

# Penggunaan antibiotik pada infeksi saluran pernafasan anak

## Antibiotic usage in pediatric respiratory tract infection

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### Abstrak

Infeksi saluran pernafasan merupakan penyebab utama kematian anak-anak di bawah 5 tahun di dunia. Di negara-negara maju, infeksi saluran pernafasan merupakan penyebab pertama morbiditas, 20% konsultasi kesehatan, 30% tidak masuk kerja dan 75 % persepsian semua antibiotik. Infeksi saluran pernafasan atas pada anak seringkali berkaitan dengan infeksi virus dan sekitar 40-60% diantaranya diresepkan dengan antibiotik. Jenis antibiotik antar rumah sakit sangat bervariasi.

Penelitian ini bertujuan untuk mengetahui pola penggunaan, keluaran dan harga antibiotik pada pediatrik yang menderita infeksi saluran pernafasan.

Penelitian ini bersifat prospektif dan dilaksanakan terhadap pasien pediatrik yang dibawa ke Bangsal Pediatrik Rumah Sakit Penang, Malaysia. Data yang diperoleh dianalisis dengan analisis deskriptif.

Hasil penelitian menunjukkan penisilin, eritromisin, amoksisilin-asam klavulanat merupakan antibiotik yang paling sering diresepkan pada penderita infeksi saluran pernafasan. Rata-rata durasi terapi antibiotik adalah  $3.0 \pm 3.2$  hari, lama turunnya demam  $2.2 \pm 2.4$  hari, hilangnya gejala  $3.7 \pm 2.5$  hari dan lama perawatan di bangsal  $4.9 \pm 2.8$  hari. Rata-rata biaya total antibiotik adalah RM  $14.83 \pm 83.13$  dan total biaya terapi infeksi saluran pernafasan adalah RM  $98.88 \pm 65.87$ .

**Kata kunci:** antibiotik, infeksi saluran pernafasan, pediatrik, rumah sakit

### Abstract

Respiratory tract infections are the worldwide main cause of death in children aging less than 5 years. In developed countries; respiratory tract infections are the leading cause of morbidity, accounted for 20% of medical consultation, 30% of work absenteeism and 75 % of all antibiotic prescription. Upper respiratory tract infections in children, which often associated with viral infection, and in average about 40 – 60 % of children with upper respiratory tract infections were prescribed with antibiotics. The type of antibiotics also varies from hospital to another.

The objectives of this study are to describe the pattern, outcome, and cost of antibiotic usage in pediatric respiratory tract infections. A prospective study of pediatrics admitted to Pediatric Ward, Penang Hospital for respiratory tract infections was carried out. Appropriate descriptive analysis was used.

The results showed that penicillin, erythromycin; amoxicillin-clavulanate were the most commonly prescribed antibiotics for respiratory tract infections. The average duration of antibiotic therapy  $3.0 \pm 3.2$  days, fever clearance time  $2.2 \pm 2.4$  days, improvement of sign and symptoms  $3.7 \pm 2.5$  days and mean length of stay in the ward was  $4.9 \pm 2.8$  days. The

average cost of antibiotics was RM 14.83 ± 83.13, and total cost of respiratory tract infections treatment was RM 98.88 ± 65.87.

**Key words:** antibiotic, respiratory tract infection, pediatric, hospital

## Introduction

Respiratory tract infections (RTIs) are considered by the World Health Organization as the forgotten pandemic; they were the worldwide main cause of death in children < 5 years old and produce 8.2 % of the total disease burden. In the developed countries, RTIs were leading cause of morbidity, accounted for 20% of medical consultation, 30% of work absenteeism and 75 % of all antibiotic prescription (Dolores and Arturo, 2001).

In United Kingdom (UK), Upper RTIs (URTI) represent the most common illness referred to family doctor and The Fourth National Morbidity Survey reports consultation rates of 3103 and 1002 per 10.000 years at risk in children ages 0-4 and 5-15 years, respectively. In 1995, Upper RTIs was the most frequent reason for seeking ambulatory in USA, resulting in more than 37 million visits to physician practices and emergency departments (Fahey *et al.*, 1998).

Acute RTIs (ARTIs) are also the most common disease afflicting Chinese children and ranks first in numbers of out patients, hospitalization and fatality rate. ARTIs are also the most frequent reason that antibiotics are prescribed (Yonghong *et al.*, 2001).

Upper RTIs (URTI) are the second leading condition for which antibiotics are prescribed each year, and it accounts for 10 % of all antibiotics prescribed annually in ambulatory practice. The cause is usually viral, with fewer than 10 % of cases caused by bacteria. Despite the predominantly viral cause, antibiotics are frequently prescribed to children with symptoms of RTIs. On average, 40 % of children with RTIs were given an antibiotic, but this varies substantially between doctors, with some general practitioners prescribing to as many as 60% of children who present with RTIs (Fahey *et al.*, 1998).

An upper ARTI was defined as the presence of at least one of following sign: rhinorrhea, sore throat or cough, without signs of lower ARTI, for > 48 hours. Lower ARTI

was defined as the presence of at least one of following sign: rales, crepitations, wheezing, stridor, respiratory rate > 50/min, cyanosis, or chest indrawing for > 48 hours. ARTIs in children are associated with acute otitis media, which is important cost for health-care services and can cause hearing loss and learning problems, even in those treated properly. URTIs include common cold, tonsillitis, acute sinusitis, otitis media pharyngitis, croup (epiglottitis & laryngitis). LRTIs include bronchitis, bronchiolitis, pneumonia (Dolores and Arturo, 2001).

A definite diagnosis of the infection sites is necessary for the rational use of antibiotics in these conditions. The study of RTIs in children is particularly interesting, because they are the most frequent infections and the main indication for antibiotics.

## Methodology

This study was carried out prospectively in the pediatric ward, Penang General Hospital, Penang, Malaysia for four months period started on December 2001 until end of March 2002. Convenience sampling was used to select the subjects. All pediatric inpatients age 15 years or less, diagnosed with RTIs with no other infectious problems were included into the study.

Study variables includes patient's factors (e.g. age, gender), disease factors (e.g. temperature on admission), drug factors (e.g. antibiotic used during hospitalization), economic factors (e.g. hospitalization expenses), length of stay (LOS), fever clearance time (FCT), duration for the improvement of sign and symptoms and costs of drug, laboratory, hospitalization and professional fee. The definitions of variables used in the study are as follow in table I.

The result was analyzed by using Statistical Package For Social Sciences (SPSS version 10.0). Parametric and nonparametric statistical analysis were used whenever appropriate.

## Results and Discussion

There were forty RTIs subjects followed and studied. In this study collected 31 male and 9 female. According the race, we collected Malay 28 (70.0%) , Chinese 9 (22.5%), and

Table I. The definition of variable

No	Variable	Definition
1	Improvement of signs and symptoms	Disappearance of symptoms occurred in patients (e.g. fever, cough, ronchi)
2	Fever clearance time (FCT)	The time form the start of treatment until the auxiliary temperature fell below 37.5 °C and remain below the level for more than 48 hours
3	Length of stay	Number of days when the patients stayed in hospital
4	Duration of antibiotic	Length of antibiotic used by the patients in the ward
5	Antibiotic cost	The cost of antibiotic used throughout the study period
6	Laboratory cost	Cost of laboratory test that been done for the patients
7	Hospitalization cost	Cost of staying and nursing in the hospital, number of days when the patients stayed in hospital x hospitalizing expenses per day (according to the hospital guidelines)
8	Professional cost	Consist of physician's cost, nurses, pharmacies, pharmacies assistance's cost, attendant's cost and lab technician's cost. E.g. Physician's cost = physician's time spent for each patient (hour) x Physician's salary per hour
9	Total cost	Sum of all cost per patient in one period of admission

Table II. Patient characteristic

Variable	No of cases	%
Gender		
Male	31	77.5
Female	9	22.5
Race		
Malay	28	70.0
Chinese	9	22.5
Indian	3	7.5
RTI groups		
Bronchiolitis	12	30.0
Pneumonia	10	25.0
Bronchopneumonia	9	22.5
Pharyngotonsillitis	5	12.5
Acute otitis media	3	7.5
Croup	1	2.5
Comorbidity	18	45.0
Previous antibiotic treatment	5	12.5

Indian 3 (7.5%). Patient had concomitant disease (comorbidity) in 18 (40.0%) patients; including asthma, cardiac problem, lymphadenopathy and worm. Five patients (12.5%) had previous antibiotic treatment (Table II).

Our study found that the main cause of RTIs were bronchiolitis in 30.0% of patients,

pneumonia 25.0%, bronchopneumonia 22.5%, pharyngotonsillitis 12.5%, acute otitis media 7.5% and croup 2.5%. An antibiotic was prescribed in 70.0 % of the RTIs when 100.0 % in pneumonia, bronchopneumonia, acute otitis media, croup, 60.0% in pharyngotonsillitis, and 16.7 % in bronchiolitis.

This finding is quite similar to the results of Ochoa *et al.* (2001) study in Spanish. In this study antibiotics were prescribed in 58.7% of the RTIs, when bronchiolitis 11.5%, bronchitis 40.2%, pharyngotonsillitis 80.9%, no specified RTIs 34.8%, pneumonia 92.4%, otitis 93.4%, and sinusitis 92.6%.

Al-Elidan *et al.* (1999) in their retrospective study also found almost similar result. Antibiotics were prescribed for otitis media in 96.0% of patients, for pneumonia in 100.0%, for pharyngitis in 66.0%, for bronchiolitis in 38.0%, for reactive airway disease in 24.0% and for viral or "upper respiratory tract illness" in 14.0%.

Yonghong *et al.* (2001) found that antibiotics were prescribed to 44.0% of patients with common colds, 46.0% with URTIs, and 75.0% with bronchitis. Extrapolating to the United States, 6.5 million prescriptions (12.0% of all prescriptions for children) were written

Table III. Group of Antibiotics most frequently prescribed

Antibiotics Prescribed	Bronchio-litis	Pneumo-nia	Bronchop-neumonia	Pharyngo-tonsillitis	Acute otitis media	Croup	Total
No antibiotics	10	-	-	2	-	-	12
Penicillin	1	6	5	2	-	-	14
Erythromycin	1	4	3	-	-	1	9
Augmentin	-	3	2	1	2	-	8
Gentamicin	-	3	2	-	-	-	5
Cefuroxime	-	2	-	-	-	-	2
Azithromycin	-	-	1	-	-	-	1
CMC drop	-	-	-	-	3	-	3
Cefotaxime	1	-	-	-	-	-	1
Amikacin	-	-	1	-	-	-	1

Table IV. Profile of Outcome Parameters

RTIs Groups	Length of stay (Days)	Duration of Antibiotics (Days)	Fever clearance time (Days)	Improvement Sign & Symptoms (Days)
All RTIs	2.8 ± 4.9	4.3 ± 3.0	3.0 ± 2.3	2.5 ± 2.5
Bronchiolitis	3.9 ± 1.9	3.5 ± 3.5	3.6 ± 1.9	3.6 ± 1.9
Pneumonia	6.7 ± 3.3	5.1 ± 3.1	3.5 ± 2.6	3.5 ± 2.6
Bronchopneumonia	5.9 ± 3.3	5.2 ± 3.5	3.6 ± 32.9	3.7 ± 2.9
Pharyngotonsillitis	3.0 ± 0.7	2.3 ± 1.5	1.2 ± 0.5	1.2 ± 0.5
Acute otitis media	3.7 ± 1.2	1.7 ± 0.6	2.7 ± 1.2	2.7 ± 1.2
Croup	4.0 ± 0.0	4.0 ± 0.0	1.0 ± 0.0	1.0 ± 0.0

Table V. Profile of Cost Parameters

RTIs Group	Antibiotics cost (RM)	Total costs (RM)
All of RTIs	14.83 ± 83.13	98.88 ± 65.87
Bronchiolitis	3.60 ± 1.95	66.33 ± 42.70
Pneumonia	24.00 ± 29.97	145.10 ± 73.27
Bronchopneumonia	24.00 ± 32.79	121.78 ± 80.15
Pharyngotonsillitis	5.00 ± 7.00	65.80 ± 9.73
Acute otitis media	13.75 ± 10.84	74.33 ± 27.10
Croup	6.00 ± 0.00	60.00 ± 0.00

for children diagnosed as having a URTI or nasopharyngitis (common cold), and 4.7 million (9.0% of all prescriptions for children) were written for children diagnosed as having bronchitis.

The antibiotics used for the management of RTIs were different between our finding and other study. Ochoa *et al.* (2001) found that the most commonly used antibiotics were amoxicillin/clavulanate (33.2%), amoxicillin (30.2%),

cefuroxime axetil (8.5%) and azithro-mycin (6.0%) compared to our finding (Table III) where penicillin 14 (50.0%), erythromycin 9 (32.1%), amoxicillin/ clavulanate 8 (28.6%) and gentamicin 5 (17.9%). The difference in local sensitivity pattern may explain these differences (Table III).

The study also found that mean duration of antibiotics in RTIs 4.3 ± 3.0, the range between mean 1.7 ± 0.6 (pharyngotonsillitis) to 5.2

$\pm 3.5$  days (bronchopneumonia). Then continue with oral antibiotic for completed 10-14 days.

The duration of antibiotic is rather short, however Pichichero. (2000) have showed that 2 to 5 day course of therapy for uncomplicated cases Acute Otitis Media (AOM) in patients at least 2 years of age are as effective as 10 day course for cephalosporins such as cefuroxime axetil and cefaclor (oral), ceftriaxone (IV) and macrolides such as azithromycin as well as amoxicillin and amoxicillin/clavulanate.

Table IV shows profile of outcome parameters according to the different groups of RTIs.

In our study, we found that antibiotics cost for all RTIs treatment therapy is cheap RM  $14.83 \pm 83.13$ . The range from RM  $3.60 \pm 1.90$  (bronchiolitis) to RM  $24.00 \pm 32.79$  (bronchopneumonia) whether total cost from RTIs RM  $98.88 \pm 65.87$ , the range from RM

$60.00 \pm 0.00$  in croup to RM  $145.10 \pm 73.27$  in pneumonia.

This is much cheaper compared to the similar study carried out by Wang *et al.* (1999) in Canada which found that the cost of over prescribing was CD 423.693, or 49.0% of the total cost of antibiotics (CD 859.893) used for treated RTIs (1 CD is equivalent to RM 2). Table V shows profile of cost parameters according to the different groups of RTIs.

## Conclusion

The study found that the trend in RTIs is similar to other studies and similarly with the use of antibiotics in the RTIs. The antibiotic cost and total cost of RTIs management are cheaper as compared to other studies.

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