

## SENSITIVITY PATTERN OF BACTERIAL ISOLATES IN CHILDHOOD SEPSIS IN CLINICAL PRACTICE AT ONITSHA

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### ABSTRACT

**Objective:** To determine the commonest organism cultured from the blood of children suspected to have bacterial sepsis and their antibiogram sensitivity using the commonly used antibiotics in a private practice and see if there are differences from established data from other areas.

**Method:** Children beyond neonatal age presenting to a children's specialist hospital in southeast Nigeria over a 2 year period with fever and other features of systemic inflammatory response syndrome (SIRS) thought to be due to bacterial infection (but without focal point of infection) had their blood cultures done. A review of their case notes and an analysis of their blood culture and antibiogram sensitivity results was done.

**Results:** Fourteen cases fitted the criteria and were analysed. *Staphylococcus aureus* was the commonest organism and of the profiled antibiogram the sensitivity pattern showed that ciproxin, gentamycin, chloramphenicol and erythromycin were the best.

**Conclusion:** *Staphylococcus aureus* is still a major cause of childhood bacterial sepsis. Gentamycin and erythromycin are safe and useful antibiotics in their treatment and are recommended.

**Key words:** childhood sepsis, bacteria, sensitivity.

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### INTRODUCTION

Blood stream infections could range from self limiting infections to life threatening sepsis that require rapid and aggressive antimicrobial treatment.<sup>1</sup> These blood stream infections when of bacterial origin and in association with systemic inflammatory response (SIRS) are referred to as bacterial sepsis.<sup>2</sup> SIRS is said to be present when there is fever in conjunction with any two of the following: tachycardia, tachypnoea and an abnormal leucocyte count.<sup>2</sup> Blood stream infections, presenting as sepsis are an important cause of morbidities and mortalities.<sup>3,4</sup> In fact, the prevalence rate for sepsis in febrile infants observed in a study in Ibadan made the researchers to recommend the empirical use of antibiotics for such febrile infants.<sup>5</sup> The detection of microorganisms in blood cultures is considered an indicator of disseminated infection and has been shown to be a valid marker for the surveillance of blood stream infections.<sup>6</sup> One of the commonest isolates worldwide is *Staphylococcus aureus*,<sup>7-10</sup> even in infants.<sup>11</sup> The study from England and Wales actually documented it as accounting for one of the top 5 causes of bacteraemia in every age

common bacterial pathogen and the others to antimicrobial agents has been changing over time depending on the drugs.<sup>11-13</sup> In fact, a study had noted that one of the more alarming recent trends in infectious diseases has been the increasing frequency of antimicrobial resistance among microbial pathogens causing nosocomial and community acquired infections.<sup>14</sup> This has led to the calls that effort at continuous surveillance of antibiotic resistance in blood pathogens be put in place.<sup>7,10-12</sup> This will help in prescribing and infection control policy and guide the development of new antibiotics.<sup>15</sup> This is essential for the attainment of the best clinical practice that is a by-product of evidence based medicine. This paper presents a review of the cases seen in a Children Specialist Hospital in southeast Nigeria and aims to highlight the sensitivity pattern of the most prevalent bacterial pathogen in childhood bacterial sepsis in the environment.

### METHODS

Children presenting with presumed bacterial sepsis from Jun 2005 to May 2007 inclusive in a Children's Specialist Hospital in South East Nigeria had blood cultures routinely done and antibiogram sensitivity pattern determined.

A review of these cases was done and for the purposes of this review, the inclusion criteria

include:

1. age above one month
2. presence of fever of above 37.5<sup>oC</sup>
3. presence of any two of the following: tachycardia or tachypnoea for age (above 90<sup>th</sup> centile for age) or neutrophilic leucocytosis.
4. positive blood culture result.

The exclusion criterion is presence of a focal point of bacterial infection.

Their sexes, ages, organism cultured and antibiogram sensitivity pattern were recorded and analysed.

## RESULTS

Thirty eight cases had blood cultures done within the period but only 14 met the criteria and were

reviewed. There were 8 males and 6 females with a male to female ratio of 1.3:1. The culture results and antibiotic sensitivity pattern are as shown in Tables 1a and 1b for females and males respectively. From these tables, the cultured organisms were sensitive to gentamicin, Erythromycin, ciproxin, chloramphenicol and streptomycin for both sexes but resistant to nitrofurantoin for both sexes. Table 2 shows the number of times each drug was used for sensitivity testing and their recorded degree of pathogen sensitivity. The cultured organisms were many times more sensitive to gentamicin erythromycin, ciproxin, chloramphenicol and streptomycin. Specifically, the degree of sensitivity was more to gentamicin, ciproxin, chloramphenicol and erythromycin in that order.

Table 1: Culture Results and Antibiotic Sensitivity in Childhood Sepsis.

Table 1a: Females

Age	Organism	Gent	Linc	Ery	Cipr	Chlor	Str	Rif	Ampclox	Nitrif	Flox
7	<i>Staph au</i>	S	S	S	S	-	S	R	R	R	S
9	<i>Staph au</i>	S	S	S	-	S	S	-	R	R	-
13	<i>Staph au</i>	S	S	S	S	S	S	S	S	S	S
48	<i>Staph au</i>	S	-	S	S	S	-	S	-	R	R
48	<i>Staph au</i>	S	S	S	-	S	S	R	-	S	S
60	<i>Strep pn</i>	S	S	S	-	S	S	S	S	-	S

Table 1b Males

Age	Organism	Gent	Linc	Ery	Cipr	Chlor	Str	Rif	Ampclox	Nitrif	Flox
7	<i>Staph au</i>	R	R	S	S	S	-	R	-	R	R
12	<i>Staph au</i>	S	R	S	S	S	-	S	S	S	S
20	<i>Strept pn</i>	S	S	S	-	S	-	-	S	R	R
23	<i>Staph au</i>	S	R	S	-	-	S	R	-	-	R
48	<i>Staph au</i>	S	R	R	S	S	S	S	-	S	R
56	<i>Staph au</i>	S	-	-	S	R	S	R	S	-	R
72	<i>Staph au</i>	S	R	-	S	-	S	S	R	-	R
84	<i>Staph au</i>	S	R	-	-	-	R	-	S	R	R

F = Female

M = Male

R = Resistance

S = Sensitive

*Staph au* = Staphylococcus aureus = 85.7%

*Strep pn* = Streptococcus Pneumonia = 14.3%

GENT = gentamicin

LINC = lincocin

ERY = erythromycin

CIPR = ciproxin

CHLOR = chloramphenicol

STR = streptomycin

RIF = rifampicin

AMPCLOX = ampicloxacin

NITRF = nitrofurantoin

FLOX = flucoxacin

**Table 2: Frequency of Use of Drug and Degree of Sensitivity.**

Drug	Degree of Sensitivity			Resistant	Total
	+ or ++	+++ or ++++			
Gentamycin	3	10	1	14	
Lincomycin	3	3	6	12	
Erythromycin	4	6	1	11	
Ciproxin	3	6	-	9	
Chloramphenicol	3	6	1	10	
Streptomycin	5	4	1	10	
Rifampicin	4	2	5	11	
Ampicloxacillin	4	2	3	9	
Nitrofurantoin	2	2	6	10	
Flucloxacillin	3	2	8	13	

+ and ++ = Sensitive  
 +++ And ++++ = Very Sensitive.

## DISCUSSION

This review is from routine clinical and laboratory practice in a children's specialist hospital. The antibiogram was the one for daily hospital practice and therefore was not all inclusive of antibiotics as would be necessary in a study like this. This shortcoming notwithstanding, the antibiotics against which sensitivity was obtained are amongst the commonly used, and therefore made this review relevant. Though 34 cases were identified, the number that met the criteria were however small, though informative. Importantly too is that the cultured organisms were unlikely to be contaminants because a greater number of cases thought to be bacterial sepsis and had blood cultures done within the same period grew nothing. The most prevalent bacterial agent in the review is *Staphylococcus aureus* from all the children with bacterial sepsis for the group reviewed. This has remained the pattern in most other studies, locally and internationally over the years.<sup>7-11</sup> This review shows that of all the antimicrobial agents, gentamicin, had the best inhibitory effect on the growth of this organism. This was followed by ciproxin, chloramphenicol and erythromycin in that order, using the degree of sensitivity. Though pharmacologically their anti-*Staphylococcal aureus* activity may not be high (except for ciproxin), their infrequent use either because of the route of administration, gentamicin as injections, or the side effects or fear of the side effects, abdominal discomfort of erythromycin, may have made them to still be very effective though having been long on the shelf. This is unlike the case for the regular anti-*Staphylococcus aureus* antibiotics e.g. ampiclox, which are often easier to administer and have fewer side effects, hence are prone to abuse. This may account for the least inhibitory effect on the growth of this organism as seen with this agent. Incidentally, erythromycin and gentamicin, to which this commonly grown organism is sensitive in this our review is also the

same finding by some other studies.<sup>7-10</sup> Additionally, it may also be plausible that in our environment, we have the Canadian strain of *Staphylococcus aureus* which was found in a sentinel study to be more sensitive to these antibiotics than as would be expected, hence our results.<sup>7</sup> A word of caution however is that these are in vitro results. There may be alterations of sensitivity, inhibitory or potentiation, which could result from in vivo use of these drugs. It is therefore being recommended that, in clinical conditions in this environment where bacterial organism is suspected as the cause of a presumed sepsis, erythromycin or gentamycin or a combination of both could be used in the initial treatment of such patients while awaiting the blood culture results. Erythromycin is recommended over ciproxin and chloramphenicol because it has the least side and or idiosyncratic effect from the other two drugs. A child with bacterial sepsis is at risk for progression of the condition to an ultimate death. Timely and definitive medication of such a child would be the expectation of all especially if based on evidence such as this.

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