GUIDELINES AND AUDIT
IMPLEMENTATION NETWORK

Intravenous fluid use in children hospitalised with Appendicitis or Bronchiolitis – a Northern Ireland Audit

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Tables & Charts

Background

Intravenous (IV) fluids may be prescribed for children admitted to hospital. The type of fluid and rates for administration for different ages were initially devised in the late 1950s and rapidly adopted by major textbooks and used widely in paediatric practice. With the increasing sophistication and reliability of micro-infusion pumps, the use of IV fluids has increased. International studies have shown that over the past two decades there have been a number of deaths and cases of significant neurological damage due to hospital acquired hyponatraemia in children receiving hypotonic intravenous fluid[1-3]. As a result there has been a significant shift in the type of intravenous fluid used and the level of monitoring of children hospitalised with this treatment[4-8].

In 2007 the National Patient Safety Agency (NPSA) issued an alert in order to reduce the risk of hyponatraemia when using intravenous infusions in children[9]. In the same year, the Northern Ireland Regional Paediatric Fluid Working group produced specific, local guidance which was in accordance with NPSA advice.[10] (Appendix A). Implementation of this regional intravenous fluid guideline for children and young people in hospital required a significant guidance from the previous 30 years. It was therefore important to assess the effects of this change in practice to see whether there had been universal uptake and/or important clinical outcomes, including potential unanticipated adverse effects. Moreover, practice in this area had a weak evidence base, despite its potential impact on patient safety. A regional audit therefore was required to fill the evidence gap and where deficiencies were identified, bring about widespread change in all stakeholders and thus improve the safety of this vulnerable population. In addition, implementation and monitoring of NPSA alerts forms an integral part of the patient safety initiative, which was endorsed by DHSSPS.

Appropriate use of the recommended IV fluids and regular monitoring according to the guideline should reduce the likelihood of electrolyte imbalances, and most importantly should reduce the likelihood of hyponatraemia. The purpose of this audit was to ascertain the level of adherence to the guideline (appropriate use of isotonic IV fluids in hospitalised children and young people), increase awareness of any problems and document, where applicable, adverse effects (either from inappropriate use of certain IV fluids or use of appropriate fluids).

Objectives

To measure compliance with DHSSPS guideline on Paediatric Parenteral Fluid Therapy (September 2007) and NPSA Patient safety alert 22 through:

1. Documentation of IV fluids and laboratory monitoring in two key conditions in hospitalised children and young people at high risk for hyponatraemia (not resuscitation) – Appendicitis and Bronchiolitis (including ages greater than one month up until 15 years and 364 days)
2. Documentation of any adverse clinical outcomes (clinical deterioration or electrolyte abnormality) in any patient associated with:
    a. Correct use of guideline directed IV fluids
    b. Incorrect use of guideline directed IV fluids
3. To provide essential data required for subsequent review/revision of the new regional guideline.

Methodology

An audit assessment form (Appendix B) was developed to assess the charts of children admitted for either of the index conditions (Appendicitis or Bronchiolitis). These two conditions were chosen as they have a high incidence of associated hyponatraemia and were commonly admitted to hospital[11]. Patients from general paediatric and surgical wards were assessed only and specialty units were excluded. Using only two diagnostic groups with a predictable course reduced the variation in IV fluids care and blood sodium abnormalities associated with other disease states.

It was assumed that not all patients admitted with these conditions will have received IV fluids. However, all charts were reviewed to ensure that all relevant patients were included. The audit form was developed to incorporate, as far as possible, outcomes considered important to users. A pilot audit in one hospital was undertaken to assess the sensitivity and validity of the assessment tool. The project team assessed the results and modified the form according to suggestions.

The audit tool was based on the requirements of the new guideline and listed:

1. Anonymous patient demographic data (age, sex, co-existing medical conditions, postal code), hospital site and diagnosis
2. Presentation time and date and whether patient received IV fluids
3. If received IV fluids, was there a measured patient weight
4. Type of IV fluids administered and total duration of all fluids.

5. Blood testing (including urea, sodium, potassium, chloride, and bicarbonate) if done with time and date up to a total of 5 days
6. IV fluids assessment, input measurement and output measurement on first and last day of intravenous treatment
7. Whether readmitted within 7 days of discharge.

Work plan

1. The data collection form was piloted and validated by the Multidisciplinary Project Group during July 2009.
2. To ensure standardisation of data collection, workshop/awareness sessions for staff in all five Trusts were completed between October and December 2009, this included the development of a frequently asked questions hand-out to address issues highlighted by audit staff within the individual Trusts (Appendix C).
3. Records for children aged greater than one month up until 15 years and 364 days admitted with the index conditions for the most recent 12-month period were reviewed. The time period chosen was 01 January to 31 December 2008 as this contained the most complete up to date records after the audit was commissioned.
4. All paediatric and medical in-patient units that care for these patients in NI were reviewed. This included the following units: Altnagelvin, Craigavon, Antrim, Causeway, Whiteabbey, Mater, Ulster, Daisy Hill, Erne, Belfast City, Royal Victoria and the Royal Belfast Hospital for sick children.
5. Data were collected between January 2010 and May 2010.
6. All data were entered using Microsoft Excel database.
7. Following full data collection, the analysis assessed frequencies of IV fluids use, laboratory monitoring and clinical outcomes.
8. Variances were analysed and assessed for targeted interventions.

Results

All children were audited with a diagnosis of Appendicitis or Bronchiolitis who were an age greater than one month up until 15 years and 364 days, in hospitals with a paediatric inpatient unit in Northern Ireland during the calendar year 2008. The total number of charts reviewed was 1236, 470 had Appendicitis and 766 had Bronchiolitis. Of all charts reviewed 578 (47%) received IV fluids.

Table 1 - Sample characteristics

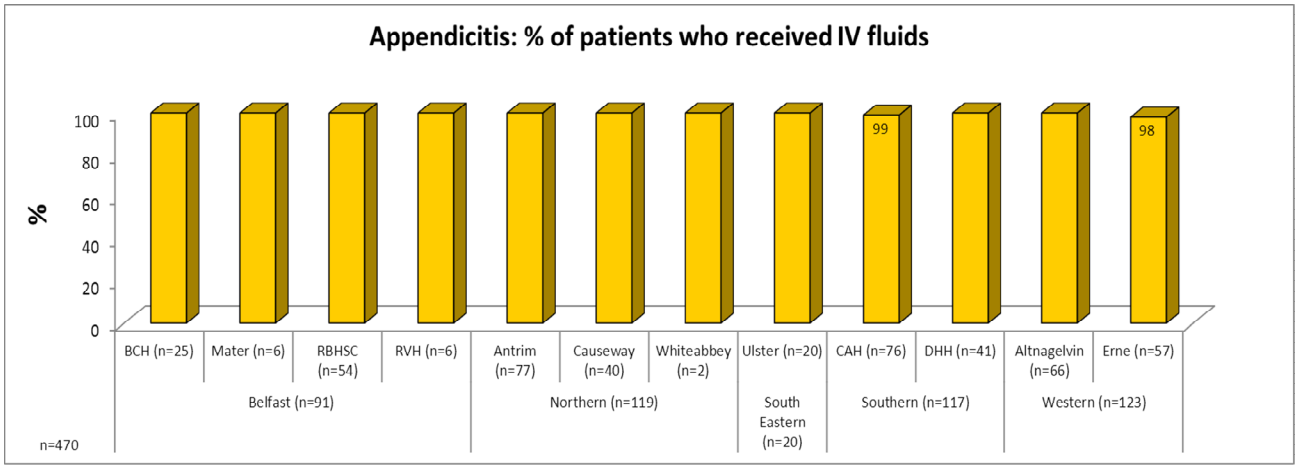
Clinical group	Appendicitis	Bronchiolitis
Total number	**N = 578**	
Number who received IV fluids (%)	468 (81%)	110 (19%)
Median age	12 years	3 months
Male Female	282 (60%) 186 (40%)	48 (44%) 62 (56%)
Length of stay in hospital (range)	1-22 days	0-22 days

These results reflect the known average age and sex of children affected by the two index conditions.

Appendicitis Group

Of the 470 children who were admitted with Appendicitis, 468 (99.6%) received fluids at some point in their hospitalisation. The breakdown of children on IV fluids by Trust is shown in Chart 1 below:

Chart 1 – Appendicitis % of Patients who Received IV fluids



Virtually all patients admitted with Appendicitis are prescribed IV fluids.

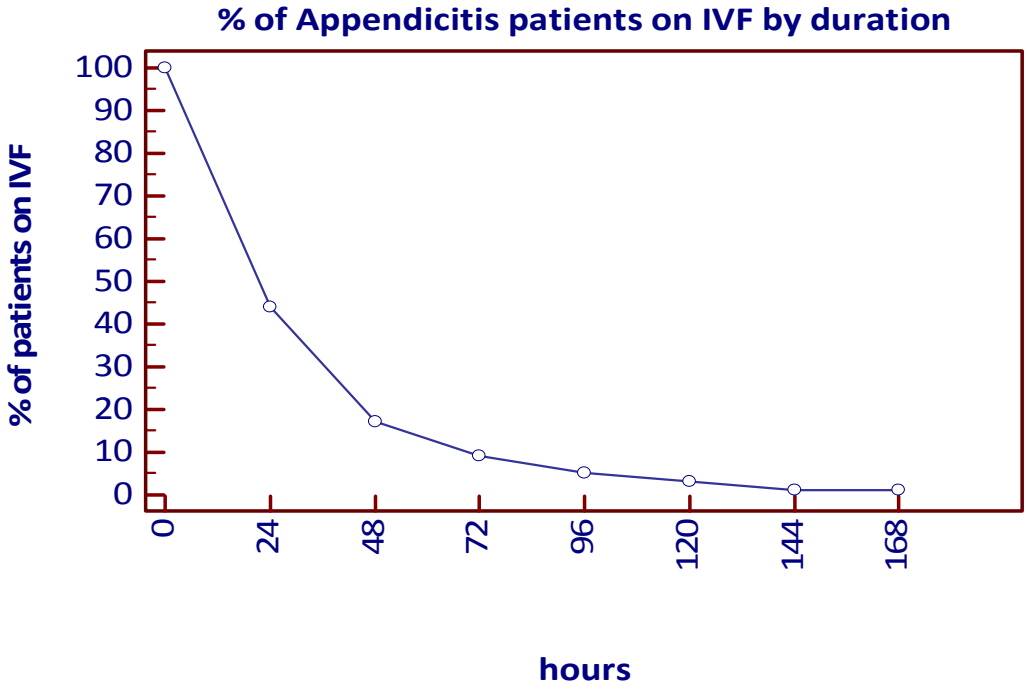
Table 2 - Duration of IV fluids (Appendicitis)

Please note this is only applicable to 429 patients with Appendicitis as 39 cases were unable to calculate a date or time.

Children spend a variable amount of time on fluids and the table below illustrates the range of time children are on fluids.

Hours on IV Fluids	Day	Initial number of patients on IV Fluids in this time band n=	Initial % on IV Fluids in this time band	Actual number of patients who stop IV Fluids in this time band
0-24	0	429	100	242
24-48	1	187	44	115
48-72	2	72	17	35
72-96	3	37	9	16
96-120	4	21	5	6
120-144	5	15	3	9
144-168	6	6	1	2
>168	7	4	1	4

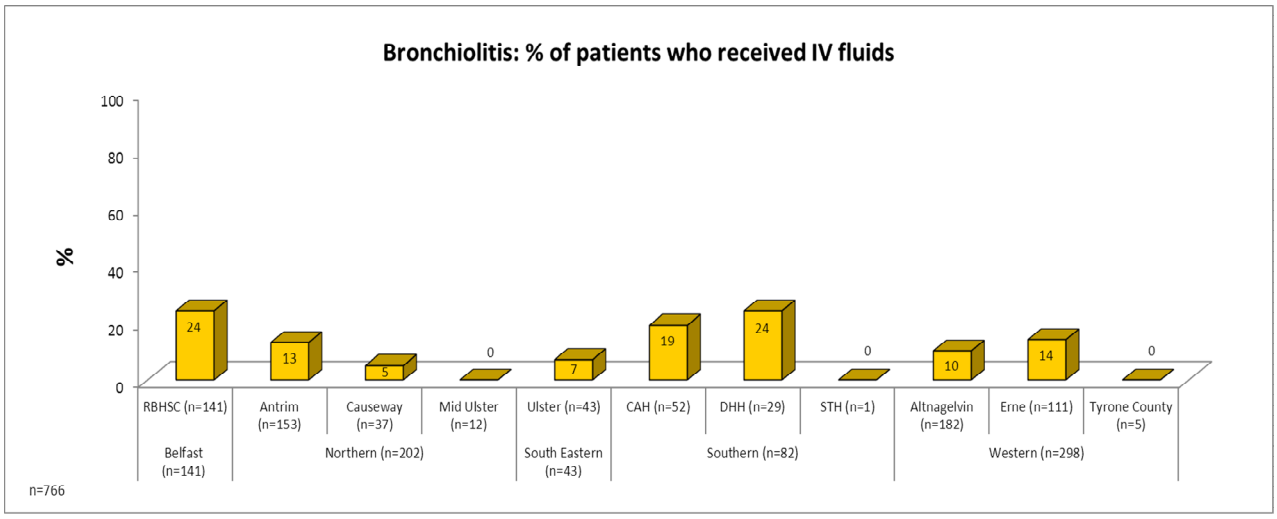
Chart 2 - % of Appendicitis Patients on IV Fluids by Duration



Bronchiolitis Group

Of the 766 children who were admitted with Bronchiolitis, 110 (14%) received IV fluids at some point in their hospitalisation. The breakdown of children on IV fluids by Trust as shown in Chart 3 below:

Chart 3 – Bronchiolitis: % of patients who received IV fluids



Whiteabbey, Mater and Belfast City hospitals had no patients with Bronchiolitis. For all other Trusts who were treating patients with bronchiolitis between 0 – 24% received IV Fluids. This reflects the case mix for each hospital, the clinical severity of the admitted patient and hospital policy for IV fluid prescribing.

Table 3 - Duration of IV fluids (Bronchiolitis)

Please note this is applicable to 97 patients with Bronchiolitis as in 13 cases we were unable to calculate a date or time.

Children spend a variable amount of time on fluids and the table below illustrates the range of time children are on fluids.

Hours on IV fluids	Day	Initial number of patients on IV fluids in this time band n=	Initial % on IV fluids in this time band	Actual number of patients who stop IV fluids in this time band
0-24	0	97	100	46
24-48	1	51	53	21
48-72	2	30	31	12
72-96	3	18	19	6
96-120	4	12	12	7
120-144	5	5	5	1
144->168	6	4	4	0
>168	7	4	4	4

Chart 4 - % of Bronchiolitis patients on IV fluids by duration

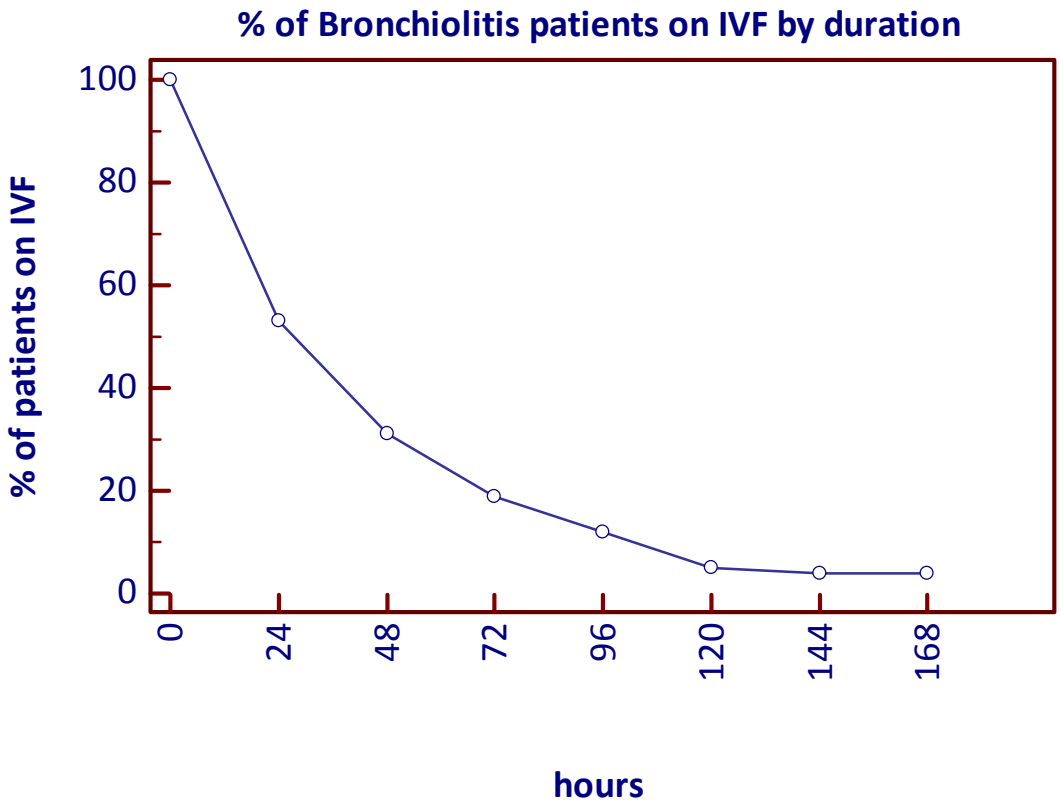


Table 4 - Characteristics of IV Fluids Prescribed

The NPSA guideline states that children at high risk of hyponatraemia (including peri/post-operative patients, Bronchiolitis) should *only* receive isotonic fluids such as sodium chloride 0.9% with glucose 5%, sodium chloride 0.9% and compound sodium lactate solution (Hartmann's solution/Ringer-Lactate solution)[9]. Therefore, all patients who were given non-isotonic solutions at any time during their admission were classified as inappropriate prescriptions.

Clinical group	Appendicitis	Bronchiolitis
Total number of IV fluids prescribed	**N = 578**	
Total number of IV fluids prescribed (%) by diagnosis	468 (81%)	110 (19%)
Total number of appropriate IV fluids prescribed (%)	397 (85%)	68 (62%)
Total number of inappropriate IV fluids prescribed at any time during their admission (%)	71 (15%)	42 (38%)

It is recognized that in some clinical circumstances, non-isotonic fluids may be appropriate but the limitations of data set precluded further assessment of this management. However, no patients who received inappropriate IV fluid prescriptions developed hyponatraemia.

Calculation of IV Fluids

Intravenous fluid prescribing is based on the clinical condition and calculated according to the weight of the child. Clinicians are required to note the reasons for prescribing the IV fluid as well as rate of infusion and time until the next assessment [9]. The following tables describe the frequencies of weight recorded.

Table 5 - Appendicitis – Is there evidence that the patient had a weight recorded?

Weight Recorded	(N=468)
Yes	429 (92%)
No	39 (8%)

Table 6 - Bronchiolitis – Is there evidence that the patient had a weight recorded?

Weight Recorded	(N=110)
Yes	107 (97%)
No	3 (3%)

Monitoring Outcomes

Following the initial prescription of the correct IV FLUIDS, all fluids need to be assessed regularly[9]. The IV fluid assessment was taken as documented evidence of the doctor's awareness of the on-going IV fluids at the time of review. This assessment is therefore a written judgement on the fluid balance from the above information and an action plan for the next time period. The following tables demonstrate the record of IV fluid assessment, inputs and outputs. The first and last days refer to the days on which IV fluids were commenced and discontinued (not the length of stay).

IV fluids, Input and Output Monitoring

Appendicitis (N=468)

Table 7 – IV Fluids Assessed

Day	IV fluids Assessed
First Day	440 (94%)
Last Day	437 (93%)

Table 8 – Input & Output Monitoring

	Input Totalled	Output Totalled
First Day	373 (80%)	122 (26%)
Last Day	338 (72%)	98 (21%)

Bronchiolitis (N=110)

Table 9 – IV fluids Assessed

Day	IV fluids Assessed
First Day	107 (97%)
Last Day	106 (96%)

Table 10 - Input & Output Monitoring

	Input Totalled	Output Totalled
First Day	95 (86%)	20 (18%)
Last Day	97 (88%)	18 (16%)

Blood testing

Plasma sodium, potassium, urea and/or creatinine should be measured on admission and at least once a day according to the regional paediatric parenteral fluid therapy guideline. In practical terms, this is accomplished initially when the intravenous cannula is sited and within the next 24 hours. More frequent measurements should be performed every four to six hours if an abnormal reading is found.

Routine blood testing

In order to assess this standard, a ratio was calculated using the number of blood tests divided by the duration of IV FLUIDS period. This provided an approximate estimate of the blood monitoring frequency in the average patient in each group. For example, for a patient that had 3 blood tests and had IV FLUIDS for a total of 68 hours (2.83 days) would have a ratio of 3/2.83 = 1.06 tests per 24 hours. An arbitrary minimal standard was set at 0.75 to reflect the realities of clinical blood testing. For example, if a patient had one blood test (with a normal result) and IV FLUIDS for a total of 32 hours (ratio = 0.75), this would be considered acceptable clinical practice.

It is understood that this ratio would underrepresent the sickest patients, given the need for multiple testing in a shorter time period. Also, as the audit only assessed up to 5 days of blood testing, it naturally excluded the sick long stay patient. The intention of this audit was to assess the basic standard of care for the average patient.

Appendicitis

Complete IV FLUIDS time data were available for 381 of the Appendicitis patients. Of this group, 359 (94%) patients had a blood testing ratio equal or greater than 0.75.

Bronchiolitis

Complete IV FLUIDS time data were available for 88 of the Bronchiolitis patients. Of this group, 82 (93%). patients had a blood testing ratio equal or greater than 0.75

Abnormal blood results

Appendicitis

For patients with Appendicitis, 29 (6%) had an initial low blood sodium (Na) result. For the patients with mild hyponatraemia (Na 131-134; n=27), all but two had at least one additional blood tests with the final result in the normal range. Two however, had no further testing (initial Na: 132, 133). No clinical effects were noted. There were two patients with severe hyponatraemia (Na ≤ 130). One at 130 had two further tests and the result returned in the normal range. The other patient had an initial Na at 127 and required four further tests before the Na was in the normal range. This patient had a satisfactory clinical outcome.

For the 70 (15%) patients who received non-isotonic fluids, none developed hyponatraemia.

Bronchiolitis

For patients with Bronchiolitis, 8 (7%) had an initially abnormal blood Na result. Six patients had mild hyponatraemia (Na 131-134). Five of these patients had no further testing and one had one further test. Two patients had severe hyponatraemia (Na ≤ 130) and had at least three further tests until the Na returned to the normal range. Both patients recovered normally. No patients developed hyponatraemia after the initial test.

For the 42 (38%) patients who received non-isotonic fluids, none developed hyponatraemia. Only one individual had a low Na on the second sample but this had improved from his initial result.

Re-admission within 7 days of discharge

There were 27 (5%) patients re-admitted within 7 days of discharge. For patients with Appendicitis 24 (5%) were re-admitted within 7 days and for patients with Bronchiolitis 3 (3%) were re-admitted within 7 days of discharge.

Summary findings

Characteristics of the sample

There was a wide variation in the percentage of patients who received IV fluids for Bronchiolitis depending on the hospital. Part of this may be explained by differing case mix and severity.

Overall, only 14% of Bronchiolitis patients were prescribed IV fluids. Anecdotal experience would suggest that this number is dropping further with the more accepted use of nasogastric tube feeding as a method of hydration.

IV fluids Prescribed

Overall, 19% (15% of Appendicitis, 38% of Bronchiolitis) patients received hypotonic IV fluids (usually 0.45% N Saline/Glucose) at some point in the hospitalization. The clinical circumstances of the patients were not recorded which may limit the interpretation of this finding.

IV fluid Monitoring

1. Weights were recorded on 92% of the Appendicitis and 97% of the Bronchiolitis patients.

2. Assessment of IV fluids in the patient's chart was noted in 94% of Appendicitis charts on day 1 dropping to 93% on the last day of admission. Assessment of IV fluids in the patient's chart was noted in 97% of Bronchiolitis charts on day 1 dropping slightly to 96% on the last day of admission.

3. Daily IV fluid input was measured for 80% of the Appendicitis patients on day 1 dropping to 72% on the last day of fluid therapy. Daily IV fluid input was measured for 86% of the Bronchiolitis patients on day 1 to 88% on the last day of fluid therapy.

4. Daily output was measured in 26% of the Appendicitis patients on day 1 and in 21% on the last day of fluid therapy. Daily output was measured in 18% of the Bronchiolitis on day 1 and this dropped to 16% on the last day of fluid therapy. The assessment of urine output in ill children can be especially difficult and often there was only a record that the patient had passed urine but without the exact volume.

Blood Testing

1. Serum Na was measured by the accepted frequency in 94% of Appendicitis patients
2. Serum Na was measured by the accepted frequency in 93% of Bronchiolitis patients
3. 27 (6%) of Appendicitis patients had a mild hyponatraemia. The majority (25) of these patients had further testing with subsequent normal results. 2 patients had no subsequent testing with no clinical effects noted. 2 additional patients had severe hyponatraemia and had further blood testing until results returned to normal range.
4. 8 (7%) of Bronchiolitis patients had a serum Na outside the normal range. 2 patients had severe hyponatraemia and had further blood testing until results returned to normal range. 5 out of 6 patients with mild hyponatraemia had no further testing.

Table 11 - Standards table (based on the regional Paediatric fluid guideline)

	Standard Evidence of/that:	Compliance - Expected	Compliance - Actual	
			Appendicitis	Bronchiolitis
1	Documentation re evidence that the patient had a weight recorded	100%	92%	97%
2	Appropriate IV fluids administered	100%	85%	62%
3	Documentation re IV fluid assessment at (12/24 hrs) after commencement	100%	94%	97%
4	Inputs were totalled and recorded on 1st day of IV fluids	100%	80%	86%
5	Outputs were recorded on 1st day of IV fluids	100%	26%	18%
6	Inputs were totalled and recorded on last day of IV fluids	100%	72%	88%
7	Outputs were recorded on last day of IV fluids	100%	21%	16%
8	Documentation re IV fluid assessment on last day of IV fluids	100%	93%	96%
9	Daily blood testing (within acceptable range) while on IV fluids	100%	94%	93%

Summary

1. Further improvement is needed in all areas of IV fluids use in children
2. A detailed quality improvement program involving all levels of medical and nursing staff needs to address the barriers to 100% compliance in IV fluids standards
3. Strategies for improved performance need to be developed to enhance input and output recording, IV fluids calculation, blood testing and documentation
4. Further administrative barriers (such as restricting access to hypotonic IV fluids) could be developed to reduce incorrect IV fluid selection
5. Continuous auditing of various target groups with rapid feedback will aid in performance improvement
6. All of the above needs review and suggestions from the regional multidisciplinary group

Action Plan

1. A Paediatric IV fluid sheet should be developed for use in all hospital facilities that care for children:
    a. The IV fluid sheet should include space for weight, detailed calculation of fluids as well as input and output monitoring
    b. The IV fluid sheet should have space for blood results according to agreed time and frequency prescribed
    c. The IV fluid sheet should be considered to be similar to medication prescription and nursing staff should not commence IV fluid until all calculations and information are present
    d. The IV fluid sheet will have a separate area for emergency resuscitation
2. Once developed, the IV fluid sheet and educational package should be rolled out to all relevant hospital trusts including all medical and nursing staff that care for these children
3. After a suitable time period (ie one year) a random sample audit should be completed in each trust to ensure adherence to the guideline and IV fluid sheet

[GAIN Addendum: It is worthy of note that since the completion of this report that the above IV fluid sheet has been developed and is soon to be introduced].

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Regional Paediatric Fluid Audit Group

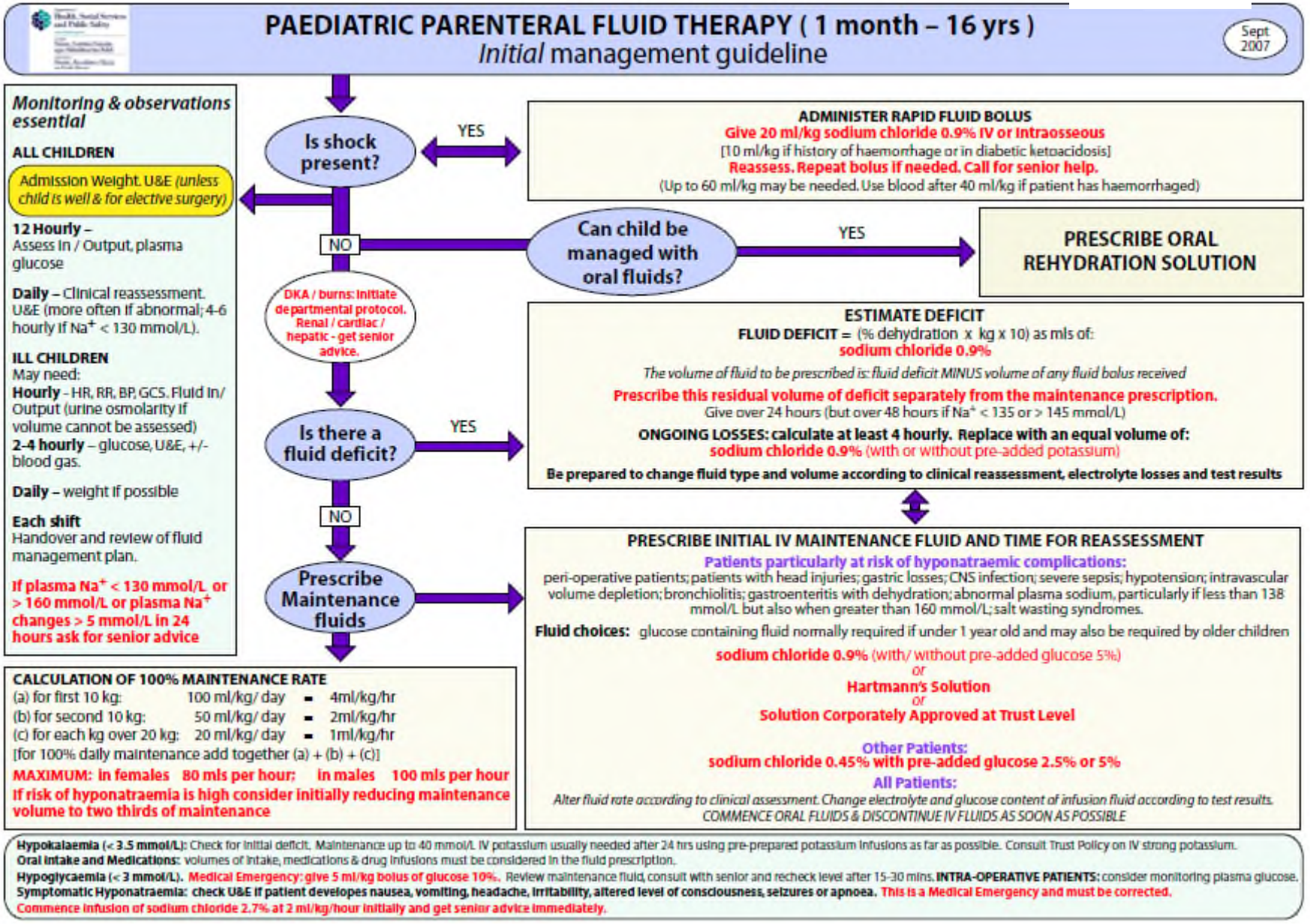
Project Lead

MBH Smith MB FRCPCH Department of Paediatrics, Craigavon Hospital

Project Team

Dr J McAloon	Dept of Paediatrics, Antrim Hospital
Dr P Stewart	Dept of Anaesthetics, Altnagelvin Hospital
Dr MD Shields	Dept of Paediatrics Royal Belfast Hospital Sick Children
Dr Alan Bailie	Dept of Paediatrics Royal Belfast Hospital Sick Children
Emma Barbour	Clinical Pharmacist, Women & Child Health, Antrim Hospital
Patricia O'Hara	Department of Paediatrics, Antrim Hospital
Dr Sarinda Millar	Department of Paediatrics, Antrim Hospital

Appendix A


PAEDIATRIC PARENTERAL FLUID THERAPY (1 month – 16 yrs)
Initial management guideline
Sept 2007
Monitoring & observations essential
ALL CHILDREN
Admission Weight, U&E (unless child is well & for elective surgery)
12 Hourly – Assess In / Output, plasma glucose
Daily – Clinical reassessment. U&E (more often if abnormal; 4-6 hourly if Na+ < 130 mmol/L).
ILL CHILDREN
May need:
Hourly - HR, RR, BP, GCS. Fluid In/ Output (urine osmolarity if volume cannot be assessed)
2-4 hourly – glucose, U&E, +/- blood gas.
Daily – weight if possible
Each shift
Handover and review of fluid management plan.
If plasma Na+ < 130 mmol/L or > 160 mmol/L or plasma Na+ changes > 5 mmol/L in 24 hours ask for senior advice
Is shock present?
YES
ADMINISTER RAPID FLUID BOLUS
Give 20 ml/kg sodium chloride 0.9% IV or Intraosseous
[10 ml/kg if history of haemorrhage or in diabetic ketoacidosis]
Reassess. Repeat bolus if needed. Call for senior help.
(Up to 60 ml/kg may be needed. Use blood after 40 ml/kg if patient has haemorrhaged)
NO
Can child be managed with oral fluids?
YES
PRESCRIBE ORAL REHYDRATION SOLUTION
DKA / burns: initiate departmental protocol. Renal / cardiac / hepatic - get senior advice.
Is there a fluid deficit?
YES
ESTIMATE DEFICIT
FLUID DEFICIT = (% dehydration x kg x 10) as mls of:
sodium chloride 0.9%
The volume of fluid to be prescribed is: fluid deficit MINUS volume of any fluid bolus received
Prescribe this residual volume of deficit separately from the maintenance prescription.
Give over 24 hours (but over 48 hours if Na+ < 135 or > 145 mmol/L)
ONGOING LOSSES: calculate at least 4 hourly. Replace with an equal volume of:
sodium chloride 0.9% (with or without pre-added potassium)
Be prepared to change fluid type and volume according to clinical reassessment, electrolyte losses and test results
NO
Prescribe Maintenance fluids
PRESCRIBE INITIAL IV MAINTENANCE FLUID AND TIME FOR REASSESSMENT
Patients particularly at risk of hyponatraemic complications:
peri-operative patients; patients with head injuries; gastric losses; CNS infection; severe sepsis; hypotension; intravascular volume depletion; bronchiolitis; gastroenteritis with dehydration; abnormal plasma sodium, particularly if less than 138 mmol/L but also when greater than 160 mmol/L; salt wasting syndromes.
Fluid choices: glucose containing fluid normally required if under 1 year old and may also be required by older children
sodium chloride 0.9% (with/ without pre-added glucose 5%)
or
Hartmann's Solution
or
Solution Corporately Approved at Trust Level
Other Patients:
sodium chloride 0.45% with pre-added glucose 2.5% or 5%
All Patients:
Alter fluid rate according to clinical assessment. Change electrolyte and glucose content of infusion fluid according to test results.
COMMENCE ORAL FLUIDS & DISCONTINUE IV FLUIDS AS SOON AS POSSIBLE
CALCULATION OF 100% MAINTENANCE RATE
(a) for first 10 kg: 100 ml/kg/ day = 4ml/kg/hr
(b) for second 10 kg: 50 ml/kg/ day = 2ml/kg/hr
(c) for each kg over 20 kg: 20 ml/kg/ day = 1ml/kg/hr
[for 100% daily maintenance add together (a) + (b) + (c)]
MAXIMUM: in females 80 mls per hour; in males 100 mls per hour
If risk of hyponatraemia is high consider initially reducing maintenance volume to two thirds of maintenance
Hypokalaemia (< 3.5 mmol/L): Check for initial deficit. Maintenance up to 40 mmol/L IV potassium usually needed after 24 hrs using pre-prepared potassium infusions as far as possible. Consult Trust Policy on IV strong potassium.
Oral intake and Medications: volumes of intake, medications & drug infusions must be considered in the fluid prescription.
Hypoglycaemia (< 3 mmol/L). Medical Emergency: give 5 ml/kg bolus of glucose 10%. Review maintenance fluid, consult with senior and recheck level after 15-30 mins. INTRA-OPERATIVE PATIENTS: consider monitoring plasma glucose.
Symptomatic Hyponatraemia: check U&E if patient developes nausea, vomiting, headache, irritability, altered level of consciousness, seizures or apnoea. This is a Medical Emergency and must be corrected.
Commence infusion of sodium chloride 2.7% at 2 ml/kg/hour initially and get senior advice immediately.

Audit of IV fluids of hospitalised children >1mth up to 15yrs 364dys
Audit time period...1/1/08 – 31/12/08

1. Hospital CAH☐ DHH☐ RVH☐ MATER ☐
ANTRIM☐ ALTNAGELVIN ☐ ULSTER☐
WHITEABBEY ☐ ERNE ☐ OTHER _____ *(SPECIFY)*

Patient ID _____
Age _____
Sex

2. Diagnosis: A ☐ B ☐
3. Other diagnosis as per discharge summary / letter: _____
4. Presentation: date ____/____/2008 5. Time (24 hr clock) ____:____
6. Discharge: date ____/____/2008 7. Time (24 hr clock) ____:____
8. LOS: _____ will be calculated automatically on spreadsheet
9. Did the patient get IVFs? Y☐ N☐
10. Is there evidence of a fluid calculation? Y☐ N☐
10a. If 'yes' where is it? _____

11. IVFs administered: ***(tick all that apply)***

Normal saline / sodium chloride 0.9%	
N saline / sodium chloride 0.9% + 5% glucose	
Sod chloride 0.45% with pre-added glucose 2.5% or 5%	
Hartmann's	
List any others used	

12. Patient's weight _____ kg or Not recorded ☐

	(a) 1st	(b) last
13. Level / rate		
14. Date	/ /2008	/ /2008
15. Time (24hr clock)	:	:

Investigations:

	Result 1 (a)	Date (b)	Time (c)	Result 2 (d)	Date2 (e)	Time2 (f)	Result 3 (g)	Date3 (h)	Time3 (i)	Result 4 (j)	Date4 (k)	Time4 (l)	Result 5 (m)	Date5 (n)	Time5 (o)
16. urea															
17. sodium															
18. potassium															
19. chloride															
20. HCO_3 check Abg / blood gases															
21. glucose															
Delete as appropriate:	pre / post IV fluids			pre / post IV fluids			pre / post IV fluids			pre / post IV fluids			pre / post IV fluids		

IV FLUIDS ASSESSMENT:

Day 1 (after starting IV fluids)

22. IVF assessed Y☐ N☐
(either **notes** or on **fluid prescription**)
23. Input totalled Y☐ N☐
24. Urine measured Y☐ N☐

Last day

25. IVF assessed Y☐ N☐
(either *{circle}* **notes** or **on fluid prescription**)
26. Input totalled Y☐ N☐
27. Urine measured Y☐ N☐

28. Readmitted within 7 days Y☐ N☐ If 'yes' why? _____

Please record other comments overleaf & relate them to the appropriate question number.

Southern Health and Social Care Trust

IV Fluids in Hospitalised Children >1mth up to 15yrs 364dys

Admitted 1/1/08 – 31/12/08

Regional Audit 2009

Frequently Asked Questions

Q. How do I identify the patient sample?

A. For ease of reference I have included my business objects query.

Q. If a child aged 3 weeks is admitted but does not get fluids until they are 4 weeks old, are they included in the audit?

A. No. They must be at least 4 weeks old on admission.

Q. If a child is 15 on admission, but passes their 16th birthday before discharge, are they included in the audit?

A. Yes. Age on admission is the deciding factor.

Q. If on screening the patient, the recorded primary diagnosis is neither Appendicitis nor Bronchiolitis (e.g. may be recorded as “viral illness”) is this patient included in the audit? (Ref Q2)

A. No. Primary diagnosis must be Appendicitis or Bronchiolitis. This may be a case of incorrect diagnostic coding.

Q. Is the presentation date the same as the admission date? (Ref Q4)

A. Not necessarily. If patient is admitted through Accident and Emergency, then the date and time of presentation at A&E should be recorded. If it is a direct admission (e.g. from GP straight to ward) then date and time of admission to the ward should be recorded.

(NB discharge time from the ward may not always be evident. If not recorded, but you know it is am or pm, record that instead.)

Q. Is there evidence of a fluid calculation? If 'yes', where is it recorded? (Ref Q10)

A. This relates to the calculation made using the child's weight to ascertain the prescription for IV fluids. Some hospitals have a special paediatric IV fluids calculation sheet. If a specialised fluid calculation sheet is in use, please enclose a blank copy for reference / information when you are submitting your dcfs.

Q. I cannot find any investigation results filed in the patient's notes. What should I do? (Ref Q16-21)

A. Check the labs system for any results you cannot find; it is also a good idea to check there also, in case investigations may have been undertaken in A&E the results of which may not always be filed in the patient's medical notes.

Also, if there is a 12hr gap or more in times of U&Es please check labs system.

Q. There are a lot more than 5 investigation results in the chart. Do I only need to record the first 5? (Ref Q16-21)

A. Please record results until the patient's sodium and / or urea levels are within the normal range. Continue on the back of the dcf if necessary, dating and timing each result as before.

This should correspond to the duration of IV fluids.

Q. What is acceptable as an assessment of IV fluids? (Ref Q22; 25)

A. There is a section on the daily fluid prescription sheet for 12 hr assessment which is signed off by a doctor. Ideally this is what we are looking for. If this is not completed, then look in the medical / clinical progress sheets or in the nursing notes / care pathway for reference to the fluids e.g. "fluids running as prescribed" or "eating and drinking well – fluids reduced" or "eating and drinking well – fluids discontinued".

If answering 'yes' – please record where you have found the assessment to be. Otherwise tick 'no'. Apply the same to question 25 for the last day of IV fluids.

Q. Does the input have to be totalled up at the bottom of the fluid prescription sheet?

A. Not necessarily. If there is a running total, that will suffice. (There is no need to check if the maths is correct.)

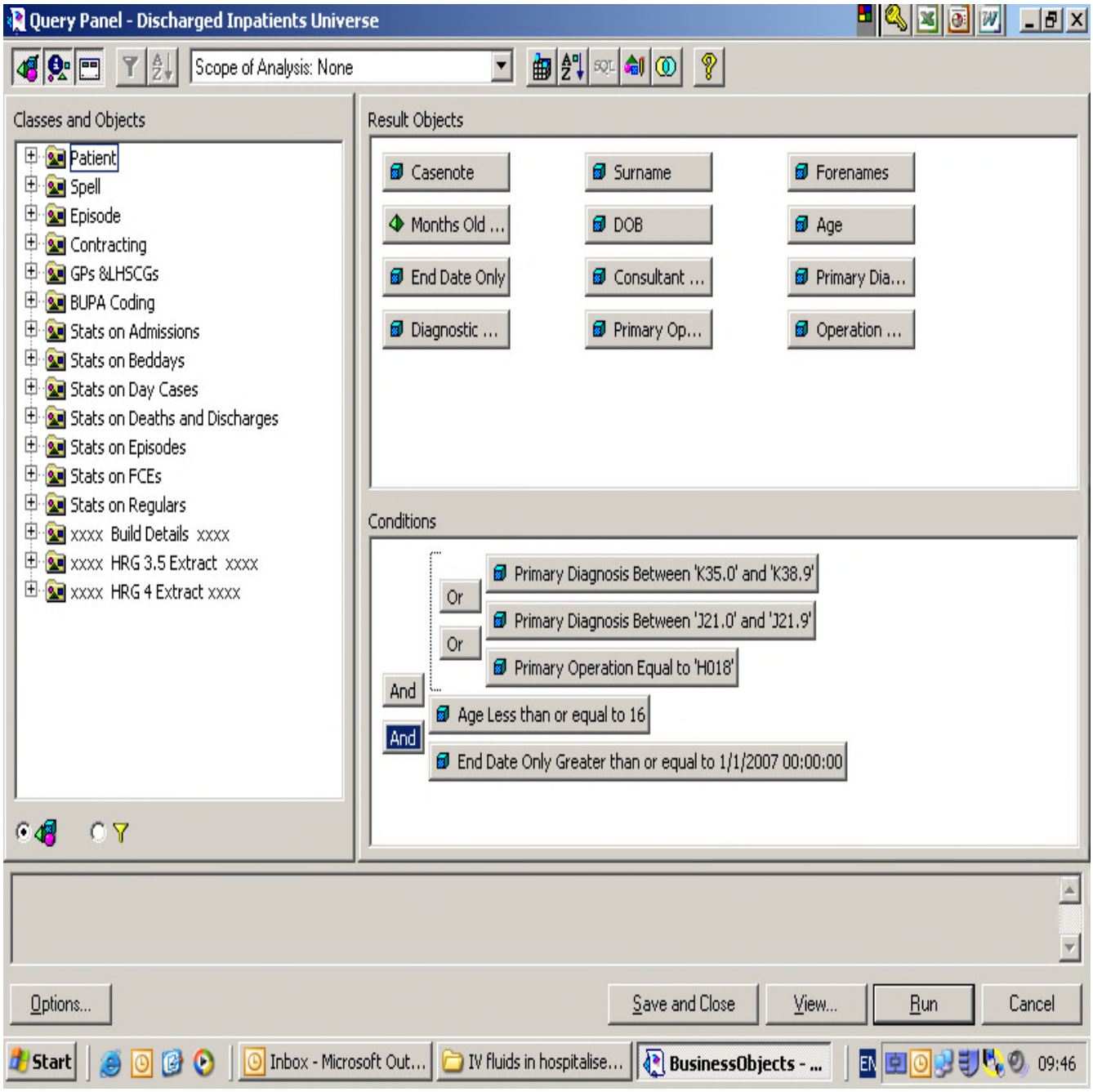
Q. Will 'PU' be sufficient to record that the urine is measured?

A. No. An amount must be recorded.

Q. The patient has been on IV fluids for less than 24 hours. How do I answer questions 25 – 27 in relation to the last day of IV fluids.

A. The answers will be duplicated for the last day, as the first and last are the same day in this case.

Business Objects Query:



GAIN Office

Room C4.17

Castle Buildings

Stormont

BELFAST

BT4 3SQ

Telephone: (028) 90520629

Email: gain@dhsspsni.gov.uk

Website: www.gain-ni.org