

EVALUATION OF ANTIBIOTIC'S USE AMONG CHILDREN DURING HOSPITALIZATION

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Abstracts

Objectives: To evaluate the use of antibiotics in children during hospitalization and to estimate the inappropriate use of antibiotic.

Methods: A review of all antibiotics prescribed for children were admitted to medical ward in Queen Rania hospital over two months. All surgical and trauma cases were excluded. The study was conducted in March and April 2013. Data involved indication, patient's age, weight, and drug's route of administration. The collected data were tabulated and kept in special registry file maintained by the author.

Results: There were 189 cases admitted to medical wad over two months. Cases were classified into five major groups: respiratory tract infection (28%), urinary tract infection (24.9%), gastroenteritis (21.2%), acute febrile illness (10.6%), neonatal disease (7.9%), and seizures (7.4%). A total of 285 antibiotics were prescribed for all cases and 38.6% of them were prescribed one or more antibiotics, 42.8% of antibiotics were prescribed by incorrectly doses according to indication, patient's age, weight, and drug's route of administration.

Conclusion: Greater attention and caution are highly needed and recommended when antibiotics prescribed for children especially according to indication and dose calculation. There is a definite antibiotics abuse and antibiotics policy and guidelines is recommended.

Keywords: Antibiotics, antibiotic abuse, prescription, respiratory tract infection, gastroenteritis.

Introduction

Antibiotics are the most prevalent drugs prescribed in the hospital setting (Hangoma, 2014). It has been recognized on the global level that the abuse of antibiotics is associated with antimicrobial resistance with negative effects on health care settings (Charani et al., 2010; CDC, 2013; Ghafur et

al., 2013; Laxminarayan et al., 2013). The study of Davy et al (2005) pointed to important consideration in which a large proportion of prescribed antibiotics within hospital settings was not appropriate. This consideration has been further confirmed by the study of Ashiru-Oredope et al (2012) in which researchers reported that about 50% of antibiotic use is inappropriate. It has been realized that both increasing and abuse of antibiotics in hospitals, health care facilities and the community are of the reasons standing beyond the progress of bacterial resistance (Shankar et al., 2003). According to this context, there should be a wise use of available antibiotics (Newland and Hersh, 2010).

In South Africa, Makhado (2009) found that highest rate (28%) of antibiotics prescribed was in children of the age group from birth to 10 years followed by 11 to 20 years (24.2%).

In a study by Bataineh (2013), the researchers investigated the use of drugs by diabetics compared with nondiabetics based on WHO five core prescribing indicators at Jordan University of Science and Technology (JUST) primary health care center. The researchers found that diabetics were 2.5 times more likely to be prescribed for drugs than nondiabetics. The results indicated that about 8% of diabetics were prescribed antibiotics compared with 29% for nondiabetics Kuo et al (2013) conducted a study to describe how effective antibiotics are for children suffering from enterovirus infection complicated with a high CRP level. Study findings showed that 71% of study participants received a prescription for antibiotics. Results identified a significant relationship between a relatively higher CRP level and a higher rate of antibiotic prescription ($p = 0.001$). researchers concluded that antibiotics might not be beneficial in treating patients with enterovirus infection, even those with a high CRP level.

In a study by Osowicki et al (2014), the objectives were to describe antimicrobial use and to analyze the appropriateness of this antimicrobial use in hospitalised Australian children. Study sample included 1373 patients, of whom 46% were prescribed at least one antimicrobial agent. It has been found that there were elevated levels of antibiotics in haematology and oncology wards (76%) and pediatric intensive care units (55%). The total number of antibiotics prescribed was 1174, of which 47% were for community-acquired infections, 15% for hospital-acquired infections and 37% were for prophylaxis.

Hangoma (2014) conducted a study to identify trends of the antibiotic prescribing among physicians and compare agreement of antibiotic prescribing with adopted National treatment guidelines. Study sample included 385 patients. Study findings showed that about 70% of patients received antibiotics. The results showed about 31.4% of patients, who received antibiotics, had bacterial culture.

Sviestina and Mozgis (2015) conducted a study to evaluate antibiotic use for surgical prophylaxis in paediatric acute appendicitis before and after introduction of the hospital guidelines. The researchers found that irrespective to the discussion and acceptance of the guidelines with surgeons and further there was two month introduction period, only few positive trends were observed with the antibiotic treatment guidelines. Accordingly, the need to develop new ways of promoting adherence to the guidelines and appropriate antibiotic use.

Murni et al (2015) conducted a study to implement a multifaceted infection control and antibiotic stewardship programme and evaluate its effectiveness on hospital-acquired infections (HAIs) and antibiotic use. Study findings indicated that there was a great reduction in HAIs from 22.6% in the preintervention period to 8.6% in the postintervention period. Also a great reduction in inappropriate antibiotic use from 43% to 20.6%. The use of hand hygiene was increased from 18.9% to 62.9%. Inhospital mortality rate decreased from 10.4% to 8%.

Younis et al (2010) conducted a study to identify the uropathogens and their antibiotic susceptibility among children with urinary tract infection treated at Prince Hashem Bin Al-Hussein hospital. Study findings showed that about 75% of isolates were due to Escherichia coli, and 25% were caused by non- Escherichia coli pathogens. It was also found that pediatric urinary tract uropathogens are highly resistant to commonly used oral antimicrobial agents such as Cephalexin and Trimethoprim-Sulfamethoxazole (TMP-SMX).

Methods and subjects

Study design: retrospective design was followed to collect data.

Study setting: Queen Rania hospital.

Study sample: files of 189 patients were reviewed.

Data collection: files of patients were reviewed over two months March and April 2013. Data involved indication, patient's age, weight, and drug's route of administration.

Statistical analysis

All data were entered to SPSS version 20 for statistical analysis. Data were represented as frequency and percentage.

Results

Classification of medical cases admitted to Queen Rania hospital

As shown in table 1, respiratory tract infections were more prevalent (28%), followed by urinary tract infections (24.9%), and gastroenteritis

(21.2%). On the other hand, other diseases had declined prevalence including acute febrile illness (10.6%), neonatal diseases (7.9%), and seizures (7.4%).

Table 1: Classification of medical cases admitted to Queen Rania hospital through March and April, 2013

Diseases	Frequency (N)	Percentage (%)
RTIs	53	28
UTI	47	24.9
Gastroenteritis	40	21.2
Acute febrile illness	20	10.6
Neonatal diseases	15	7.9
seizures	14	7.4
Total	189	100

Antibiotic related information

As shown in table 2, there were 285 antibiotics prescribed for all patients. The rate of antibiotic prescription was 38.6%. The data also showed that about 43% of antibiotics were prescribed inappropriately.

Table 2: Antibiotic related information

Total No. of prescribed antibiotics for all cases	285
Antibiotic prescription frequency (N, %)	
- No antibiotics prescribed	116 (61.4)
- One or more antibiotics prescribed	73 (38.6)
Appropriate antibiotic prescription frequency (N, %)	163 (57.2)
- Yes	122 (42.8)
- NO	

Discussion

The present study was conducted to evaluate the use of antibiotics in children during hospitalization and to estimate the inappropriate use of antibiotic.

The study findings showed that the prescription rate of antibiotics was about 39%. This finding is less than that reported by Osowicki et al (2014) in which 46% of patients were prescribed at least one antimicrobial agent. Our findings are also less than that reported by Hangoma (2014) who reported that about 70% of patients received antibiotics. Also the study of Kuo et al (2013) reported 71% of study participants received a prescription for antibiotics.

The study findings also showed that inappropriate use of antibiotics was about 43%. The findings of our study agree with the study of Davy et al (2005) who pointed to important consideration in which a large proportion of prescribed antibiotics within hospital settings was not appropriate. The findings of our study showed less inappropriate use of antibiotics compared

with the results of Ashiru-Oredope et al (2012) in which researchers reported that about 50% of antibiotic use is inappropriate.

Conclusion

Greater attention and caution is highly needed and recommended when antibiotics prescribed for children especially according to indication and dose calculation. There is a definite antibiotics abuse and antibiotics policy and guidelines are recommended

References:

- Ashiru – Oredope, D., Sharland, M., Charani, E., McNulty, C. and Cooke, J. (2012). Improving the quality of antibiotic prescribing in the NHS by developing a new Antimicrobial Stewardship Programme: Start Smart - Then Focus. *J. Antimicrob. Chemother.*, 67(1): i51–i63.
- Centers for Disease Control and Prevention (2013). Antibiotic resistance threats in the United States, Atlanta: CDC, 2013. <http://www.cdc.gov/drugresistance/threat-report-2013> (accessed Apr 2014).
- Charani, E., Cooke, J. and Holmes, A (2010). Antibiotic Stewardship Programmes –What’s missing?. *J Antimicrob Chemother.*, 65: 2275 – 2277.
- Davey, P., Brown, E., Fenelon, L., Finch, R., Gould, I., Hartman, G., Holmes, A., Ramsay, C., Taylor, E., Wilcox, M. and Wiffen, P. (2005). Interventions to improve antibiotic prescribing practices for hospital inpatients. *Cochrane Database Syst. Rev.*, 19:CD003543.
- Ghafur A, Mathai D, Muruganathan A, et al (2013). The Chennai Declaration: a roadmap to tackle the challenge of antimicrobial resistance. *Indian J Cancer*, 50: 71-73.
- Indah K Murni, Trevor Duke, Sharon Kinney, Andrew J Daley, Yati Soenarto (2015). Reducing hospital-acquired infections and improving the rational use of antibiotics in a developing country: an effectiveness study. *Arch Dis Child*, 100:454–459.
- Inese Sviestina, Dzintars Mozgis (2015). Evaluation of the antibiotic use for surgical prophylaxis in paediatric acute appendicitis. *Journal of Young Pharmacists*, 7 (1): 7-11.
- Jimmy M. Hangoma (2014). Antibiotic prescribing patterns among physicians at the University Teaching Hospital in Lusaka, Zambia. A dissertation submitted to the University of Zambia in partial fulfilment of the requirements of the degree of Master of Clinical Pharmacy, THE UNIVERSITY OF ZAMBIA, LUSAKA.
- Joshua Osowicki, Amanda Gwee, Jesuina Noronha, Pamela Palasanthiran, Brendan McMullan, Philip N Britton, David Isaacs, Tony Lai, Clare Nourse, Minyon Avent, Paul Moriarty, Julia Clark, Joshua R Francis, Christopher C Blyth, Celia M Cooper, Penelope A Bryant (2014). Australia-wide point

- prevalence survey of the use and appropriateness of antimicrobial prescribing for children in hospital. *Research*, 201 (11): 657-662.
- Kuang-Che Kuo, Ying-Hsien Huang, I-Ling Chen, Yi-Chuan Huang, Chung-Chen Li, Hsuan-Chang Kuo, Yi-Chun Yeh, Chen-Hsiang Lee (2014). Are antibiotics beneficial to children suffering from enterovirus infection complicated with a high C-reactive protein level? *International Journal of Infectious Diseases*, 25, 100–103.
- Laxminarayan R, Duse A, Wattal C, et al (2013). Antibiotic resistance — the need for global solutions. *Lancet Infect Dis*, 13: 1057-1098.
- Makhado, M. (2009). Comparison of Antimicrobial Prescribing Patterns with Stanard Treatment Guidelines and Essential Drug List in Primary Healthcare Facilities in Vhembe District, Limpopo Province, Master of Science in Medicine-Pharmacy thesis, Department of Pharmacy, Faculty of Healthcare Sciences, Medunsa Campus: South Africa.
- Newland JG, Hersh AL (2010). Purpose and design of antimicrobial stewardship programs in pediatrics. *Pediatr Infect Dis J*, 29: 862-863.
- Nidal Younis, Mohammed Al-Nader, Ibraheem Jbar, Reham Mardeni (2010). Uropathogens and their Antibiotic Susceptibility among Children with Urinary Tract Infection Treated at Prince Hashem Bin Al-Hussein Hospital. *JRMS*, 17(2): 41-45.
- Shankar, R.P., Partha, P. Shenoy, N.K., Easow, J.M. and Brahmadathan, K.N. (2003). Prescribing patterns of antibiotics and sensitivity patterns of common micro-organisms in the Internal Medicine ward of a teaching hospital in Western Nepal: a prospective study. *Indian J Pharmacol.*, ISSN: 1531 -2976. Available from <http://www.annclinmicrob.com/content/2/1/7>. Accessed on 14 April, 2013.
- Zeyad Bataineh, Nadia Fayez khasawneh, Sameer Kofahi, Mosheer kamel Al-Moqasqas (2013). Assessment of Drug Use by Diabetics-Experience at JUST Primary Health Care Center in Irbid, Jordan. *JORDAN JOURNAL OF APPLIED SCIENCE* 11 (3): 45-60.