



Patterns of Antimicrobial therapy in acute tonsillitis: A cross-sectional Hospital-based study from UAE

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ABSTRACT

Background: Diseases of the ear, nose and throat (ENT) are associated with significant impairment of the daily life and a major cause for absenteeism from work. **Aim:** The study determined antimicrobial prescription pattern in patients with acute tonsillitis. **Materials and Methods:** A cross-sectional study was carried out among all the patients attending the ENT department with acute tonsillitis. Data were retrieved from the medical records using a proforma. Statistical analysis was carried out using SPSS.19. **Results:** Total of 238 patients included (Males 138; females 100). About 96% of total drugs were prescribed by generic name. Median number of drugs prescribed was four (range 1-7). Eighty eight percent of prescriptions contained antimicrobials, (78.5%) analgesics and (57.9%) antipyretics. Amoxicillin / Clavulanic acid (24.8%) and Ceftriaxone (12.2%) were the most commonly prescribed antimicrobials. Parenteral route was preferred in 41.6%. About 23.7% of the patients on Amoxicillin / Clavulanic acid had received the drug as intravenous injection. Culture and sensitivity tests were carried out in 106 (44.5%) of the cases. Antimicrobials were changed / added after the culture and sensitivity test in 25 patients. **Conclusion:** Study findings highlighted rational practices in drug prescribing. Therapeutic guidelines based on current sensitivity pattern optimize the use of antimicrobial agents.

Key words: drug utilization, antimicrobial use, acute tonsillitis, parenteral.

INTRODUCTION

Diseases of the ear, nose and throat (ENT) affect adults and children, with significant impairment of the daily life (Grace and Bussmann 2006, WHO 2004). Upper Respiratory Tract Infections (URTIs) including nasopharyngitis, pharyngitis, tonsillitis and otitis media constitute a major proportion of the total episodes of respiratory infections (Jain et al. 2001).

This is a major cause for absenteeism from work. The vast majority of acute URTIs are caused by viruses (Dasaraju and Liu 1996). Inappropriate use of drugs in the treatment of upper respiratory tract infections has been previously reported in literature (Gaash 2008, Brink et al. 2004). This could result in the development of drug related problems such as adverse drug reactions and drug resistance, in addition to increasing the overall cost for health care (Einarson 2008).

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Acute respiratory infections (ARI) accounted for 20-40% of outpatient and 12-35% of inpatient attendance in a general hospital (Jain et al. 2001). In developing countries, 30% of all patients consultations and 25% of all pediatric admissions are due to ARI (WHO 2004). Pharyngitis and tonsillitis account for > 10% of all visits to primary care clinics and 50% of outpatient antibiotic use (Linder 2008). In a study from Saudi Arabia that analyzed the prescriptions for acute respiratory tract infections, 65.8% of them accounted for upper respiratory infections (El-Gilany 2000). Naghipour et al. (2007) reported on the high frequency of occurrence and transmissibility within the family cohort in Iran implying the burden of these infections on the community.

The majority of the antibiotics are prescribed for ENT infections with a presumed viral etiology. Acute tonsillitis, where viruses like adenovirus, Epstein-Barr virus or influenza viruses are implicated, is treated symptomatically with antipyretics, anti-inflammatory drugs and mouth gargles, and reassurance to the patients. Several studies have reported that antimicrobials are prescribed in the management of URTI due to the drug related problems associated with inappropriate use (Rehan 2003, Leblebicioglu et al. 2002, McCaig et al. 2002). The limited role of antimicrobials in acute tonsillitis of viral etiology has been published in an overview of Cochrane reviews by Arroll (2005). In a study published from the Middle East, antimicrobials were rated as the fourth most frequently prescribed drugs in primary health-care facilities (Al Khaja et al. 2008).

In cases of secondary bacterial infection causing purulent material to accumulate in the tonsillar crypts, penicillin has been the drug of choice. Recent results with amoxicillin suggest that efficacy in acute tonsillitis, is also waning. Cephalosporins alone or Cephalosporins with metronidazole where anaerobes are implicated have the highest bacteriological and clinical efficacy (Pichichero 2006).

Antibiotic prescription pattern differs from country to country, or even from region to region, which is attributable to various factors such as the infecting organisms and antimicrobial susceptibility, physician preference, and costs. Therefore, it is imperative to evaluate and monitor the drug utilization patterns periodically, to enable suitable modifications to be made in prescribing patterns, in order to increase the therapeutic benefit and decrease the adverse effects, and thus optimize the treatment (Srishyla et al. 1994). Drug utilization studies are designed to systematically review the drugs prescribed to the patients. These help provide feedback to the clinicians, develop protocols that describe optimal drug use, and promote appropriate drug use through educating the patients.

Hence, the present prospective study was aimed at determining the antimicrobial prescription pattern in adult patients with acute tonsillitis.

MATERIALS AND METHODS

A cross-sectional, hospital-based study was carried out to evaluate the antimicrobial prescription pattern in patients with acute tonsillitis. All patients attending the ENT outpatient department of a tertiary care hospital, Ajman, UAE from January 2011 to December 2011 and diagnosed with acute tonsillitis were included. The approval of institutional Ethics Committee was obtained before the start of the study. Incomplete patient records were excluded from the study. The drug utilization data was retrieved from the medical records of patients using a specially designed data collection form. The form included the following domains: Socio demographic characteristics (Age, gender, nationality), Clinical data (Clinical diagnosis, Clinical manifestations, Examination findings), Laboratory data: (Culture and sensitivity data: Organism isolated, sensitivity and resistance pattern), Drug data: (Antimicrobial agents prescribed, dose and duration of treatment,

change of medication and response to treatment). Statistical analysis was carried out using SPSS19.

RESULTS

Among the total of 238 patients, 138 (57.9%) were males and 100 (42.1%) were females. The majority of patients were Indians [49 (20.6%)], Emiratis [35 (14.7%)], and Pakistanis [31 (13%)]. The highest numbers of patients were in the age group 20-29 years and the lowest in the 60-79 years. The gender and age distribution of patients with acute tonsillitis is listed in Table I.

TABLE I
Age- and gender-based distribution of patients with acute tonsillitis.

Variables	Group	No.	%
Gender	Male	138	58
	Female	100	42
Age group	1-9	49	20.6
	10-19	17	7.1
	20-29	93	39.1
	30-39	56	23.5
	40-49	14	5.9
	50-59	6	2.5
	60-69	2	0.8
	70-79	1	0.4
TOTAL		238	100

The common types of tonsillitis noted were acute parenchymatous tonsillitis, acute follicular tonsillitis and acute pharyngotonsillitis. Of the total, 7 (2.9%) patients had self-medicated prior to the hospital visit. About 96% of the total number were prescribed by generic name. The median number of drugs prescribed was four (range 1-7).

A total of 925 medications were prescribed to 238 patients with acute tonsillitis. 209 (88%) of the prescriptions contained antimicrobial agents. Antimicrobials (265) were the most commonly prescribed group of drugs followed by analgesics (187) and antipyretics (138), as shown in Figure 1.

The prevalence and indicators of antimicrobials used in the treatment of acute tonsillitis are shown in Table II.

Among the antimicrobial drug classes, beta-lactam antimicrobials such as Cephalosporins and Penicillins were the most frequently prescribed. Amoxicillin/Clavulanic acid [72 (30.25%)], Ceftriaxone [40 (16.8%)] and metronidazole [35 (14.7%)] were the most commonly prescribed antimicrobials. Of the 264 antimicrobials prescribed, 109 (41.2%) constituted parenteral antibiotics. The commonly prescribed parenteral antimicrobials were Ceftriaxone and Amoxicillin/Clavulanic acid. About 23.7% of the patients were administered Amoxicillin/Clavulanic acid as intravenous injection. The pattern of monotherapy and combination therapy of antimicrobials in acute tonsillitis is listed in Table III. The most commonly used fixed drug combination was Amoxicillin/Clavulanic acid [72 (30.25%)].

Culture and sensitivity test of the throat swab was carried out in 106 (44.5%) of the cases. Of the 106 throat swabs, bacterial species were isolated in 100 cases (94.3%). Alpha hemolytic streptococci species was the most commonly isolated organisms in 35 (33%) cases, followed by streptococcus species 18 (17%), Neisseria species 13 (12.3%) and a few staphylococcus species. The isolated bacteria were most frequently sensitive to 3rd / 4th Generation Cephalosporins and Amoxicillin/clavulanic acid. Some organisms were multi drug resistant, being sensitive only to piperacillin, ceftriaxone, cefotaxime and meropenem. Antimicrobials were changed after the culture and sensitivity test in 25 patients. Of these patients 12 patients were on parenteral antibiotics. No pattern was noticed with regard to the change in antimicrobial prescription however, oral Cefuroxime was the most frequently added antimicrobial agent based on the sensitivity report.

DISCUSSION

The present study highlights the current trends in antimicrobial prescriptions in the management of acute tonsillitis at the outpatient department of Otorhinolaryngology. A slightly higher male preponderance was noticed, in line with previous

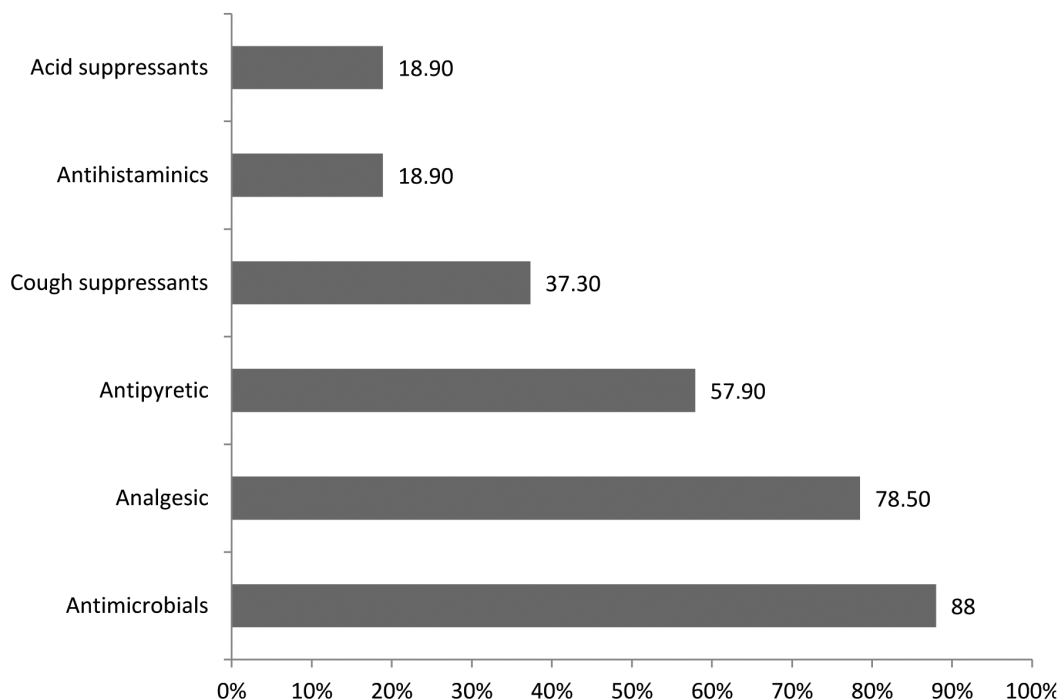


Figure 1 - Commonly prescribed drug classes in acute tonsillitis.

TABLE II
Prevalence and indicators of antimicrobial use.

Prevalence of Antimicrobial use	No. (%)
Overall drug use (n = 238)	
Average number of drugs per prescription	4
Percentage of drugs prescribed by generic name	96%
Percentage of prescriptions with injections	109 (45.7%)
Percentage of drugs prescribed from essential drug list	60%
Antimicrobial use	
Total number of prescriptions with antimicrobials	209
Total number of antimicrobials prescribed	264
Number of antimicrobials by parenteral route	109
Average number of antimicrobials	1
Number of prescriptions with:	
Antibacterial drugs	209
Single antibacterial agent	165
Multiple antibacterial agents	
• Two drug combination	34
• Three drug combination	10

reports on the infections of the ear, nose and throat (Ain et al. 2010, Pradhan and Jauhari 2007, Khan et al. 2011). It was found that a majority of the patients were in the age group of 20-29 years and the lowest percentages were of the geriatric group. A similar finding was reported by other studies from India

(Khan et al. 2011) and Thailand (Issarachaikul and Suankratay 2013). This finding could be explained due to the study's setting being at the ENT department, where one expects most patients to be adults, whereas pediatric cases seen at ENT department are referred to pediatricians.

TABLE III
Pattern of monotherapy and combination therapy in acute tonsillitis.

Antimicrobial drug class	Individual antimicrobial	Monotherapy	Combination therapy	Overall utilization
Penicillin	Amoxicillin/Clavulanic acid	60	12	72
Cephalosporins	Cefpodoxime	19	6	25
	Cefdinir	18	5	23
	Ceftriaxone	13	27	40
	Cefuroxime	13	5	18
	Cefexime	1	-	1
	Macrolides	Azithromycin	22	5
Fluroquinolones	Clarithromycin	4	6	10
	Clindamycin	5	-	5
	Ciprofloxacin	4	-	4
Nitroimidazoles	Levofloxacin	1	1	2
	Metronidazole	1	34	35
	Tinidazole	-	3	3

The most commonly prescribed categories of anti-bacterials were found to be from β -lactam antimicrobials (Penicillin and Cephalosporins). This finding was in par with several other studies conducted by Ain et al. (2010), Khan et al. (2011), Senok et al. (2009), Higashi (2009) and Issarachaikul and Suankratay (2013).

Among the individual drugs, amoxicillin-clavulanate followed by ceftriazone were the widely utilized drugs in the present study, similar to a previous report from India, but the common cephalosporin prescribed in the latter study was cefopodoxime (Ain et al. 2010). This finding contradicts (Senok et al. (2009), Khan et al. (2011), Das et al. (2005) and Rehan (2003), wherein the preferred antimicrobial agents were amoxicillin, cefixime and ciprofloxacin respectively. Reports from Japan documented cefcapene, a third generation cephalosporin as the most commonly prescribed antibiotic, followed by clarithromycin (Higashi 2009). The reason for prescribing amoxicillin/clavulanate and third generation Cephalosporins could be due to the preponderant mixed group of infections and increase in antibiotic resistance, which encourages physicians to choose a broader spectrum antibiotic.

The median number of drugs per prescription was one, whereas Ain et al. (2010), Das et al. (2005)

and Rehan (2003) documented that the average number of drugs per prescription was as high as three drugs. The average number of drugs is an important indicator to assess rational practice in drug prescribing. The mean number of drugs per prescription should be as low as possible to avoid increased risk of drug interactions, adverse drug effects, development of bacterial resistance, poor patient compliance and increased treatment related costs. This finding in the present study indicates the practice of rationalization in prescribing drugs, to minimize the total number of drugs prescribed. The culture of prescriptions contained antimicrobials in the present study and the culture and sensitivity reports on throat swab were useful tools in assisting clinicians in selecting the most appropriate antimicrobial agents in individual patients. In a study from Nepal 95.9% of prescriptions contained antimicrobials in the treatment of acute tonsillitis (Rehan 2003). In a publication from Thailand, more than 80% of the prescriptions for upper respiratory tract infections contained antimicrobials (Issarachaikul and Suankratay 2013).

About 96% of the drugs in this study were prescribed using generic names indicating a rational practice of drug prescribing. Prescribing by generic names reduce overall expenditure

on drugs, especially on newer antibiotics, and promote rational use of drugs. Prescribing by trade name benefits drug promotional activities of pharmaceutical companies, and undermines the objectives of the essential drug concept.

One of the noteworthy findings was that a significant proportion (41%) of the antimicrobial were prescribed by parenteral route unlike earlier studies where parenteral route was used only in 16% of the patients (Ain et al. 2010). The probable reason for this finding was due to the acute presentation of the symptoms in a majority of the patients necessitating parenteral antibiotics.

The most commonly used antimicrobial fixed dose drug combination (FDC) was Amoxicillin/Clavulanic acid about 30%. Amoxicillin/Clavulanic acid prescribed in this study is among the rational FDC recommended by World Health Organization (WHO 2013) in the management of upper respiratory tract infections. Rehan (2003) reported only 16.5% utilization of antimicrobial fixed drug combination and the most common being Ampicillin with cloxacillin. Khan et al. (2011) documented the frequently used FDC in their study as Cefixime+Clavulanic acid (9.7%) followed by Amoxicillin/Clavulanic acid (9.5%).

Culture and sensitivity test of the throat swab was carried out in 44.5% of the patients as other patients were already on antimicrobials. Alpha hemolytic streptococci species was the most commonly isolated bacterial organisms in 33% of the cases which is one of the commensal in the throat. This finding needs to be further investigated to elucidate the role of commensals in the pathogenesis of acute tonsillitis. However, most of the isolated bacterial organisms were sensitive to 3rd/4th Generation Cephalosporins and Amoxicillin/clavulanic acid. A trend towards multi drug resistance was also noted which needs to be further explored.

The strength of the study is that it highlighted several rational prescribing practices and newer trends in the administration of antimicrobial

agents. The limitation of the study included non-generalizability of the study findings as the study was carried out at a single center; hence the results cannot be generalized to the whole region. Considering the findings of this study, treatment guidelines based on the current sensitivity pattern for tonsillitis may be developed to optimize the use of antimicrobial agents and provide cost effective treatment. Pharmacoeconomic studies can be undertaken to establish cost effective treatment strategies

CONCLUSION

Beta lactam antimicrobials were the most commonly prescribed antimicrobials. Injection was a widely used route of administration of antimicrobials. The majority of the patients received a single antimicrobial. The majority of the medications were prescribed in generic names encouraging rational use of drugs. The culture and sensitivity tests were performed in most of the cases to identify the organism and to prescribe the appropriate antimicrobials indicating a rational practice.

RESUMO

Fundamento: As doenças do ouvido, nariz e garganta (ENT) estão associadas a comprometimento significativo da vida diária e uma das principais causas de afastamento do trabalho. **Objetivo:** O estudo teve como objetivo determinar o padrão de prescrição de antimicrobianos em pacientes com amigdalite aguda. **Materiais e Métodos:** Foi realizado um estudo transversal com todos os pacientes atendidos no Setor de Otorrinolaringologia e que apresentavam amigdalite aguda. Os dados foram extraídos dos prontuários médicos, utilizando uma pró-forma. A análise estatística foi realizada utilizando SPSS.19. **Resultados:** Total de 238 pacientes incluídos (homens 138; mulheres 100). Cerca de 96 % do total de medicamentos foram prescritos pelo nome genérico. O número médio de medicamentos prescritos foi de quatro (intervalo 1-7). Oitenta e oito por cento das prescrições continham antimicrobianos, (78,5%), analgésicos e (57,9%) antipiréticos (57,9%). Amoxicilina / ácido clavulânico (24,8%)

e ceftriaxona (12,2%) foram os antimicrobianos mais comumente prescritos. A via parenteral foi preferida em 41,6 %. Cerca de 23,7% dos pacientes tratados com Amoxicilina / Clavulanato receberam a droga por via intravenosa. Testes de cultura e de sensibilidade foram realizados em 106 (44,5%) dos casos. Os antimicrobianos foram alterados / adicionados após a cultura e teste de sensibilidade realizados em 25 pacientes. **Conclusão:** Os achados destacam as práticas racionais na prescrição de medicamentos. Diretrizes terapêuticas com base no padrão de sensibilidade atual otimizam o uso de agentes antimicrobianos.

Palavras-chave: utilização de drogas, utilização antimicrobiana, amidalite aguda, parenteral.

REFERENCES

- AIN MR, SHAHZAD N, AQIL M, ALAM MS AND KHANAM R. 2010. Drug utilization pattern of antibacterials used in ear, nose and throat outpatient and inpatient departments of a university hospital at New Delhi, India. *J Pharm Bioall Sci* 2: 8-12.
- AL KHAJA KA, SEQUEIRA RP, DAMANHORI AH, ISMAEEL AY AND HANDU SS. 2008. Antimicrobial prescribing trends in primary care: implications for health policy in Bahrain. *Pharmacoepidemiol Drug Saf* 7: 389-396.
- ARROLL B. 2005. Antibiotics for upper respiratory tract infections: An overview of Cochrane reviews. *Respiratory Medicine* 99: 255-261.
- BRINK AJ, COTTON MF, FELDMAN C, GEFFEN L, HENDSON W, HOCKMAN MH, MAARTENS G, MADHI SA, MUTUAMPUNGU M AND SWINGLER GH. 2004. Guideline for the management of upper respiratory tract infections. *S Afr Med J* 94(6- 2): 475-483.
- DAS BP, SETHI A, RAUNIAR GP AND SHARMA SK. 2005. Antimicrobial utilization pattern in outpatient services of ENT department of tertiary care hospital of Eastern Nepal. *Kathmandu Univ Med J* 3: 370-375.
- DASARAJU PV AND LIU C. 1996. Infections of the Respiratory System. In *Medical Microbiology*. 4th ed., Baron S, Ed. Galveston (TX): University of Texas Medical Branch, Galveston, Chapter 93. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK8142/>
- EINARSON T. 2008. Pharmcoepidemiology. In: Parthasarathi G, Hansen KN and Nahata MC (Eds), *A Text book of Clinical Pharmacy Practice essential concepts and skills*. 1st ed., Hyderabad: Universities Press (India) Limited, p. 405-423.
- EL-GILANY AH. 2000. Acute respiratory infections in primary health care centres in northern Saudi Arabia. *East Mediterr Health J* 6(5-6): 955-960.
- GAASH B. 2008. Irrational Use of Antibiotics. *Indian J Practising Doctor* 5(1): 3-4.
- GRACE NN AND BUSSMANN RW. 2006. Traditional management of ear, nose and throat (ENT) diseases in Central Kenya. *J Ethnobiol Ethnomed* 2: 54.
- HIGASHI T AND FUKUHARA S. 2009. Antibiotic prescriptions for upper respiratory tract infection in Japan. *Inter Med* 48: 136.
- ISSARACHAIKUL R AND SUANKRATAY C. 2013. Antibiotic prescription for adults with upper respiratory tract infection and acute bronchitis at King Chulalongkorn Memorial Hospital, Thailand. *Asian Biomedicine* 7(1): 15-20.
- JAIN N, LODHA R AND KABRA SK. 2001. Upper respiratory tract infections. *Indian J Pediatr* 68:1135-1138.
- KHAN FA, NIZAMUDDIN S AND SALMAN MT. 2011. Drug Utilization Patterns of Antimicrobial agents in the Outpatient department of ENT in a tertiary care teaching hospital of North India. *JAPHR* 1(2): 22-30.
- LEBLEBICIOGLU H, CANBAZ S, PEKSEN Y AND GUNAYDIN M. 2002. Physicians' antibiotic prescribing habits for upper respiratory tract infections in Turkey. *J Chemother* 14: 181-184.
- LINDER JA. 2008. Evaluation and management of adult pharyngitis. *Compr Ther* 34(3-4): 196-203.
- MCCAIG LF, BESSER RE AND HUGHES JM. 2002. Trends in antimicrobial prescribing rates for children and adolescents. *JAMA* 287: 3096-3102.
- NAGHIPOUR M, HART CA AND CUEVAS LE. 2007. Burden of acute respiratory infections in a family cohort in Iran. *Epidemiol Infect* 135(8): 1384-1388.
- PICHICHERO ME. 2006. Pathogen shifts and changing cure rates for otitis media and tonsillopharyngitis. *Clin Pediatr (Phila)* 45(6): 493-502.
- PRADHAN S AND JAUHARI AC. 2007. A study of antibiotics used in adult respiratory disorders in Kathmandu and Bhaktapur. *Nepal Med Coll J* 9: 120-124
- REHAN HS. 2003. Pattern of drug utilization in acute tonsillitis in a teaching hospital in Nepal. *Indian J Otolaryngol Head Neck Surg* 55(3):176-179.
- SENOK AC, ISMAEEL AY, AL-QASHAR FA AND AGAB WA. 2009. Pattern of upper respiratory tract infections and physicians' antibiotic prescribing practices in Bahrain. *Med Princ Pract* 18: 170-174.
- SRISHYLA MV, KRISHNAMURTHY M, NAGARANI MA, CLARE SM, ANDRADE C AND VENKATARAMAN BV. 1994. Prescription audit in an Indian hospital setting using the DDD (Defined Daily Dose) concept. *Indian J Pharmacol* 26: 23-28.
- WHO - WORLD HEALTH ORGANIZATION. 2004. Chronic suppurative otitis media: Burden of illness and management options. Geneva, Switzerland: World Health Organization. Available at: http://www.who.int/pbd/deafness/activities/hearing_care/otitis_media.pdf
- WHO - WORLD HEALTH ORGANIZATION. 2013. The 18th WHO Model List of Essential Medicines. Geneva: World Health Organization. Available at: http://www.who.int/medicines/EMP_Website_notice_EML_July2013.pdf