



# Management of Infection Diseases and Clinical Outcome in Pediatric Ward

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## Research Article

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## Abstract

**Background:** Almost 11 million children die before the age of 5 years old. The cause of this problem is varying, such as acute respiratory disease, malaria, diarrhoea, measles, dysentery, pneumonia, and cough.

**Objective:** The objective of this study is to evaluate the patient drug therapy management and its outcome in the paediatric ward.

**Methodology:** The research was conducted using longitudinal observative method data was collection from patients' medical record in pediatric ward of HUSM Malaysia.

**Result :** From 37 male and 22 female with the mean age of  $4,94 \pm 4,05$  years old, the most common diagnose of patients are RTI (Respiratory Tract Infection) such AEBA (Acute Exacerbation Bronchial Asthma), Croup, CAP (Community Acquired Pneumonia ) and Acute Tonsillitis; meningitis and UTI (Urinary Tract Infection). The most common antibiotic drug treatment in paediatric ward was augmentin. There was significant different in antibiotic therapy among all of patient with different diagnosis of RTI disease ( $P < 0.05$ ). Most of the patient admitted in paediatric ward Discharge without complication.

**Key words:** pediatric ward, Therapy management, infectious diseases clinical outcome.

## INTRODUCTION

Children health is an indicator for the health of a nation (RWJF, 2009). Health problem in children will affect their growth. WHO (2004) described almost 11 million children die before the age of 5 years old. World Vision Asian Pacific (2009) report the same case occurred in Camboja, India, and Laos. In United States, 200 from 1000 children died before the age of 1 years old (Unicef, 2006). The cause of this problem is vary, such as acute respiratory disease, malaria, diarrhea, measles, malnutrition, dysentery, pneumonia, diphtheria, and cough ( Unicef, 2006; World Vision Asian Pacific, 2009; Nelson, 2007). In fact, death can be avoided through rapid handling (Unicef, 2006).

Infectious diseases remain the leading cause of death and disability-adjusted life years (MMWR., 1994), 25% cause of death in children due to infection. The top five causes of death from infectious disease are lower respiratory tract infections, HIV, diarrhoeal diseases, tuberculosis and malaria. Of the 11 million deaths in children under five who die each year, half are lost to pneumonia, diarrhoea, malaria. (Brownlie, et al., 2006).

None of parent want their children hospitalized, but from the above data, possibility of children hospitalized very high. For this reason, Hospital should give special notice for handling pediatric patients. Pediatric particularly neonates with a rudimentary organ metabolism can't accept the same treatment with adult. Drug treatment for pediatric need perfect management, start from enforcement diagnosis, drug selection, dosage plan, until monitoring of drug use (Agalu & Mekonnen, 2012).

Pediatric patients require special attention from health professionals in terms of drug interactions, because children have a different response to the drug with adults. Parts of the body which is responsible for the excretion perfectly not fully developed until the age of 1 year, so that the half-life of the drug is to long, that lead it's to toxicity (Novaes, 2006).

Objectives of this study is to determine the patient diagnoses in pediatric ward HUSM Kelantan



Malaysia, to determine how management therapy of infection diseases, and to determine outcome therapy infection disease with data laboratory.

**MATERIAL & METHODS**

This is prospective longitudinal study, which was conducted on 59 patients in paediatric ward. Data sociodemographic include age, gender, diagnosis, medical story. Data sociodemographic and diagnosis were descriptive analysis while relationship diagnosis and therapy by chi-square analysis, and relationship diagnosis with laboratory data by ANOVA analysis.

**RESULTS**

From 59 patients involved in study, 62.7% (37 patients) of them are male and 37.2% (22 patients) of them are female. The average body weight of the patient were 14.65 ± 11.44 Kg, and the average age of the patients were 4.94 ± 4.05 years old (Table 1 ).

**Table. 1. Frequency Sociodemographic Patients in Studied Population**

Characteristic	Mean ± SD	N	%
Gender			
Male		37	57,6
Female		22	37,2
Age	4,94 ± 4,05		
Bodyweight	14,65 ± 11,44		
Length of stay	3,24 ± 3,00		

During the period this study, RTI (Respiratory Tract Infection) case are of 31 (52.5%), while others infections diseases of 4 (6.8%), neuronal diseases of 8 (13.6%), renal diseases of 4 (6.8%), gastrointestinal diseases of 4 (6.8%), autoimmune diseases of 2 (3.4%), and others diseases of 6 (10.2%). From this data the most frequency disease diagnosed were RTI 31 (52.5%), and the second frequency is neuronal 8 (13.6%) (Table. 2).

In this study, the most common antibiotic used to treated the patient with RTI and others infection diseases is augmentin (Table,3 and 4).

**Table .2. The Relationship Between Diagnosis and The Age of Studied Population**

Diagnosis	N	(%)	Age Mean ± SD	P value *
RTI diseases				0.242
• Bronchopneumonia	2	32.2	4.0±3.94	
• AEBA	5	8.47	6.4±3.95	
• Croup	2	3.38	1.0±2.31	
• CAP	1	1.70	1.4±0.63	
• Acute Tonsillitis	3	5.10	4.40±2.861	
Others Infectious diseases				0.373
• Meningitis	2	3.38	1.65±0.643	
• UTI	2	3.38	1.4±-	
Neuro diseases				0.911
• Seizure	6	10.2	5.1±5.79	
• Epilepsi	2	3.38	3.7±0.989	
Renal diseases				0.034
• Nephrotic Syndrome	2	3.38	11.7±0.494	*
• AGN (acute Glomerulus Nefritis	2	3.38	7.6±5.027	
Gastrointestisinal diseases				0.989
• Constipation	3	5.10	4.6±4.975	
• AGE	1	1.70	5.0±-	
Autoimun diseases				0.927
• ITP (idiopphatic trombocitopenia)	1	1.70	2.9±-	
• SLE	1	1.70	11.0±-	
Other diseases				0.163
• Chrinic Hydrocephalus	1	1.70	9.0±-	
• Alleged insect	2	3.38	3.6±2.192	
• AVSD	1	1.70	5.0±-	
• Syncope	1	1.70	9.8±-	
• pseudotu mor cerebri	1	1.70	14.0±-	
Jumlah	5			
	9			



**Table. 3. The Relationship between RTI Diseases and Antibiotic**

in which more boy patients were found than the female patients.

Drugs	RTI Disease							P Value*
	No RTI Diseases	BP	AEBA	Croup	CAP	Acute Tonsillitis	Quota N (%)	
<b>Antibiotic</b>								0.050*
• augmentin	5	9	2	-	-	1	17 (28.81)	
• penicilin	2	-	-	-	-	1	3 (5.08)	
• cefotaxim	2	1	-	-	-	-	3 (5.08)	
• cefixim	1	-	-	-	-	-	1 (1.70)	
• ampicillin	-	1	1	-	-	-	2 (3.38)	
• azitromicin	-	1	-	-	-	-	1 (1.70)	
• doxacillin	1	-	-	-	-	-	1 (1.70)	
• metronidazole + augmentin	1	-	-	-	-	-	1 (1.70)	
• cefotaxim + ampicillin	1	-	-	-	-	-	1 (1.70)	
• gentamicin + penicilin	-	-	-	-	1	-	1 (1.70)	
• Ampicillin + azitromicin	-	-	1	-	-	-	1 (1.70)	
• Augmentin + ampicillin	-	2	1	-	-	-	3 (5.08)	
• Augmentin + azitromicin	-	2	-	-	-	-	2(3.38)	
• aygmentin + cefotaxim + azitromicin + cefuroxim	1	-	-	-	-	-	1 (1.70)	
Total							38 (64.40)	
Total No Diseases and treat	15	4	-	2	-	-	21 (35.6)	
Total of patient	31	20	5	2	1	3	59	

Most of the laboratorium data (Hb, Na, K, Ca, Cr, and albumin) of patient with RTI disease (Bronchopneumonia, AEBA, Croup, CAP, Acute Tonsiliti) were no significant different (P > 0.1), except plasma urea of patient with CAP was lower as compared to those in patient with BP, AEBA, Croup and Acute Tonsiliti, further more, most of the laboratorium data (Hb, WBC, Na, Ca, Cr, and albumin) of patient with others infection disease (Meningitis, and UTI), were not significantly different (P> 0.1), except plasma K of the meningitis patient was higher as compaire to plasma K of the patient with UTI diseases, where plasma urea of UTI patient was higher then patient with meningitis. (P< 0.05) (Table 6 and 7).

## DISCUSSION

The sociodemographic data on the pediatric ward of HUSM hospital showed that patients treated in this ward were dominated by male. The same condition was reported by David et al, (2001) on Myeloid Leukemia, and Wine et al, (2004) on Pediatric Crohn's Diseases and Growth Retardation

Males have shorter life expectancy than women (Grumbach, 2004; NMHP, 2010), but women have worse health than men (Macintyre et al, 1996). This is due to the biological and physiological differences of those sex, such as differences hormones and chromosomes (WHO, 2010).

The present study showed that the average age of children hospitalized in the pediatric ward was below five years old. Children at these ages are at high risk to have diseases (Wine et al, 2004; Descloux et al, 2009; Hasan et al, 2009; Going et al, 2011). This problem is due to a manifestation of changes in the physical size morphologic changes, biochemistry and physiological processes continuously during the growth period of children (Rudolph, 2006).

In this study, the average weight of pediatric patients was ideal if compared with average age, 14.65±11.44 kg and 4.94±4.05 years. WHO (2009) announced that children with average age of 4 years have average body weight of 14 kg.



The length of stay of patients in the USM hospital depends on the diseases. In this study, the average length of stay of the pediatric patients was 3 days. Other studies reported that the average length of stay of pediatric patients was about 2 days (Bellet and Whitaker, 2000) and 5 days (Bianco *et al*, 2003). The length of stay varies greatly influenced by the type of disease, the treatment regimen, the type of drug administered, and also medical skill factor.

Infectious diseases were the most common disease in the pediatric ward of HUSM which was counted 91.5%, while patients with other diseases were counted 8.5%. It was also reported from Indonesia (WHO, 2005), Ethiopia (Agala, 2012) and Tanzania (Reyburn *et al*, 2007) where infectious diseases were the most common disease in pediatrics. Infectious diseases are the main cause of death in children as they are particularly vulnerable to infectious diseases.

The most common infectious disease found in the pediatric ward of HUSM was bronchopneumonia. This is similar to a report from UNICEF where pneumonia was the most common infectious disease that killed children (WHO, 2006). In South Asia such as India, Pakistan, and Bangladesh, pneumonia is a common type of infection (Zaidi, 2004). Children in the period of growth are very susceptible to bronchopneumonia (Nelson, 2000), and according to the Global Coalition Against Child (2011), pneumonia kills a child every 20 seconds. Besides bronchopneumonia, many other infectious diseases were also found in the children's ward of HUSM such as AEBA, Croup, CAP, acute tonsillitis, meningitis and UTI.

The result of this study reveals that there was no significant association between the age factor and the diseases. Several previous studies also suggested that the age factor did not affect the type of disease suffered by children (Rodman, *et al.*, 2005; Callangham, 2005). According to Kollmann (2012), children aged less than 5 years old are susceptible to infectious diseases. So the age of the children in this study does not completely affect the type of disease, except for kidney disease.

Augmentin (amoxicillin and clavulanic acid) is the most common Antibiotic treat for infectious diseases in clinical data from pediatric ward HUSM. This confirms studies from BPAC (2006) in New York, and Miller *et al*, (2010) in the UK, which showed amoxicillin group as the most common antibiotics used for infectious diseases. While in Croatia, the most widely used antibiotic used to treat infection was gentamicin (Liki *et al*, 2007). The difference in the use of antibiotics for the treatment of infection in different countries depends on antibiotic resistance.

Antibiotics used in the treatment pneumonia in the pediatric ward HUSM are amoxicillin, penicillin, ampicillin, azithromycin, doxycycline, cefixime, cefotaxime, and metronidazole. The protocol of therapy in the treatment of pneumonia states the first-line treatment are *beta-lactam* antibiotics such as benzylpenicillin, amoxicillin, while the second line are cephalosporin antibiotics such as cefotaxime, cefuroxime and ceftazidime, and the third line are *carbapenem* antibiotics such as imipenem and other classes of antibiotics, for instance aminoglycoside antibiotics such as

gentamicin, amikacin (Husain, 2008). The drug used in the treatment of pneumonia reported in previous study was amoxicillin (Gray & Zar, 2010). In conclusion, the treatment for pneumonia in the children's ward of HUSM is based on protocols.

AEBA (*acute exacerbation of bronchial asthma*) is also a respiratory tract infection found during the present study in the pediatric ward of HUSM. The medications given for AEBA disease in the children's ward of HUSM are antibiotics such as amoxicillin, ampicillin, azithromycin, and cefotaxime; beside bronchodilators such as salbutamol and ventolin; and steroids such as prednisolone. Previous studies have reported that primary care in the treatment of AEBA is to provide oxygen, and then administer bronchodilators, anticholinergics, steroids and theophylline (Wang *et al*, 2011; Corrales, *et al*, 2011). Antibiotics were commonly used in the children's ward in the treatment of AEBA although it is not included in the protocol of therapy and doesn't confirm the reports from previous studies. The antibiotics are used since the patients experience fever and increased number of white blood cells count in the laboratory examination. This has led to the use of antibiotics in the pediatric ward of HUSM.

Patients diagnosed with meningitis admitted to the pediatric ward of HUSM receive the initial therapy of penicillin and cephalosporin antibiotics. The protocol of antibiotic therapy states that the drugs are given based on the age of the patients. Penicillin C antibiotic or cefotaxime are given to children aged 1-3 months, while children older than 3 months are given antibiotic therapy of C-penicillin and cefotaxime or ceftriaxone (Hussain, 2008). The treatment of meningitis in the present study is in line with a report from Saez (2003). The treatment performed in the pediatric ward of HUSM is in accordance with the protocol.

The medications received by the patients at pediatric ward of HUSM for acute tonsillitis infection during the treatment are amoxicillin and penicillin. Data from previous studies conducted in 1998-2001 showed that the treatment given for acute tonsillitis infection were in line with another study reported by Kuzelova *et al* (2004) in Bratislava, Slovakia.

In this study, the relationship between diagnosis and laboratory data for URTI disease shows a significant association seen in the examination of white blood cells and the levels of urea, while in other cases of infection, a significant association is seen on the levels of potassium and urea. Increased number of white blood cells indicates the presence of infection or acute inflammation process (Sutedjo, 2008), because white blood cells are responsible to fight infection and protect the body from foreign organisms by the



**Table. 4. The Relationship Between others infection Diseases and Antibiotic**

patient's disease, and treatments performed by medical professionals.

Drugs	Infection Disease				P Value*
	No Infection Disease	Meningitis	UTI	Quota N (%)	
<b>Antibiotic</b>					0.011*
• augmentin	17	-	-	17 (28.81)	
• penicilin	3	-	--	3 (5.08)	
• cefotaxim	1	1	1	3 (5.08)	
• cefixim	0	-	1	1 (1.70)	
• ampicillin	2	-	-	2 (35.6)	
• azitromicin	1	-	-	1 (1.70)	
• doxacillin	1	-	-	1 (1.70)	
• metronidazole + augmentin	1	-	-	1 (1.70)	
• cefotaxim + ampicillin	-	1	-	1 (1.70)	
• gentamicin+ penicilin	1	-	-	1 (1.70)	
• Ampicillin +azitromicin	1	-	-	1 (1.70)	
• Augmentin + ampicillin	3	-	-	3 (5.08)	
• Augmentin + azitromicin	2	-	-	2 (35.6)	
• aygmentin + cefotaxim + azitromicin + cefuroxim	1	-	-	1 (1.70)	
Total				38 (64.40)	
Total No Diseases and treat	21	0	0	21 (35.60)	
Total of patient	55	2	2	59	

Mechanisms of phagocytosis and producing and distributing antibodies (Kementerian Kesehatan Republik Indonesia. 2011). Thus, the white blood cells count is increasing while the infection happens.

In this study, the clinical outcome of patients treated at the paediatric ward of HUSM shows a good outcome where all patients are discharged without complications. This outcome is influenced by several factors such as the

Most of the diagnose patient discharge without complication, (Table, 5).

**Table. 5. The Relationship between Diagnosis with outcome**

Diagnosis	Outcome						P value*
	Patient		Discharge without complication		Discharge with complication		
	N	(%)	N	(%)	N	(%)	
RTI							0.611
• Bronchopneumonia	20	32.20	20	32.20	0	-	
• AEBA	5	8.47	5	8.47	0	-	
• Croup	2	3.38	2	3.38	0	-	
• CAP	1	1.70	1	1.70	0	-	
• Acute Tonsillitis	3	5.10	4	6.78	0	-	
Infection							1.000
• Meningitis	2	3.38	2	3.38	0	-	
• UTI	2	3.38	2	3.38	0	-	

establishment of a good diagnosis based on the results of laboratory data, drug selection and dosing according to the



**Table 6. The Relationship Between Diagnosis RTI Disease and laboratory Data**

Laboratory value	RTI Disease					P Value*
	BP Mean ± SD	AEBA Mean ± SD	Croup Mean ± SD	CAP Mean ± SD	Acute Tonsillitis Mean ± SD	
Hb	11.9 ± 1.064	11.8 ± 1.607	11.6 ± 0.141	1 ± -	12 ± 0.424	0.353
WBC	16.120 ± 5.311	16.667 ± 6.855	11.000 ± 0.282	15.750 ± -	11.7 ± 9.206	0.112
Na	136 ± 2.445	136 ± 2.516	134 ± -	136 ± -	133 ± 2.12	0.680
K	4.23 ± 0.665	3.90 ± 0.608	4.40 ± -	5.40 ± -	4.2 ± 0.212	0.509
Ca	2.7 ± 1.178	-	-	-	2.1 ± -	0.528
Urea	6.8 ± 1.487	4.2 ± 2.050	7.3 ± -	1.4 ± -	4.2 ± -	0.099*
Cr	51.9 ± 10.696	55.5 ± 4.949	50.0 ± -	43.0 ± -	67 ± 1.41	0.262
Albumin	42.3 ± 4.062	-	-	-	39 ± -	0.736

**Table 7. The Relationship Between others infection Disease and laboratory Data**

Laboratory value	Infection disease		P Value*
	Meningitis Mean ± SD	UTI Mean ± SD	
Hb	11 ± 2.192	11 ± 1.131	0.586
WBC	12.500 ± 0.141	21.100 ± 0.000	0.122
Na	136 ± 0.707	138 ± 0.000	0.645
K	6.0 ± -	4.2 ± -	0.016*
Ca	2.4 ± -	-	0.941
Urea	4.3 ± 0.141	9.6 ± 0.000	0.026*
Cr	48.0 ± 7.701	50.0 ± 0.000	0.401
Albumin	45 ± -	-	0.564

## CONCLUSION

The conclusions of the study on the clinical evaluation of management therapy at the pediatric ward of HUSM Malaysia conducted in April to June 2012 are as follows:

1. The most common disease suffered by pediatric patients is infection.
2. The most antibiotic drug used at the pediatric ward is augmentin
3. The clinical outcome of the patients with infections diseases at the pediatric ward of HUSM shows that patients are generally discharged without complications.

## References

Agalu, A & Mekonnen, H. 2012. Drug prescribing practice in a pediatrics ward in Ethiopian. Wollo University, College of Medicine and Health Sciences, Department of

Bellet, P. S & Whitaker, R. C. 2000. Evaluation of a Pediatric Hospitalist Service: Impact on Length of Stay and Hospital Charges. American Academy of Pediatrics, vol.105. No. 3.

Bianco, A., Claudia, P., Francesca, T., and Angelillo, I. F. 2003. Appropriateness of Admissions and Days of Stay in Pediatric Wards of Italy. American Academy of Pediatrics. Vol. 112 No. 1.

BPAC. 2006. Rational Use of Antibiotic in Respiratory Tract Infection. [www.bpac.org.nz](http://www.bpac.org.nz). New York.

Brownlie, J., Peckham, C., Waage, J., Woolhouse, M., Lyall, C., Meagher, L., Tait, J., Baylis, M. and Nicoll, A. 2006. Infectious Diseases: Preparing For The Future Future Threats. Office Of Science And Innovation. London.

Chalangan, B. D., Hoo, A. F., Dinwiddie, R., Balfoorlin, I. M., and Carr, S. B. 2005. Growth and Lung Function in Asia Patients with Cystic Fibrosis.

Corrales, A. Y., Soto-Martinez, M., and Mike, S. Management of severe asthma in children. Reprinted from Australian Family Physician Vol. 40

David, K. H., Webb, G. H., Richard F. Stevens, B. G. Gibson, I., Hann, M. and Keith, W. 2001. For The MRC Childhood Leukaemia Working Party. American Society of Hematology. Washington DC.

Descloux, E., Sabelle, D., Pierre, C., Denis, V. D., Ninet, Jacques; Fabien, Nicole; Cimaz, Rolando. 2009. Influence of age at disease onset in the outcome of paediatric systemic lupus erythematosus. Oxford University Press on behalf of the British Society for Rheumatology.





- Global Coalition Against Child Pneumonia. 2011. The Global Coalition Against Child Pneumonia Save A Child.
- Going, S. B., Lohman, T. G., Cussler, E.C., Williams, D. P., Morrison, J. A., and Horn, P. S. 2011. Percent Body Fat and Chronic Disease Risk Factors in U.S. Children and Youth. *American Journal of Preventive Medicine*, 41. Published by Elsevier Inc.
- Grumbach, M. M. 2004. To An Understanding Of The Biology Of Sex And Gender Differences: "An Idea Whose Time Has Come". Department of Pediatrics, University of California, San Francisco CA, USA.
- Gray, D., and Zar, H.J. 2010. Childhood Pneumonia in Low and Middle Income Countries: Burden, Prevention and Management. *Department of Pulmonology, School of Child and Adolescent Health, Red Cross War Memorial Children's Hospital, University of Cape Town, South Africa. The Open Infectious Diseases Journal. Vol.4.*
- Hasan, R. A., Abuhammour, W., and Zureikat, G. Y. 2009. The Relationship Between Body Weight and Objective Measures of Airway Obstruction in Children. *Pediatric Medicine Journal vol 3*
- Hussain, I., Phak, N. G., And Thomas, T. 2008. Paediatric Protocols for Malaysian Hospital. Edition 2.
- Kementerian Kesehatan Republik Indonesia. 2011. Pedoman Interpretasi Data Klinik. Jakarta.
- Kollmann, T. R. 2012. What's Hot in Pediatric Infectious Diseases. Division of Infectious & Immunological Diseases Department of Pediatrics University of British Columbia. AMMI Canada.
- Kuželová, M., Halačová, M., Baňasová, K., and Fulmeková, M. 2004. Analysis Of Treatment Of Acute Tonsillitis In Children From Prescriptions Of Anti-Infective Drugs. Faculty of Pharmacy, Comenius University, Bratislava.
- Liki, R, Igor, F., Marinko, B., Viktorija E., Ksenija M. A., Carmen, J., and Petra imi. 2007. Antibiotic Use Optimization Program in the Largest Croatian University Hospital – Benefits of Restrictions on Unlimited Antibiotic Use. Department of Internal Medicine, Unit of Clinical Pharmacology, University Hospital Rebro, Zagreb, Croatia.
- Miller, M., Lorraine, C., and Barlow, G. 2010. Guidelines for Treatment of Infections in Primary Care in Hull and East Riding. Hull and East Riding Prescribing Committee. HERPC Guidelines for the Treatment of Infections in Primary Care. HPA Published. England.
- MMWR. 1994. Addressing Emerging Infectious Disease Threats. Department Of Health And Human Services Public Health Service Centers For Disease Control And Prevention (CDC) Atlanta, Georgia. U.S.
- Nelson, B. A. 2007. Nelson Textbook Of Pediatrics, 18/E. ISBN-13: 978-1-4160-2450-7.
- National Male Health Policy NMHP. 2010. Building On The Strengths Of Australian Males Departement of health and ageing. Australian Government.
- Novaes, M.R.C., and Gomes, K.L.G. 2006. Estudo de utilização de medicamentos em pacientes pediátricos. *Infarma*.
- Reyburn, H., Emmanuel, M., Chonya, S., Mtei F., Bygbjerg, P. A., and Olomi R,. (2007). Clinical assessment and treatment in paediatric wards in the north-east of the United Republic of Tanzania. London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, England. *Bulletin of the World Health Organization*. 86 (2).
- Rodman, D.M., Polis, J.M., Heltshe, S.L., et al. 2005. Late diagnosis defines a unique population of long-term survivors of cystic fibrosis. *Am J Respir Crit Care Med*.
- Rudolph, A. M., Wahap. A.S., Bani, A. P. 2006. Buku Ajar Pediatric Rudolph. Alih Bahasa Samik Wahab, Moeliono Trastotenojo, and Brahm U. Pedit. EGC. Edisi. 20. Jakarta.
- RWJF (Robert Wood Johnson Foundation). 2008. How Do States Compare?. *America's Health Starts With Healthy Children*.
- Saez, L. X., McCracken Jr, G.H. 2003. Bacterial meningitis in children. *Lancet*.
- Sutedjo, A.Y. H., Soeharyo. 2008. Buku saku mengenai penyakit melalui hasil pemeriksaan laboratorium, pengertian, nilai normal dan interpretasi Penyakit Diagnosa Yogyakarta.
- UNICEF. 2006. Nutrition: The Foundation Of Survival And Development progress For Children. A Report Card On Nutrition. No 4.
- Wang, X.F., and Hong, J. G. 2011. Management of severe asthma exacerbation in children. Department of Pediatrics, Shanghai First People's Hospital, Shanghai Jiaotong University. *Shanghai, China*.
- WHO. 2004. The importance of caregiver–child interactions for the survival and healthy development of young children. Department Of Child And Adolescent Health And Development.
- WHO. 2005. Indonesia Communicable Disease Profile. Communicable Diseases Working Group on Emergencies, WHO/HQ. WHO Regional Office for South-East Asia (SEARO).
- WHO 2006. Carbamazepine In Childhood Epilepsy. Report Prepared For The World Health Organization.
- WHO. 2009. Cause-Specific Mortality And Morbidity. *World Health Statistics*.
- WHO. 2010. Gender, Women And Primary Health Care Renewal.
- World Vision Asia-Pacific. 2009. Maternal and Child Health in the Asia Pacific. [www.wvasiapacific.org](http://www.wvasiapacific.org).
- Wine, E., Reif, S. S., Leshinsky-Silver, E., Weiss, S., Ron.R., Raanan S., Wasserman, D., Lerner, A., Boaz, M., and Levine, A. 2004. Pediatric Crohn's Disease and Growth Retardation:



International Journal of Pharmacy Teaching & Practices 2013, Vol.4, Issue 3, 735-742.  
The Role of Genotype, Phenotype, and Disease Severity. American Academic of Pediatrics Vol. 114. No.5.

Zaidi, A. K. M., Awasthi, S., and H. J. Desilva. 2004. Burden of infectious diseases in South Asia. BMJ. <http://bmj.bmjournals.com/subscriptions/subscribere.shtml>

#### **AUTHORS' CONTRIBUTIONS**

Authors contributed equally to all aspects of the study.

#### **PEER REVIEW**

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#### **CONFLICTS OF INTEREST**

The authors declare that they have no competing interests.