HSC Business Services Organisation

Directorate of Legal Services
— Practitioners in Law to the Health & Social Care Sector —

2 Franklin Street, Belfast, BT2 8DQ
DX 2842 NR Belfast 3

Your Ref:	Our Ref:	Date:
BMcL-0027-12	HYP/W50/2	26th February 2013

Mr B McLoughlin
Assistant Solicitor to the Inquiry
Inquiry into Hyponatraemia-related Deaths
Arthur House
41 Arthur Street
Belfast
BT1 4GB

Dear Sir

RE: INQUIRY INTO HYPONATRAEMIA RELATED DEATHS- RAYCHEL FERGUSON (PRELIMINARY)

I refer to the above matter and to your letter dated 13th November 2012, referenced above. I confirm having now received instructions from my client, as follows.

I am informed that, in its efforts to obtain the information requested in your above-mentioned letter, the Western Trust made various attempts to contact both of the authors of the presentation, Dr McMorrow and Dr Corrigan. Dr McMorrow was formerly employed by the legacy Trust in 2000 as a Junior Doctor. However, she is no longer employed by the Western Trust and the Trust is currently attempting to locate her whereabouts.

Dr Corrigan is a Consultant Paediatrician who is currently employed by the Trust at Altnagelvin Hospital. My client had passed on your request for information to Dr Corrigan, and he has only just been able to locate the relevant documentation which he has now forwarded to my client. Accordingly, I now enclose copies of the following documents, for your perusal:-

1. Document entitled- 'Paediatric Hyponatraemia:Incidence Aetiology and Management'
2. 'Hyponatraemia in Paediatric Appendicitis'- Authors, McMorrow, Corrigan et alia.
3. Presentation slides- 'Paediatric Hyponatraemia: Who Gets it and Why?'- Authors, McMorrow and Corrigan.

I also enclose a pro forma 'Checklist document' which has been provided to us by the Trust's Professional Audit Department, in connection with Dr Corrigan's Audit.

Yours faithfully

A M Crawford .

Angela Crawford
Solicitor

Encs.

Paediatric Hyponatraemia: Incidence Aetiology and Management

Background and aims: Recent publicity has highlighted the potentially catastrophic results of paediatric hyponatraemia. Little data exists however on the overall incidence and course of uncomplicated hyponatraemia in general paediatric practice.

Methods: All children admitted to Altnagelvin Hospital over a 21-month period with hyponatraemia (<133) were identified using our laboratory database. Newborns and infants in NICU were excluded. Retrospective chart review enabled data collection regarding incidence, aetiology and management.

Results: 6,276 children were admitted to Altnagelvin Hospital over the study period. 153 patients (2.4%) had at least one documented episode of hyponatraemia (medical 68% vs surgical 32%). Of 105 medical children, the most common diagnoses were gastroenteritis (25%), viral infections (25%) and lower respiratory tract infection (21%). Of 21 general surgical children, acute appendicitis accounted for 50%. The incidence of hyponatraemia complicating acute appendicitis was 11%.

The primary pathophysiological trigger for the hyponatraemia was attributable to SIADH in 66% of children overall.

Hyponatraemia was a presenting feature in 88% of children. Intravenous fluid therapy was prescribed for 61% of children. 0.45% saline / dextrose (64%) and isotonic saline solutions (27%) comprised the majority of prescribed fluids with no children receiving solution 18. Fluid volumes were given as maintenance in 60%, restricted in 31% and potentially generous in 7%. No serious complications of hyponatraemia were identified.

Conclusion: Hyponatraemia is a common complication of acute illness in both medical and surgical children, with SIADH as the primary mechanism. Very hypotonic intravenous solutions are no longer being prescribed, in keeping with regional guidelines.

HYPONATRAEMIA IN PAEDIATRIC APPENDICITIS

AS McCoubrey, A McMorrow, N Corrigan, S Dace
Altnagelvin Area Hospital, Londonderry, BT47 6SB

Introduction

Paediatric hyponatraemia is increasingly being recognised as a rare but significant cause of morbidity and mortality in ill children. An association with appendicitis is recognised however the incidence is unknown. This study aims to look at incidence and possible clinical markers predictive of hyponatraemia in children with appendicitis.

Methods

A retrospective chart review of all children less than 13 years admitted to a District General Hospital with appendicitis over a 24 month period (January 2004-December 2005) was undertaken. Data collection included serum sodium, length of presentation, examination findings, serum inflammatory markers, intraoperative pathology and fluid management. Significant hyponatraemia was defined as plasma sodium < 133mmol/l.

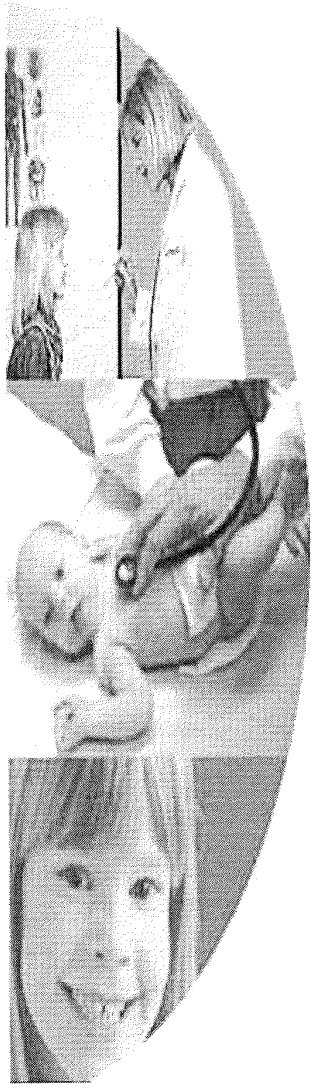
Results

Seventy-one appendicectomies were carried out over the study period in children aged 3-12 years. Seventeen patients were found to be significantly hyponatraemic giving an incidence of 23%. Predictive makers of hyponatraemia were a high CRP level ($p=0.0025$) and perforated appendix ($p=0.003$). Length of presenting symptoms, presence of peritonism and white cell count were not predictive of hyponatraemia.

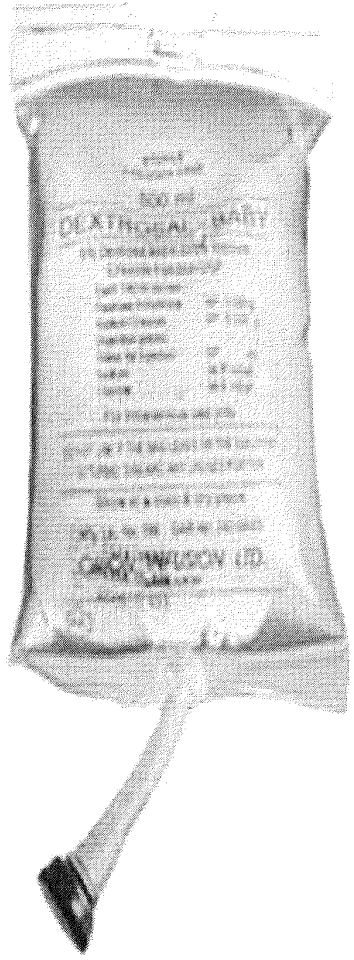
Conclusion

Hyponatraemia is a common problem in children with appendicitis. Clinical markers associated with its presence or subsequent development include a markedly raised CRP level and a gangrenous or perforated appendix at time of operation. Electrolytes should be

carefully monitored throughout admission and acted on appropriately.

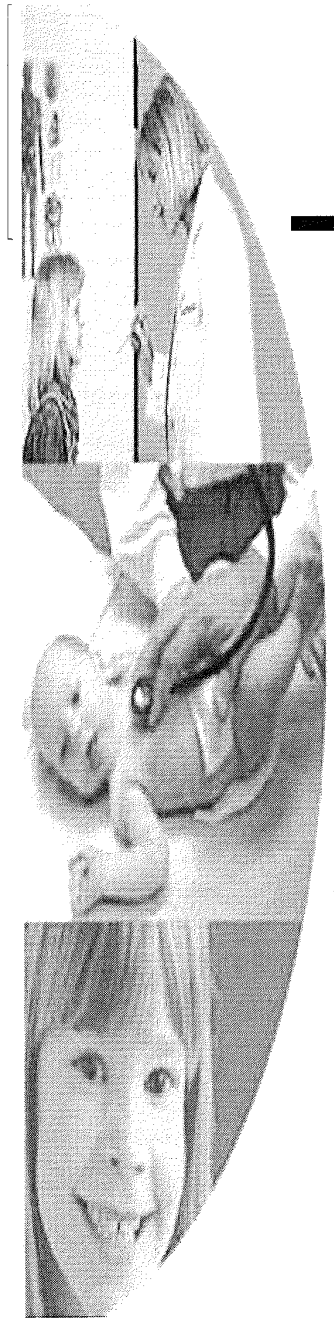


Paediatric Hyponatraemia: Who Gets it and Why?



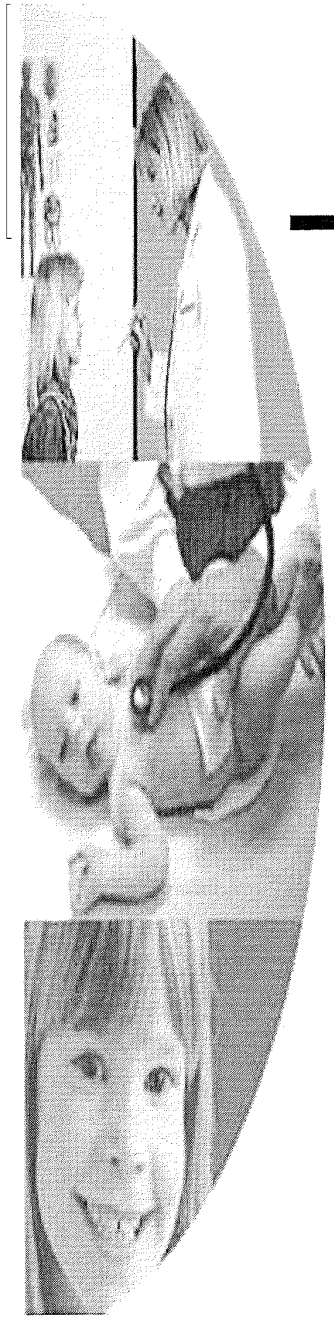
Dr Aoife McMorrow

Dr Neil Corrigan



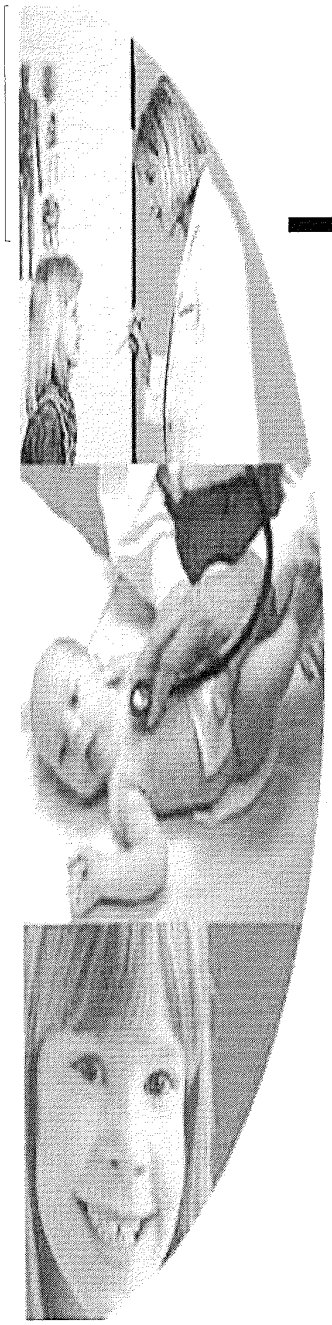
Aim

To examine the incidence, aetiology and management of paediatric hyponatraemia



Methods

Retrospective chart review of all children admitted to Altnagelvin Hospital over a 21 month period with sodium <133



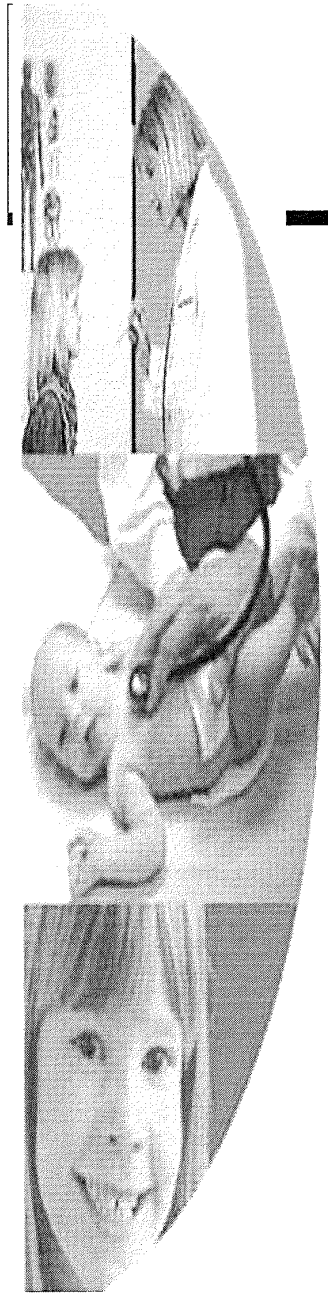
Results

6,276 admissions

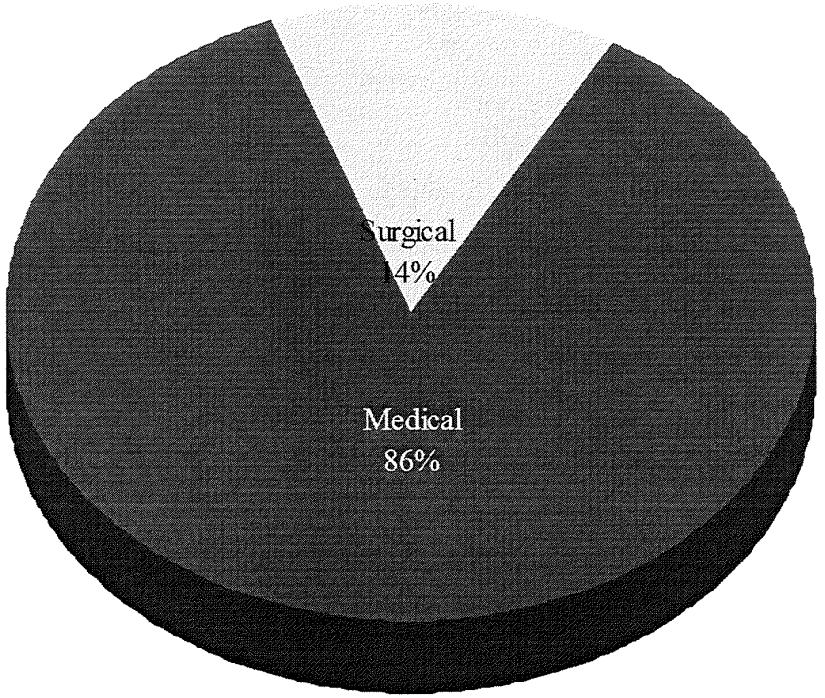
147 children (2.3%) identified

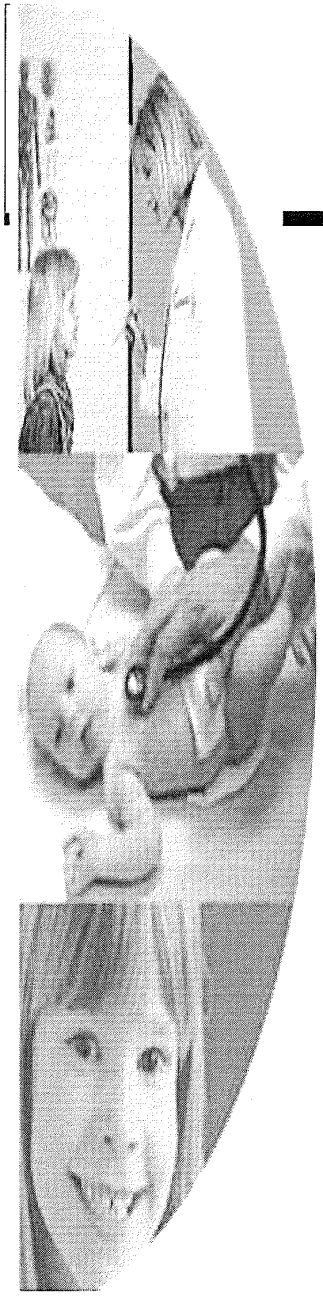
136 charts reviewed

Newborns and infants in NICU excluded

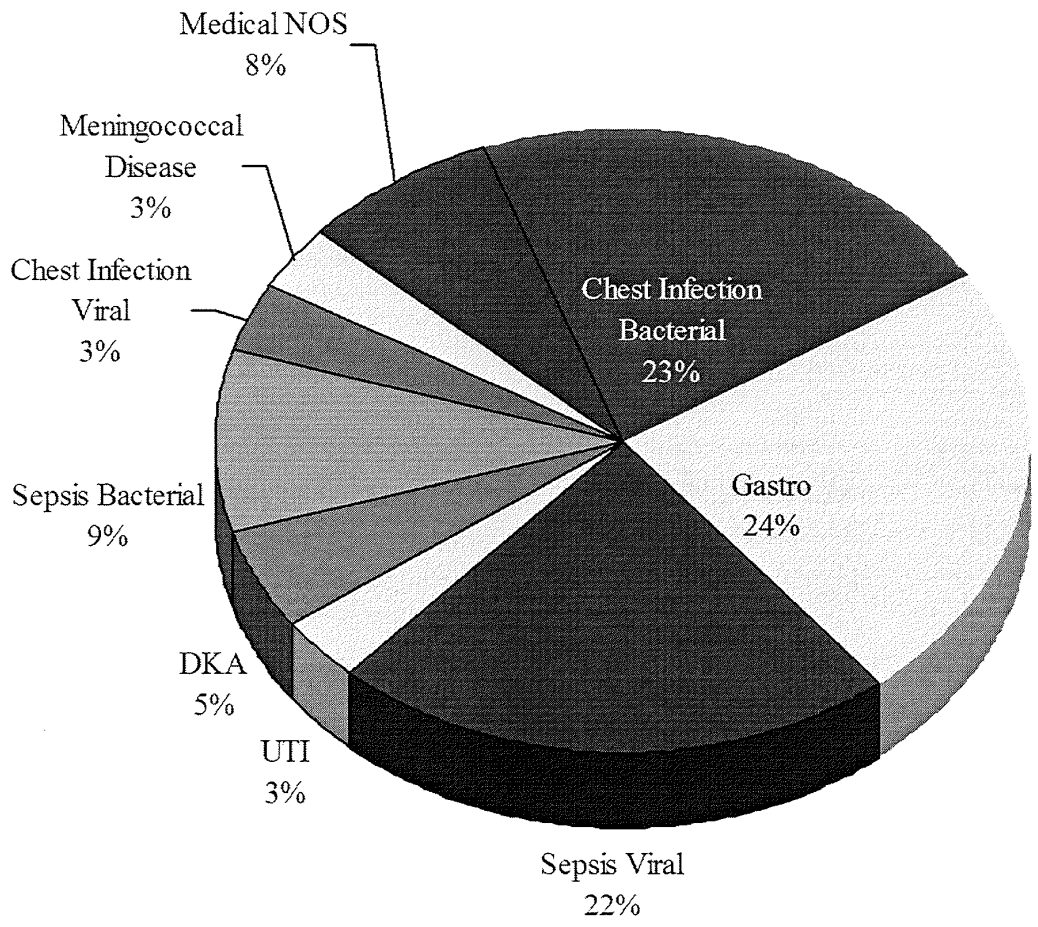


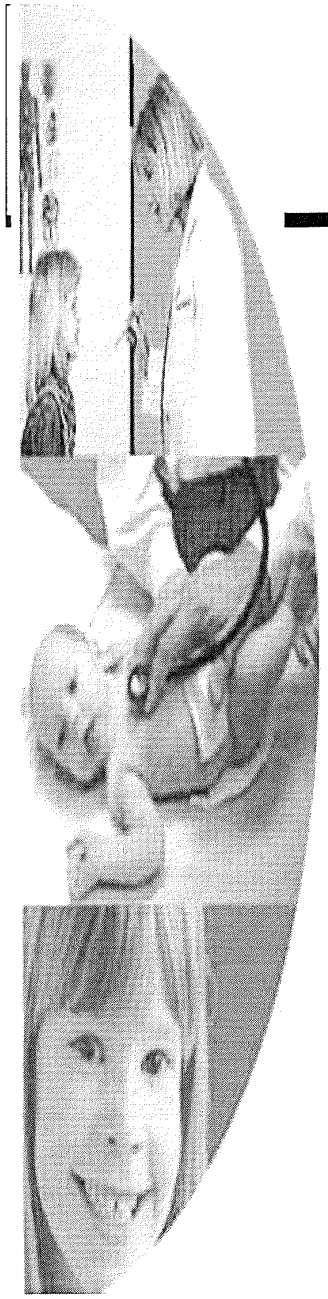
Diagnosis



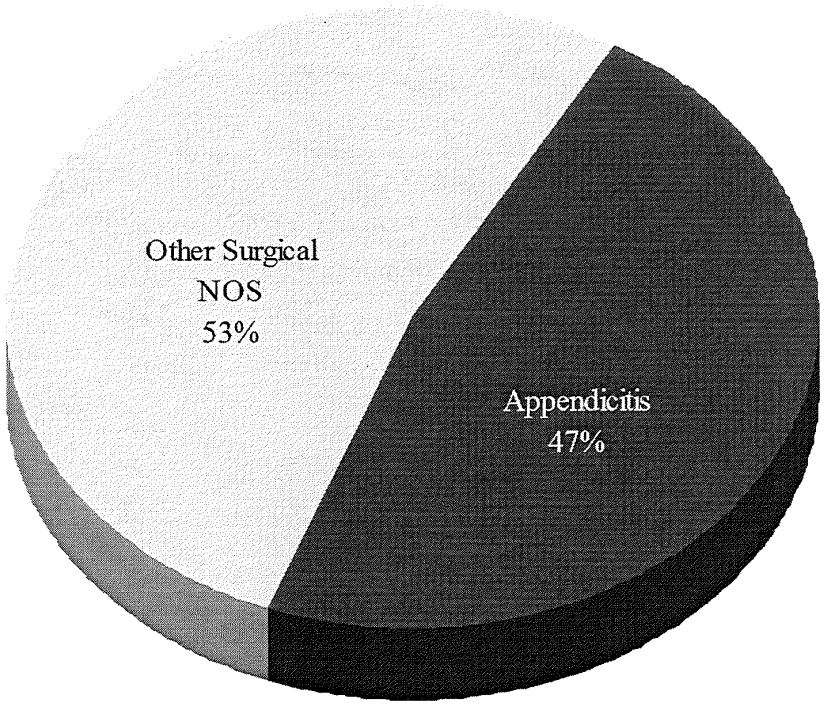


Diagnosis: Medical

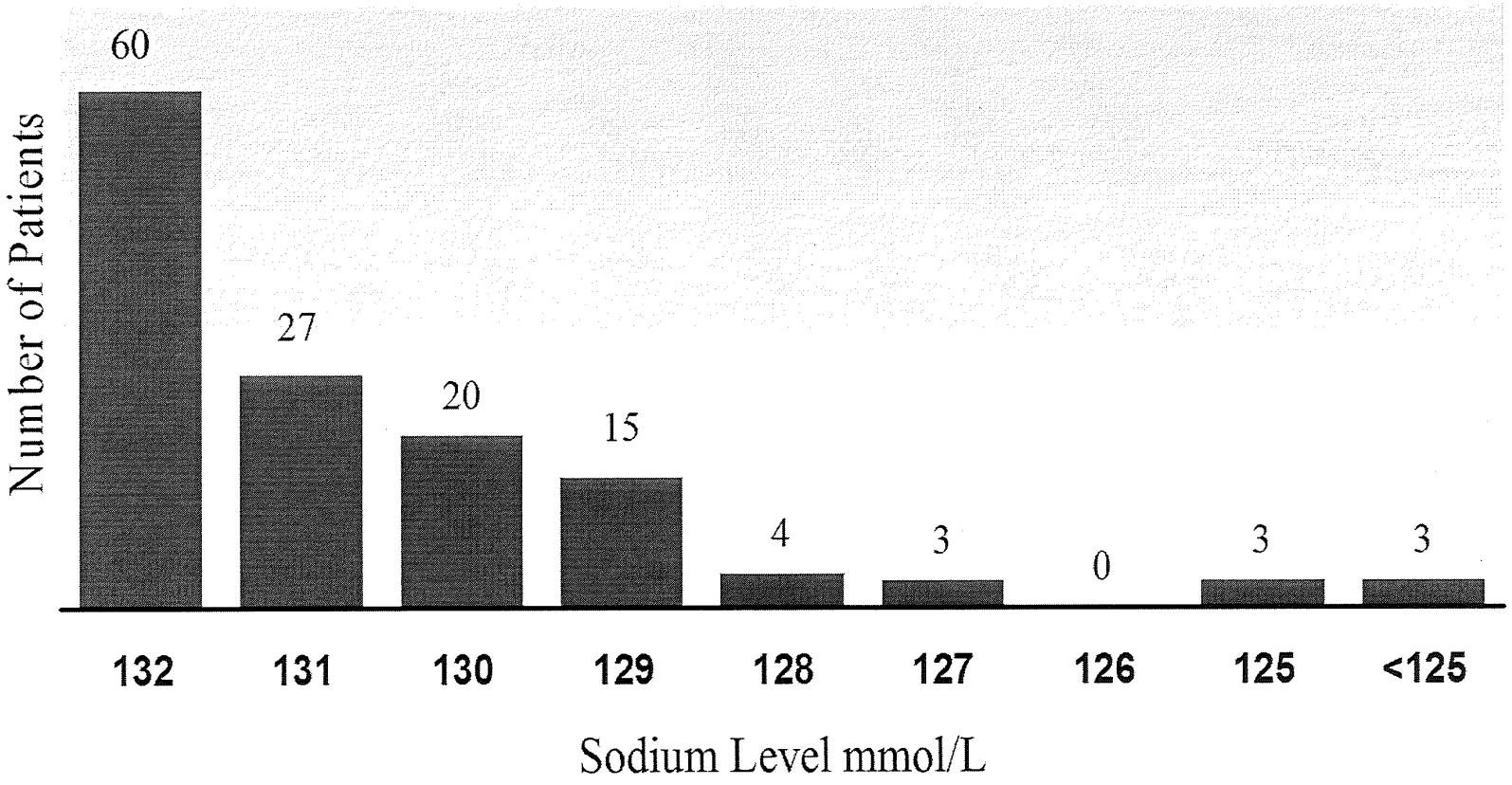


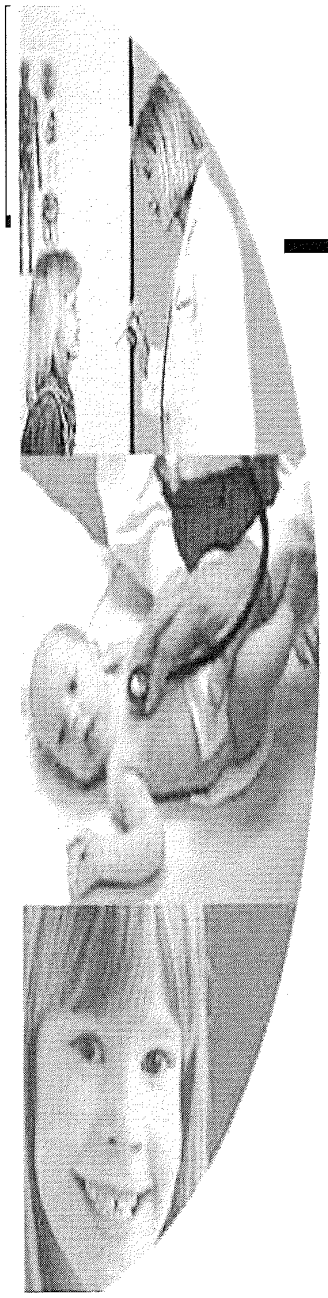


Diagnosis: Surgical



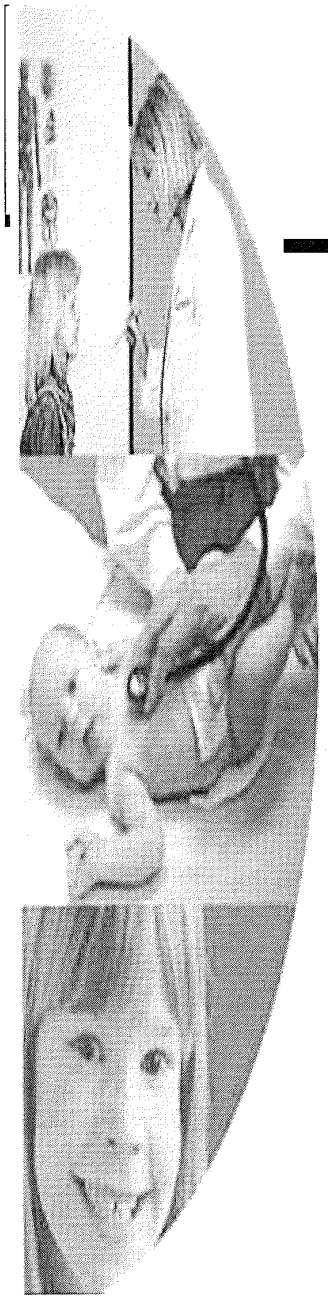
Distribution of Lowest Na+





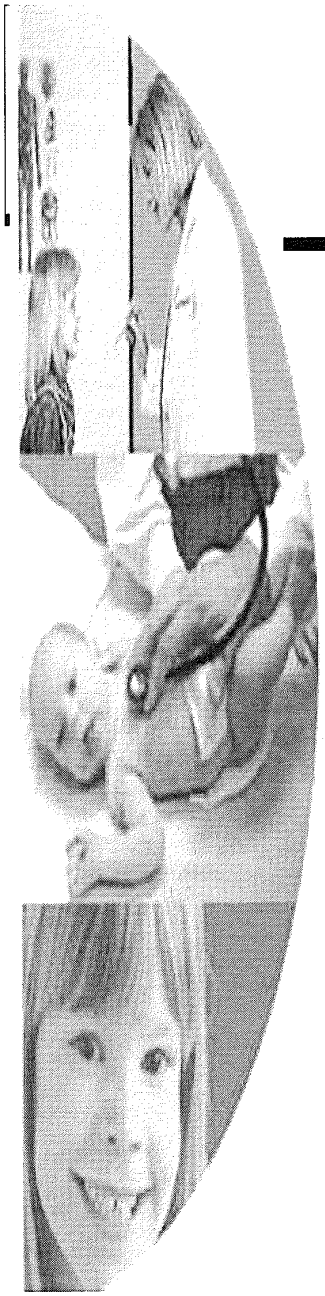
Hyponatraemia On Admission

	IVF Prescribed	No IVF
Patient %	68%	32%
Medical	91%	92%
Surgical	9%	8%
Mean Na+	134	130
Mean Time to Correction	23 hrs	22 hrs



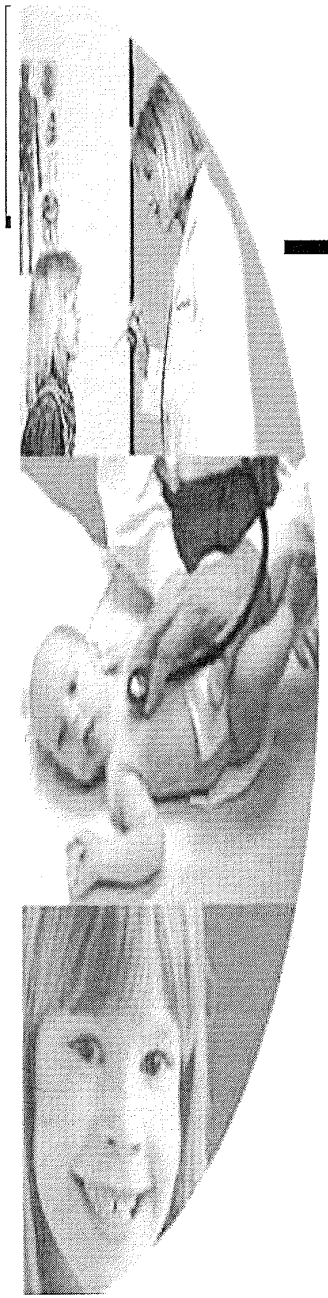
IVF Prescription*

	0.45% Saline	0.9% Saline
Patient %	64%	36%
Mean Na+	134	134
Mean Time to Correction	25 hrs	21 hrs



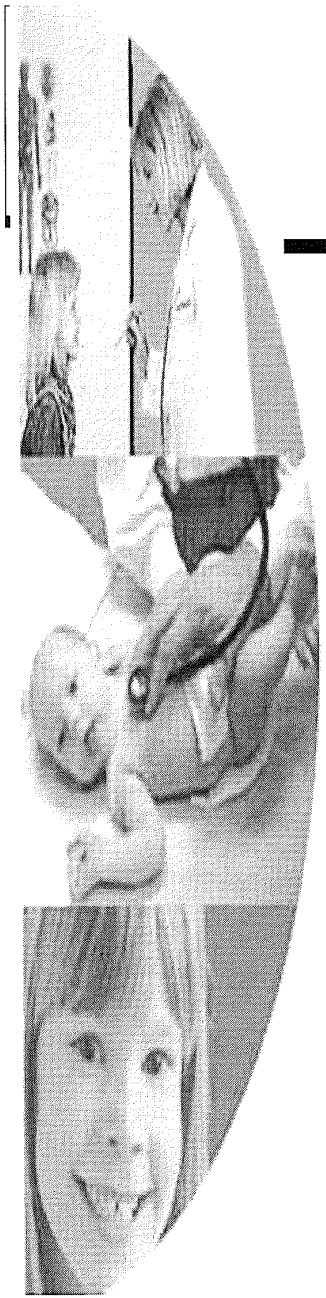
Normonatraemic On Admission

	IVF Prescribed	No IVF
Patient Count	75%	25%
Medical	50%	75%
Surgical	50%	25%
Prescribed 0.45% Saline	92%	
Prescribed 0.9% Saline	8%	



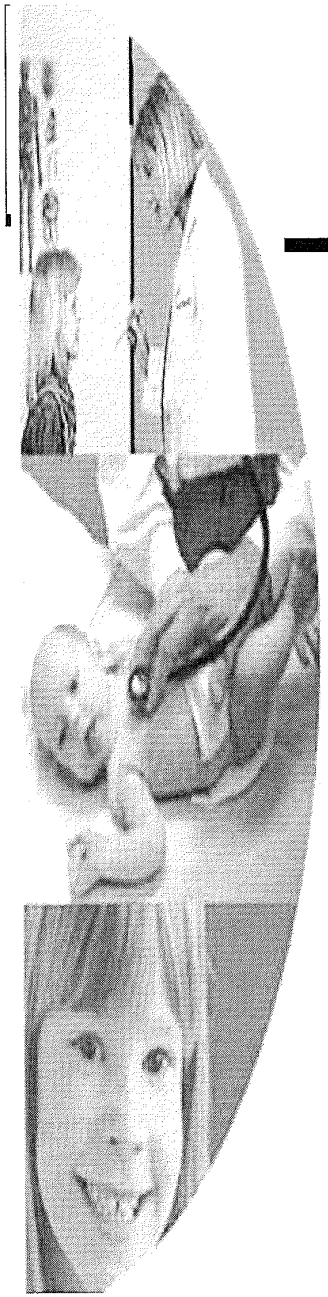
Became Hyponatraemic During Admission

	IVF Prescribed	No IVF
Patient %	75%	25%
Medical	50%	33%
Surgical	50%	67%
Mean Na+	135	136
Mean Time to Correction	49 hrs	5 hrs



IVF Prescription**

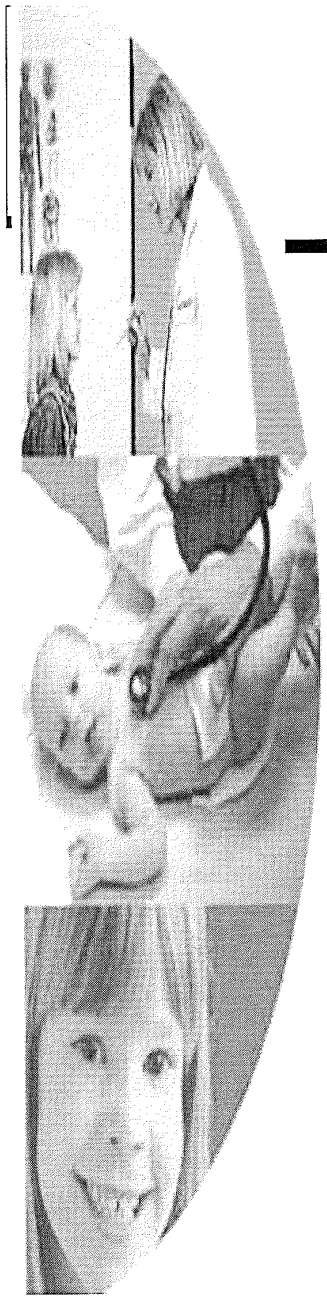
	0.45% Saline	0.9% Saline
Patient Count	57%	43%
Mean NA+	135	135
Mean Time to Correction	19 hrs	54 hrs



Appendicitis

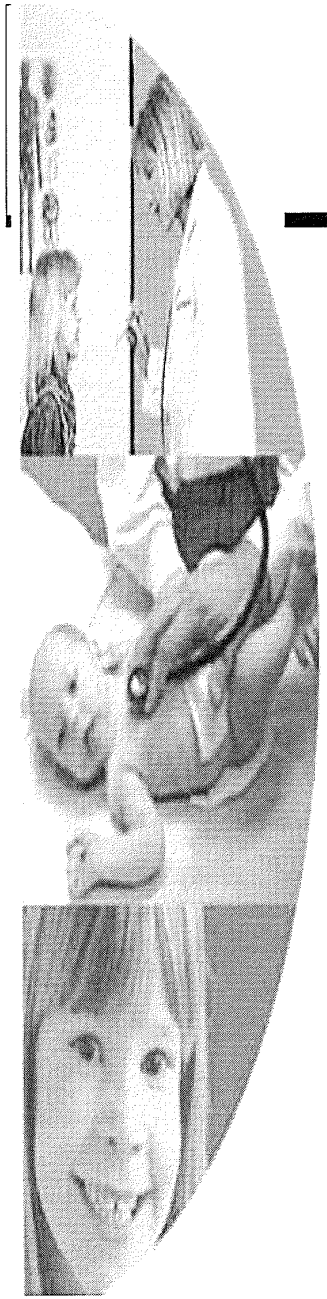
Patient Count = 7%

Criteria	Normonatraemic on admission	Hyponatraemic on admission
IVF Prescribed	22%	78%

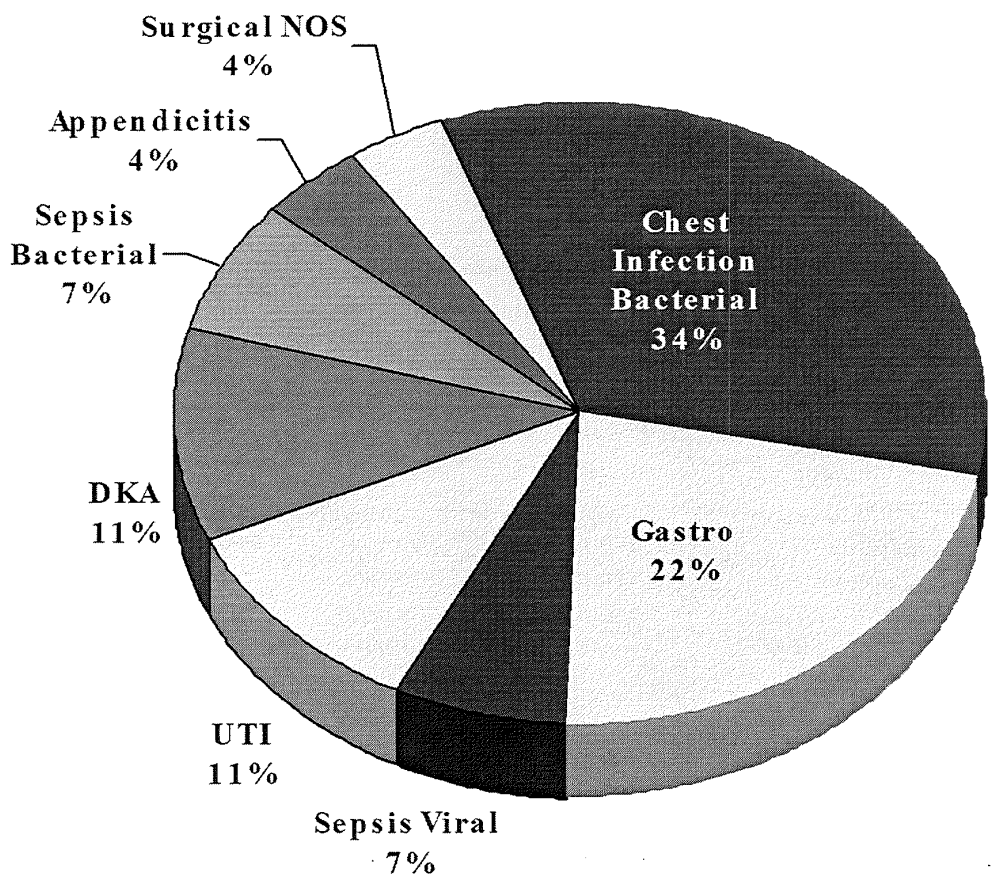


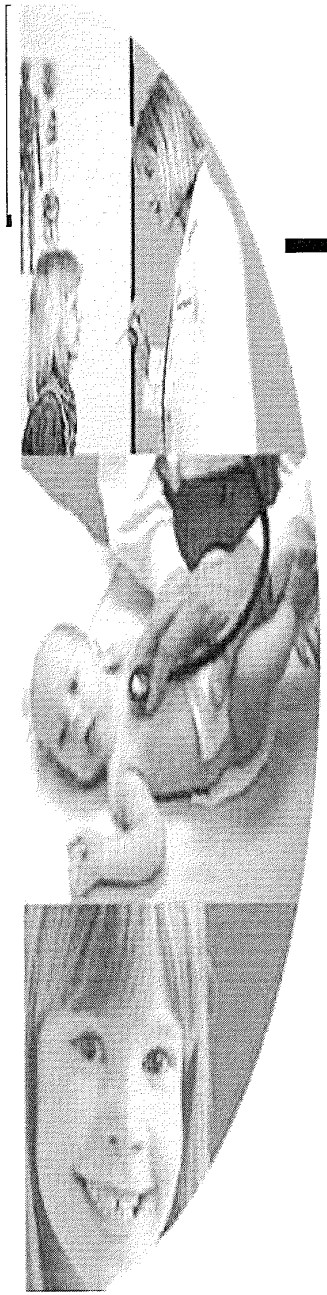
Sodium Level < 130

Patient Count = 20%	
Received IVF	85%
0.45% Saline	52%
0.90% Saline	44%
Hartman's	4%



Diagnosis < 130

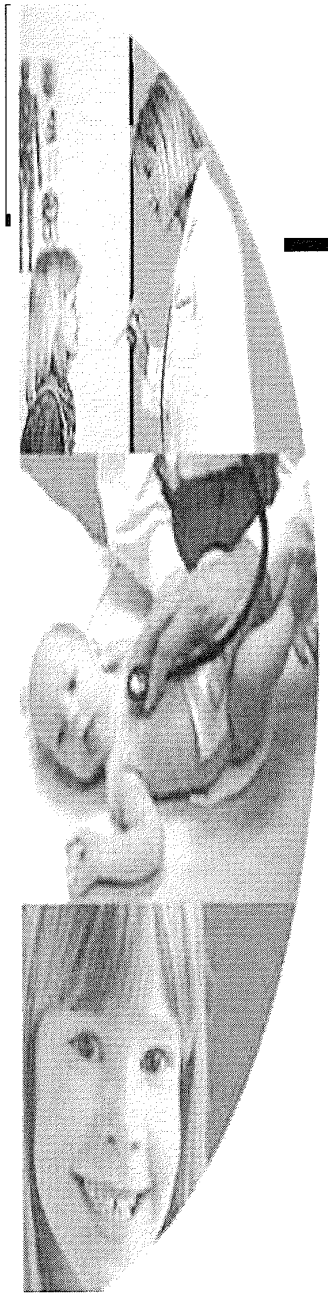




Aetiology: SIADH

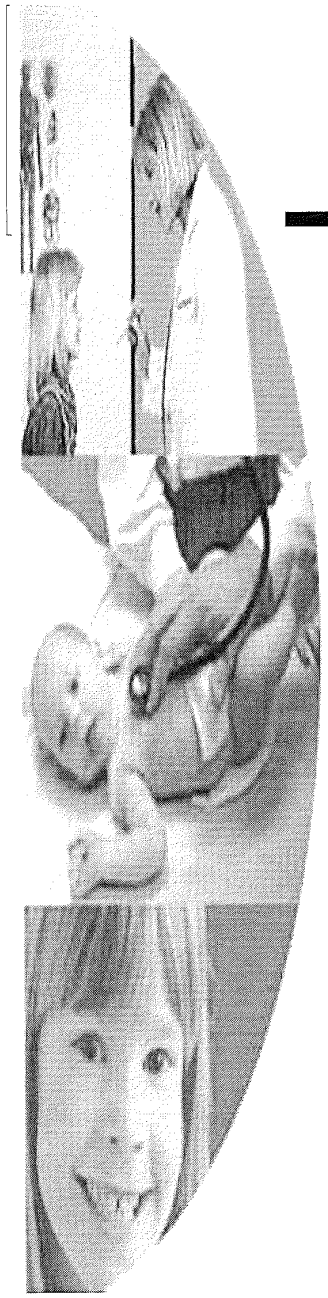
Patient Count = 66%

Criteria	Normonatraemic on admission	Hyponatraemic on admission
Received IVF	83%	62%
IVF Volume Restricted	0%	41%

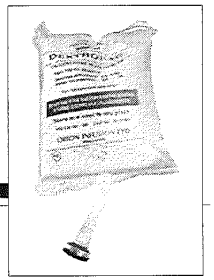


IVF Volume: Generous

	Normal Serum Na^+ on Admission	Hyponatraemia on Admission
Patient Count	6%	5%
Medical	100%	83%
Surgical	0%	17%

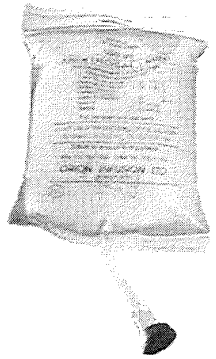


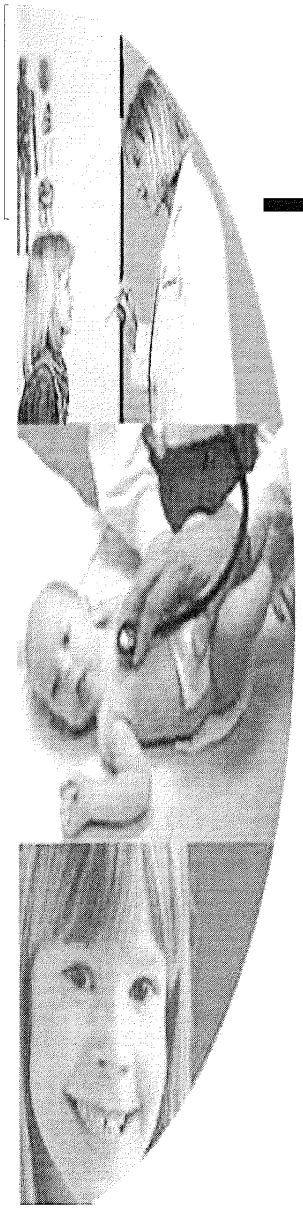
Conclusion



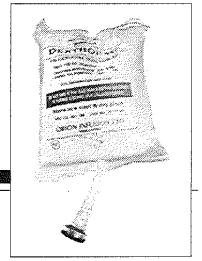
Common complication in acute medical and surgical conditions

Very hypotonic solutions no longer being prescribed



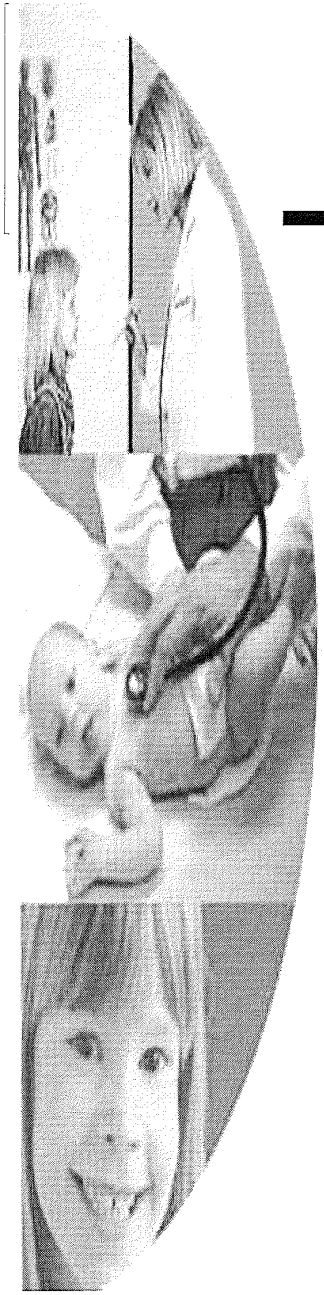


Recommendations

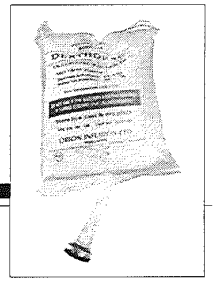


Formation of ward guidelines for fluid prescribing and monitoring

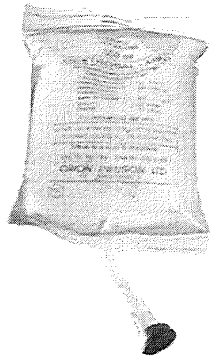
Re-audit 2007



Acknowledgement



The Author / Authors of this audit project wish to acknowledge the resources provided by Altnagelvin H&SST through the Clinical Audit Department in support of this piece of work.



Corrigan

Hosp No: A H 4 4 2 1 3 4 Patient ID: 1 4 0

Hyponatraemia on admission. If NO Go to Section A: If YES Go to Section B

Section A: General Management:

Was Fluid Bolus required: ☐ Yes ☐ No **Bolus Volume appropriate:** ☐ Yes ☐ No **Bolus Solution appropriate:** ☐ Yes ☐ No

Were IV Fluids administered: ☐ Yes ☐ No **No of hours:** ☐☐ **Input Recorded:** ☐ Yes ☐ No **Output Recorded:** ☐ Yes ☐ No

How was it recorded: ☐ Standard ☐ Urine Measured ☐ Nappies Weighed ☐ Catheterised ☐ Not recorded

Initial Fluid Prescription: ☐ 0.5% N saline + Dextrose **(SD)** ☐ N saline **(N)** ☐ Hartmans **(H)** ☐ Sol 18 **(SO)** ☐ Other **(O)**

Initial Fluid Volume prescribed: ☐ Maintenance ☐ Restricted appropriately SIADH ☐ Generous ☐ Too little ☐ Other

Type of fluid appropriate clinically: ☐ Yes ☐ No **Time to reassessment of fluids: (hours)** ☐☐ **Did patient become hyponatraemic on IV fluids having had normal initial sodium level?** ☐ Yes ☐ No

Section B: Management of Hyponatraemia:

Was Fluid Bolus required: ☐ Yes ☐ No **Bolus Volume appropriate:** ☐ Yes ☐ No **Bolus solution appropriate:** ☐ Yes ☐ No

Were IV fluids administered: ☐ Yes ☐ No **No of hours:** ☐☐ **Input recorded:** ☐ Yes ☐ No **Output recorded:** ☐ Yes ☐ No

How was it recorded: ☐ Standard ☐ Urine measured ☐ Nappies weighed ☐ Catheterised ☐ Not recorded

Initial Fluid prescription for Hyponatraemia: ☐ 0.5% N saline + dextrose **(SD)** ☐ N saline **(N)** ☐ Hartmans **(H)** ☐ Sol 18 **(SO)** ☐ Other **(O)**

Initial Fluid Volume Prescribed: ☐ Maintenance ☐ Restricted appropriately SIADH ☐ Generous ☐ Too Little ☐ Other

Repeat Fluid prescription for Hyponatraemia: ☐ 0.5% N saline + dextrose **(SD)** ☐ N saline **(N)** ☐ Hartmans **(H)** ☐ Sol 18 **(SO)** ☐ Other **(O)**

Repeat Fluid Volume Prescribed: ☐ Maintenance ☐ Restricted appropriately SIADH ☐ Generous ☐ Too Little ☐ Other

Time to reassessment of fluids (Hours) ☐☐ **Were fluids prescribed relevant to probable ongoing aetiology of hyponatraemia:** ☐ Yes ☐ No **If patient surgical were they referred to paediatrics:** ☐ Yes ☐ No

Is there record in chart of discussion with / review by middle grade: ☐ Yes ☐ No **Is there record in chart of discussion with / review by consultant:** ☐ Yes ☐ No

ALTNAGELVIN HOSPITALS

Clinical Audit Department
Directorate of Nursing & Risk Management

"Audits Undertaken Determines Improvement in Treatments"

Hyponatraemia Study Data Sheet: December 2005

Patient ID: N N N

Name: _____ **Age:** ☐☐ **Gender:** ☐ Male ☐ Female

Adm Date: ☐☐/☐☐/☐☐ **Time:** ☐☐:☐☐ **length of stay (days)** ☐☐ **ICU transfer:** ☐ Yes ☐ No

U & E

Tot number of U&E's checked: _____

Time to 1st post treatment:
☐ < 6 h ☐ < 12 h
☐ Daily ☐ > 24 h

Time (hours) to documented normal sodium: ☐☐

Highest WCC: ☐☐ **Highest CRP:** ☐☐☐ **Lowest serum osmolality:** (= 2Na + glucose + urea) ☐☐☐ **Lowest urine osmolality:** ☐☐☐

Aetiology

Directorate: ☐ Medical ☐ Surgical **If surgical:** ☐ Pre-op ☐ Post-op ☐ N/A

Diagnosis/code:

Infective:
- ☐ Chest infection - bacterial **(CB)**
- ☐ Chest infection - viral **(CV)**
- ☐ UTI **(U)**
- ☐ Septicaemia/meningococcal disease/meningitis **(M)**
- ☐ Sepsis - bacterial NOS **(SB)**
- ☐ Sepsis - Viral NOS **(SV)**
- ☐ Gastroenteritis **(G)**

Medical Other:
- ☐ DKA **(D)**
- ☐ Other medical NOS **(MN)**

Surgical:
- ☐ Appendicitis **(A)**
- ☐ Other Surgical NOS **(SU)**
- ☐ Orthopaedic **(OR)**
- ☐ ENT infective **(EI)**
- ☐ ENT other **(EO)**

Aetiology

	SIADH	Excessive Losses	Inappropriate IV Replacement Volume	Inappropriate IV Solution	Drugs	Inappropriate Orals	Other
I	☐	☐	☐	☐	☐	☐	☐
II	☐	☐	☐	☐	☐	☐	☐
III	☐	☐	☐	☐	☐	☐	☐

DRAFT

Audit Topic Proposal Form

Approved outside Committee 2/12/05.

NAME OF PARTICIPANTS: Dr Neil Corrigan, Dr Aoife McMorrow

PRIMARY CONTACT: N Corrigan CONTACT NUMBER: Bleep 8279 [redacted]

AUDIT TITLE The management of hyponatraemia in children admitted to AAH over a 21 month period

METHOD: PROSPECTIVE ☐ RETROSPECTIVE [X]

IF QUESTIONNAIRE PLEASE INDICATE: PATIENT ☐ STAFF ☐

STANDARDS / GUIDELINES: Royal College ☐ Local Hospital [X] CREST ☐ Professional College ☐ ☐

Please attach guideline/standard Other please specify DHSS

SOURCE OF AUDIT: ALTNAGELVIN [X] REGIONAL ☐ NATIONAL ☐

Line Manager Signature: Dr Murray Quinn

(To state that he/she has approved this audit will take place)
N.B. THIS FORM WILL NOT BE PROCESSED UNLESS SIGNED BY LINE MANAGER

WHERE DO YOU INTEND TO PRESENT RESULTS? Ulster Paediatric Society / local audit

If you intend to present your audit outside of local hospital please gain permission from Line Manager

CLINICAL AUDIT DEPARTMENT ASSISTANCE

The Clinical Audit Department is happy to assist with one or more of these fields. Please delete as applicable

Please tick required assistance

QUESTIONNAIRE / PROFORMA DESIGN ☐ ANALYSIS ☐

PRESENTATION ☐ CASENOTES / X-RAYS [X] HOW MANY? 153

(N.B. IN THE 1ST INSTANCE 50 SETS OF CASENOTES WILL BE PROVIDED)

Please state where these casenotes are to be viewed Ward 16 AAH

COMMENCEMENT DATE: ASAP COMPLETION DATE: Feb 2006

If you have not requested assistance with your questionnaire, please enclose a copy of audit questionnaire you intend to use. Failure to do so may delay the start of your audit

The Clinical Audit Committee will discuss all requests for audit assistance, the schedule of meetings are detailed below. You will receive a letter within 2-3 days after the meeting informing you of assistance that will be available to you.

In EXCEPTIONAL circumstances, the Clinical Audit Committee can give approval for a study to commence and audit assistance to begin.

If you consider you need an urgent audit commenced before the next meeting, please indicate why?

[redacted]

Please return this form to Clinical Audit Manager, Clinical Audit Office, Altnagelvin Hospital.

Meeting Date	Closing Date for Entry
4TH JANUARY 2005	Closing date 22nd December 2004
1ST MARCH 2005	Closing date 22nd February 2005
3RD MAY 2005	Closing date 26th April 2005
5TH JULY 2005	Closing date 28th June 2005
6TH SEPTEMBER 2005	Closing date 30th August 2005
1ST NOVEMBER 2005	Closing date 25th October 2005
3RD JANUARY 2006	Closing date 22nd December 2005

DATE RECEIVED: [redacted]

AUDIT COMMITTEE APPROVAL: YES ✓ NO

Hyponatraemia study data sheet
November 2005

Further data to be collected:

Identifier:

Hyponatraemia

Serial results

day									
sodium									

Other electrolyte abnormalities y/n
Other electrolyte abnormalities – define

_____

WCC _____ CRP _____

Aetiology:

Surgical versus medical S/M
Hyponatraemic at admission Y/N
Aetiology

Aetiology	ISADH	Excessive Losses	Inappropriate replacement	Drugs	Inapprop fluids	Other

Diagnosis: _____
Diagnosis
classification: infective resp/git/neuro/other
Surgical appx/other git/other

Management:

Input/output recorded Y/N
How recorded Standard/urine measured/nappies weighed/catheterised/other

IV fluids administered Y/N

Type of fluid

Type of fluid	0.5%N saline +	N saline	Hartmans	Sol 18	Other

Type of fluid appropriate clinically Y/N

Fluid prescription:

Maintenance	Restricted appropriately ISADH	Restricted with concomitant orals	Generous	Too little	

If generous how much extra given ____%

Became hyponatraemic on IV fluids: Y/N