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Original Article

Antibiotic profile in pediatric wards, Department of Child Health, Cipto Mangunkusumo Hospital

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ABSTRACT

Introduction The medical profession has currently come to a conclusion that the major problem in the future is failure of treatment due to antibiotic-resistant microorganisms.

Objective The aim of this study was to determine the profile of antibiotics used in the Pediatric Wards of Department of Child Health, Medical School, University of Indonesia, Cipto Mangunkusumo Hospital, Jakarta.

Methods A descriptive retrospective study was conducted on all patients hospitalized in the Pediatric Wards of Department of Child Health, Medical School, University of Indonesia, Cipto Mangunkusumo Hospital during June–July 2001. Data were obtained from the medical records of the patients.

Results Three hundreds and fifty-six hospitalized patients fulfilled the inclusion criteria. The antibiotics were given to 48.7% of the patients. The greatest user of antibiotics was the age group of 1-5 year-old, 50% of patients had been given single antibiotic and the rest given combined antibiotics. The ICU used antibiotics most frequently in contrast to the one-day care unit which used least. The greatest use of single antibiotic was in the class 1-2 wards while combined antibiotics were mostly used in the third class wards. Single antibiotics used were cefotaxime (49.4%), amoxicillin (20.7%), and ampicillin (11.55%). Combined antibiotics used were ampicillin + chloramphenicol (34.5%), cotrimoxazole (21.8%), cefotaxime + amikacin (5.7%), cefotaxime + cotrimoxazole (5.7%), and cefotaxime + isoniazid + rifampicin + pyrazinamide (5.7%).

Conclusions The antibiotics most commonly used singly was cefotaxime. The combination of antibiotic mostly used was ampicillin + chloramphenicol **[Paediatr Indones 2004;44:46-50].**

Keywords: antibiotic, pediatric ward, hospitalized patients, single antibiotic, combined antibiotic

Antibiotic is a substance produced by microorganisms with a specific function of killing other type of microorganisms. Nowadays, there are antibiotics that are semisynthetic as well as fully synthetic.[1] The inappropriate or irrational use of antibiotics will cause new problems such as increased resistance and inefficient use of funds.[2] In order to know and understand the use of antibiotics in children, one must comprehend the nature of absorption, distribution, metabolism, and excretion.[3]

The aim of this study was to obtain information regarding the use of antibiotics in children in the Pediatric Wards, Department of Child Health, Medical School, University of Indonesia, Cipto Mangunkusumo Hospital.

Methods

This was a descriptive study conducted retrospectively on all patients who were treated in the Pediatric Ward, Department of Child Health, Medical School, University of Indonesia, Cipto Mangunkusumo Hospital during the period of June to July 2001. Data were collected from medical records of the patients. Samples were selected through simple random sampling. Criteria of inclusion were all patients with the age of one month to 18 years old with complete

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medical records, who were given antibiotics either started from the beginning of hospitalization or after a few days of hospitalization. All newborn infants, patients treated in the private class, those who had incomplete medical records, and patients who died or discharged from the hospital before 24 hours of hospitalkization were excluded from the study.

The Department of Child Health, Medical School, University of Indonesia, Cipto Mangunkusumo Hospital has outpatient clinics and wards. The wards consist of classes 1-2, class 3, one-day care, intermediate ward, intensive care unit, perinatology ward, and private ward. These wards have different classification, indications, and price rates. Identification of variables was done including age, diagnosis, type of antibiotics, type of single antibiotic, and type of combined antibiotics.

The age groups in this study were 1-11 months, 1-5 years, 6-10 years, and 11-18 years old.[4] The diagnosis of the disease could be clinical, symptomatic, pathologic anatomy, physiological, functional, and causal or etiologic.[5] The use of single antibiotic was defined as the use of only one antibiotic during the early period of treatment, while the use of combination of antibiotics was defined as the use of more than one antibiotics during the early period of treatment.[6,7] All data were recorded in a prepared form and transferred into a computer disc using SPSS program. Analyzed data are presented in text or tables.

Results

During the study period, data in the ward indicated that there were 611 patients. There were only 365 (65%) patients whose medical records could be found. From these number there were 356 patients whose records fulfilled the inclusion criteria. Nine subjects were excluded (4 neonates, 2 died, 2 with incom-plete medical records, 1 with age of >18 years old). The 356 subjects consisted of 205 boys and 152 girls. There were 174 (48.7%) patients who received antibiotics, 87 of which (50.0%) received single antibiotic and the other 87 (50.0%) received a combination of antibiotics. The rest of the patients (183 patients or 51.3%) did not receive antibiotics. The age group with the highest use of antibiotic was 1-5 years old. The ward that most frequently used antibiotic was the intensive care unit whereas the least was the one-day care unit. Single antibiotic usage was more frequent in class 1-2 wards, while the combination of antibiotics was more frequently used in the class 3 ward.

Table 1 shows that cefotaxime is the most commonly used single antibiotic in the pediatric ward. The greatest use of cefotaxime was in the ICU.

Table 2 indicates that patients in the 3rd class ward were the highest users of combined antibiotics whereas those in the one-day care ward were the lowest. The most common combination of antibiotics used was ampicillin + chloramphenicol.

Discussion

The subjects were not evenly distributed in regard to age; most patients were young children. The selection of sample was different from the original plan because each ward had different preferences in the use of antibiotics, thus the sample was selected according to

Table 1. The use of single antibiotic in the Pediatric Wards, Department of Child Health, Cipto Mangunkusumo Hospital, from June–July 2001

Single Antibiotic	Ward					Total
	3rd Class	1st – 2nd Class	ODC	IW	ICU	
Amikacin	1	-	-	-	-	1 (1%)
Amoxicillin	4	6	3	4	1	18 (21%)
Ampicillin	2	5	-	3	-	10 (12%)
Kedacillin	-	-	-		1	1 (1%)
Clindamycin	1	-	1		-	2 (2%)
Chloramphenicol	1	-	1		-	2 (2%)
Cefepime	-	-	-		2	2 (2%)
Penicillin	2	-	-		-	2 (2%)
Cephadroxyl	1	2	-		1	4 (5%)
Cefotaxime	10	8	1	6	18	43 (49%)
Cephradine	1	1	-	-	-	2 (2%)
Total	**23 (26%)**	**22 (25%)**	**6 (7%)**	**13 (15%)**	**23 (26%)**	**87 (100%)**

Note: ODC: One-day Care, **IW:** Intermediate Ward, **ICU:** Intensive Care Unit

TABLE 2. ANTIBIOTIC COMBINATION PROFILE IN THE PEDIATRIC WARDS, DEPARTMENT OF CHILD HEALTH, CIPTO MANGUNKUSUMO HOSPITAL, FROM JUNE–JULY 2001

Antibiotic Type	Ward					Total
	3rd Class	1st-2nd Class	ODC	IW	ICU	
Ampicillin + chloramphenicol	19	1	1	8	2	31 (36%)
Cotrimoxazole	9	1	9	-	-	19 (22%)
Ampicillin + gentamicin	-	-	-	-	2	2 (2%)
Cefotaxim + amikacin	1	1	-	-	3	5 (6%)
Cotrimoxazole + metronidazole	3	-	-	-	-	3 (3%)
Cefotaxime + metronidazole	-	-	-	-	3	3 (3%)
Cefotaxime + cotrimoxazole	3	1	-	1	-	5 (6%)
Cefotaxime+rif+INH+ETH+PZA	3	-	-	2	-	5 (6%)
Ampicillin+rif+INH+PZA	-	-	-	-	1	1 (1%)
Ampicillin+rif+INH+ETH+PZA	1	-	-	-	-	1 (1%)
Cotrimoxazole + amoxicillin	-	-	-	1	-	1 (1%)
Penicillin + cefotaxime	1	-	-	-	-	1 (1%)
Rif + INH + ETH + PZA	1	-	-	-	-	1 (1%)
Cefotaxime+chloramphenicol+ rif+INH+ETH+PZA	-	1	-	-	-	1 (1%)
Cefotaxime+metronidazole + rif+INH+ ETH+PZA	1	-	-	-	-	1 (1%)
Cefotaxime+amikacin+rif+INH+ ETH+PZA	-	-	-	1	-	1 (1%)
Ceftazidime + amikacin	-	-	-	-	1	1 (1%)
Ceftriaxone + rif + INH + PZA	1	-	-	-	1	1 (1%)
Ceftriaxone + mentronidazol	-	1	-	-	-	1 (1%)
Cefotaxime + gentamicin	-	-	-	1	1	1 (1%)
Total	**43 (49%)**	**6 (7%)**	**10 (12%)**	**14 (16%)**	**14 (16%)**	**87 (100%)**

Note: **ODC:** One-day Care, **IW:** Intermediate Ward, **ICU:** Intensive Care Unit
Rif: rifampicin, **INH:** isoniazid, **ETH:** ethambutol, **PZA:** pyrazinamide

a time limit (June 1st – July 31st 2001).

Cefotaxime belongs to the third generation of cephalosporin that is intended for Gram negative and Gram positive bacteria. This antibiotic is indicated for therapy as well as for prophylaxis in surgery.[8] In this study, 43 patients consisting of 20 post-surgical patients, 8 malignancy, 5 hemolytic anemia, 2 sepsis, 2 coagulation disorder, 2 pleural effusion, 2 nephrotic syndrome, 1 aplastic anemia, and 1 urinary tract infection patient received cefotaxime as a single antibiotic.

Amoxicillin and ampicillin belong to the betalactamase group (penicillin) which have a broad spectrum activity but easily destroyed by the betalactamase enzyme of Gram positive and Gram negative bacteria.[9] In this study, 18 patients consisting of 5 post streptococcal acute glomerulonephritis, 3 aplastic anemia, 2 congenital heart diseases, 1 complex febrile convulsion, 1 malignancy, 1 hemolytic anemia, and 1 dengue fever patient received amoxicillin. There were 10 patients consisting of 6 congenital heart disease, 2 postsurgical, 1 hemolytic anemia, and 1 upper respiratory tract infection patient who received ampicillin.

Cefepime is a fourth generation of cephalosporin indicated for Gram positive and Gram negative aerobic bacteria that are resistant to the third generation of cephalosporin.[10] In this study, two patients, one post surgery and one with sepsis, received cefepime. Cefepime is safe and effective as an empirical therapy for serious infection in patients who are hospitalized. Moreover, cefepime is effective as an empirical therapy for malignancy patients with neutropenic fever.[11-13]

Chloramphenicol must be used cautiously because it can cause gray syndrome in neonates due to the toxic effect of chloramphenicol accumulation. Until recently, chloramphenicol is the drug of choice for typhoid fever although some investigators considered it to be resistant.[14]

The combination of antibiotics that is still widely used in our department is ampicillin + chloramphenicol. This combination is mostly indicated for *Haemophilus influenzae*. Although it is still a controversy, empirically it is effective. World Health Organization has recommended the use of this type of antibiotics combination in developing countries. And in our department, until 2001, this combination was

widely used in pneumonia, purulent meningitis, encephalitis, etc.[15]

In this study, a combination of ampicillin and chloramphenicol was administered to 10 patients with bronchopneumonia, 6 diarrhea, 4 aspiration pneumonia, 3 encephalitis, 2 upper respiratory tract infections, 2 congenital heart diseases, 1 purulent meningitis, 1 dengue hemorrhagic fever, and 1 hydrocephalus patient. Aronoff *et al* believed that ceftriaxone is safer and more effective in treating bacterial meningitis compared to ampicillin + chloramphenicol.[8]

Cotrimoxazole is a fixed antibacterial combination of trimethoprim and sulfamethoxazole indicated for Gram positive and Gram negative bacteria.[9] In this study, 18 patients consisting of 15 diarrhea, 1 upper respiratory tract infection, 1 typhoid fever, and 1 malignancy patient received cotrimoxazole.

A combination of cefotaxime and amikacin, which is effective against several Gram positive and all Gram negative bacteria, is often used in severe infections and is considered to be the drug of choice. In this study, there were 6 patients consisting of 2 sepsis, 1 encephalitis, 1 bronchopneumonia, 1 purulent meningitis, and 1 post surgical patient who received this combination. Leibovici *et al* stated that such combination should be given to neutropenic patients who are at risk for pseudomonas infection while patients with Gram negative infection should be treated with betalactame as monotherapy.[16]

Cefotaxime-cotrimoxazole is a combination that is rarely used and is given incidentally. In this study, those who received such combination were 4 malignancy patients and 1 patient with diarrhea. Malignancy patients in our department received cotrimoxazole as a prophylaxis treatment against *Pneumocytis carinii* whereas cefotaxime is given to those with neutropenic fever.[14]

A combination of cefotaxime with antituberculous drugs is used in tuberculous patients who suffer from nonspecific infection. In this study, three patients with serous meningitis, one with severe malnutrition, and one with hydrocephalus, received this combination. Currently, tuberculosis in children is treated with a combination of isoniazid, pyrazinamide and rifampicin. In severe tuberculosis or if a risk of resistance is expected, ethambutol is also given during the early period of treatment.[17]

We concluded that the antibiotic most commonly used singly in our department is cefotaxime, whereas the combination of antibiotics mostly used is ampicillin + chloramphenicol. A prospective study with bigger sample and better recording of data needs to be done in order to get more reliable results. Since resistance pattern is always changing, an audit of antibiotic used should be done in each division. Moreover, in order to increase the rational use of antibiotics, there should be a standard procedure for infection treatment, a guideline of using antibiotics, a monitoring of bacterial resistance pattern, prescription writing, and antibiotic consumption.

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