Causes and management of acute respiratory infections in primary health care

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Abstract

Objective: To explore clinical aspects and drug prescription of acute respiratory infection in primary health care.

Results: Analyses of data of 1,200 outpatient visits revealed that 313 visits (26.08%) were for acute respiratory infection. Over half the patients with acute respiratory infections were children under 15 years old (56.5%), particularly among those under five (36.1%). It was more common in males (65.5%) compared to females (34.5%). Upper and lower respiratory infections were almost equal (50.8% and 49.2% respectively). Acute bronchitis (37.1%) and pharyngitis (28.4%) were the most common presenting diseases. Pneumonia (9.3%), acute tonsillitis (8.3%), common cold (7%), and otitis media (5.4%) were also reported. While pharyngitis was the most common disease in those under 15 years old, acute bronchitis was the most frequent respiratory disease in those older than 45 years old. Fever (63.9%) and cough (61.3%) were the most common presenting symptoms. Antibiotics (37.1%) and analgesics (26.2%) were the most common drugs prescribed to patients with acute respiratory infection. Antibiotics were unnecessarily prescribed to 32.8% of acute bronchitis, 32.6% of pharyngitis, and 18.2% of cases with common cold/influenza. Our study adds to evidence that misuse of antibiotics, characterized by antibiotic overuse is widespread in the treatment of outpatient ARIs.

Key words: Acute respiratory infection, primary health care, antibiotic over-use

Introduction

Lower respiratory tract infections, defined in the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) as pneumonia or bronchiolitis, are a leading cause of mortality and morbidity worldwide. Nearly 2•38 million deaths resulted from lower respiratory infections in 2016, making lower respiratory infections the sixth leading cause of mortality for all ages and the leading cause of death among children younger than 5 years.(1). Respiratory tract infections (RTIs) are a leading cause of death among adults and children, accounting for 12% of all deaths worldwide. In low- and middle-income countries, upper respiratory tract infections account for 11.3% and 5.4% of all deaths, respectively; in additionally, they are common causes of school and work absenteeism. (2). For patients, clinic visits are inconvenient, requiring time and costing money. (3). Respiratory tract diseases, particularly, ARIs are form one of the most common reasons for visits to the primary care physician and thus exerting enormous pressure on health services. (4). ARIs include common cold, otitis media, sinusitis, pharyngitis, acute bronchitis, influenza and pneumonia. Most ARIs are self-limitinged, do not require medical evaluation and can be managed with over-the-counter medications. (5, 6).

ARI visits also result in antibiotic prescriptions (7), many of which are inappropriate. (8). ARIs account for 50% of antibiotic prescriptions to adults and 75% of antibiotic prescriptions to children (9). Unnecessary antibiotics increase health care costs, expose patients to adverse drug reactions and increase the prevalence of antibiotic-resistant bacteria. (10, 11).

In Saudi Arabia, ARI was found to be the most common diagnostic label used in more than half of the prescriptions; antibiotics were prescribed for 53%, anti-cough for 43% and anti- histamine for 20% of patients with ARIs. (12). In this context, optimizing therapy for ARIs is an appropriate area for action. Health care providers in Saudi Arabia have become aware of the problem of prescribing for ARIs and to solve this problem among children, “the national protocol for diagnosis and treatment of acute respiratory infections among children in health care centers and small hospitals” has been developed. (13). However, studies in Makkah Al Mukarramah reported that many physicians were not following the WHO guidelines for Acute Respiratory Infection (14). Educational health programs should be conducted to sensitize the physicians as well as patients regarding the appropriate method of diagnosis and rational use of antibiotics (15). This study was conducted to explore causes of ARTIs in outpatient clinics and to study drug prescription for ARIs.

Subjects and methods

Design: A cross section study was conducted on outpatient visits to two general hospitals; one in a relatively high socioeconomic level (SEL) area, and the other in a relatively lower SEL one.

Sampling: The sampling technique was a convenient one; the total number of outpatient visits enrolled was 1,200 patients during the period September 2017- May 2018.

Collection of data: Patients were examined by the physicians in the outpatient clinics of both hospitals and they filled in predesigned check lists. It included information on place of the hospital, year of examination, complaints, assessment of vital signs, diagnosis, investigation and management as well as outcome of the visits.

Data analysis and statistical tests: Data was analyzed using the Statistical Package for Social Sciences (IBM SPSS, version 22, Armonk, NY: IBM Corp.). Chi square test of significance was employed. The level of significance for the study was 0.05.

Results

Out of the 1200 visits, respiratory tract disorders accounted for 26.12%. They ranked second to cardiovascular disorders (31.5%), and exceeded those due to gastro-intestinal disorders (14.8%). The frequency of lower respiratory tract infections (LRTIs) and upper respiratory tract infections (URTIs) was almost equal (49.2% and 50.8% respectively). Acute bronchitis (37.1%), and acute pharyngitis/ tonsillitis (36.7%) were most common respiratory diseases. Fever (63.9%) and cough (61.3%) were the most common presenting symptoms. Antibiotics (37.1%) and analgesics (26.2%) were the most common drugs prescribed to patients with acute respiratory infection.

Table 1 reveals that URTIs were more common in children under 15 years old, compared to adult patients; on the other hand LRTIs were more common in those older than 15 years, compared to under 15 years old children ($p < 0.001$). The symptoms, earache, headache, sore throat, runny nose, and fever were significantly more common among URTIs compared to LRTIs ($p < 0.05$). On the other hand, the symptoms cough, dyspnea and wheeze were more significantly encountered among LRTIs compared to URTIs ($p < 0.05$). A greater proportion of patients with LRTIs were ordered routine or specific investigations compared to patients with URTI ($p< 0.000$).

Acute bronchiolitis was exclusively encountered among under five children, while acute bronchitis was most common among those over 40 years old. Lobar pneumonia was more encountered among those aged 40 to 60 years, while bronchopneumonia was more encountered among school age children. Pharyngitis, tonsillitis and otitis media were more encountered among less than 15 years old children; all these differences were statistically significant where $X2$ was 78.7 and $p < 0.000$ (Table 2). Antibiotics were prescribed to 53% of school age children, and 36.3% of under five children; these were significantly higher than to other age groups ($p< 0.05$).
Antibiotics were prescribed mainly for cases with tonsillitis

Table 1: ARTI according to age, gender, presenting complaint and investigations ordered

Variable	Characteristics	ARTI		X2 (p)
		URTI (Number 159)	LRTI (Number 154)	
Age groups in years	< 5 years	43.4%	28.6%	18.3 (< 0.001)
	5 -	24.5%	16.2%	
	15 -	21.4%	31.2%	
	40 -	6.9%	16.2%	
	60 +	3.8%	7.8%	
Gender	Males	62.3%	68.8%	1.5 (<0.222)
	Females	37.7%	31.2%	
Earache	Present	10.1%	0.0%	16.3 (<0.000)
Headache	Present	6.3%	0.6%	7.3 (<0.007)
Sore throat	Present	46.5%	2.6%	80.7 (<0.000)
Runny nose	Present	34.0%	6.5%	36.3 (<0.000)
Cough	Present	35.2%	88.3%	92.9 (<0.000)
Dyspnea	Present	0.6%	34.4%	62.6 (<0.000)
Wheeze	Present	0.0%	2.6%	4.1 (<0.04)
Vomiting	Present	3.8%	5.2%	0.37 (<0.543)
Fever	Present	73.4%	53.6%	13.2 (<0.000)
Investigations	No	34.6%	13.7%	29.3 (<0.000)
	Routine	56.0%	57.5%	
	Specific	9.4%	28.8%	

Antibiotics were prescribed mainly for cases with tonsillitis (76.9%) and lobar pneumonia (62.5%). However it was also prescribed to patients with acute bronchitis (32.8%), pharyngitis (32.6%) and common cold/influenza (18.2%). These differences were statistically significant where p< 0.000 (Table 3). The highest frequency of prescribing drugs for the different diseases was as follows: nasal drops for sinusitis (40%), anti-histamine and bronchodilators for bronchopneumonia (23.1% and, 38.5% respectively), analgesic for pharyngitis (44.9%), and corticosteroids for acute bronchitis (23.1%). These differences were statistically significant where p values were < 0.05. Most commonly prescribed antibiotics were amoxicillin and other penicillin (64.7%), Macrolides (23.5%, ceftriaxone (11.7%) and ciprofloxacin (5.9%).

Table 2: ARTIs and drug prescribed for different age groups

Variables	Age groups in years (numbers = 313)					X2 (p)
	< 5 (113)	5- (64)	15– (82)	40– (36)	60+ (18)	
Acute bronchiolitis	7.1%	1.6%	0.0%	0.0%	0.0%	78.7 <0.000
Acute bronchitis	23.0%	26.6%	48.8%	61.1%	61.1%	
Lobar pneumonia	3.5%	3.1%	7.3%	8.3%	5.6%	
Bronchopneumonia	5.3%	7.8%	2.4%	0.0%	0.0%	
Common cold/influenza	8.8%	3.1%	9.8%	2.8%	5.6%	
Pharyngitis	31.9%	28.1%	26.8%	22.2%	27.8%	
Tonsillitis	11.5%	17.2%	2.4%	0.0%	0.0%	
Otitis Media	8.0%	12.5%	0.0%	0.0%	0.0%	
Acute Sinusitis	0.9%	0.0%	2.4%	5.6%	0.0%	
Antibiotic	36.3%	53.1%	32.9%	27.8%	22.2%	10.7 (<0.03)
Nasal drops	15.0%	9.4%	1.2%	0.0%	0.0%	18.2 (<0.001)
Anti-histaminic	10.6%	6.3%	11.0%	11.1%	0.0%	3.2 (<0.520)
Corticosteroids	1.8%	3.1%	1.2%	2.8%	0.0%	1.2 (<0.876)
Cough mixtures/Expectorants	9.7%	18.8%	12.2%	11.1%	11.1%	3.1 (<0.572)
Analgesic	30.1%	26.6%	24.4%	22.2%	16.7%	2.2 (<0.705)

Table 3: Drugs prescribed for different ARTIs

ARTIs	AB	ND	AH	BD	AG	CS
Acute bronchiolitis (number: 9)	22.2%	0.0%	0.0%	11.1%	11.1%	0.0%
Acute tonsillitis (Number: 26)	76.9%	7.7%	0.0%	0.0%	38.5%	0.0%
Acute bronchitis (Number: 116)	32.8%	0.0%	5.2%	24.1%	11.2%	23.1%
Bronchopneumonia (Number: 13)	30.8%	0.0%	23.1%	38.5%	23.1%	0.0%
Otitis Media (Number: 17)	41.2%	0.0%	5.9%	0.0%	23.5%	1.1%
Pharyngitis (Number: 89)	32.6%	14.6%	19.1%	3.4%	44.9%	0.0%
Pneumonia (Number: 16)	62.5%	0.0%	0.0%	0.0%	6.3%	0.0%
Sinusitis (Number: 5)	40.0%	40.0%	0.0%	0.0%	20.0%	0.0%
Common cold/ Influenza (Number: 22)	18.2%	31.8%	9.1%	9.1%	40.9%	0.0%
X2 (p)	28.4 (<0.000)	45.7 (<0.000)	21.5 (<0.006)	38.6 (<0.000)	38.7 (<0.000)	33.1 (<0.000)

AD Antibiotic; ND: Nasal drops; AH: Anti-histaminic; BD: Bronchodilator; AG: Analgesic; CS: corticosteroid.

Discussion

This study was conducted to explore causes of ARIs and reveal prescribing pattern of drugs for ARIs in primary health care facilities. Although, the study is based on convenient samples which could not accurately portray the pattern of ARI in the private health care sector in Jeddah city, however, the large number of studied patients (1,200 cases), may justify this study as an exploratory one, which may prompt the need for further studies, based on cluster samples, to assess the situation in the region.

Out of the 1200 visits, ARIs accounted for 26.12%. This is in line with previous studies which revealed that ARIs were among the leading causes for visiting primary health care (4 – 6). The majority of the visits with ARIs were for less than 15 year-old children (56.5%); this is in line with previous studies in Saudi Arabia (14, 17). This might reflect the composition of the Saudi population pyramid, as 50% of the population is under the age of 15 (18). In the present study, males were more affected by ARIs compared to females. This is in line with several other studies (19 – 21). This could be due to involvement of males in outdoor activities more often than females which render them more vulnerable to ARI. Unlike several previous studies, we found that URIs and LRIs were almost similar in frequency among the visits to outpatient clinics in hospitals (14,17,19 – 20). This might reflect the type of patients who prefer to visit the hospitals. Mild self-limited UTRIs, which are caused mainly by viruses, may make the patient reluctant to visit a doctor, particularly in outpatient clinics of hospitals; on the other hand LRTIs with prolonged cough may urge the patient to visit a physician in outpatient clinics of hospitals as they might get better care.

Fever was the most common symptom encountered among patients with ARIs (63.9%). This is in line with previous studies (14,17,19). Cough was encountered in 61.3% of cases with ARIs. Runny nose and sore throat were reported by 20.4% and 24.9% of the cases respectively.

These are in line with previous studies in Saudi Arabia (17,19). It was shown in some studies that a large proportion of patients with rhinovirus infections would continue to cough for more than 2 weeks (22). The present study revealed that acute bronchitis (37.1%), and acute pharyngitis (28.4%) were most common respiratory diseases. This is in line with previous studies (14, 17). Most of these illnesses are self-limiting which points out the importance of implementation of community based health education programs to prevent these illnesses and educate the public about self-management of these self-limiting diseases and when to use the health care facilities (5,6). Antibiotic was the drug most frequently prescribed for patients with ARIs (37.1%). This is in line with previous studies (5,8,14). Amoxicillin and other penicillin groups were the most frequently prescribed antibiotics (64.7%). This is consistent with other studies (8,13,14). In the present study antibiotics were prescribed mainly for cases with tonsillitis (76.9%) and lobar pneumonia (62.5%). However it was also prescribed to patients with acute bronchitis (32.8%), pharyngitis (32.6%) and common cold/influenza (18.2%). This is in line with Havers et al in 2018 who found that among 14/987 outpatients with acute respiratory infections, 41% were prescribed antibiotics, 41% of whom had diagnoses for which antibiotics are not indicated, primarily viral upper respiratory tract infections and bronchitis (24). Indiscriminate use of antibiotics should be discouraged. Antibiotics should be reserved for cases with group A beta hemolytic streptococcal pharyngitis and patients with bacterial complications such as otitis media, pneumonia and sinusitis (23,24). Antibiotics should be used when clinically indicated. This will help to slow the emergence of resistant bacteria (25). Concomitant with clinical therapies, prevention and other health promotion strategies should be carried out.

Conclusion

Our study adds to evidence that misuse of antibiotics, characterized by antibiotic overuse and inappropriate antibiotic selection, is widespread in the treatment of outpatient ARIs.

We must strengthen outpatient antibiotic stewardship efforts to eliminate antibiotic treatment for viral URIs and acute bronchitis, which our study indicates would make the largest contribution to decreasing unnecessary antibiotic prescriptions. Increased efforts are needed to support improved adherence to guidelines for antibiotic prescribing for common diagnoses, including more stringent adherence to group A Streptococcus (GAS) pharyngitis testing guidelines and clinical criteria for antibiotic treatment of sinusitis, as well as interventions focused on appropriate selection of first-line antibiotics for these conditions if treatment is indicated. The Centers for Disease Control and Prevention published “Core Elements of Outpatient Antibiotic Stewardship, (26) which provides guidance to clinicians and enable leadership to implement activities to improve antibiotic use.

Limitations of this study

This study is based on a convenient sample. It was a hospital based study.

List of abbreviations

SEL: Socio-economic level
KSA: Kingdom of Saudi Arabia
SPSS: Statistical package for Social Sciences
ARI: Respiratory tract infection
URTI: Upper respiratory tract infection
LRTI: Lower respiratory tract infection
OM: Otitis Media
Group A Streptococcus: GSA

Declarations

-Ethics approval and consent to participate

Ethical clearance was obtained from the institutional review board (Protocol identifier 006MP25082019; Application of human ethics committee approval -1-, 25/08/2019). Permission was obtained from the directors of the outpatient clinics for collecting data from the records. Data collection procedure was anonymous.

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