Evaluation of antibiotics use in the treatment of upper respiratory tract infection in Bedele District Hospital, Southwest Ethiopia

Girma Mamo*, Abeba Teshome

Girma Mamo
Department of Pharmacy, Institute of Health, Faculty of Health Sciences, Jimma University, Ethiopia

Abeba Teshome
Department of Pharmacy, Institute of Health, Faculty of Health Sciences, Jimma University, Ethiopia

Abstract

Background: Upper respiratory tract infections (URTIs) are acute febrile illnesses involving the nose, paranasal sinuses, pharynx, larynx and upper trachea. The causative organisms in majority of the cases are viruses. Antibiotics are not needed in these circumstances; however the treatment of URTIs has become the major areas of antibiotics abuse globally. OBJECTIVE: To assess antibiotic prescription pattern for upper respiratory tract infection in Bedele District Hospital. **Method:** An institution based descriptive cross-sectional study was conducted between February 15 to March 30/2015 using a structured data abstraction checklist. The necessary information was recorded from patients' medical records seen in the hospital by the year 2014. The collected data was cleaned and analyzed using SPSS version 16. **Result:** Prevalence of antibiotics prescription in the management of URTIs in the hospital was 79.1%. Majority of the antibiotics prescribed were the Penicillin 246 (88.8 %). Amoxicillin was prescribed for 197 (71.1 %) cases. Among the 277 cases managed by antibiotics 167 (60.3%) were treated according to the national STG making the overall concurrence with the national STG 60.3%. Among 168 unspecified URTIs, 102 (60.7%) of the antibiotic prescription were made out of indication for unspecified AURTI which is common cold. **Conclusion:** There is irrational use of antibiotics prescription in management of URTIs in the hospital indicated by high prevalence of antibiotics prescription and low adherence to the standard treatment guideline.

Keywords: Antibiotics, Evaluation, Upper respiratory tract infections, Bedele, Southwest Ethiopia.

INTRODUCTION

Upper respiratory tract infections (URTIs) are defined as acute febrile illnesses involving the nose, paranasal sinuses, pharynx, larynx and trachea. It presents with cough, coryza, sore throat, or hoarseness. URTI is one of the major reasons for visiting primary care physicians.[1] URTI occurs commonly in both children and adults and is a major cause of morbidity.[1] URTIs are usually viral in nature, but both viral and bacterial pathogens are considered to play an important role in the etiology of URTIs.[3,4] Transmission of organisms causing URIs occurs by aerosol, droplet, or direct hand- to -hand contact with infected secretions, with subsequent passage to the nares or eyes.[5]

Antibiotics are prescribed more frequently in patients with URTIs.[6-9] Antibiotics have no role in the management of the common cold or any mild URTI. However, almost 75% of adults with URTIs are prescribed antibiotics by their physicians.[10,11] Antibiotics misuse/overuse is an important public health issue that affects the community and the individual. Irrational ruse of antibiotics can leads to the development of antibacterial resistance, increasing the burden of chronic diseases, raising costs of health services, and the development of adverse effects.[12]

Perhaps, even more striking than the overall rate of antibiotic use is the high rate of prescribing broad - spectrum antibiotics. Overall, broad-spectrum antibiotics were used for more than half of URI episodes, including 68% for acute bronchitis. Again, this contradicts current guidelines, which state that even when antibiotics are appropriate (such as in selected cases of acute sinusitis and pharyngitis), broad spectrum antibiotics should not be used as first line agents.[13]

Despite the fact that antibiotics are ineffective in treatment of viral acute URTIs, management of URTIs is the major area of antibiotics misuse throughout the world. Therefore, this research is designed to

Correspondence:
Girma Mamo
Department of Pharmacy, Institute of Health, Faculty of Health Sciences, Jimma University, Ethiopia

investigate the antibiotics use in treatment AURTIs in Bedele District Hospital Oromia regional state south-west Ethiopia.

METHOD AND MATERIALS

The study was conducted in Bedele General Hospital. The hospital is located in Bedele town, Oromia regional state at a distance of 480 km away from the capital City of Ethiopia, Addis Ababa. This study was conducted from February 15 to March 30, 2015. An institution based Cross sectional study was conducted using a standard data abstraction check list adapted from other published studies and modified to suite the study purpose.

All patients with the diagnosis of Upper Respiratory Tract Infections were included in the study. Patients who had other infectious disease for which antibiotics could be recommended were excluded from the study. Single population proportion formula was used to calculate the sample size. Since, the prevalence of antibiotic prescription for URTIs in the study setting or in the region is not available the sample size is determined using estimate of prevalence of antibiotic prescription for URTIs of 50% , margin of error of 0.05 and Z value of 1.96. Therefore, the minimum sample size for the study was 360. A systematic simple random sampling technique was used to select out the study participants medical records from a sampling frame.

Data was collected using a standard data abstraction check list adapted from other published researches on similar topic modified to suite the study purpose by trained data collectors. The collected data was coded and interred in to SPSS version 16. Descriptive analysis was carried out using SPSS version 20; chi square test was carried to assess the relation between the dependent variable and the independent variables. The result is presented in tables and figures with appropriate discussions.

To ensure the quality of the data, the data collectors were given training on the data collection for one day. The data collection was supervised by the principal investigator and every filled data abstraction check list was checked for completeness and consistency every day by the Principal investigator.
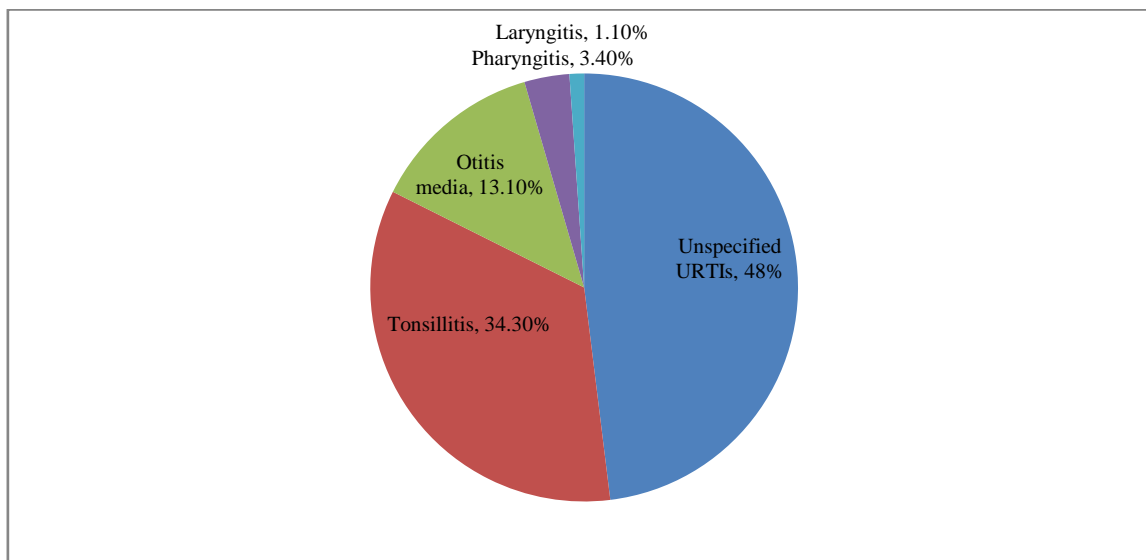
Ethical clearance was obtained from Jimma University, College of Health Sciences. An official letter asking for permission to conduct the research was presented to the hospital administration and the research purpose was explained to the hospital officials. Data collection was conducted after obtaining a formal permission from the hospital. All information obtained from patient's medical records was used only for the stated research purpose. Personal identifiers were not used in the research by any means.

RESULTS

A total of 360 patient medical records of acute upper respiratory tract infections were selected out by systematic random sampling method. Ten of the patient records were not used in the analysis because of incompleteness important data related to the independent variables. Therefore, 350 (91.15%) of the medical records were used for this study.

Socio demographic characteristics

The acute respiratory cases age range was 69 years with a mean of 17.89 years. The distribution by age group shows 170 (48.6%) was in the age group of under 12 years and 177 (50.6%) was between the age of 13-65. Regarding the sex distribution 185 (52.9%) were female and 165 (47.1%) were male with a M: F ratio of 0.892 (Table 1). Regarding the residence of the Patients, 207 (59.1%) were urban dwellers and 143 (40.9%) were rural dwellers.

Table 1: Distribution of Acute Upper Respiratory Tract Infections in Bedele District Hospital by Age and Sex, March 2015, Bedele, Southwest Ethiopia

| Age group | Sex | | | | Total |
| | Male | | Female | | |
	Frequency	Percent	Frequency	Percent	
≤ 12	90	52.9	80`	47.1	100
13 - 65	75	42.4	102	57.6	100
>65	0	0	3	100	100
Total	165	47.1	185	52.9	100

Table 2: Distribution of AURTIs by age group in Bedele District Hospital, March 2015, Bedele, Southwest Ethiopia

| URTIs | Age group | | | | | | | |
| | ≤ 12 | | 13 – 65 | | >65 | | Total | |
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Unspecified URTI	67	19.1	98	28	3	0.9	168	48
Tonsillitis	77	22	43	12.3	0	0	120	34.3
Laryngittis	0	0	4	1.1	0	0	4	1.1
Pharyngittis	8	2.3	4	1.1	0	0	12	3.4
Otitis Media	18	5.1	28	8	0	0	46	13.1
Total	170	48.5	177	50.5	3	0.9	350	100

X^2 = 26.23 (DF=8) P-value = 0.001

Figure 1: Types of Acute URTIs in Bedele District Hospital, March 2015, Bedele, Southwest Ethiopia

**Types of acute upper respiratory cases**

The diagnosis of the URTIs cases showed, 182 (52%) of the cases were specified URTIs while the remaining 168 (48%) were unspecified URTIs. Tonsillitis, otitis media and Pharyngitis were the leading types of specific URTIs in the hospital. The three cases accounted for 178 (97.8%) of the specified URTIs and 50.9% of the whole URTIs cases (Figure 1).

The distribution of the URTIs by age group revealed most of the URTIs were common in the age group of 13-65 and ≤12 accounting for 50.5% and 48.5% of the cases respectively. Tonsillitis and Pharyngitis were more common in children under the age of 12. Age is associated with URTIs significantly with chi square value of 26.23 (DF=8) P-value 0.001 (Table 2).

Antibiotics prescription pattern

Different types of antibiotics were prescribed for 277 (79.1%) of the AURTIs cases. The mean duration of therapy for the different antibiotics was 7.17 days and a range of 13 (1-14) days. Majority, 262 (94.6 %) of the route of administration were oral route of administration. Majority of the antibiotics prescribed were Penicillin 246 (88.8 %). Amoxicillin was prescribed for 197 (71.1 %) of the cases followed by Amoxicillin/Clavulinic acid, 45 (16.2%) (Figure 2).

Majority 140 (40.0%) of the antibiotics prescription were made for patients under the age of 12 years but there is no significant association between antibiotics prescription and age group (Table 3).
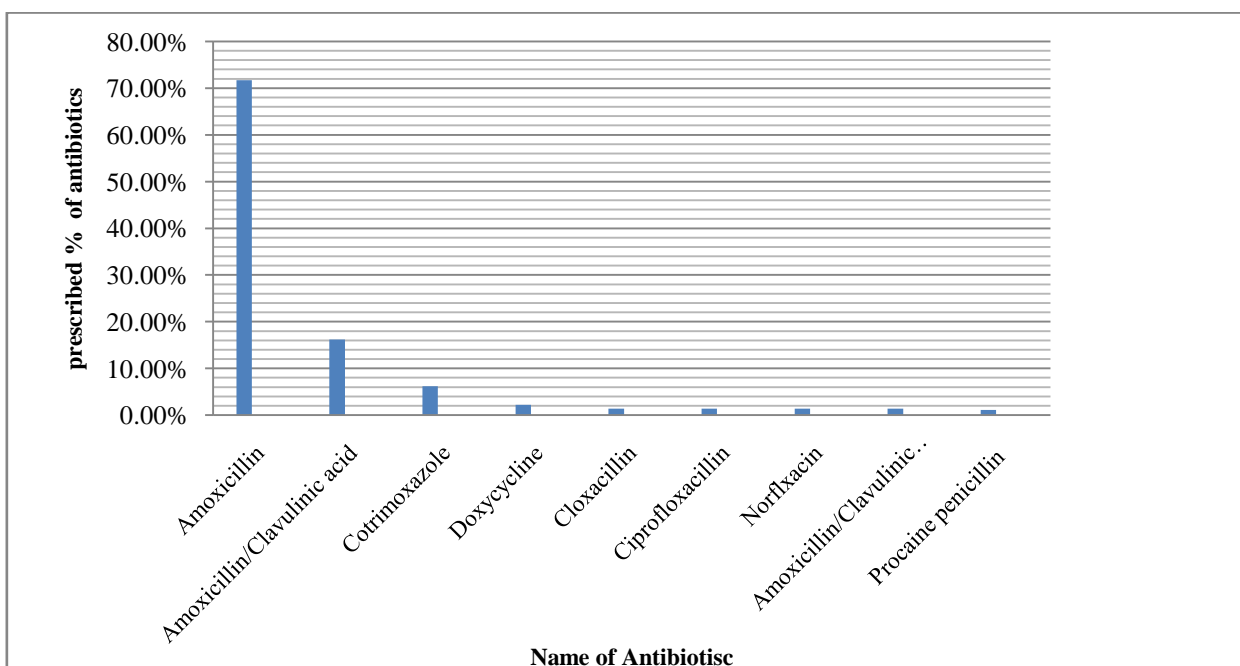
Figure 2: Types of Antibiotics prescribed for AURTIs in Bedele District Hospital. March, 2015. Bedele, Southwest Ethiopia

Table 3: Antibiotics prescription for AURTIs by age group in Bedele District Hospital, March 2015, Bedele, Southwest Ethiopia

Antibiotics prescribed	Age group ≤ 12		13 – 65		>65		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Yes	140	40.0	134	38.3	3	0.9	277	79.1
No	30	8.6	43	12.3	0	0	73	20.9
Total	170	48.6	177	50.6	3	0.9	350	100

$X^2 = 3.12$ (DF= 2), P-value = 0.21

Table 4: Antibiotics prescription for AURTIs by specific diagnosis in Bedele District Hospital, March, 2015, Bedele, Southwest Ethiopia

| Antibiotics	Diagnosis Unspecified		AOM		Tonsillitis		Laryngitis		Pharyngitis	
	F*	%	F	%	F	%	F	%	F	%
Amoxicillin	67	39.8	28	60.9	94	78.3	-	-	8	66.7
Amoxicillin/Clavulinic acid	8	4.8	14	30.4	23	19.2	-	-	-	-
Cotrimoxazole	14	8.3	-	-	3	2.5	-	-	-	-
Cloxacillin	-	-	-	-	-	-	4	100	-	-
Ciprofloxacin	-	-	-	-	-	-	-	-	4	33.3
Norfloxacin	4	2.4	-	-	-	-	-	-	-	-
Doxycycline	6	3.6	-	-	-	-	-	-	-	-
Procaine Penicillin	3	1.8	-	-	-	-	-	-	-	-
Amoxicillin/Clavulinic acid + ciprofloxacin	-	-	4	8.7	-	-	-	-	-	-
Total	102	60.7	46	100	120	100	4	100	12	100

F* = Frequency

The pattern of antibiotics prescription by the types AURTIs showed that all of the AOM, Laryngitis and Pharyngitis cases were managed with antibiotics. Among 168 unspecified URTIs 102 (60.7%) and from specified URTIs 113 (62.1%) of the tonsillitis cases were managed by Antibiotics. The management of the URTIs by different antibiotics shows the unspecified URTIs were majorly managed by amoxicillin 67 (39.8%) followed by Cotrimoxazole 14 (8.3 %) and Amoxicillin/Clavulinic acid 8(4.8%); AOM were managed majorly by Amoxacillin 28 (60.9 %) followed by Amoxicillin/Clavulinic acid 14 (30.4%); tonsillitis were managed majorly by Amoxicillin 94(83.2%) followed by Amoxicillin/Clavulinic acid 16(14.2%); Pharyngittis were managed by amoxicillin 8(66.7%) and ciprofloxacine 4 (33.3%) and all of the Laryngittis cases were managed by Cloxacillin (Table 4).

When we see concurrence with the national standard treatment guide line (STG) of Ethiopia, the AOM (Acute otitis media) cases were managed by antibiotics indicated in the national STG for general hospitals, except those managed by Amoxicillin/Clavulinic acid + ciprofloxacin. The prescription of amoxicillin or amoxicillin-clavulinate for acute tonsillitis is according to the national STG but the prescription of Cotrimoxazole is not according to the STG. The management of acute Laryngitis and some pharyngitis (4 cases) were not in accordance with the national STG. Among the 277 cases managed by antibiotics, 167(60.3%) were treated according to the national STG making the overall concurrence with the national STG 60.3%.

The Antibiotics prescription pattern does not have a statistically significant difference by sex, residence, presence of co morbidity or type of the AURTI. The only variable that does have a significant association with prescription of antibiotics was age group.
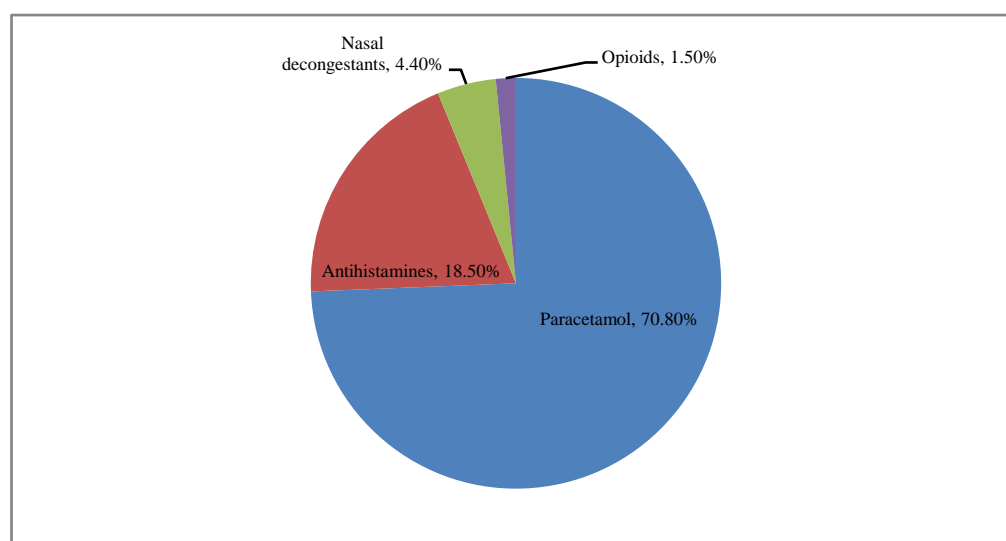
Figure 3: Other medications prescribed for symptomatic treatment of AURTIs in Bedele District Hospital. March 2015, Bedele, Southwest Ethiopia

DISCUSSION

Evaluation of health care setting's drug use pattern in the management of common diseases usually seen in health institutions has a paramount importance in revealing the rationality of the drug use and appropriateness of the clinical management of diseases. Especially, evaluation of antibiotic use patterns in the management of different diseases particularly in areas, where antibiotic misuse is common is so vital. In addition to indicating the rationality of antibiotic prescription, the result of this kind of studies can also indicate the group of antibiotics that are highly misused and prone for the development of resistance by pathogenic microbes. Apart from this, it can also shed some light on reasons of emergence of antibiotic resistance. This study has attempted to evaluate the antibiotic use pattern in the management of URTIs in Bedele District Hospital, Bedele, Southwest Ethiopia.

The result of this study indicated the presence of irrational antibiotic use in the treatment of different URTIs in the hospital. The prevalence of antibiotics use in treatment of URTIS was found to be 277(79.1%). The figure is by far higher when compared with other study results from developing and developed countries. For example, the proportion of URTIs treated with antibiotics was 68.4% in Malaysia, 67.5% in Saudi Arabia and 64% in Canada.[14-16] The probable reason for the high prevalence of antibiotic use in treatment of URTIs could be the knowledge gap in the use of antibiotics in management of URTIs among the prescribers. The low rate of adherence to the STG, which was only 60.3%, could also be the other reason. Given the fact that most of URTIs are caused by viral agents[17] and cases are treated empirically, most of the antibiotic prescriptions made for URTIs in the hospital were irrational.

This study revealed that the level of adherence to the STG in treatment of URTIs in the hospital was only 167(60.3%). This shows the presence of a high rate of non-compliance to the prescribing guidelines in the studied Hospital. Jeliniskin *et al* reported that, according to prescribers' diagnosis 61% of the prescriptions were concurrent with prescribing guidelines in two hospitals in Canada.[16] Similarly, a study from Ireland reported that 2445(71.76%) of the antibiotic prescriptions were found to be necessary in accordance with the prescribing guideline though there were deviations, such as 2nd and 3rd line agents.[18] The high rate of non – compliance to the prescribing guide line could probably relate to the knowledge gap and attitude of using antibiotics for all types of URTIs. Beside this, the result indicates that the prescriptions are either unfamiliar with the prescribing guideline or do not appreciate the importance of strictly following the guidelines recommendations. Out of the total of 277 URTIs diagnosis for which antibiotics were prescribed, 102 (36.8%) of the antibiotics prescriptions were made for the diagnosis's of Unspecified URTIs which is defined as common cold in this research. Antibiotics are not indicated for common cold because they are known to have a viral etiology. Literature shows that there is no proof to support the use of antibiotics in treatment of acute bronchitis and common cold.[19-21] The result of this study is higher compared with other study results. For example, a study in Saudi Arabia reported that 17.5% of the antibiotics prescription was for common cold and other viral infections.[15] In USA, antibiotics were prescribed for 26% of the visits made for Influenza.[22]

A total of 9 types of antibiotics mainly belonging to four different classes, namely the Penicillin, Fuoroquinolin, Tetracycline and Sulphonamide, were used in the treatment of URTIs. The most frequently prescribed antibiotics were from the Penicillin's group, 246 (88.8%). Amoxicillin were the most frequently prescribed from the Penicillin, accounting for 197 (71.1%). Next to the Penicillin, the other

most frequently prescribed antibiotic was Trimethoprim/Sulfamethoxazole "Cotrimoxazole", about 17 (6.2%). The result is greater with research findings from Malaysia where the Penicillins were prescribed for 389 (59.4%) of URTIs cases where Amoxicillin and Ampicillin were specially prescribed with a magnitude of 279 (42.6%) and 68(10.4%), respectively.[14] It is also comparable with a report from Saudi Arabia where the Penicillin specially Amoxicillin and Ampicillin accounted for 50.5% of the antibacterial agents prescribed for URTIs cases.[15] The prescribed number of "Cotrimoxazole" in studied hospital was lower when compared with the report of Lieng et.al where it was prescribed with a magnitude of 58 (8.8%) in Malaysia.[14] The high proportion prescription of the Penicillin and Trimethoprim/Sulfamethoxazole combination "Cotrimoxazole" could be because of the broad spectrum nature of the antibiotics and also because this antibiotics are considered as the 1st line treatment option in management of different bacterial infections by the national STGs in Ethiopia.[23] Considering the lower rate of adherence to the STG and high rate of antibiotic use in the studied health centers, it can be said that, the Penicillin specifically Amoxicillin and "Cotrimoxazole" are the most widely misused antibiotics in the hospital.

CONCLUSION

The treatment pattern of URTIs in the hospital indicates the presence of irrational use of antibiotics with overall antibiotic prescription prevalence is high. Antibiotics were prescribed more frequently in the management of tonsillitis, unspecified URTI and otitis media. Amoxicillin and Amoxicillin/Clavulinic acid were the most frequently prescribed antibiotics in the management of URTIs. Adherence to the STG was less. Antibiotic prescriptions were found to have no statistically significant association with the specific URTI diagnosis. Age is associated with URTIs.

Conflict of interest

The authors declare there is no any conflict of interest.

Acknowledgement

REFERENCES

1. Khan MW, Khan MM, to assess prevalence of URTI and associated symptoms among university students. International Journal of Multidisciplinary Research and Development 2015;2(6):70-77.
2. Cotton MF, Innes S, Jaspan H, Madide A, Rabie H. Management of upper respiratory tract infections in children, Paediatric Infectious Diseases Unit, Department of Paediatrics and Child Health, Stellenbosch University SA Fam Pract 2008;50(2):6-12.
3. Arroll B, Kenealy T. Antibiotics for the common cold and acute purulent rhinitis. The Cochrane Library, John Wiley & Sons Ltd, Chichester, UK, 2005;4.
4. Karevold G, Kvestad E, Nafstad P, Kvaerner KJ. Respiratory infections in schoolchildren: co-morbidity and risk factors. Arch Dis Child 2006;91(5):391-5.
5. Musher DM. How contagious are common respiratory tract pathogens? N Engl J Med 2003;348:1256-66.
6. Teng C, Leong K, Aljunid S, Cheah M. Antibiotic prescription in upper respiratory tract infections. Asia Pacific Family Medicine 2004;3(1-2):3845.
7. Irshaid Y, Al-Homrany M., Hamdi A, Adjepon-Yamoah K, Mahfouz A. A pharmacoepidemiological study of prescription pattern in outpatient clinics

in Southwestern Saudi Arabia. Saudi Medical Journal 2004;25(12):1864-10.

8. Cebotarenco N, Bush P. Reducing antibiotics for colds and flu: a student-taught program. Health Education Research 2008;23(1):146–57.

9. Chang SC, Shiu MN, Chen TJ. Antibiotic usage in primary care units in Taiwan after the institution of national health insurance. Diagn Microbiol Infect Dis 2001;40(3):137-43.

10. Green R. Symptomatic treatment of upper respiratory tract symptoms in children South African Family Practice 2006;48(4):14-9.

11. Hall CB. Long CE, Schnabel KC. Respiratory syncytial virus infections in previously healthy working adults. Clinical Infectious Diseases 2001;33:792-6.

12. Alumran A, Hurst C, Hou X. Antibiotics Overuse in children with upper respiratory tract infections in Saudi Arabia: Risk factors and potential interventions. Clinical Medicine and Diagnostics 2011;1(1):8-16

13. Snow V, Mottur-Pilson C, Hickner JM. Principles of appropriate antibiotic use for acute sinusitis in adults. Ann Intern Med 2001;134:495-7.

14. Teng CL, Leong KC, Aljunid SM, Cheah M. Antibiotic prescription in upper respiratory tract infections. Asia Pacific Family Medicine 2004;3(1-2):38-45.

15. Irshaid YM, Al-Homrany MA, Hamdi AA. A pharmacoepidemiological study of prescription pattern for upper respiratory infections in a tertiary health care center. Saudi Med J 2005;26(10):1649-51.

16. elinski S, Parfrey P, Hutchinson J. Antibiotic utilisation in community practices: guideline concurrence and prescription necessity. Pharmacoepidemiology and drug safety 2005;14(5):319-26.

17. National Institute for Health and Clinical Excellence/NHS/. Respiratory tract infections – antibiotic prescribing. Prescribing of antibiotics for self-limiting respiratory tract infections in adults and children in primary care. NICE clinical guideline 69, 2008. (Retrieved from http://www.nice.org.uk/nicemedia/pdf/CG69 Full Guideline.pdf; Accessed on, December 2015)

18. Marion Murphy, Colin P Bradley and Stephen Byrne. Antibiotic prescribing in primary care, adherence to guidelines and unnecessary prescribing – an Irish perspective. [online] BMC Family Practice 2012, 13:43 (Retrieved from: http://www.biomedcentral.com/1471-2296/13/43; Accessed on December 2015).

19. Wutzke S, Artist M, Kehoe L, Fletcher M, Mackson J, Weekes L. Evaluation of a national program to reduce inappropriate use of antibiotics for upper respiratory tract infections: Effects on consumer awareness, beliefs, attitudes and behavior in australia. Health Promotion International 2007;22(1):53-64.

20. Al-Faris E, Al-Taweel A. Audit of prescribing patterns in Saudi primary health care: What lessons can be learned? Ann Saudi Med 1999;19(4):31721.

21. Fahey T, Stocks N, Thomas T. Systematic review of the treatment of upper respiratory tract infection. Arch Dis Child 1998;79:225-30.

22. Linder JA, Bates DW, RPlatt R. Antivirals and antibiotics for influenza in the United States, 1995–2002. Pharmacoepidemiology and drug safety 2005;14:531–6.

23. Food, Medicine and Health Care Administration and Control Authority (FMHACA) of Ethiopia, Standard treatment guidelines for general hospitals, 3rd Edition, 2014. (Available at: www.fmhaca.gov.et, Accessed on, March 2015)