

AETIOLOGY & MORTALITY OUTCOMES OF CHILDREN WITH ACUTE RENAL FAILURE AT KATH

**SAMPSON ANTWI (DR)
LECTURER/PAEDIATRIC NEPHROLOGIST
DEPT OF CHILD HEALTH-SMS/KNUST**

Introduction



Definition

ARF (AKI):

sudden decline in GFR expressed clinically as *retention of nitrogenous wastes* notably urea and creatinine in the blood \pm corresponding *reduction in urine output*.¹

Introduction cont.



Aetiology/Classification

- Aetiology varies widely according to age, geographical region, and clinical setting.²
- Classified into:
 - Pre-renal
 - Intrinsic (intra-renal)
 - Post-renal causes

Introduction cont.



In developing countries, infection-related causes are often cited as the predominant causes particularly:

- gastroenteritis (diarrhoea and/or vomiting) associated with poor sanitation and lack of safe drinking water
- post streptococcal glomerulonephritis.^{3,4}

Introduction cont.



- ARF remains a significant contributor to the mortality of critically ill children.⁵
- Mortality outcomes depend on such factors as aetiology, medical setting, co-morbidities, and availability of dialysis therapy.¹

Study Objectives



- Despite the abundant data on ARF in the literature, only few are from Africa.
- This study was undertaken to determine the **aetiology** and **mortality outcomes** of children presenting with ARF at KATH

In this study, ARF was defined as:

- an increase in serum creatinine
- and/or decrease in urine output of $<0.5\text{ml/kg/hr}$ for > 6 hrs in accordance with the RIFLE criteria.⁶

Subjects and Methods



- Case notes review of all children presenting with ARF to the department of Child Health, KATH, from October, 2009-July 2010.

Results

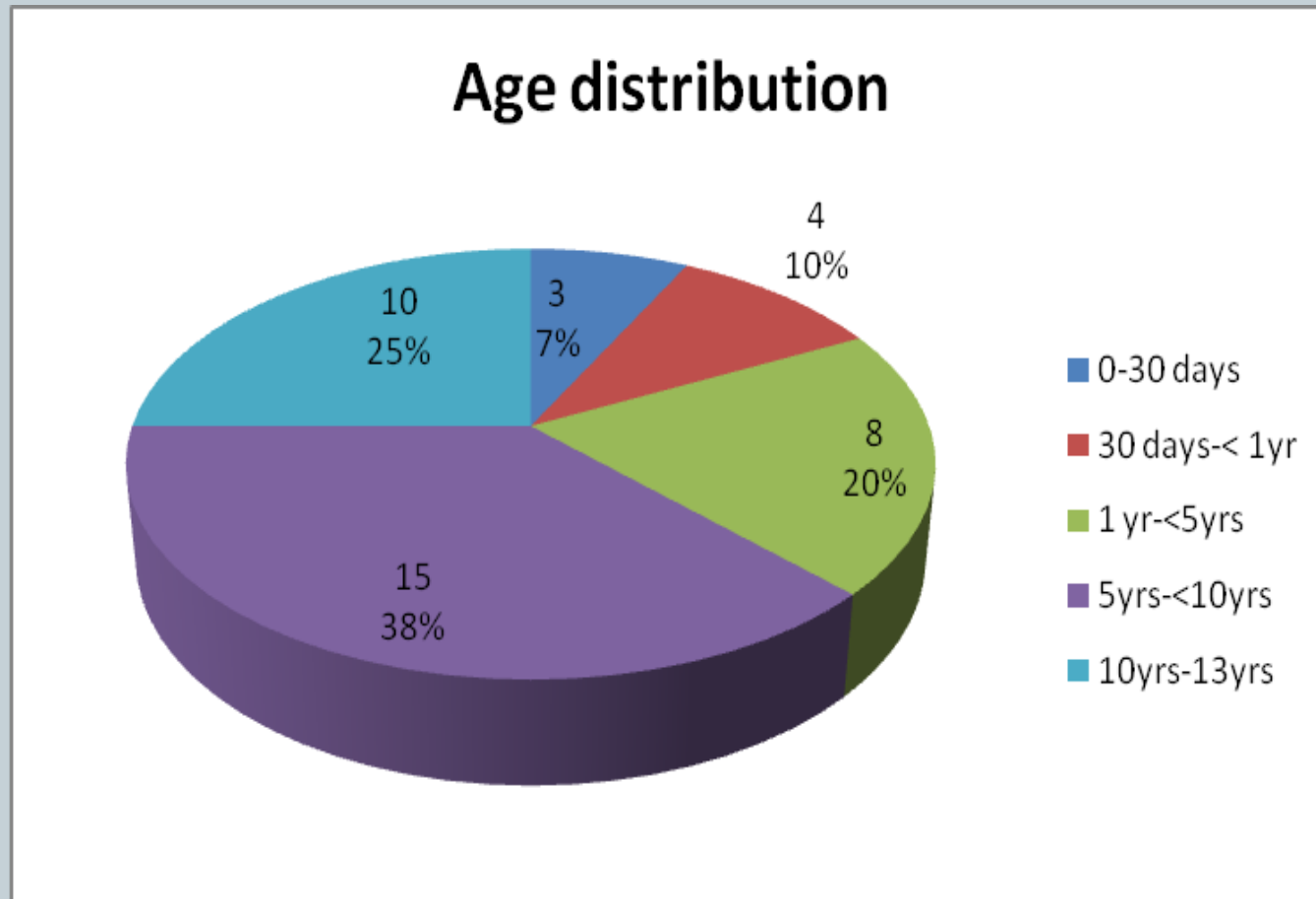


- 40 cases of ARF recorded among a total of 140 renal patients over the study period.

Gender and Age at diagnosis

- Gender distribution was even; 20 subjects apiece.
- Age at presentation ranged from 5 days to 12 years.
- Figure 1 shows age distribution of study subjects.

Figure 1: Age distribution of study subjects



Aetiology of ARF



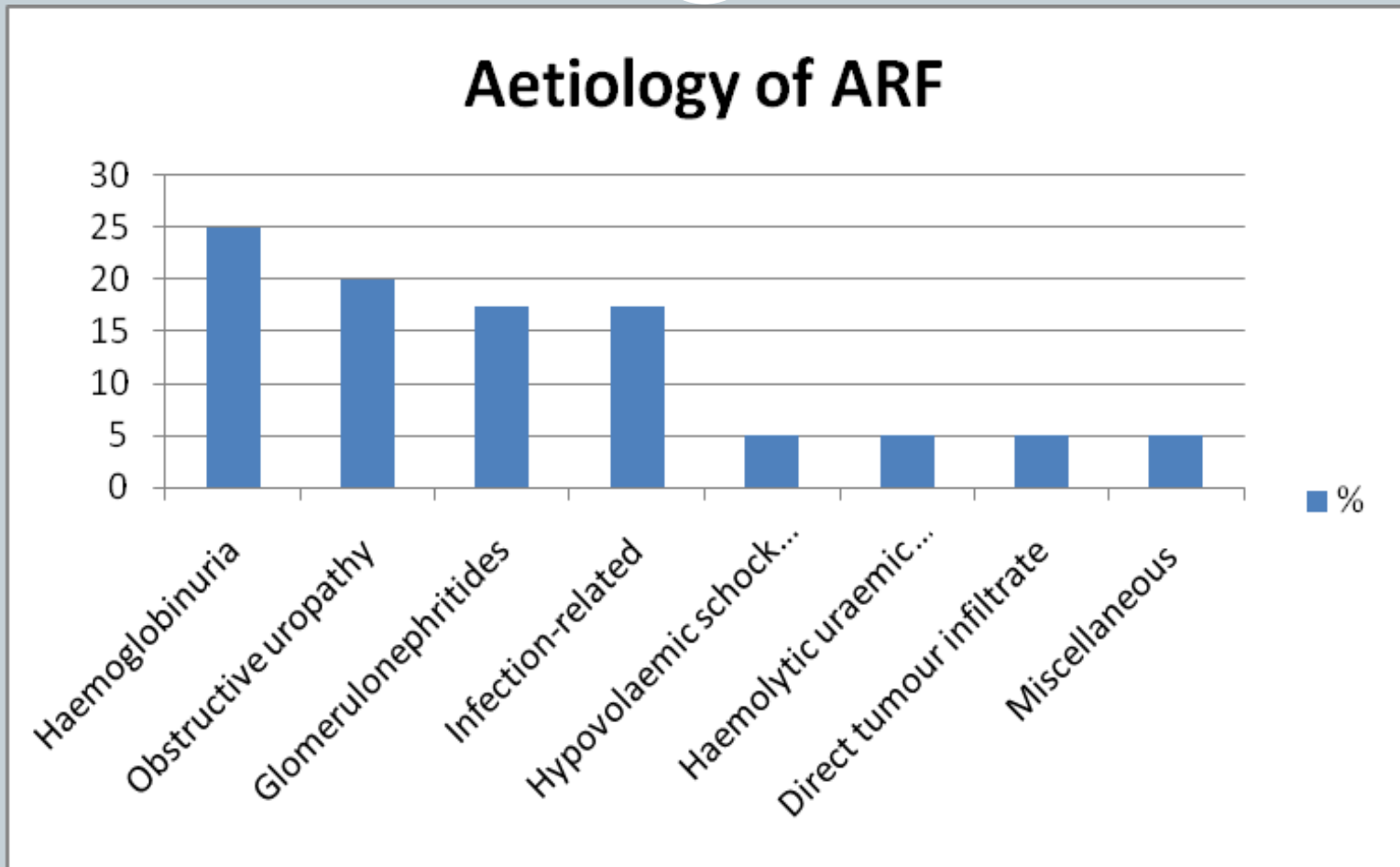
- Pigment nephropathy secondary to **haemoglobinuria** was the leading cause; 10 cases (25%)
 - Only one case (2.5%) of haemoglobinuria had positive malaria parasitaemia (blackwater fever).
- This was followed by **obstructive uropathy** (post-renal ARF); 8 cases (20%).
 - Interestingly, 50% of the obstructive uropathies were secondary to bilateral extrinsic ureteral compression by abdominal tumour

Aetiology cont.



- Only 2 (5%) cases were **gastroenteritis-related**
- Same number was caused by **haemolytic uraemic syndrome** (all 2 cases being D –ve)
- **Nephrotic syndrome** and **acute glomerulonephritis** accounted for 10% and 7.5% of cases respectively.
- Figure 2 shows the aetiology of ARF among study patients.

Figure 2: Aetiology of ARF among 40 study subjects



Treatment and Mortality outcomes



- 29 (50%) of the 40 patients with ARF needed dialysis therapy.
- However, only 2 (10%) patients could be provided with improvised peritoneal dialysis one of whom made a complete recovery.

Treatment and Mortality outcomes

cont.

- Three patients in need of dialysis benefited from surgical interventions (ureterostomy, valve ablation, and nephrostomy)
- and another 3 survived on conservative management.

Treatment and Mortality outcomes cont.



- The remaining 12 cases that could not be dialysed all died.
- In all, 13 subjects died giving case fatality rate of 32.5%.
- All 10 cases of haemoglobinuria-induced ARF made complete recovery on conservative management.

Figure 3: Improvised peritoneal dialysis in progress for a child in ARF



Discussion



Age distribution

- Neonates accounted for only 7% of all cases contrary to findings from other studies.³ Altogether, infants accounted for 17% of cases.
- The low prevalence of ARF among these age groups may be due to the lack of:
 - routine prenatal screening for congenital renal malformations
 - evaluation of renal function in at risk neonates.
- *Birth asphyxia* and *neonatal sepsis* are recognised risk factors for ARF in neonates but the former was not identified as a cause of ARF in this study.

Discussion cont.



- 63% of cases were above 5 years.
- This may be due to:
 - the contribution of abdominal lymphoma (15%)—a disease prevalent in the over 5 year old group, and
 - an interesting pattern of distribution of haemoglobinuria-induced ARF;
 - ❖ except for 1 patient aged 4 years, all cases of haemoglobinuria-induced ARF occurred in children older than 5 years (6-12 years).

Aetiology of ARF



- The pattern of ARF in this study is at variance with earlier reports from the continent³ and opinion of authors⁴ and may point to changing trends in the aetiology of ARF in Africa.

Aetiology cont.



- The relatively low prevalence of gastroenteritis as a cause of ARF in this study may be due to:
 - the ready availability and widespread use of oral rehydration salt for home treatment of diarrhoeal diseases in Ghana
 - the modest gain in the economy since the advent of sustained democratic governance

Discussion cont.



- *Haemoglobinuria* and *extrinsic ureteral obstruction* from tumour mass as well as *direct tumour infiltrate* of the kidneys are documented causes of ARF.^{1,2}
- However, their predominance as causes of ARF in this study is an interesting finding that needs to be followed closely.

Discussion cont.



- Haemoglobinuria as a cause of ARF might have been overlooked in the past since urine output is often maintained in this forms of nephropathy.
- Thus, short off serum urea and creatinine determination, an investigation that is unavailable in many health facilities in Africa, this form of ARF may escape detection.

Discussion cont.



- *Haemolytic uraemic syndrome*, a leading cause of ARF in developed world, was recorded in only 2 (5%) cases similar to the 3.3% recorded in another study in West Africa and affirms the long held view that HUS is uncommon in Africa.³

Mortality of ARF



- The high case fatality rate of 32.5% may be due largely to the lack of facilities for dialysis.
- Only 2 (10%) of the 20 cases who needed dialysis therapy actually received a form of improvised peritoneal dialysis one of whom made a complete recovery.
- The other died unexpectedly from acute upper airway obstruction when the serum chemistry has stabilised after 31 days on dialysis.

Mortality of ARF cont.



- The remaining 12 deaths might have been averted if dialysis services were available.

Conclusion/Recommendation



- Aetiological pattern of ARF in Africa may be changing.
- All children who present with haemoglobinuria should be monitored for possible acute renal failure and should have blood urea and creatinine determinations done.

Conclusion/Recommendation cont.

- There is the urgent need for the establishment of facilities for dialysis in children in Ghana to improve treatment outcomes of ARF.

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- ***Conflict of Interest: None***

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