Appendicitis: JAN 04 – DEC 05
WD 6 – Admission

Age 13.

RECEIVED
21 JUN 2006

AUDIT TOPIC PROPOSAL FORM

TITLE OF AUDIT:
HYPONATRAEMIA IN PAEDIATRIC APPENDICITIS

AUDIT OBJECTIVE: To determine incidence & aetiology of ~~IN~~ hyponatraemia & to identify risk factors.

STANDARDS / GUIDELINES MEASURING:
FLUID MANAGEMENT IN CHILDREN measured against DEPT OF HEALTH GUIDELINES.

SOURCE OF AUDIT: ALTNAGELVIN ☑ REGIONAL ☐ NATIONAL

METHOD: Chart review

WHERE DO YOU INTEND TO PRESENT RESULTS? NI Surgical Trainee's Prize Day

CLINICAL AUDIT DEPARTMENT ASSISTANCE

Please tick required assistance — **How many?**

CASENOTES / ~~X-RAYS~~ IN THE 1ST INSTANCE 50 SETS OF CASENOTES WILL BE PROVIDED — ?90

Please delete as applicable

QUESTIONNAIRE DESIGN / PROFORMA		Yes ☑		No ☐
ANALYSIS	Basic	Yes ☑		No ☐
PRESENTATION		Yes ☐		No ☑

NAME OF PARTICIPANTS: MRS ALISON MCCOUBREY, DR N CORRIGAN
MR S DACE

PRIMARY CONTACT: ALISON MCCOUBREY CONTACT TEL NO: Bleep [redacted]

HOSPITAL ADDRESS: WD 32
ALTNAGELVIN AREA HOSPITAL.

COMMENCEMENT DATE: **COMPLETION DATE:**

Line Manager Signature:

(To state that he/she has ~~approved~~ this audit will take place)

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

SEE OVER FOR FURTHER INFORMATION

SCHEDULE OF CLINICAL AUDIT COMMITTEE MEETINGS

TUESDAYS – 1.30PM

Meeting Date	Closing Date for Entry
3rd JANUARY 2006	*Closing date 22nd December 2005*
7th MARCH 2006	*Closing date 22nd February 2006*
2nd MAY 2006	*Closing date 26th April 2006*
4th JULY 2006	*Closing date 28th June 2006*
5th SEPTEMBER 2006	*Closing date 30th August 2006*
7thNOVEMBER 2006	*Closing date 25th October 2006*
9th JANUARY 2007	*Closing date 22nd December 2006*

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

In urgent circumstances, the Chairman, Dr M Parker 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?

I would like to complete data collection from the charts before my post finishes in Altnagelvin (1/08/06).

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

DATE RECEIVED: 19/6/06

AUDIT COMMITTEE APPROVAL: YES ☑ NO ☐

Clinical Audit Department
Directorate of Nursing & Risk Management

"Audits Undertaken Determines Improvement in Treatments"

Hyponatraemia Study Data Sheet: December 2005

Patient ID: ☐☐☐

Hosp No: ☐☐☐☐☐☐☐☐

Name: _____ **DOB** ☐☐/☐☐/☐☐ **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:U&E: ☐ < 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)**
- ☐ Febrile Seizure **(FS)**

Surgical:

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

Diagnosis:

Aetiology

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

Serial Results

Hosp No:

Patient ID:

	SAMPLE	DATE	TIME	RESULT
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Hosp No: ☐☐☐☐☐☐☐☐ Patient ID: ☐☐☐

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

Hyponatraemia in Paediatric Appendicitis Between Jan'04 - Dec'05

Name of Lead: Alison McCoubrey

Name of Audit Staff: Caroline Coyle

Date Completed: November 2006

Acknowledgements

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

Aim:

To investigate the incidence of hyponatraemia in children with appendicitis and to evaluate possible clinical markers for its development.

Standards:

Department of Health guidelines

Method:

Retrospective chart analysis of all children under the age of 13 years undergoing appendicectomy over a 2 year period (Jan 2004 – Dec 2005).

Proforma:

An audit proforma was used to collect the information from the patient's clinical notes. 71 were analysed. This information is enclosed.

I will attach a copy of your proforma here:

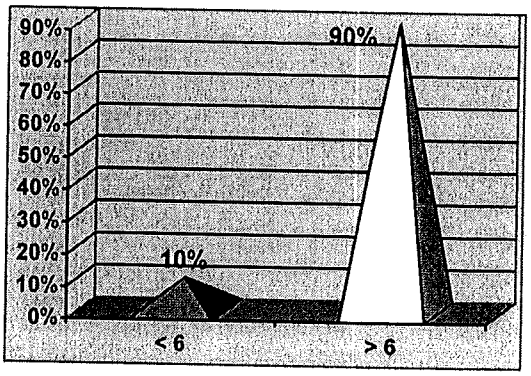
Hyponatraemia in Paediatric Appendicitis Between Jan'04 - Dec'05

Study size: 71 Children (17 children were hyponatraemic, and the remaining 54 children with normal sodium)

Demographics:

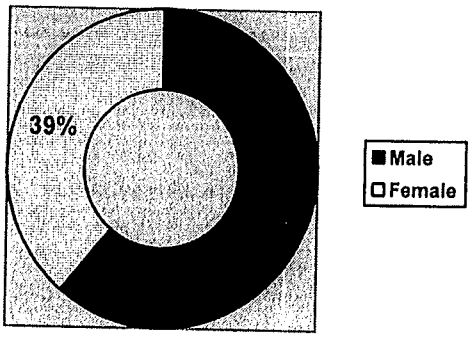
Age range

- Children were aged between 3 -12 years old,
- With an average age of: 9 years old & median of 9. Below states age range:
  - < 6 years old = 7 (10%)
  - ≥ 6 years old = 64 (90%)



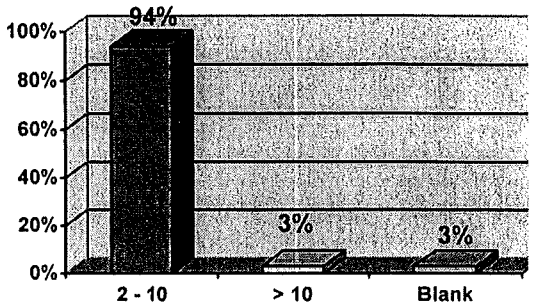
Gender

- Male = 43 (61%)
- Female = 28 (39%)



Length of stay

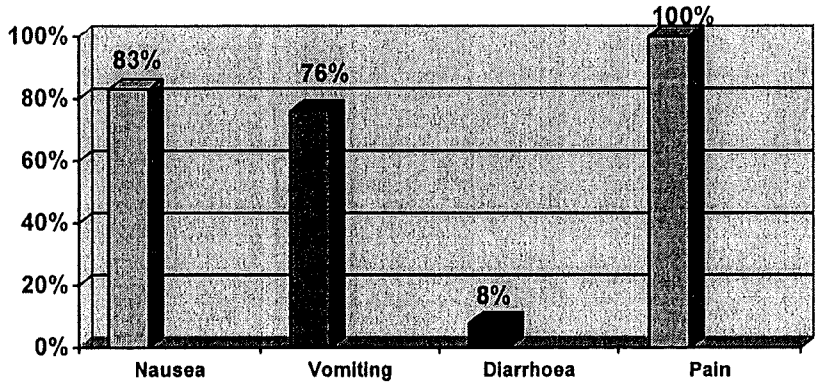
- Ranged from 2 - 48 days (only 1 child with a length of stay of 48 days).
- Average length of stay: 4 days and median of 3 days
  - 2 - 10 days = 67 (94%)
  - Greater than 10 days = 2 (3%)
  - Blank = 2 (3%)



History:

Symptoms

- Symptoms included:
  - Nausea = 59 (83%)
  - Vomiting = 54 (76%)
  - Diarrhoea = 6 (8%)
  - Pain = 71 (100%)
- With only 5 children (7%) having all 4 symptoms.



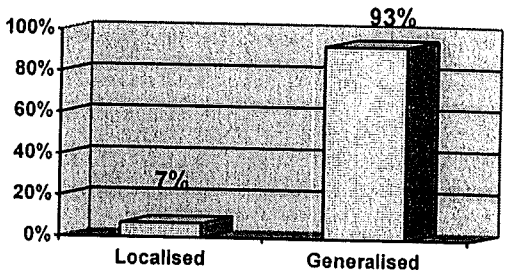
Length of Symptoms

- Nausea: Symptoms lasted between 4 - 72 hrs, average: 30 hrs, median: 24 hrs
- Vomiting: Symptoms lasted from 4 - 72 hrs, average: 27 hrs. median: 24 hrs
- Diarrhoea: Lasted 5 -24 hrs, average: 16 hrs, median: 24 hrs
- Pain: Lasted from 4 - 168 hrs, average: 33 hrs, median: 24 hrs

Examination Findings:

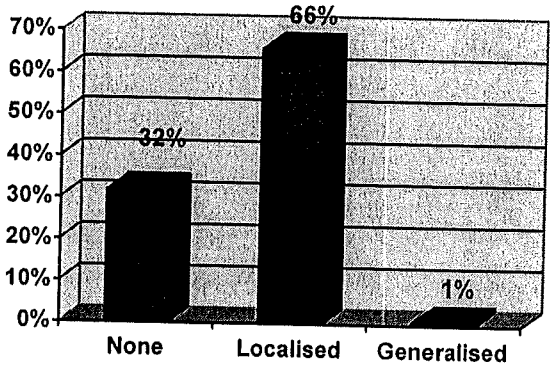
Tenderness

- Localised = 5 (7%)
- Generalised = 66 (93%)



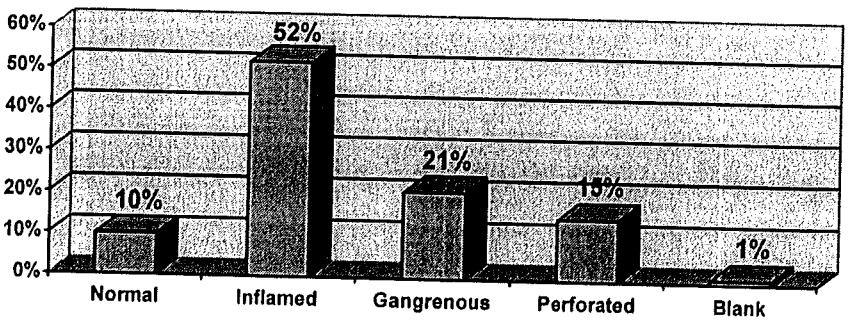
Peritonism

- None = 23 (32%)
- Localised = 47 (66%)
- Generalised = 1 (1%)



Appendicitis

- Normal = 7 (10%)
- Inflamed = 37 (52%)
- Gangrenous = 15 (21%)
- Perforated = 11 (15%)
- Blank = 1 (1%)



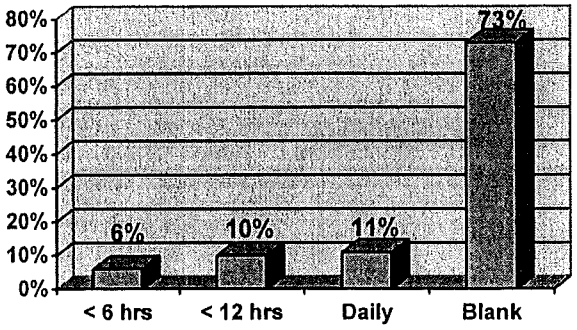
Blood Results:

U&E Checked

- The total number of U&E checked: 2 - 13, average: 4, median: 3

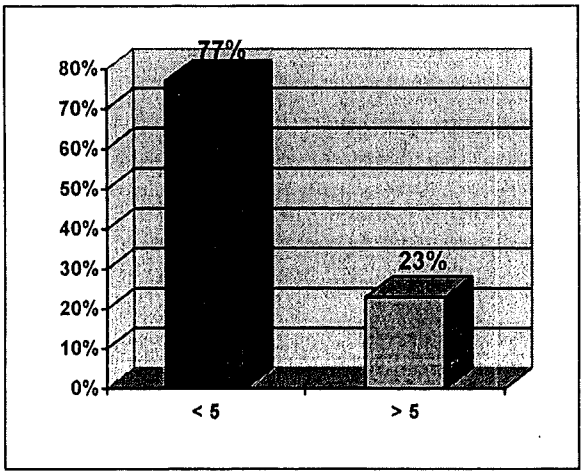
Time to 1st Post Treatment: U&E

- < 6 hrs = 4 (6%)
- < 12 hrs = 7 (10%)
- Daily = 8 (11%)
- Blank = 52 (73%)



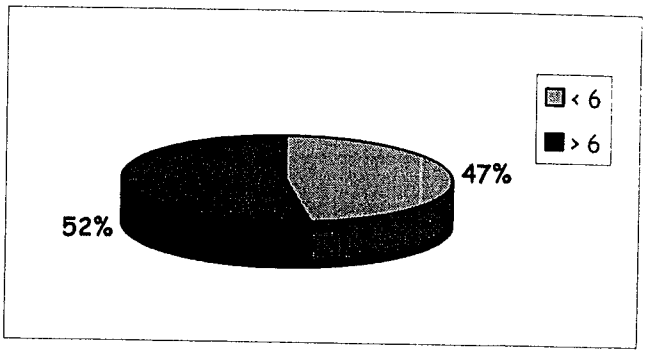
Urea on Admission

- Ranged from 2.3 - 8.4, average: 4, median: 4
  - < 5 = 55 (77%)
  - ≥ 5 = 16 (23%)



Glucose Results

- Ranged from 4.1 - 9.7,average: 6, median: 6
  - < 6 = 34 (47%)
  - ≥ 6 = 37 (52%)



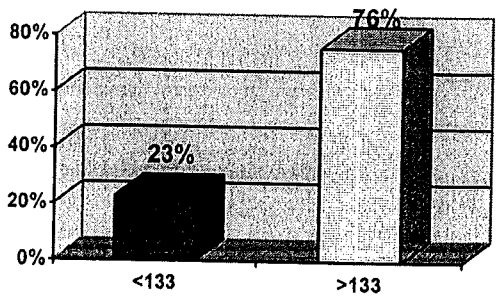
Range of Osmolalities

- **Lowest Serum Osmolality** - 55 (77%) were not stated, the remaining 16 (23%) were stated:
- Ranged from 265 - 281,average: 275, median: 275

- **Lowest Urine Osmolality** - 69 (97%) were not stated, the remaining 2 (3%) were stated:
- The ranges included 106.9 and 357.

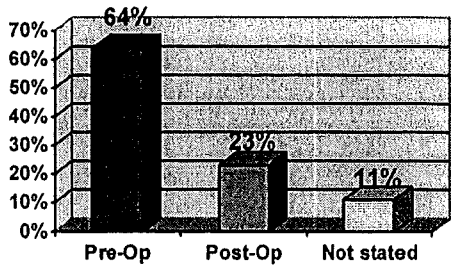
Children that were hyponatraemic & distribution of Lowest Sodiums

- ≤ 133 = 17 (23%) (The proportion of children with hyponatramia)
- > 133 = 54 (76%)

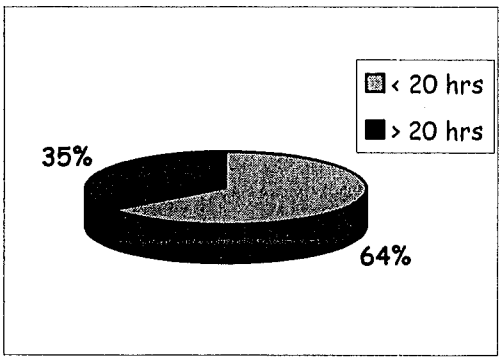


Children that were Hyponatraemic:

- **Out of the 17 children that were hyponatraemic (na < 133)**
  - 11 (64%) = Pre-Op
  - 4 (23%) = Post-Op
  - 2 (11%) = Not stated

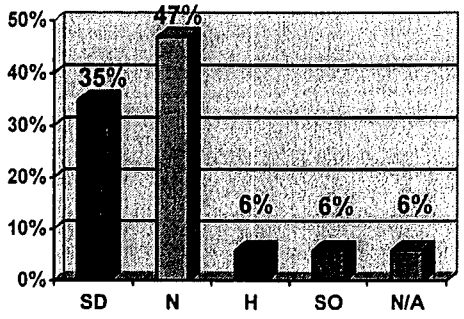


- **Time (Hours) to Documented Normal Sodium:** For these 17 children time ranged from 0 - 60 hrs, average= 18 hrs. Median: 14 hrs Breakdown is as follows:
  - < 20 hrs = 11 (64%)
  - ≥ 20 hrs = 6 (35%)



Fluid Management:

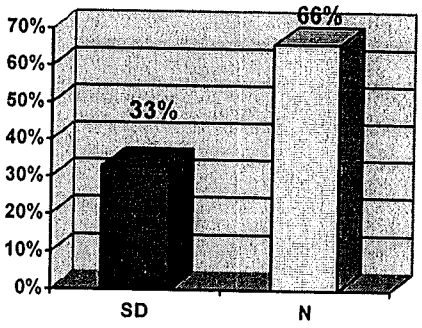
- **Type of fluids that were prescribed to these children:**
  - 0.5% N Saline & Dextrose (SD) = 6 (35%)
  - N Saline (N) = 8 (47%)
  - Hartmans (H) = 1 (6%)
  - Sol 18 (SO) = 1 (6%)
  - N/A = 1 (6%)



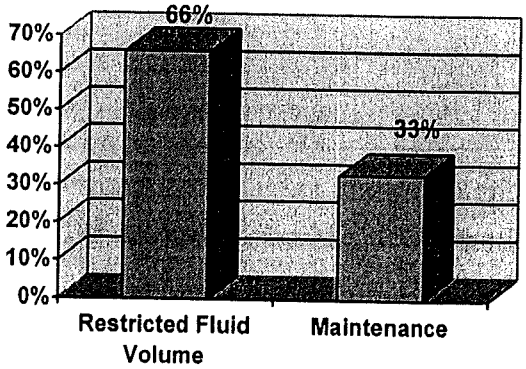
NA < 130:

- **Children with Sodium < 130**
  - = 3 (4%)
  - Were IV Fluids administered? = Yes All 3 (100%)

- **Type of fluids were:**
  - 0.5% N Saline & Dextrose = 1 (33%)
  - N Saline (N) = 2 (66%)



- **Initial Fluid Volume prescribed:**
  - 2 (66%) = Restricted Fluid Volume
  - 1 (33%) = Maintenance

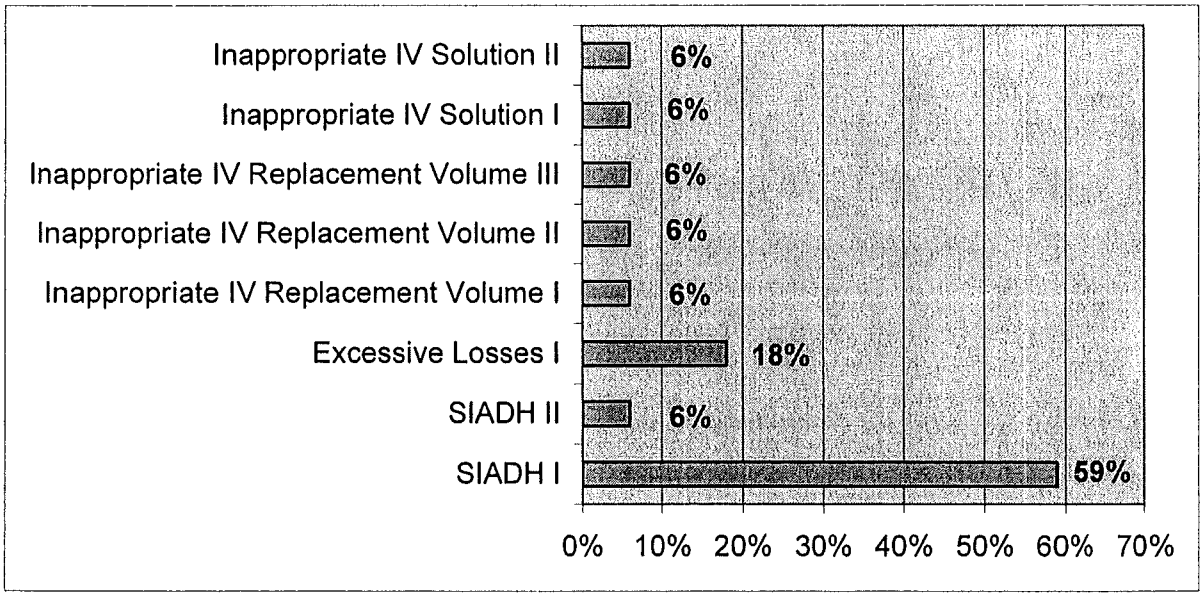


Aetiology

Proportions of Aetiology

- Out of the 17 children that were hyponatraemic, the table below shows the number of children and % that were recorded with the following Proportions of Aetiology:

	SIADH	Excessive Losses	Inappropriate IV Replacement Volume	Inappropriate IV Solution
I	10 (59%)	3 (18%)	1 (6%)	1 (6%)
II	1 (6%)		1 (6%)	1 (6%)
III			1 (6%)	



Length of Time of treatment with IV Fluids

- Ranged from 10 - 192 hrs, average = 41 hrs, median: 34 hrs

Time to Reassessment of fluids (hrs)

- Ranged from 4 - 20 hrs, average = 12 hrs, median: 12 hrs

A Comparison of Examination Findings: Hyponatraemic children Vs children with Normal Sodium

WCC (White Cell Count)

- WCC for the children that were hyponatraemic ranged from 8 - 23,average = 15, median: 14
    - Compared to children with normal sodium ranged from 6 -32, with an average: 15,median of 15

Highest CRP

- Ranged from 15 - 316,average = 126, median: 87 for hyponatraemic children.
    - Children with normal sodium ranged from 5 - 255, average: 54, median of 23

Symptoms/Length of Symptoms

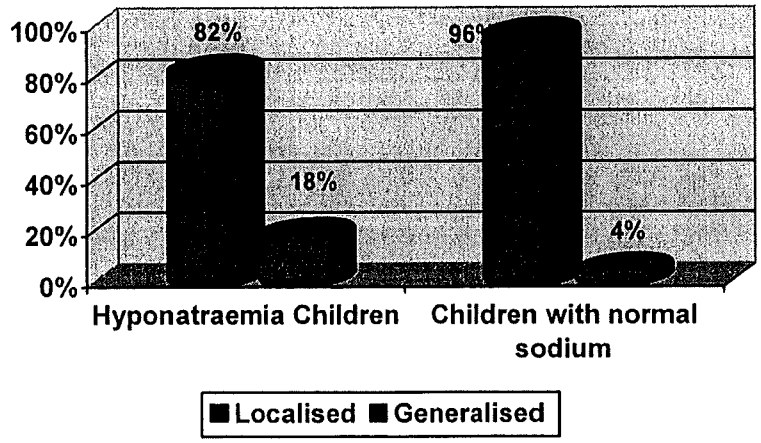
- **Nausea** - 15 (88%) of the hyponatraemic children had nausea for an average of 39 hours, median of 24 hrs
    - 44 (81%) out of the children with normal sodium had nausea for an average of 27 hrs, median of 24 hrs.
- **Vomiting** - 14 (82%) had vomiting, which lasted on average for 33 hours, median of 24 hrs for the hyponatraemia children.
    - 40 (74%) of the children with normal sodium had vomiting, lasting for 25 hrs on average, median: 24 hrs.
- **Diarrhoea** - Only 1 hyponatraemic child had diarrhoea (1%)
    - 5 (9%) of the children with normal sodium experienced diarrhoea, for an average of 16 hrs, median: 24 hrs
- **Pain** - All 17 of the hyponatraemic children (100%) experienced pain, on average for 37 hrs, median: 24 hrs
    - For the children with normal sodium also all 54 (100%) children experienced pain, on average for 31 hrs, median: 24 hrs.

Tenderness

- Localised = 14 (82%)
- Generalised = 3 (18%)

Compared to children with normal sodium:

- Localised = 52 (96%)
- Generalised = 2 (4%)

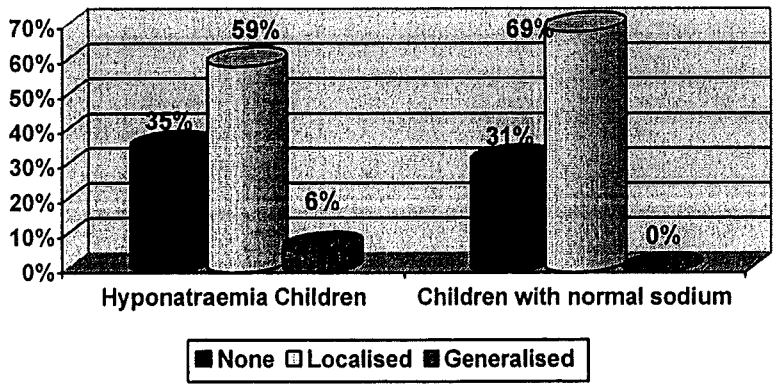


Peritonism

- None = 6 (35%)
- Localised = 10 (59%)
- Generalised = 1 (6%)

Compared to children with normal sodium:

- None = 17 (31%)
- Localised = 37 (69%)
- Generalised = 0 (0%)

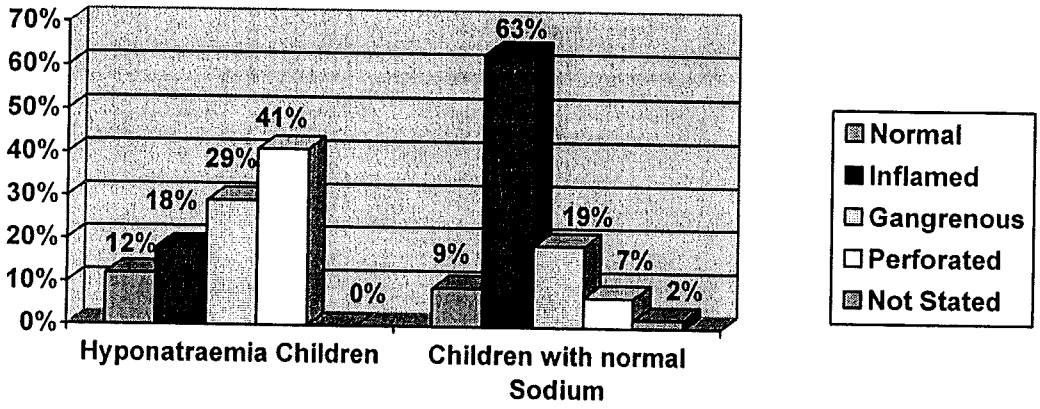


Appendicitis

- Normal = 2 (12%)
- Inflamed = 3 (18%)
- Gangrenous = 5 (29%)
- Perforated = 7 (41%)

Compared to children with normal sodium:

- Normal = 5 (9%)
- Inflamed = 34 (63%)
- Gangrenous = 10 (19%)
- Perforated = 4 (7%)
- Not stated = 1 (2%)



*** The table on the next page summarises the comparison of examination findings between children with hyponatraemia and children with normal sodium.**

	Children with Hyponatraemia (17)			Children with Normal Sodium (54)	
	Average	Median		Average	Median
WCC	15	14		15	15
CRP	126	87		54	23
Nausea (hrs)	39	24		27	24
Vomiting (hrs)	33	24		25	24
Diarrhoea (hrs)	N/A	N/A		16	24
Pain (hrs)	37	24		31	24
	Total	%		Total	%
Tenderness:					
Localised	14	82		52	96
Generalised	3	18		2	4
Peritonism:					
None	6	35		17	31
Localised	10	59		37	69
Generalised	1	6		0	0
Appendicitis:					
Normal	2	12		5	9
Inflamed	3	18		34	63
Gangrenous	5	29		10	19
Perforated	7	41		4	7
Not Stated	0	0		1	2

Key Results:

See table above

Conclusions / Recommendations:

Hyponatraemia is a common problem in children with appendicitis.
Electrolytes should be carefully monitored throughout admission and acted on appropriately.