

# Attitude of Nigerian Paediatricians towards the Management of Acute Pyelonephritis

IC Anochie\*, FU Eke\*\*

## Summary

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**Background:** Acute pyelonephritis (APN) is a common renal disorder in children. The management is controversial and has generated a lot of debate globally. There is no consensus on the strategies for its investigation and treatment in Nigeria.

**Objective:** To determine the attitude of Nigerian paediatricians towards the management of acute pyelonephritis in children.

**Materials and Methods:** The management attitude of Nigerian paediatricians towards children with acute pyelonephritis was investigated during an annual paediatric conference, using a questionnaire containing a brief description of a clinical case of APN in a three-year old female.

**Results:** Out of 195 questionnaires issued to registered paediatricians, 115 (59.0 percent) were retrieved and analysed. Ninety five (82.6 percent) of the 115 responders were based in tertiary hospitals. All the paediatricians would perform a urine culture and 98 (85.2 percent), including the eight paediatric nephrologists, would request a renal ultrasound during the acute phase of pyelonephritis. Twelve (10.4 percent) respondents would request an intravenous pyelography (IVU). Fourteen percent and 36 percent respectively, were of the opinion that micturating cystourethrography (MCU) and  $^{99m}\text{Tc}$ -dimercaptosuccinic acid scintigraphy (DMSA) scan were indicated. Those working in tertiary hospitals would perform both the MCU and DMSA less frequently than those working in private/company hospitals ( $p > 0.05$ ). Significantly more doctors who graduated in the 1990s would ask for MCU and DMSA scan than those who graduated earlier ( $p < 0.05$ ). Immediate antibiotic treatment was preferred by 96.5 percent, with cephalosporin being the antibiotic of choice in 47.8 percent. Intravenous administration of antibiotics was preferred to the oral route (87.8 percent vs 12.2 percent).

**Conclusion:** Although the opinion expressed in this study may not reflect the actual practice of the paediatricians, there is a marked variation in the management of APN observed among them. There is a need to establish a protocol of "best treatment" of APN in the country given the varied and frequently limited resources available.

**Keywords:** Attitude, acute pyelonephritis, management, paediatricians

## Introduction

URINARY tract infection (UTI) remains the most common childhood renal disorder in Port Harcourt.<sup>1</sup> The

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University of Port Harcourt Teaching Hospital,  
Port Harcourt

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### Department of Paediatrics

\* Senior Lecturer

\*\*Professor

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Correspondence: Dr Ifeoma C Anochie  
E-mail: anochiefy@hotmail.com

upper UTI or acute pyelonephritis (APN), accounts for 3.6 percent of renal disorders seen in the tropics.<sup>2</sup> The overall incidence of APN in febrile urinary tract infection (UTI) was reported as 70 percent in Taiwan, with a higher incidence among older children than infants.<sup>3</sup> Renal damage from the initial insult of APN leads to subsequent development of an irreversible scar in 50-65 percent of affected children.<sup>4-6</sup> This usually occurs as a result of delays in the diagnosis and treatment of UTI, as well as inappropriate treatment.<sup>7,8</sup> Studies have shown that renal scarring with repetitive infections can result in hypertension, chronic renal failure and end-

stage renal disease.<sup>5,9-11</sup> There is currently no defined consensus for the management of APN in Nigeria. The attitude of physicians involved in caring for children in our environment has rarely been investigated. There are many private hospitals whose practices are not controlled, and whose level of medical care may be low. This problem is heightened by the lack of facilities for renal replacement therapy in children in the country. We therefore report the result of a study of the attitude of Nigerian paediatricians towards the management of APN in children.

### Materials and Methods

The study was conducted during the 34<sup>th</sup> Annual General and Scientific Conference of the Paediatric Association of Nigeria (PANCONF) held in Port Harcourt, from January 21-25, 2003. A total of 250 participants registered for the conference, out of which 195 were paediatricians. The study material was a close-ended questionnaire, which was administered to only the registered paediatricians. The case of a three-year old girl with clinical features highly suggestive of acute pyelonephritis was presented. The respondents were asked to indicate the investigations, treatment modalities and preferred route of treatment to be administered on the child. The questionnaires were anonymous, and were collected on the same day of administration.

Data was analysed using Epi Info version 6. Fisher exact test was applied where the number in the cell was less than five. Yates corrected chi-square was also used. P value < 0.05 was considered to be statistically significant.

## Results

### *Characteristics of the responders*

One hundred and fifteen (59.0 percent) of the registered paediatricians responded. They comprised 64 (55.7 percent) ordinary members (Fellowship holders of either the West African or National Colleges of Physicians) and 51 (44.3 percent) resident doctors. Thirteen (20.3 percent) of the Fellows were professors, and eight (12.5 percent) were paediatric nephrologists. For the purpose of this study, both the Fellows and resident doctors with over two years experience in the various departments of paediatrics were considered as paediatricians. They were mainly females, with a male: female ratio of 1:1.9 (Table I). Their ages ranged from 28 years to 72 years, with 61 percent being above 40 years. About 80.0 percent of the doctors normally practised in tertiary hospitals, and only 18.3 percent graduated in the 1960-1970s. Forty-three (67.2 percent) of the Fellows obtained their fellowship in the 1990s, while 21 (32.8 percent) did so before 1990.

### *Investigations in APN*

All the respondents would request a urine culture for a child with APN, while 98 (85.2 percent) would order renal ultrasound (Table II). Of the 98, eighty one (82.7 percent) were practising in tertiary hospitals. All the paediatric nephrologists would request a renal ultrasound in the acute phase of pyelonephritis. Twelve (10.4 percent) respondents were of the opinion that an intravenous pyelogram (IVU) was required; this number included one (12.5 percent) of the paediatric

Table I

### *Characteristics of the Respondents*

<i>Characteristics</i>	<i>Number (n=115)</i>	<i>% of Total</i>
<i>Sex</i>		
Male	39	33.9
Female	76	66.1
<i>Age (years)</i>		
< 40	45	39.1
> 40	70	60.9
<i>Place of work</i>		
Tertiary hospitals	93	80.8
General hospitals	8	7.0
Company clinics	8	7.0
Private health facility	6	5.2
<i>Year of graduation</i>		
1960-1970s	21	18.3
1980-1989	51	44.3

Table II:

Chosen management options versus certain social characteristics of respondents.

	All	PN	Place of practice		P-value	Year of Graduation		P-value
			TRH	NTRH		< 1990	> 1990	
N	115	8	93	22		72	43	
	%	%	%	%		%	%	
Urine culture	100	100	100	100	>0.5	100	100	>0.5
Renal U/S	85.2	100	83	95	0.19	85	86	>0.5
IVU	10	13	9	18	0.24	10	12	>0.5
MCU	14	0	13	18	0.50	7	26	0.01
DMSA scan	36	38	34	41	0.75	18	42	0.01
IT	96.5	100	98	91	0.55	97	100	>0.5
OA	12.2	0	13	13	>0.5	14	9	0.65

PN=Paediatric nephrologist  
U/S=Ultrasound scan  
IT=Immediate treatment

TRH=tertiary hospital  
IVU=Intravenous urogram  
OA=Oral antibiotics

NTRH=Non-tertiary hospital  
MCU=micturating cystourethrogram  
DMSA=Dimercaptosuccinic acid

nephrologists and nine (nine percent) of the doctors in tertiary hospitals. The difference observed between doctors working in tertiary and non-tertiary hospitals was not significant. Sixteen (13.9 percent) and 42 (36.5 percent) of the paediatricians respectively, said that micturating cystourethrogram (MCU) and  $^{99m}\text{Tc}$ -dimercaptosuccinic acid scintigraphy (DMSA) scan would be needed. Those working in tertiary hospitals tended to advocate the performance of both the MCU and DMSA less frequently than those working in private/company hospitals ( $p=0.50$  and  $0.75$ , respectively). A significantly higher proportion of the doctors who graduated in the 1990s than those that graduated earlier, favoured the various imaging procedures (for MCU:  $\chi^2 = 6.33$ ,  $p$  value =  $0.01$  and for DMSA scan:  $\chi^2 = 6.59$ ,  $p$  value =  $0.01$ ).

#### Investigations based on professional status of responders

Requests for the various investigations varied according to the professional status of the responders. A greater percentage of resident doctors (46/51; 90.2 percent) than consultants (52/64; 81.3 percent) would order renal ultrasound; this difference was however, not significant ( $\chi^2 = 2.5$ ,  $p$  value  $< 0.1$ ). Three (4.7 percent) of the consultants thought the child would re-

quire an intravenous urogram (IVU). The use of MCU and DMSA scan was favoured by two (3.1 percent) and 17 (26.6 percent) consultants, respectively. Corresponding numbers among the resident doctors were eight (15.7 percent) and 24 (47.1 percent); the difference was significant only with respect to the use of DMSA scan ( $\chi^2 = 5.53$ ,  $p$  value  $< 0.025$ ).

#### Treatment of APN

Most paediatricians (96.5 percent) would commence treatment immediately, without waiting for urine culture results as shown in Table II. All paediatric nephrologists (100 percent) and resident doctors (100 percent) agreed on immediate treatment. The intravenous route was preferred to the oral route (87.8 percent vs 12.2 percent). The use of oral antibiotics for the treatment of APN was inversely related to the year of graduation. However, the difference was not statistically significant. Similarly, the place of work, professional status and the year of graduation did not significantly influence the treatment eventually chosen ( $p > 0.05$ ). A cephalosporin was the preferred antibiotic of choice for the empirical treatment of APN by 55 (47.8 percent) of the paediatricians as against penicillin favoured by 28 (24.3 percent) and other drugs preferred by 32 (27.8 percent) others. Forty-one (35.7

percent) respondents would include gentamicin in the treatment of APN.

### Discussion

Although the study assessed the opinions of Nigerian paediatricians with regard to the investigation and treatment of APN, the responses obtained may not necessarily reflect their current practices. The characteristics of the respondents reflect those of Nigerian paediatricians. Most of the qualified paediatricians in Nigeria work in tertiary hospitals while a few work in private hospitals. There are few paediatric nephrologists serving a population of over 20 million children in the country. There is currently no consensus guideline for the investigation and treatment of APN in the country. All paediatricians in this study requested a urine culture for APN. This is perhaps due to the fact that culture of more than  $10^8$  single organism/ml in the urine is the gold standard for establishing the diagnosis of urinary tract infection.<sup>3,7,11,12</sup> The finding is comparable to the 99 percent request for urine culture reported among Belgian paediatricians.<sup>13</sup>

Renal ultrasound (RUS) is an important non-invasive diagnostic tool for evaluation of acute pyelonephritis.<sup>3,7,11</sup> This is underscored by the fact that all paediatric nephrologists in this study would request the investigation during the acute phase of pyelonephritis. This is against the backdrop that it is operator-dependent and unreliable in demonstrating vesico-ureteric reflux (VUR).<sup>11,12,14,15</sup> Zamir *et al*<sup>14</sup> and Hoberman *et al*<sup>15</sup> reported the sensitivity of RUS for detecting VUR as 17.7 percent and 10 percent, respectively. Renal ultrasonography may demonstrate enlarged kidneys in 30-60 percent of APN, and renal scars in 30 percent of cases. It is also sensitive for detecting pyonephrosis, renal pelvis dilatation, hydroureters and hypertrophied bladders.<sup>11,14,17</sup> Intravenous urography (IVU) and micturating cystourethrogram (MCU) would be ordered by very few paediatricians in this study. This may be due to a high risk of radiation especially to the gonads in girls which discourages their routine use in APN, except in recurrent UTIs, suspected VUR or the possibility of urinary obstruction.<sup>5,7,11,14,18,19</sup> MCU is sensitive in the diagnosis of VUR in 40 percent of patients.<sup>5,11,12,19,20</sup> However, it is uncertain if the low incidence of VUR reported in Nigeria may have contributed to the low request for MCU in the present study.<sup>1,21</sup> The controversy in the appropriate timing of MCU in the management of UTI may have influenced the request. A delay of 2-6 weeks after the treatment of UTI is often recommended before MCU, in order to allow resolution of inflammation and prevent ascending infections in patients with reflux.<sup>11</sup>

Although the management of APN, including the use

of imaging is still controversial and generates much debate,<sup>14-18,20</sup> the American Academy of Pediatrics guidelines as appraised by the Royal College of Paediatrics and Child Health do not recommend invasive imaging for all UTI, except for recurrent UTI, all two- to 24-month-old children with their first documented UTI and those with specific risk factors.<sup>16</sup> The imaging should include MCU and renal ultrasonography, with the objective of minimizing the risk of chronic renal damage within reasonable economic constraints.<sup>16</sup> Similarly, the British Paediatric Association Imaging Group does not recommend MCU after UTI in children over one year unless specific risk factors exist.<sup>22</sup> This controversy may probably explain why very few consultants favoured the use of imaging compared to resident doctors in this study.

<sup>99m</sup>Tc-dimercaptosuccinic acid scintigraphy (DMSA) scan is the most sensitive test for APN and for the prediction of renal scarring.<sup>5,7,11-15,19,23-26</sup> Renal scans obtained at presentation identify children with APN, and the scans obtained six months later identify those with renal scarring.<sup>15,24,26</sup> The radiation dose is lower than for urography, and can be useful where renal function is impaired. However, DMSA scan facilities are lacking in most tertiary hospitals in Nigeria, due to poor funding of the health facilities. The level of medical care is low in Nigeria, and patients mostly finance their medical bills hence, only patients in private or company hospitals can afford these expensive procedures. This may probably explain the lower request for this investigation by the doctors working in tertiary as compared to those in private or company hospitals. Difference in the knowledge of the respondents, rather than resources available to them may have contributed to the observed wide variation in practice; the doctors who graduated in the 1990s would request imaging studies more commonly than the older doctors.

Immediate treatment of suspected APN before the availability of urine culture result was favoured in this study. Hiraoka *et al*<sup>8</sup> reported that treatment within 24 hours of febrile UTI prevents the development of renal damage. This is particularly important in our country where there is lack of sustained facility for renal replacement therapy. Drugs, including antibiotics, are freely sold in medicine shops, even without medical prescription in the country. This practice encourages inappropriate antibiotic use with development of drug resistance. Previous study has reported a high rate of resistance to first-line antibiotics in Nigeria and South Africa.<sup>27</sup> These may account for the choice of a cephalosporin in the empirical treatment of UTI. Reports have noted that intravenous antibiotic therapy is preferred in young children with APN because they

are usually ill and may exhibit overt signs of septicemia.<sup>7,11,12,14</sup> This trend is supported by the present study, with only 12.2 percent of paediatricians, mainly the older ones, accepting to use oral antibiotics in the treatment of APN.

The present study has thus shown a wide variation in the attitude of Nigerian paediatricians towards the management of APN. There is a need for the evolution of a protocol for the management of the infection given the varied and frequently limited resources in Nigeria. An evidence-based guideline should be adopted in the country as elsewhere, to prevent inappropriate investigation and treatment of the children at risk.<sup>16,23</sup>

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