOR THE RECOMMENDATION	Many patients had clinical features of hyponatraemic encephalopathy but only half were administered hypertonic saline, and there were patients with no clinical indication who had it administered. When it was administered, there was variation in the rate, route, strength, and location of administration. Currently there is variability in the strength(s) of hypertonic saline stocked in hospitals, which increases risk as resident doctors rotate between hospitals. Additionally, a fifth of patients administered hypertonic saline had inappropriate subsequent monitoring of their blood sodium levels which increases the risk of too-rapid sodium correction, a risk factor for developing osmotic demyelination syndrome.
ASSOCIATED GUIDANCE	Society for Endocrinology: Emergency management of severe and moderately severely symptomatic hyponatraemia in adult patients NICE: Hyponatraemia scenario management European Society of Endocrinology Clinical guideline for the management of hyponatraemia
ADDITIONAL STAKEHOLDERS	Royal Colleges of Physicians, Royal College of Emergency Medicine, Society for Acute Medicine, Royal College of Surgeons, Association of Surgeons, Royal College of Nursing, Faculty for Intensive Care Medicine, Intensive Care Society, Royal Pharmaceutical Society
IMPLEMENTATION SUGGESTIONS	▪ Use of hypertonic saline could be improved through localisation of nationally developed guidance, to provide clinicians information on local specialist support for managing hyponatraemia ▪ Alongside this, the development of standardised training packages, potentially including multidisciplinary simulation training, would

	improve the appropriate use of hypertonic saline and the assessment of patients with abnormal blood sodium levels ▪ Local agreements as to where patients are admitted following administration could be agreed ▪ Audits of blood sodium monitoring in patients given hypertonic saline ▪ Guidelines could have specific times at which blood sodium levels should be measured and a standardised treatment plan for managing over-correction to reduce the risk of patients developing osmotic demyelination syndrome.

5	Raise awareness of the importance of documenting and communicating all medication changes made in hospital to primary care as well as the patients and their family/carers.
FOR ACTION BY	Royal Colleges of Physicians, Royal College of Emergency Medicine, Society for Acute Medicine, Royal College of Surgeons, Association of Surgeons, Royal College of Nursing, Faculty for Intensive Care Medicine, Intensive Care Society, Royal College of General Practitioners, Royal Pharmaceutical Society
RATIONALE FOR THE RECOMMENDATION	Most patients reviewed were taking one or more medicine that could be associated with the development of either hyponatraemia or hypernatraemia. Patients should have a thorough medication review (prescribed, over-the-counter and others) at the time an abnormal blood sodium is identified. As a result, many patients had changes to their prescribed medications during the admission to hospital (for example doses changed, switching to alternative medicines, and/or stopping of medication(s)). These changes were not clearly outlined at the point of discharge to the GP, other healthcare professionals involved in their care, patients and/or their family/carers.
ASSOCIATED GUIDANCE	NICE Clinical Knowledge Summary: Hyponatraemia scenario management Professional Record Standard Body: eDischarge Summary Standard Royal College of Physicians: Acute care toolkit 17 Managing multiple medications
ADDITIONAL STAKEHOLDERS	Commissioners/integrated care boards, Department of Health and Social Care/NHS England, Welsh NHS, Health Department of Northern Ireland, Government of Jersey
IMPLEMENTATION SUGGESTIONS	▪ Patients admitted with hypo- or hypernatraemia should have a comprehensive medication review at the point of identification of the abnormal blood sodium ▪ Hospitals should have protocols and/or a standard operating procedure on how the medication review should be undertaken, and regular auditing that this has been undertaken

	▪ Chief Executives and others could ensure that discharge letters include a mandatory section on whether any medication changes have occurred, with the rationale for those changes ▪ Clinicians should balance changing medicines to reduce the risk of recurrence of further abnormal sodium disorders against the risk of stopping a clinically important drug for an underlying long-term health condition (for example epilepsy) ▪ Involve appropriate specialists in outlining the rationale for the changes in communications to the GP and/or other healthcare professionals once made. Failure to do this increases the risk that medicines may be recommenced after discharge, leading to recurrence of the hyponatraemia and associated risks. Conversely, changes undertaken in primary care may not be visible when a patient presents to hospital ▪ Local agreements should be in place about who counsels patients, and their family/carers if appropriate, on their medications, including any changes, at the point of discharge ▪ The NICE clinical knowledge summary could be updated to strengthen information about communication of medication changes.

SUGGESTIONS FOR FUTURE RESEARCH

- Further work is needed to determine whether postoperative fluid protocols should be adjusted for weight and/or size, to reduce the risk of hyponatraemia and other electrolyte disturbances occurring.
- National guidelines or recommendations on how quickly clinicians should act on abnormal blood sodium levels once reported and on the criteria for reporting rapidly dropping sodium results, which may be a more important risk factor for the development of hyponatraemic encephalopathy than the absolute value.
- The use of point-of-care ultrasound in the assessment of blood sodium levels.