



The **Regulation** and
Quality Improvement
Authority

RQIA INDEPENDENT REVIEW

Reducing the risk of hyponatraemia when administering intravenous infusions to children

Report of actions taken by HSC Trusts and independent hospitals to implement recommendations made in the report "Reducing the risk of hyponatraemia when administering intravenous fluids to children" (RQIA, June 2008)

May 2010

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RQIA Independent Review
Reducing the risk of hyponatraemia when administering intravenous fluids to children
May 2010

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1. The Regulation and Quality Improvement Authority

The Regulation and Quality Improvement Authority (RQIA) is the independent health and social care regulatory body for Northern Ireland and is an integral part of the new health and social care structures. In its work RQIA encourages continuous improvement in the quality of services, through a programme of inspections and reviews.

RQIA was established in 2005 under the Health and Personal Social Services (Quality, Improvement and Regulation)(Northern Ireland) Order 2003.

The vision of RQIA is to be a driving force for positive change in health and social care in Northern Ireland through four core activities:

- **Improving Care:** we encourage and promote improvements in the safety and quality of services through the regulation and review of health and social care.
- **Informing the Population:** we publicly report on the safety, quality and availability of health and social care.
- **Safeguarding Rights:** we act to protect the rights of all people using health and social care services.
- **Influencing Policy:** we influence policy and standards in health and social care.

2. Context for the Review

The National Patient Safety Agency (NPSA) reported that since 2000, there had been four child deaths following neurological injury from hospital-acquired hyponatraemia in the United Kingdom. In addition, there had been more than 50 cases reported internationally of serious injury or child death related to hyponatraemia and associated with the administration of hypotonic infusions.

As a result, the NPSA issued the Patient Safety Alert 22: Reducing the Risk of Hyponatraemia when Administering Intravenous Infusions to Children (Appendix 1) and associated alerts. These alerts described and recommended a specific actions to be taken to ensure patient safety.

In April 2007, the Department of Health, Social Services and Public Safety (DHSSPS) issued a circular (Appendix 2) and subsequently, an addendum (Appendix 3), to all HSC organisations and independent hospitals in Northern Ireland where intravenous infusions are administered to children. These circulars outlined the requirement to implement the recommended actions identified in the NPSA Alert 22. Furthermore, the Northern Ireland Regional Paediatric Fluid Therapy Working Group and the Northern Ireland Medicines Governance Team developed Paediatric Parenteral Fluid Therapy clinical guidelines in the form of a wall chart (Appendix 4) in accordance with NPSA guidance. Copies of the wall chart were disseminated by DHSSPS and RQIA to HSC trusts and independent hospitals for local implementation.

In response to a request from the DHSSPS in 2008, RQIA carried out a review of HSC trusts and independent hospitals to examine how these organisations had recommended actions outlined in the NPSA Alert 22. The findings of this review were implemented the presented in the RQIA report : Reducing the Risk of Hyponatraemia when Administering Intravenous Fluids to Children (June 2008). This report made 16 recommendations (Appendix 5) for HSC trusts and independent hospitals in order to achieve full compliance with NPSA Safety Alert 22.

Progress since the 2008 review

In February 2009 a letter was issued jointly by the Chief Medical Officer, Chief Nursing Officer and Chief pharmaceutical Officer (Appendix 6) to HSC Trusts and independent hospitals requiring full implementation of all 16 recommendations made in the RQIA report. At that time, the Minister requested that RQIA undertake a further review of the measures in place within HSC Trusts and independent hospitals to reduce the risk of hyponatraemia in Northern Ireland, specifically in terms of the implementation of the recommendations made in the previous RQIA report. The Minister indicated that the follow- up review should pay particular attention to the reporting of incidents and the treatment of children in adult wards.

The NPSA Safety Alert 22 and the 2008 RQIA Report recommendations relate to paediatric patients from four weeks to their 16th birthday. These recommendations were not intended for maternity units, paediatric or neonatal intensive care units or specialist areas such as renal, liver, and cardiac units where hypotonic solutions

may have specialist indications. These specialist areas have not been included in this review.

3. The review methodology

RQIA established an independent review team including lay representation, to carry out this review. The review process had three key phases:

- completion by all trusts and independent hospitals of a self-assessment questionnaire of the clinical structures, processes and training in place against the recommendations made by NPSA and RQIA,
- validation visits to the trusts by the review team, which included meetings with senior managers and clinicians; and visits to wards and departments: and,
- production and publication of a report of the findings of the review team.

4. The review team

The review team consisted of an expert panel from across the United Kingdom and included lay representation:

Table 1: The independent review team

Name	Title	Organisation
Miss Elizabeth Duffin	Lay representative	
Miss Linda Matthew	Interim Head of Patient Safety Direct	NPSA
Mrs Valerie Morrison	Inspector / Quality reviewer	RQIA
Dr. Stephen Playfor	Consultant Paediatric Intensivist	Royal Manchester Children's Hospital
Dr. David Stewart	Medical Director and Director of Service Improvement	RQIA
Mrs Hilary Brownlee	Project Manager	RQIA
Miss Claire Richardson	Project Manager	RQIA

Table 2: Professional Advisors to the review team

Name	Title	Organisation
Dr. Jarlath McAloon	Consultant Paediatrician	NHSCT
Dr. Peter Crean	Consultant Paediatric Anaesthetist	BHSCT

RQIA would like to thank the members of the independent review team for their expertise, time and professional advice without which this review would not have been possible.

We would also like to thank members of staff in health and social care trusts and independent hospitals who contributed to the review.

Finally, we would particularly like to thank patients and members of the public who provided views of the services and shared their experiences.

5. Background

Hyponatraemia, is defined as a serum sodium concentration of less than 135 mmol/L. It is reported to be the most common electrolyte disorder amongst hospitalised patients and a large proportion of these cases are iatrogenic. The administration of hypotonic intravenous fluids in these circumstances can result in the development of symptomatic hyponatraemia.

The international medical literature cites more than 50 cases of permanent neurological disability or death occurring in children because of the administration of hypotonic intravenous fluids. The greatest risks appear to be associated with the most hypotonic intravenous maintenance fluids, such as sodium chloride 0.18% with glucose 4% (No. 18 solution).

Children are at particularly high risk of developing symptomatic hyponatraemia, as they tend to develop hyponatraemic encephalopathy at higher serum sodium concentrations than adults. They also have a poorer prognosis and this is probably due to a combination of physical and physiological differences.

Acute symptomatic hyponatraemia is a medical emergency that must be treated promptly. It may produce a variety of clinical features such as nausea, headache, lethargy, disorientation, agitation, delirium, seizures, focal neurological deficits, pathological reflexes and respiratory arrest. Progressive cerebral swelling may lead to raised intracranial pressure, and death.

Increasing recognition of the risks of iatrogenic hyponatraemia has led to the publication of various clinical guidelines and regulatory documents. These include The National Patient Safety Agency (NPSA) Patient Safety Alert 22: Reducing the risk of hyponatraemia when administering intravenous infusions to children (Appendix 1) and the Consensus Guideline on Perioperative Fluid Management in Children¹. These publications recommend that children at high risk of iatrogenic hyponatraemia, including those in the perioperative period, should only ever receive isotonic intravenous fluids, such as sodium chloride 0.9%, sodium chloride 0.9% with glucose 5% or Hartmann's Solution, and that No. 18 solution should be removed from stock and general use in clinical areas where children are treated.

The 2008 RQIA review report (Appendix 5) concluded that where No. 18 solution was available on site, there was a degree of prevailing risk of children receiving this solution. The robust supply processes and clear labelling that should have been in place to minimise this risk were not in place in many clinical areas at that time. Therefore, the recommendation was made that all hospitals should monitor the ongoing use of No.18 solution to enable assurance that infusions are removed from stock and general use in areas that treat children.

In order to reduce the risks of hyponatraemia when administering intravenous fluids to children the NPSA also recommended that hospitals should review and improve the design of existing intravenous fluid prescriptions and fluid balance

¹ Consensus Guideline on Perioperative Fluid Management in Children'. Association of Paediatric Anaesthetists of Great Britain and Ireland (2007)

charts for children. The 2008 RQIA review report recommended the implementation of revised paediatric intravenous fluid prescription and fluid balance charts in all settings where children are treated, including adult wards.

Education and Training in the Management of Paediatric Intravenous Infusion Fluids

The 2008 RQIA review found that the provision of intravenous fluid prescription and administration training for non-paediatric staff caring for older children on adult wards was not evidenced across all organisations visited by the review team. A recommendation was made that hospitals should ensure that clinicians who care for children are provided with competency based assessed education in administration of intravenous fluids.

The NPSA in association with BMJ Learning has developed an e-learning module that gives information about safe prescribing, administration and monitoring of intravenous fluids to children. It highlights the main risks and key issues that should be considered and looks in detail at the risk of children developing acute hyponatraemia as a result of receiving intravenous fluids. The Northern Ireland Medical and Dental Training Agency (NIMDTA) has taken steps to ensure that all doctors in foundation training programmes are required to complete training in hyponatraemia and all paediatric trainees were required to complete the BMJ module as part of their June 2008-09 assessment, which resulted in full compliance.

There is no similar mandatory requirement for nurses or pharmacists to undertake training in hyponatraemia. There was evidence in 2008 that induction and update training programmes for nurses, and to some extent pharmacists, included awareness sessions in hyponatraemia. However, there was no evidence of any assessment of knowledge or competency gained from attendance at these sessions or any evaluation of the benefits in terms of improved practice.

Reporting of Hyponatraemia Incidents

The reporting, analysing and monitoring of incidents relating to hospital acquired hyponatraemia is central to an organisation being able to assure itself of safe practice, and that actions linked to NPSA Patient Safety Alert 22 are embedded in practice.

In 2008, the review team found little evidence in any hospital of a reporting culture for incidents relating to administration of intravenous fluids to children, and hyponatraemia. The systems that were in place were not appropriate to enable clinical staff to easily report, analyse and learn from intravenous fluids and hyponatraemia related incidents. The inadequacy of the systems could have been a potential barrier to patient safety improvement and good risk management generally.

Robust improvement in patient safety requires action and change in a number of areas of health care delivery, including the development of an organisational safety

culture. There is no universally agreed definition of a safety culture in healthcare but it should include an ongoing awareness of the potential for things to go wrong, encouragement for staff to report incidents, learning through investigation and taking action to help prevent recurrence.

There is evidence that when open reporting and analysis of incidents takes place, it is a positive experience for the staff and the organisation and contributes to the development of an increasingly safe environment in which to deliver care.

6. Findings of the Review Team

In the week commencing 9 November 2009 the RQIA review team visited all HSC trusts to undertake an independent assessment of the systems in place to implement the recommendations made in the NPSA Patient Safety Alert 22: Reducing the Risk of Hyponatraemia when Administering Intravenous Infusions to Children. Members of the review team also visited independent hospitals on 9 -10 December 2009 and 11 February 2010.

During each visit, reviewers considered and explored key areas in respect of the actions taken to implement the NPSA recommendations and the recommendations made in the RQIA Hyponatraemia Review 2008.

Overview of Findings

The review team concluded that all HSC Trusts and independent hospitals visited had undertaken considerable work to reduce the risk of hyponatraemia when administering intravenous fluids to children. In all areas visited there was evidence of improvement and commitment to achieving full compliance with the recommendations made in the NPSA Patient Safety Alert 22 and the RQIA Hyponatraemia Review 2008.

Reviewers concluded that trusts and independent hospitals had taken a number of appropriate actions to implement the recommendations. Trusts and independent hospitals provided reviewers with evidence to demonstrate that patient safety was a priority when prescribing, administering and monitoring of intravenous infusions to children.

The actions taken by individual trusts and independent hospitals are summarised and presented in Appendix 7.

Action taken by independent hospitals to implement recommendations made in this report will be followed up by RQIA through its annual programme of inspections.

NPSA Recommendation 1:

Remove sodium chloride 0.18% with glucose 4% intravenous infusions from stock and general use in areas that treat children. Suitable alternatives must be available.

Restrict availability of these intravenous infusions to critical care and specialist wards such as renal, liver and cardiac units. Ensure that suitable alternatives are available for use.

RQIA Recommendation (2008)

1. All hospitals should monitor the ongoing use of no.18 solution to enable assurance that infusions are removed from stock and general use in areas that treat children.
2. Where appropriate, hospitals must be able to demonstrate that an active strategy is in place for minimising risk of use in clinical areas that continue to stock No.18 solution and where children are accommodated. For example, provision of additional labelling or separate storage for those No.18 solution bags still stocked in such clinical areas.

Summary of action taken by trusts and independent hospitals:

- The review team confirmed that all hospitals comply with the NPSA recommendation. No. 18 Solution has been completely removed from all clinical areas where children are treated, and its use across all trusts and independent hospitals was negligible. A number of hospitals have retained limited stocks in pharmacy departments (Antrim Area Hospital, BHSCT hospitals and Erne) for use in specialist areas such as critical care, renal, liver and cardiac units.

Recommendation for improvement:

1. **In view of the substantial decline in the use of No. 18 Solution, it is recommended that those hospitals with continued stock should consider the potential for its removal.**

NPSA Recommendation 2

Produce and disseminate clinical guidelines for the fluid management of paediatric patients. These should give clear recommendations for fluid selection and clinical and laboratory monitoring.

Ensure that these are accessible to all healthcare staff involved in the delivery of care to children.

Please note that the clinical guidelines for the fluid management of paediatric patients should be as follows:

DHSSPS Parenteral Fluid Therapy Wall-Chart (issued by DHSSPS in October 2007), with a list of available local fluids attached to or displayed alongside it. However, it is important that this list and how it is displayed is in accordance with hospital policy.

RQIA Recommendation (2008)

3. All hospitals should continue with the ongoing work of disseminating clinical guidelines. This should be undertaken in conjunction with multidisciplinary awareness-raising and education on the use of the guidance and wall-chart in all settings where children may be treated. This is particularly important in adult wards where older children are treated.

5. All hospitals should ensure that the DHSSPS Paediatric Parenteral Fluid Therapy wall chart issued by DHSSPS in October 2007 is displayed in clinical areas where children may be treated, with a list of available local fluids alongside it. All previous versions of the wall-chart should be removed from the clinical areas.

7. Hospitals should continue to review, collaborate and implement organisation wide policy and guidelines, in relation to intravenous infusion for children

Summary of action taken by trusts and independent hospitals:

- Reviewers noted that copies of the Clinical Guidelines in the form of the Paediatric Parenteral Fluid Therapy wall charts issued by DHSSPS in October 2007 were displayed in clinical areas in all trusts and independent hospitals visited. Where additional intravenous fluids are used, they were listed and displayed alongside the wall chart.
- There was evidence that the majority of trusts and independent hospitals had written policies for the administration of intravenous fluids to children, in association with the clinical guidelines. The content of these policies were similar throughout the trusts. The policy and guidelines are available on trust intranet systems, with evidence of accessibility of printed copies in clinical areas.
- Clinical staff in all areas visited by the review team were aware of the content of the DHSSPS wall chart and were knowledgeable about the administration of intravenous fluids to children.

NPSA Recommendation 3

Provide training and supervision for all staff involved in the prescribing, administering and monitoring of intravenous infusions for children.

Please note that education and competency assessment in respect of the following recommendations should be interpreted as follows:

- **Multi-professional Induction Training;**
- **Multi-professional Knowledge Test/ Competency Assessment;**
- **Evaluation/ Audit of Training Effectiveness.**

RQIA Recommendation (2008)

6. Hospitals should assure themselves that all members of staff have the appropriate skill and knowledge in this clinical area. Competency assessment tools in administration of intravenous infusion to children should be developed, formalised and implemented for all relevant, multi-professional staff.

8. All hospitals should ensure the development and provision of multidisciplinary education opportunities in administration of intravenous infusion to children and that all relevant clinical staff uptake this education.

9. Hospitals should develop mechanisms to identify the location of patients aged 14-16 years who are in adult wards and ensure staff who care for those children are provided with competency based, assessed education in administration of intravenous infusion to children.

10. All hospitals should make wider use of training sources available such as BMJ E-Learning Module on Hyponatraemia to address different learning styles and devise a mechanism to ensure 100% multi-disciplinary uptake of such learning.

Summary of action taken by trusts and independent hospitals:

- Mechanisms have been put in place in all hospitals to identify the location of patients aged 14 -16 years. Some children continue to be admitted to and treated in adult wards and clinical areas. During site visits, reviewers were advised of the on going work across trusts to ensure safe and effective administration of intravenous infusion to children in all clinical settings. It was evident that some improvements have been made since the 2008 hyponatraemia review. However, there is a continuing risk associated with the administration of intravenous fluids to children treated on adult wards and clinical areas.
- Training records examined by reviewers across trusts and independent hospitals confirmed that paediatric nurses have attended educational opportunities and awareness raising sessions on the administration of intravenous fluids to children.
- There was evidence of inclusion of the administration of intravenous fluids to children in induction training for newly appointed nurses. However, there was minimal evidence that training programmes for pharmacists include administration of intravenous fluids to children.

- Trusts and independent hospitals have made limited progress in providing multidisciplinary educational opportunities or awareness sessions in the administration of intravenous fluids to children, for clinical staff (including medical consultants) who work in adult wards where children may be treated.
- There is little evidence that competency assessment has been incorporated into the administration of intravenous fluids to children. However, the review team was shown a good example of a competency based approach to assessment in a clinical area in Musgrave Park Hospital but, in general, assessment is knowledge based rather than competency based.
- There is evidence of a good uptake of the BMJ E-Learning Module on hyponatraemia by doctors in training across trusts. However, the uptake by nurses and pharmacists is variable across the trusts and independent hospitals.
- There are currently no standardised, validated, competency assessment tools on the administration of intravenous fluids to children. Reviewers recommend that the choice of knowledge and competency assessment tool should be specifically tailored to take account of a number of variables, such as the type of assessment, the opportunities for assessing practitioners and other factors relating to the administration of intravenous fluids to children.

Recommendations for improvement:

- 2. Trusts, with support from education providers, should consider developing a validated, competency assessment tool on the administration of intravenous fluids to children to ensure the application of theory to practice.**
- 3. Trusts should develop a strategy to ensure that there is collaborative, clinical management between paediatric and adult clinicians, for the administration of intravenous fluids to children in adult wards. There must be clear identification of roles and lines of responsibility. All clinicians who are involved in the administration of intravenous fluids to children should undertake training and have demonstrated competency in this area.**

NPSA Recommendation 4

Reinforce safer practice by reviewing and improving the design of existing intravenous fluid prescriptions and fluid balance charts for children.

RQIA (2008) Recommendation

11. Priority must be given to the completion of a Trust-wide review, and implementation of revised paediatric intravenous fluid prescription and fluid balance charts in all settings where children may be treated including adult wards where children are treated.

Summary of action taken by trusts and independent hospitals:

- All trusts have reviewed paediatric intravenous fluid prescription and fluid balance charts and have implemented or are implementing revised documentation.

Independent hospitals

- Independent hospitals currently use generic adult fluid balance charts.
- Senior clinicians in the Belfast Clinic acknowledged that there is a prevailing risk in continuing to use the adult fluid balance chart.
- Senior clinicians in the North West Independent Hospital have not considered the need to review or revise the use of the generic adult fluid balance charts when administering intravenous fluids to children.
- Senior managers in the Ulster Independent Clinic advised reviewers that clinicians were awaiting the results of a pilot being undertaken in the Royal Belfast Hospital for Sick Children (RBHSC) on a revised prescription and fluid balance chart. It was acknowledged by clinicians that there is a prevailing risk in continuing to use the adult fluid balance chart.

Recommendations for improvement:

4. Trusts and independent hospitals should consider standardising paediatric intravenous fluid prescription and fluid balance charts for use across Northern Ireland.
5. Independent hospitals should introduce the use of *paediatric* prescription and fluid balance charts in line with clinical good practice when administering intravenous fluids to children.

NPSA Recommendation 5

Promote the reporting of hospital-acquired Hyponatraemia via local risk management systems and implement and audit programme to ensure NPSA recommendations and local procedures are being adhered to.

RQIA (2008) Recommendation

12. All hospitals should develop a culture of incident reporting, analysis and learning generally and specifically in respect of intravenous fluids and hyponatraemia.
13. Plans for development of systems for reporting, analysing and monitoring incidents to assure organisations of safe practice and that actions linked to NPSA Alert 22 should be implemented and regularly audited by all hospitals to ensure adherence to the process.
14. The development of 'trigger lists' that have been adopted by Antrim Area Hospital to aid understanding of the types of incidents to be reported should be shared and taken up more widely.
15. The development of an audit tool which may include wider aspects but should address as a minimum aspects of NPSA Alert 22, should continue to be progressed and used at least annually.
16. Trusts should continue to seek approval and funding for a regional audit (GAIN proposal) on the uptake of the Paediatric Parenteral Fluid Therapy guideline and potential unexpected clinical consequences of the guideline.

Summary of action taken by trusts and independent hospitals:

- Reviewers were impressed with the awareness of the incident reporting procedure of staff across all sites and noted that there had been a noticeable improvement since the previous RQIA visit. However, there was limited evidence of robust and embedded actionable learning and improvement from the reporting of incidents across all organisations.
- In several trusts, periodic audits of biochemical information on hyponatraemia in children have been introduced.
- Reviewers provided independent hospitals with copies of the revised trigger list that had been adopted by Antrim Area Hospital to aid understanding of the types of incidents to be reported, for display alongside the Paediatric Parenteral Fluid Therapy wall chart.

Recommendations for improvement:

- 6. Trusts and independent hospitals should ensure robust systems are in place that facilitate learning and improvement following the reporting of incidents.**
- 7. Independent hospitals should ensure that the 'trigger list' that had been adopted by Antrim Area Hospital to aid understanding of the types of incidents to be reported is available and displayed alongside the Paediatric Parenteral Fluid Therapy wall chart. Senior managers should ensure that implementation is supported through the provision of training and awareness raising sessions.**
- 8. Independent hospitals should devise action plans for ongoing audit of progress against NPSA Alert 22 recommendations to ensure practice/progress and improvement is embedded into practice.**

Summary of recommendations

Recommendation 1.

In view of the substantial decline in the use of No. 18 Solution, it is recommended that those hospitals with continued stock should consider the potential for its removal.

Recommendation 2

Trusts, with support from education providers, should consider developing a validated, competency assessment tool on the administration of intravenous fluids to children to ensure the application of theory to practice.

Recommendation 3

Trusts should develop a strategy to ensure that there is collaborative, clinical management between paediatric and adult clinicians, for the administration of intravenous fluids to children in adult wards. There must be clear identification of roles and lines of responsibility. All clinicians who are involved in the administration of intravenous fluids to children should undertake training and have demonstrated competency in this area.

Recommendation 4.

Trusts and independent hospitals should consider standardising paediatric intravenous fluid prescription and fluid balance charts for use across Northern Ireland.

Recommendation 5.

Independent hospitals should introduce the use of *paediatric* prescription and fluid balance charts in line with clinical good practice when administering intravenous fluids to children.

Recommendation 6.

Trusts and independent hospitals should ensure robust systems are in place that facilitate learning and improvement following the reporting of incidents.

Recommendation 7.

Independent hospitals should ensure that the 'trigger list' that had been adopted by Antrim Area Hospital to aid understanding of the types of incidents to be reported is available and displayed alongside the paediatric Parenteral Fluid Therapy wall chart. Senior managers should ensure that implementation is supported through the provision of training and awareness raising sessions.

Recommendation 8.

Independent hospitals should devise action plans for ongoing audit of progress against NPSA Alert 22 recommendations to ensure practice/progress and improvement is embedded into practice.

7. Conclusions

Health and social care trusts and independent healthcare facilities in Northern Ireland have good operational control of the administration of intravenous fluids to children and compliance with the NPSA Safety Alert 22 has been substantially achieved. This is very significant and there is evidence of effective action on the part of senior managers and clinicians.

No. 18 Solution has been removed from clinical areas. A number of hospitals have retained limited stocks in pharmacy departments and the Review Team recommend that ongoing use is monitored with the potential of complete removal.

There is good compliance with the display and staff awareness of the Clinical Guidelines in the form of the Paediatric Parenteral Fluid Therapy wall charts issued by DHSSPS in October 2007. Most organisations had written policies for the administration of intravenous fluids to children.

There is evidence that nursing staff have attended training events on the administration of fluids to children and there is good uptake of the BMJ E-Learning Module on hyponatraemia by doctors in training. The Review Team found minimal evidence that training programmes for pharmacists include administration of intravenous fluids to children.

There are currently no standardised, validated, competency assessment tools on the administration of intravenous fluids to children and the Review Team recommend that consideration should be given to the development of such a tool.

The Review Team found that independent hospitals currently use generic adult fluid balance charts and recommend that the use of a *paediatric* intravenous fluid prescription and fluid balance chart in line with clinical good practice when administering intravenous fluids to children.

There is good evidence of staff awareness of incident reporting systems across all sites visited but limited evidence of robust systems for putting the learning from incident reporting into practice.

Reviewers noted that all hospitals have measures in place to identify the location of patients aged 14 -16 years. Some children continue to be admitted to and treated in adult wards and clinical areas. Because of the continuing risk associated with the administration of intravenous fluids to children treated on adult wards and clinical areas, the review team recommends that trusts develop a strategy for ensuring collaborative, clinical management between paediatric and adult clinicians, for the administration of intravenous fluids to children in adult wards. There must be clear identification of roles and lines of responsibility and all clinicians who are involved in the administration of intravenous fluids to children should undertake training and have demonstrated competency in this area.

8. Hospitals visited by the review team

Trust	Hospitals Visited
Southern	Craigavon Area Daisy Hill South Tyrone
Western	Altnagelvin Area Erne
Northern	Antrim Area Causeway Mid Ulster Whiteabbey
South Eastern	Ulster Lagan Valley Downe
Belfast	Musgrave Park Royal Belfast Hospital for Sick Children Royal Victoria Mater Infirmorium Belfast City
Independent Hospitals	North West Independent Ulster Independent Clinic The Belfast Clinic

Appendix 1: NPSA Patient Safety Alert 22: Reducing the Risk of Hyponatraemia When Administering Intravenous Infusions to Children.



National Patient Safety Agency

Patient safety alert

22



Alert

28 March 2007

- | | |
|---------------------|-------------------------------------|
| Immediate action | <input type="checkbox"/> |
| Action | <input checked="" type="checkbox"/> |
| Update | <input type="checkbox"/> |
| Information request | <input type="checkbox"/> |

Ref: NPSA/2007/22

Reducing the risk of hyponatraemia when administering intravenous infusions to children

The National Patient Safety Agency (NPSA) is issuing advice to healthcare organisations on how to minimise the risks associated with administering infusions to children.

The development of fluid-induced hyponatraemia in the previously well child undergoing elective surgery or with mild illness may not be well recognised by clinicians. To date, the NPSA's National Reporting and Learning System (NRLS) has received only one incident report (that resulted in no harm), but it is likely that incidents have gone unreported in the UK.

Since 2000, there have been four child deaths (and one near miss) following neurological injury from hospital-acquired hyponatraemia (see definition on page 7) reported in the UK.¹⁻³ International literature cites more than 50 cases of serious injury or child death from the same cause, and associated with the administration of hypotonic infusions.⁴

Action for the NHS and the independent sector

The NPSA recommends that NHS and independent sector organisations in England and Wales take the following actions by 30 September 2007 to minimise the risk of hyponatraemia in children:

- 1 Remove sodium chloride 0.18% with glucose 4% intravenous infusions from stock and general use in areas that treat children. Suitable alternatives must be available. Restrict availability of these intravenous infusions to critical care and specialist wards such as renal, liver and cardiac units.
- 2 Produce and disseminate clinical guidelines for the fluid management of paediatric patients. These should give clear recommendations for fluid selection, and clinical and laboratory monitoring.
- 3 Provide adequate training and supervision for all staff involved in the prescribing, administering and monitoring of intravenous infusions for children.
- 4 Reinforce safer practice by reviewing and improving the design of existing intravenous fluid prescriptions and fluid balance charts for children.
- 5 Promote the reporting of hospital-acquired hyponatraemia incidents via local risk management reporting systems. Implement an audit programme to ensure NPSA recommendations and local procedures are being adhered to.

For response by:

- All NHS and independent sector organisations in England and Wales

For action by:

- The chief pharmacist/pharmaceutical advisor should lead the response to this alert, supported by the chief executive, medical director, nursing director and clinical governance lead/risk manager

We recommend you also inform:

- Clinical governance leads and risk managers
- Clinical directors – paediatrics and child health
- Clinical directors – anaesthetics
- Clinical directors – surgery
- Directors of NHS laboratories
- Medical staff
- Nursing staff
- Pharmacy staff
- Patient advice and liaison service staff in England
- Procurement managers

The NPSA has informed:

- Chief executives of acute trusts, primary care organisations, ambulance trusts, mental health trusts and local health boards in England and Wales
- Chief executives/regional directors and clinical governance leads of strategic health authorities (England) and regional offices (Wales)
- Healthcare Commission
- Healthcare Inspectorate Wales

- Medicines and Healthcare products Regulatory Agency
- Business Services Centre (Wales)
- NHS Purchasing and Supply Agency
- Welsh Health Supplies
- Royal colleges and societies
- NHS Direct
- Relevant patient organisations and community health councils in Wales
- Independent Healthcare Forum
- Independent Healthcare Advisory Services
- Commission for Social Care Inspection

Appendix 2 : DHSSPS Circular HSC(SQS) 20/2007- NPSA Patient Safety Alert 22: Reducing the Risk of Hyponatraemia When Administering Intravenous Infusions to Children.

Safety, Quality and Standards Directorate
Office of the Chief Medical Officer



Department of
**Health, Social Services
and Public Safety**

An Roinn
**Sláinte, Seirbhísí Sóisialta
agus Sábháilteachta Poiblí**

www.dhsspsni.gov.uk

For action:

Chief Executives of HSC Trusts
Chair -Regional Paediatric Fluid Therapy Working Group
NI Medicines Governance Team
Regulation and Quality Improvement Authority (for cascade to independent hospitals, hospices and relevant regulated establishments)

Castle Buildings
Stormont Estate
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BT4 3SQ

Tel: 028 90522795

For information:

David Sissling, Chief Executive Designate, HSCA
Chief Executives HSS Boards
Medical Directors HSC Trusts
Medical Director NIAS
Directors of Public Health
Directors of Nursing HSC Boards/ HSC Trusts
Directors of Pharmacy HSC Boards/ HSC Trusts
Chair – CREST
Northern Ireland Clinical & Social Care Governance Support Team
Professor R Hay, Head of School of Medicine and Dentistry, QUB
Professor James McElroy, Dean of Life and Health Science, UU
Professor Jean Orr CBE, Head of School of Nursing and Midwifery, QUB
Dr Carol Curran, Head of School of Nursing, UU
Ms Donna Gallagher, Staff Tutor of Nursing, Open Nursing

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Circular HSC (SQS) 20/2007

27 April 2007

Dear Colleague

NPSA PATIENT SAFETY ALERT 22: REDUCING THE RISK OF HYPONATRAEMIA WHEN ADMINISTERING INTRAVENOUS INFUSIONS TO CHILDREN

Introduction

1. The National Patient Safety Agency (NPSA) has issued advice to the NHS on how to reduce the risks associated with administering infusions to children (see below). The recommendations made in the NPSA Patient Safety Alert relate to paediatric patients from one month to 16 years old. They are not intended for paediatric or neonatal intensive care units or specialist areas such as renal, liver, and cardiac units where hypotonic solutions have specialist indications.
2. HSC organisations are required to implement the actions identified in the Alert by **30 September 2007**. Independent sector providers which administer intravenous fluids to children will also wish to ensure that the actions specified in the alert are implemented in their organisations within the same time scale.

Working for a Healthier People



NPSA Alert 22

3. The NPSA Alert 22 is available on http://www.npsa.nhs.uk/site/media/documents/2449_PaediatricInfusionsPSAFINAL.pdf

A number of resources have been developed by NPSA to support implementation of the Alert. All materials are available on www.npsa.nhs.uk/health/alerts. These include:

- A **guideline template** to assist with the production of local clinical guidelines;
- A **prescription template** providing ideas on how local prescriptions for intravenous fluids can be improved;
- An **e-learning module** for clinical staff prescribing paediatric infusion therapy;
- A **practice competence statement** for the prescribing and monitoring of intravenous infusions;
- An **audit checklist** to assist organisations with an annual audit process to ensure that the recommendations are embedded and maintained within practice; and
- A **patient briefing**.

Local Development of Clinical Guidelines

4. It should be noted that one of the actions in the NPSA Alert is for each NHS organisation to produce and disseminate local clinical guidelines for the fluid management of paediatric patients based on the suggested NPSA guidelines template. As The Northern Ireland Regional Paediatric Fluid Therapy Working Group and the NI Medicines Governance Team were part of the NPSA external reference group, the Department has asked both of these groups to work collaboratively to produce an intravenous fluid clinical guideline in accordance with NPSA guidance, by **31 July 2007**. This will then be disseminated to each HSC Trust for local implementation and monitoring.

ACTION

5. HSC Trust Chief Executives are responsible for implementation of NPSA Alert 22. All Trusts should:
- a. Develop an action plan and ensure that action is underway by **2 July 2007**;
 - b. Complete actions by **30 September 2007**; and
 - c. Return the audit template, by **31 October 2007**: www.npsa.nhs.uk/site/media/documents/2452_Paediatric_audit_checklist.doc to the Safety, Quality and Standards Directorate in DHSSPS at qualityandsafety@dhsspsni.gov.uk. The purpose of this return is to ensure full implementation of the actions as set out in the Alert.
6. The return of the audit proforma should be accompanied by an endorsement by the Chief Executive to confirm that the named HSC Trust has undertaken an internal audit in line with the audit tool, and that the recommended actions have been fully implemented.
7. The audit proforma should also be copied to the Regulation and Quality Improvement Authority who may wish to incorporate the Trust's evidence as part of their clinical and social care governance reviews in 2007/08. RQIA will also wish to ensure that relevant independent establishments are compliant with this Alert.

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Appendix 3: DHSSPS Circular HSC (SQS) 20/2007 Addendum: NPSA Patient Safety Alert 22: Reducing the Risk of Hyponatraemia When Administering Intravenous Infusions to Children- Regional Clinical Guideline



Safety, Quality and Standards Directorate
Office of the Chief Medical Officer

For action:

Chief Executives of HSC Trusts
Regulation and Quality Improvement Authority (for cascade to independent hospitals, hospices and relevant regulated establishments)

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For information:

Chair -Regional Paediatric Fluid Therapy Working Group
NI Medicines Governance Team
David Sissling, Chief Executive (designate) HSCA
Regional Director Public Health
Chief Executives HSS Boards
Directors of Pharmacy HSC Boards/ HSC Trusts
Medical Directors HSC Trusts
Medical Director NIAS
Directors of Public Health
Directors of Nursing HSC Boards/ HSC Trusts
Chair – GAIN
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**Circular HSC (SQS) 20/2007 -
Addendum**

16 October 2007

Dear Colleague

NPSA PATIENT SAFETY ALERT 22: REDUCING THE RISK OF HYPONATRAEMIA WHEN ADMINISTERING INTRAVENOUS INFUSIONS TO CHILDREN – REGIONAL CLINICAL GUIDELINES

Introduction

Circular HSC(SQS) 20/2007 informed you about the National Patient Safety Agency alert on administering infusions to children aged from 1 month to 16 years.

The NPSA alert is to be implemented by 30 September 2007, and an audit template completed and returned to **DHSSPS by 31 October 2007**.

The Northern Ireland Regional Paediatric Fluid Therapy Working Group and the Northern Ireland Medicines Governance Team were asked to develop a clinical fluid guideline in accordance with NPSA guidance, to be disseminated to HSC Trusts for local implementation and monitoring. A regional paediatric fluid guideline, which has been endorsed by the Department, is attached.

The Regional Paediatric Fluid Guideline

The fundamental layout selected for this guideline complements a structured approach to patient clinical assessment. A sequence of questions is offered that prompts the clinician to assess for the presence of shock and guides treatment, if required; further assessment of whether there is also a deficit to be considered and then the calculation and prescribing for maintenance requirements, is also included.

The guideline emphasises that assessment of each patient should include a decision on whether oral fluid therapy could be appropriately initiated instead of intravenous therapy and further prompts reconsideration of this question when IV therapy is reviewed. ***The guidance is not a replacement for individual patient assessment, treatment and reassessment or for consultation with a senior clinician.***

Promoting Safe Use of Injectable Medicines

Organisations should also note that the NPSA Patient Safety Alert 20 on Promoting Safe Use of Injectable Medicines was issued on 4 June 2007 for local implementation. Circular HSC(SQSD)28/2007 refers. Action included a risk assessment of injectable medicine procedures and products and the development of an action plan to minimise risk. As indicated in this circular, Chief Executives should have nominated Chief Pharmacists, Pharmaceutical Directors/Advisers and Heads of Pharmacy and Medicines Management in HSC organisations to lead the action required.

Organisations should use ready to administer preparations and, if possible, avoid the need for potassium chloride to be added in clinical settings. Staff should consult the local Trust policy on IV strong potassium. Information about the availability of infusion fluids in individual hospitals should be attached to the Regional Paediatric Fluid Guideline wall chart so that all prescribers are made aware of the infusion fluids available for use in the local hospital.

ACTION

1. ***HSC Trusts (and other establishments) should ensure that the guideline is available and followed for fluid prescribing for children aged 1 month to 16 years. Children may be treated in adult wards and Accident and Emergency units, therefore, the guideline should be implemented in all settings where children aged 1 month to 16 years are treated.***

Certain groups of children such as those with renal, cardiac or hepatic conditions, or suffering from burns or diabetic keto-acidosis (DKA) or those treated in intensive care will require management under special protocols; however, this guideline will be helpful in their initial assessment and management.

2. ***Where a senior clinician(s) considers that a "special" maintenance infusion fluid is required, then this alternative choice for fluid maintenance must be endorsed by the Chief Executive of the Trust with clear documentation of the reasons for that endorsement.***

3. **Information about the availability of infusion fluids in individual Trusts should be developed by Trust Directors of Pharmacy and attached to the regional paediatric fluid guideline wall chart locally.**
 4. **Medical directors, in collaboration with other Directors and educational providers, should ensure that all prescribers are made aware of this circular and wall chart, and that the contents are brought to the attention of new junior prescribers on an ongoing basis.** Educational material to support this guideline is available on <http://www.bmlearning.com/planrecord/servlet/ResourceSearchServlet?keyWord=All&resourceId=5003358&viewResource>.
- In order to ensure the effective implementation of this guidance and to promote a user friendly version for the use by individual clinicians, the Department has asked the NI Medical and Dental Training Agency to work with Regional Paediatric Fluid therapy Group to produce wall and pocket charts appropriate to the needs of individuals and teams. These will be circulated in the near future. In addition, the NIMDTA should work with Trusts and other training agencies to ensure that the principles of paediatric fluid therapy and its potential risks, as highlighted in the National Patient Safety Agency Alert, are highlighted in postgraduate training programmes.
5. **Trust Directors of Pharmacy should develop a progress report on important supply issues in respect of all infusion fluids relevant to this regional paediatric fluid guideline and submit a report to the Pharmacy Contracting Evaluation Group and copied to the Regional Paediatric Fluid Therapy Working Group.**

Conclusion

This circular is an addendum to Circular HSC(SQS)20/2007 which informed you about implementation of the NPSA alert on reducing the risk of hyponatraemia when administering intravenous infusions to children. This Alert is applicable to HSC Trusts and other independent hospitals, hospices and regulated establishments.

A regional clinical guideline is attached to assist in implementation of Circular HSC(SQS)20/2007.

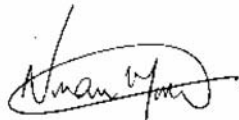
A commercially produced version of the wallchart and pocket version will be circulated by NIMDTA to HSC organisations when it becomes available. This should be complemented by information about the availability of infusion fluids in individual Trusts.

The Department expects HSC organisations to complete the NPSA audit template and return it to the Department by 31 October 2007, as outlined in Circular HSC(SQS)20/2007.

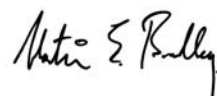
Yours sincerely



DR MICHAEL McBRIDE
Chief Medical Officer

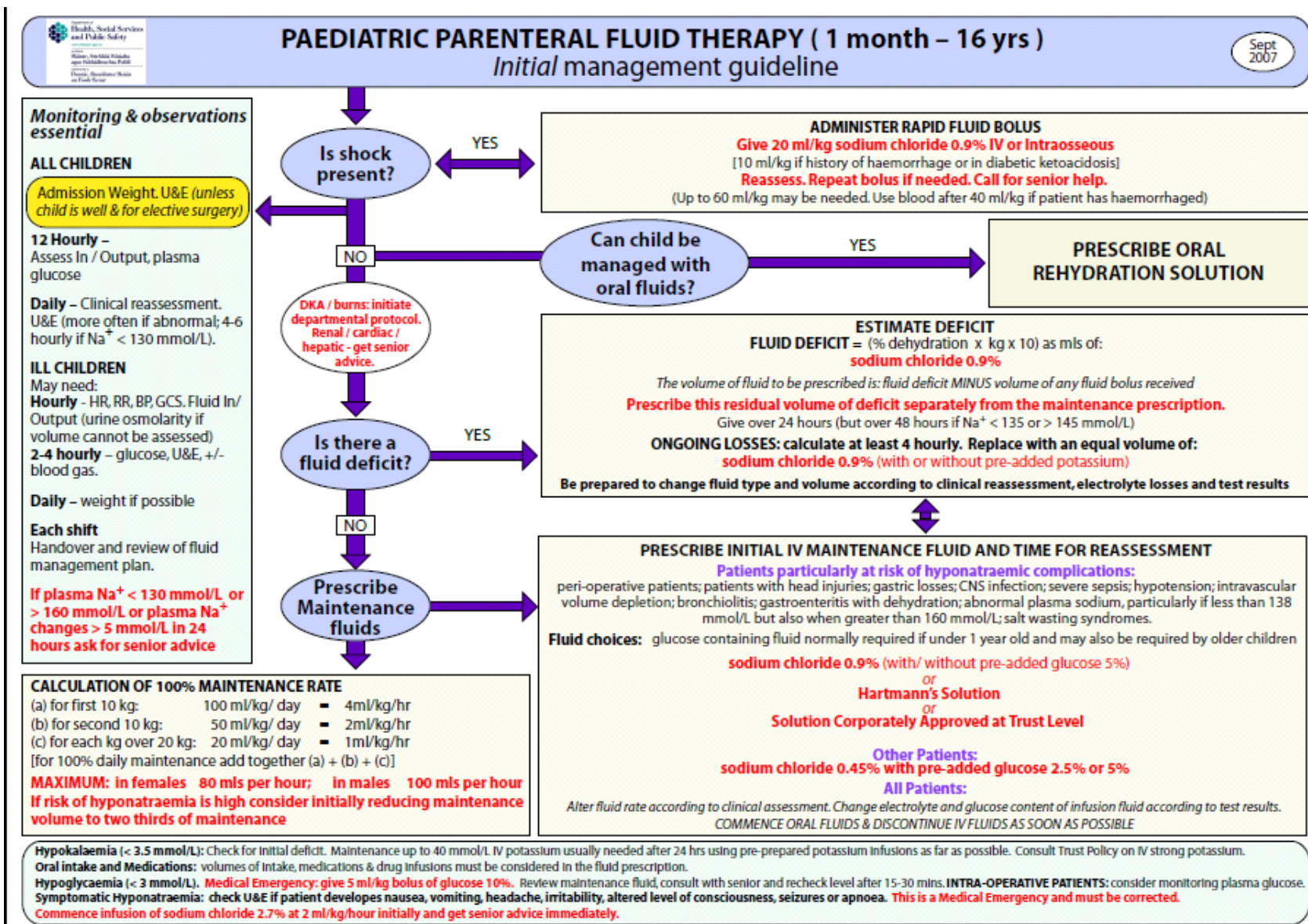


DR NORMAN MORROW
Chief Pharmaceutical Officer



MR MARTIN BRADLEY
Chief Nursing
Officer

Appendix 4: DHSSPS Regional Clinical Guideline Wallchart to assist in the implementation of Circular HSC(SQS) 20/2007): NPSA Patient Safety Alert 22: Reducing the Risk of Hyponatraemia When Administering Intravenous Infusions to Children.



Appendix 5: RQIA Independent Review Report: *Reducing the Risk of Hyponatraemia when Administering Intravenous Infusions to Children* (September 2008) - Summary of Recommendations for Improvement.

Summary of Recommendations for Improvement

- REC 1** All hospitals should monitor the ongoing use of No. 18 solution to enable assurance that infusions are removed from stock and general use in areas that treat children.
- REC 2** Where appropriate, hospitals must be able to demonstrate that an active strategy is in place for minimising risk of use in clinical areas that continue to stock No 18 solution and where children are accommodated. For example, provision of additional labelling or separate storage for those No.18 solution bags still stocked in such clinical areas.
- REC 3** All hospitals should continue with the ongoing work of disseminating clinical guidelines. This should be undertaken in conjunction with multidisciplinary awareness-raising and education on the use of the guidance and wall chart in all settings where children may be treated. This is particularly important in adult wards where older children are treated.
- REC 4** Independent hospitals must be assured that all visiting doctors who may manage patients up to 16 years old use the clinical guidelines when managing children being treated with intravenous infusions.
- REC 5** All hospitals should ensure that only the DHSSPS Paediatric Parenteral Fluid Therapy wall-chart issued by DHSSPS in October 2007 is displayed in clinical areas where children may be treated, with a list of available local fluids available alongside it. All previous versions of the wall chart should be removed from clinical areas.
- REC 6** Hospitals should assure themselves that staff have the appropriate skill and knowledge in this clinical area. Competency assessment tools in administration of intravenous infusion to children should be developed, formalised and implemented for all relevant, multi-professional staff.
- REC 7** Hospitals should continue to review, collaborate and implement organisation wide policy and guidelines, in relation to intravenous infusion for children.

- REC 8** All hospitals should ensure that the development and provision of multidisciplinary education opportunities in administration of intravenous infusion to children and that all relevant clinical staff uptake this education.
- REC 9** Hospitals should develop mechanisms to identify the location of patients aged 14-16 years who are in adult wards and ensure staff who care for those children are provided with competency based, assessed education in administration of intravenous infusion to children.
- REC 10** All hospitals should make wider use of training sources available such as BMJ E-Learning Module on Hyponatraemia to address different learning styles and devise a mechanism to ensure 100% multi-professional uptake of such learning.
- REC 11** Priority must be given to the completion of a Trust-wide review, and implementation of revised paediatric intravenous fluid prescription and fluid balance charts in all settings where children may be treated including adult wards where children are treated.
- REC 12** All hospitals should develop a culture of incident reporting, analysis and learning generally and specifically in respect of intravenous fluids and hyponatraemia.
- REC 13** Plans for development of systems for reporting, analysing and monitoring incidents to assure organisations of safe practice and that actions linked to NPSA Alert 22 should be implemented and regularly audited by all hospitals to ensure adherence to the process.
- REC 14** The development of 'trigger lists' that have been adopted by the Antrim Area Hospital to aid understanding of the types of incidents to be reported should be shared and taken up more widely .
- REC 15** The development of an audit tool which may include wider aspects but should address as a minimum aspects of NPSA Alert 22 should continue to be progressed and used at least annually.
- REC 16** Trusts should continue to seek approval and funding for a regional audit (GAIN proposal) on the uptake of the Paediatric Parenteral Fluid Therapy guideline and potential unexpected clinical consequences of the guideline.

Recommendation 6
From the Chief Medical Officer
Dr Michael McBride



Department of
**Health, Social Services
and Public Safety**

www.dhsspsni.gov.uk

AN ROINN
**Sláinte, Seirbhísí Sóisialta
agus Sábháilteachta Poiblí**

MÁNNYSTRIE O
**Poustie, Resydënter Heisin
an Fowk Siccar**

For Action:
Chief Executives of HSC Trusts

Independent hospitals, hospices and relevant regulated establishments

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Our Ref:
Date: 4th February 2009

**RQIA REVIEW INTO APPLICATION OF NPSA SAFETY ALERT 22:
REDUCING THE RISK OF HYPONATRAEMIA WHEN ADMINISTERING
INTRAVENOUS INFUSIONS TO CHILDREN**

Dear colleagues

You will be aware that the Regulation and Quality Improvement Authority has recently completed its review into the application of NPSA Safety Alert 22 in hospitals in Northern Ireland. The final report of this review is attached.

RQIA notes in its review that HSC Trusts and independent hospitals have undertaken considerable work to reduce the risk of hyponatraemia when administering IV fluids to children. However, it also highlights areas where further work is required and makes a number of recommendations around, for example, the use of No. 18 solution, staff training, and reporting of adverse incidents.

Circular HSC (SQS) 20/2007 required Trusts to implement the actions outlined in NPSA Safety Alert 22 by 30 September 2007. RQIA's findings would suggest that this work is not yet complete. We would therefore ask that you review the recommendations contained in RQIA's report and take whatever action necessary to ensure that these, along with the recommendations set out in NPSA Safety Alert 22, are implemented by **30 April 2009**.

We would emphasise the importance that the Minister and the Department places on this issue. To this end, we have asked RQIA to repeat its review next year to assess the extent to which its recommendations and those of NPSA Safety Alert 22 have been implemented. It is anticipated that RQIA will

undertake this further review in June 2009 and we would expect it to find evidence that significant progress has been made.

RQIA highlights the need to develop an audit tool which could be used by Trusts to measure the implementation of NPSA Safety Alert 22. The Department is working closely with the Guidelines and Audit Implementation Network (GAIN) to facilitate the development of such an audit tool as soon as possible.

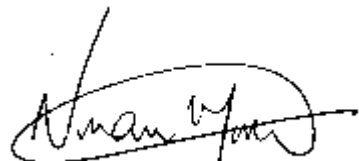
RQIA also raises concerns about the systems in place for reporting and learning from adverse incidents. You may be aware that the current system has been reviewed to ensure that appropriate and effective HSC-wide reporting systems for adverse incidents are in place. Following the completion of this review, it is anticipated that phased implementation of an agreed new process will commence shortly. In the meantime, however, we would stress the need for all staff to be made aware of the current system and of the importance of ensuring that all adverse incidents are reported and managed appropriately.

We should be grateful if you would ensure that RQIA's report is made available to all relevant staff in your organisation, and take every effort to ensure that RQIA's recommendations are implemented as a matter of urgency.

Yours sincerely



**Dr Michael McBride
Bradley**
Chief Medical Officer



Dr Norman Morrow
Chief Pharmaceutical Officer



Mr Martin
Chief Nursing
Officer

cc:

Chief Executive, RQIA

Chief Executives, HSC Boards

NI Medicines Governance Team

Hugh Mullen, Director of Performance and Provider Development, Service Delivery Unit

Directors of Pharmacy, HSC Boards/ HSC Trusts

Medical Directors, HSC Trusts

Medical Director, NIAS

Directors of Public Health, HSC Boards

Chair, Guidelines and Audit Implementation Network

Head of School of Medicine and Dentistry, QUB

Dean of Life and Health Sciences, UU

Head of School of Nursing and Midwifery, QUB

Head of School of Nursing, UU

Staff Tutor of Nursing, Open Nursing

Professor David Cousins, NPSA

Chief Executive NIMDTA, NICPLD, NIPEC

Appendix 7 Summary of actions taken by trusts and independent hospitals to implement the recommendations made in the NPSA Patient Safety Alert 22.

Trust	NPSA Rec 1 No. 18 sol	NPSA Rec 2 Clinical Guidelines	NPSA Rec 3 Staff training	NPSA Rec 4 Revision of paed. IV infusion and FBC's charts	NPSA Rec 5 Incident reporting and audit
BHSCT	<p>Significant work has been done to remove No.18 solution from areas indicated in the NPSA Safety Alert and to maintain systems of controlled supply.</p> <p>Audit results indicate that supply of No. 18 solution to restricted areas occurred twice in the past six months and was in line with the agreed arrangements for distribution to these areas.</p>	<p>The wall-chart and clinical guidelines were available in all the clinical sites visited. Lists of available paediatric intravenous fluids were not always displayed next to DHSSPS wall-charts.</p>	<p>Senior clinicians were aware of risks of delivering care to older children in adult areas.</p> <p>No comprehensive database of staff training in hyponatraemia.</p> <p>Good example of a competency based approach to assessment at MPH.</p> <p>BMJ e-learning module is variable across the trust sites. Considered by some clinicians to be 'untailed to the clinical approach taken' by hospitals in the Belfast trust area.</p>	<p>Paediatric fluid chart utilized in a sample of wards.</p> <p>Good progress made on the design, pilot and review of paediatric IV prescription and fluid balance chart. Well received in all areas that were visited including the RVH Adult Medical Assessment Unit.</p>	<p>Clinicians aware of incident reporting management process across the trust. Incidents are reviewed at divisional level with dissemination of actions / outcomes / learning.</p> <p>The 'trigger list' that had been adopted by Antrim Area Hospital to aid understanding of the types of incidents to be reported is available in most, but not all, clinical areas that were visited.</p>

Trust	NPSA Rec 1 No. 18 sol	NPSA Rec 2 Clinical Guidelines	NPSA Rec 3 Staff training	NPSA Rec 4 Revision of paed. IV infusion and FBC's charts	NPSA Rec 5 Incident reporting and audit
NHSCT	<p>No 18 solution has been removed from all clinical areas; however, a stock is retained in the pharmacy department in Antrim Area Hospital.</p> <p>The method for labelling of No. 18 solution that is stocked in Antrim Area Hospital pharmacy is not explicit. The laminated warning sheet is located along with 'Off-Licence Use' forms in the Emergency Drug Cupboard.</p>	<p>The wall-chart, trigger list and list of available IV fluids were displayed in all clinical areas visited.</p> <p>No IV infusion policy</p> <p>Clinical personnel who treat adults willing to take clinical responsibility for prescribing and delivering IV fluids to children.</p>	<p>Good uptake by paediatric nurses of the educational opportunities and awareness sessions on the administration of IV fluids to children with some uptake by consultant medical staff.</p> <p>Induction training for newly appointed nurses includes administration of IV fluids to children.</p> <p>All pharmacists have undertaken the BMJ E-Learning Module on Hyponatraemia.</p>	<p>A revised IV fluid prescription chart, is now implemented, and its use is fully embedded into clinical practice, throughout the trust.</p> <p>Acknowledgement that there is a prevailing risk where two prescription charts (adult and paediatric) are available, and in use in clinical areas where adults and children are treated jointly.</p>	<p>Noticeable improvement in incident reporting since the previous RQIA visit. No incidents of hyponatraemia reported over the past 12 months and no fluid related incidents.</p> <p>There is a structured process for review and management of incidents, but less clarity about 'what happens next'.</p> <p>The introduction of a biochemical audit commended.</p>

Trust	NPSA Rec 1 No. 18 sol	NPSA Rec 2 Clinical Guidelines	NPSA Rec 3 Staff training	NPSA Rec 4 Revision of paed. IV infusion and FBC's charts	NPSA Rec 5 Incident reporting and audit
SHSCT	No. 18 solution has been removed totally from all sites throughout the trust.	<p>Wall-chart prominently displayed in all clinical areas across all sites.</p> <p>Clinical Guidelines are disseminated to all staff via the trust intranet and printed copies accessible in all clinical areas visited across the trust.</p> <p>Clinical staff in adult wards demonstrated excellent awareness of the clinical guidelines.</p>	<p>Good uptake of educational / awareness sessions by pharmacists, nursing and junior medical staff, no record of uptake by consultant medical staff. No mandatory requirement for medical consultants to attend.</p> <p>No m/d training in the administration of IV infusion to children is provided by the trust.</p> <p>Good uptake of BMJ E-Learning Module by junior medics, not made available to nursing staff.</p> <p>No evidence of competency assessment.</p>	<p>Revised paediatric fluid prescription and fluid balance charts implemented in paediatric wards with plan to implement in adult areas.</p> <p>Evidence that training has been provided prior to the roll out of the revised charts.</p> <p>Audit is planned further to implementation of the charts into adult areas where children are treated.</p>	<p>Clinicians aware of the incident reporting management process across all sites with learning from incidents cascaded throughout clinical areas.</p> <p>The 'trigger list' is available in most, but not all, clinical areas that were visited.</p> <p>Trust has obtained funding from the Guidelines Audit Implementation Network (GAIN) to undertake a regional audit on IV fluid use in hospitalised children with appendicitis and bronchiolitis. Audit has been completed in and the findings presented to the regional multi-disciplinary steering group in July 2009.</p>

Trust	NPSA Rec 1 No. 18 sol	NPSA Rec 2 Clinical Guidelines	NPSA Rec 3 Staff training	NPSA Rec 4 Revision of paed. IV infusion and FBC's charts	NPSA Rec 5 Incident reporting and audit
SEHSCT	<p>No. 18 solution not located in wards/clinical areas in any of the sites visited</p> <p>It was reported that 10 bags has been supplied to ICU at the Ulster Hospital site in February 2009, despite this, none were located at the time of the visit.</p>	<p>Wall-chart prominently displayed in clinical areas that were visited. One outdated wall-chart in the Medical Assessment unit in the Lagan Valley was removed immediately.</p> <p>Little evidence of lists of available solutions cited along with the DHSSPS wall-charts.</p>	<p>Good uptake of education and awareness by paediatric nurses and doctors.</p> <p>No monitoring of the uptake of training provided including the e-learning module.</p> <p>Aware of risks of delivering care to older children in adult areas, limited progress has been made in providing educational opportunities or awareness sessions for clinical staff who work in adult wards where children may be treated.</p>	<p>Adult clinical documentation is used for children in adult areas.</p> <p>A revised combined prescription and fluid balance chart has been developed piloted and audited.</p> <p>Rollout has commenced in a number of paediatric areas and staff have observed caution in rolling out to adult areas until the document has been fully assessed / piloted.</p>	<p>In-depth approach to review of incident investigation, identification of root causes and learning/evidence since the previous RQIA visit.</p> <p>The most recent audit of issues outlined in the NPSA Safety Alert 22 had been carried out in 2008.</p>

Trust	NPSA Rec 1 No. 18 sol	NPSA Rec 2 Clinical Guidelines	NPSA Rec 3 Staff training	NPSA Rec 4 Revision of paed. IV infusion and FBC's charts	NPSA Rec 5 Incident reporting and audit
WHST	<p>No. 18 solution has been removed from all clinical areas on both sites; it is now only available in the pharmacy in the Erne Hospital.</p> <p>There is provision for separate storage and labelled as 'supply on request to ICU only' for (4x10) No.18 solution bags that are stocked in the pharmacy in the Erne Hospital.</p>	<p>The wall-chart was prominently displayed in all clinical areas across both sites.</p> <p>The availability / positioning of hard copies of clinical guidelines and policy documents is not centralised on ward areas. These areas could include the ward office / staff room /treatment room.</p> <p>Clinical Guidelines are disseminated to all staff via the trust intranet.</p>	<p>Good variety of education and awareness sessions but multidisciplinary training was not evidenced.</p> <p>Induction training for newly appointed doctors includes administration of IV fluids to children. Very little evidence that this is included in induction training for nurses and pharmacists.</p> <p>Good uptake of BMJ E-Learning Module including a trust version by F1 doctors; it would appear that this module has not been made available to nursing staff.</p>	<p>A newly designed paediatric prescription / fluid balance chart has been introduced in both sites visited.</p>	<p>Widespread awareness of clinicians of the incident reporting management process across both sites that were visited by reviewers.</p> <p>Incidents are reviewed analysed and learning is cascaded throughout clinical areas. The development of an incidents newsletter is commended.</p> <p>The 'trigger list' was available in most, but not all, clinical areas that were visited by the reviewers.</p>

Independent hospitals

Hospital	NPSA Rec 1 No. 18 sol	NPSA Rec 2 Clinical Guidelines	NPSA Rec 3 Staff training	NPSA Rec 4 Revision of paed. IV infusion and FBC's charts	NPSA Rec 5 Incident reporting and audit
UIC	No. 18 Solution has been totally removed from the clinic.	The wall-chart, and list of available intravenous fluids were displayed in all clinical areas visited by reviewers.	<p>Good uptake by nurses of awareness sessions.</p> <p>Evidence of inclusion in induction training for newly appointed nurses was provided.</p> <p>Good uptake of BMJ E-Learning Module on Hyponatraemia by nurses in the clinic. (100% uptake)</p> <p>All paediatric consultants have undertaken relevant education in the management of paediatric intravenous infusion.</p>	<p>Currently using a generic adult fluid balance chart.</p> <p>Awaiting the results of a pilot being undertaken in the RBHSC on a revised prescription and fluid balance chart.</p> <p>Senior nursing staff acknowledged that there is a prevailing risk in continuing to use the adult fluid balance chart</p>	A structured process for the review and management of incidents.

Hospital	NPSA Rec 1 No. 18 sol	NPSA Rec 2 Clinical Guidelines	NPSA Rec 3 Staff training	NPSA Rec 4 Revision of paed. IV infusion and FBC's charts	NPSA Rec 5 Incident reporting and audit
NWIH	No. 18 Solution has been totally removed from the hospital	<p>Wall-chart, and list of available intravenous fluids were displayed in all clinical areas visited by reviewers.</p> <p>Paediatric care is provided by consultant paediatricians</p>	<p>Good uptake by nurses of m/d awareness sessions provided by a paediatrician from Altnagelvin hospital and a training consortium.</p> <p>All paediatric consultants have undertaken education in the management of paediatric intravenous infusion</p> <p>Included in induction training for newly appointed nurses.</p> <p>Competency approach to assessment requires to be further developed.</p>	<p>Generic adult fluid balance chart that is currently in use. provides for the recording of basic fluid balance information.</p>	<p>No incidents of hyponatraemia have been reported over the past 12 months and no fluid related incidents were returned as evidence.</p> <p>Verbal evidence of a structured process for the review and management of incidents.</p>

Hospital	NPSA Rec 1 No. 18 sol	NPSA Rec 2 Clinical Guidelines	NPSA Rec 3 Staff training	NPSA Rec 4 Revision of paed. IV infusion and FBC's charts	NPSA Rec 5 Incident reporting and audit
The Belfast Clinic	No. 18 Solution has been totally removed from the clinic.	<p>Copies of wall-chart were displayed in all clinical areas visited. A list of available intravenous fluids was not displayed in clinical areas.</p> <p>Medical staff who have practising privileges not required to provide evidence of competency</p> <p>Paediatric care is provided by consultant paediatricians and paediatric nurses.</p> <p>All paediatric theatre lists are attended by paediatric anaesthetists.</p>	<p>Awareness sessions on the administration of intravenous infusion to children have not been provided by the clinic and is not included in induction training for all clinicians.</p> <p>Good uptake of BMJ E-Learning Module on Hyponatraemia by nurses in the clinic. (100% uptake)</p> <p>No evidence that competency or knowledge assessment has been incorporated into training programmes.</p>	<p>Currently using a generic adult fluid balance chart. A copy of a revised prescription and fluid balance chart that originated in the RBHSC was discussed.</p> <p>It was acknowledged that there is a prevailing risk in continuing to use the adult fluid balance chart.</p>	Verbal evidence that work is ongoing to develop a structured process for the review and management of incidents.

Appendix 8: Trigger list of Clinical incidents related to administration of IV fluids to young people (over 4 weeks - 16th Birthday)

Mandatory reporting of Clinical Incidents related to administration of IV Fluids to young people (Over 4 weeks – 16th Birthday)

The following list describes events that must always be considered as potential clinical incidents.

Incidents relating to choice of IV Fluid

- Bolus Fluid: Use of a solution with sodium content **less than 131mmol/L** for treatment of shock.
- Maintenance Fluid: Use of a solution with sodium content **less than 131mmol/L in a peri-operative patient** (24 hours before – 24 hours after surgery).
- Deficit Fluid: Use of a solution with sodium content **less than 131mmol/L** for correction.

Biochemical Abnormalities

- Any episode of symptomatic Hyponatraemia while in receipt of IV fluids.
- Any episode of Hypoglycaemia (**<3mmol/L**) while in receipt of IV fluids.
- Any episode of severe acute hyponatraemia (i.e. sodium level dropping from **135mmol/L or above to less than 130mmol/L within 48 hours of starting IV treatment**).

Assessment

- Electrolytes not checked at least once per 24 hours in any patient receiving IV fluids exclusively.
- Failure to record the calculations for fluid requirements in the case notes / on the prescription sheet.
- Failure to note in the case notes / prescription sheet a serum sodium **less than 130mmol/L**.
- Failure to document in the case notes the steps taken to correct a serum sodium less than **130mmol/L**.

If a doctor, nurse or pharmacist recognises any of these ‘Triggers’ on a patient’s chart, an Incident and Near Miss Reporting Form must be completed. This will help evaluate how the Paediatric Parenteral Fluid Therapy Guideline is being used and may indicate the need for further training etc.

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