Original article

Inappropriate antibiotic use for respiratory infections in outpatient settings

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ABSTRACT

Background: Overuse of antibiotics is a significant problem in low- and middle-income countries where recommended treatment guidelines are not routinely practiced, resulting in antimicrobial resistance. Acute respiratory tract infections, mostly viral in origin, remain the clinical category for most commonly prescribed antibiotics. Due to the lack of local evidence about antibiotic prescribing trends in such infections, this study was conducted to evaluate the prescribing patterns in general and antibiotic prescribing trends specifically in prescriptions with the diagnosis of acute respiratory infections in district Mirpur of Azad Kashmir.

Patients and methods: A prospective cross-sectional study carried out in the Department of Pharmacology and Therapeutics, Army Medical College, Rawalpindi, and outpatient departments of public health facilities in district Mirpur, Kashmir, from Aug to Oct 2020. Data were collected from 10 different public health facilities in District Mirpur, Kashmir including, three rural health centers (RHC) and five basic health units (BHU). Prescribing pattern analysis by objective observations of the prescriptions after patient-physician encounter against the World Health Organization defined core prescribing indicators. The appropriateness of antibiotic use was analyzed against clinical practice guidelines. IBM SPSS Statistics for Windows, Version 26 was used for data analysis. Descriptive analysis was done to find frequencies and percentages for categorical data and means and standard deviation for continuous data.

Results: Total number of prescriptions evaluated was 144. Number of prescriptions containing antibiotics was 118 (82%) (standard, 20 - 26.8%). Inappropriate use of antibiotics was seen in 78% of cases where no antibiotics were indicated. The average number of medicines per prescription was 3.11 (standard, 2.1), whereas 79% of medicines prescribed were from the national essential medicine list (standard, 100%). Only 2.5% (standard, 100%) of the medications were prescribed with generic names.

Conclusion: This study shows an inappropriate and overuse of antibiotics for acute respiratory tract infections, indicating a lack of adherence to core prescribing indicators and clinical guidelines by the physicians in outpatient clinics of Mirpur.

Keywords:

Antibiotics, Prescriptions, Respiratory tract infections, World health organization, Mirpur Azad Kashmir

INTRODUCTION

Antibiotics can serve as a disease-specific indicator for specific conditions such as acute respiratory tract infections to gain insight, as inappropriate prescribing of antibiotics is common in such infections despite mainly being viral in origin.[1] Inappropriate use of antibiotics is one of the major factors leading to antimicrobial resistance[2] leading to higher treatment cost because of the dependence on expensive alternative antibiotics and longer duration of illness[3]. The impact of antimicrobial resistance is higher in developing countries like Pakistan because of poor existing infrastructure and financial constraints to combat the epidemics of drug resistance[4]. There is a lack of national data on the use of antibiotics in Pakistan. However, available local data showed a very high percentage of prescription encounters with antibiotics ranging from 52 to 70%[5]. To improve the appropriateness of prescribing, it is necessary to ascertain the current trends being practiced, but there is no data available to date on prescribing practices in respiratory tract infections in Azad Kashmir. Therefore, this study was conducted to find out the medicine prescribing patterns in general and antibiotic prescribing trends in particular in prescriptions of patients diagnosed with respiratory infections at the outpatient settings of district Mirpur of Azad Kashmir.

Conflict of interest: The authors declared no conflict of interest exists.

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PATIENTS AND METHODS

The ethical review committee approved the protocol of Centre for Research in Experimental and Applied Medicine (CREAM)", Army Medical College National University of Medical Sciences, Rawalpindi Army Medical College (ERC/ID/ 89). In addition, permission to collect data from the health facilities was obtained from the district health officer. Consent was obtained verbally from each study participant before the objective observation of prescriptions. The data was coded and then entered to keep the identities of patients and prescribers confidential.

This was a cross-sectional study from August to October 2020. Data were collected from 10 different public health facilities in District Mirpur, Kashmir, including a district headquarters (DHQ) hospital, a tehsil headquarters (THQ) hospital, three rural health centers (RHC), and five basic health units (BHU) keeping appropriate representation from urban, semi-urban and rural facilities. The selection of health care facilities such as RHC and BHU was carried out after discussion and approval by the local health administration, considering convenience, accessibility, and other logistic aspects. The guidance for this sample size selection and survey methodology was taken from validated World Health Organization (WHO) developed guidelines[6]. According to WHO guidelines on investigating antimicrobial use patterns in health facilities, at least 100 encounters should be included in any study investigating prescribing patterns[7].

Non-probability purposive sampling technique was used, and the primary author did the collection and objective observations of the prescriptions carried by the patients. The patient's visit to the health facility and their encounter with the prescriber was taken as a unit for analysis.

Prescriptions of the patients of all age groups attending the outpatient health facility were included. The prescribed medicines were counted as antimicrobial according to the criteria mentioned in the WHO manual of using drugs. Drugs such as anti-leprosy, anti-tuberculosis, antifungal, anti-amoebic, anti-giardiasis, anti-leishmaniasis, anti-trypanosomal, and antimalarial drugs are placed in a separate category from other antibiotics and therefore were not considered among antibiotics[8].

The selection of prescriptions to be included was based on written diagnosis and treatment prescribed irrespective of the level of the prescriber's experience. Prescriptions with the diagnosis of upper respiratory tract infections (tonsillitis, pharyngitis, rhinitis, common cold, sore throat, cough, or otitis media) and lower tract infections (acute bronchitis, bronchiolitis, pneumonia) were included in the study[9]. The prescription encounters without the written diagnosis in the above categories but with cough and sore throat were also analyzed.

The appropriateness of antibiotic use in RTI was analyzed against the international clinical practice guideline recommendations from professional societies as no national guidelines were available[10]. Common respiratory tract infections were classified into three tiers based on the most likely indication for an antibiotic's prescription. Tier 1 diagnoses are the ones for which antibiotics are almost always indicated and include pneumonia. Tier 2 diagnoses are the conditions for which antibiotics may be indicated, including sinusitis, suppurative otitis media, and pharyngitis. Tier 3 diagnoses are all other conditions for which antibiotics are not indicated and include asthma, allergy, bronchitis and bronchiolitis, influenza, non-suppurative otitis media, a viral upper respiratory infection.

In addition to the antibiotic prescribing patterns, the prescriptions were also analyzed for the other WHO core prescribing indicators: (1) average number of drugs per patient encounter; to evaluate the degree of polypharmacy. Combination drugs were counted as one. (2) percentage of drugs prescribed by generic name; check the tendency to prescribe by generic name[11]. Generics were defined as an international non-proprietary name (INN) as per WHO guidelines. INN prescribing is statutory in many countries and a standard practice without legal obligation in other names; therefore, this list was used as a guide in measuring this indicator[12].

(3) Percentage of encounters with an injectable to determine the extent of use of these costly forms of medicine, (4) Percentage of drugs prescribed from the national essential drug list; to measure the degree to which practitioners stick to the National Drug Policy. National Essential Medicine List of Pakistan, published in 2018 by the Drug Regulatory Authority of Pakistan, was used as a reference[13].

IBM SPSS Statistics for Windows, Version 26 was used for data analysis. Descriptive analysis was done to find frequencies and percentages for categorical data and means and standard deviation for continuous data. Results of the study analyzed WHO parameters for prescribing indicators.

Table 1. Analyses of prescribing indicators

Core Prescribing Indicator	Average/Percentage	WHO Standard
Average medicines per prescriptions	3.11	1.6 - 1.8
Prescriptions with antibiotics	82%	20.0 – 26.8
Prescriptions with injections	3%	13.4 – 24.1
Medicines from the essential drug list	79%	100
Medicines with generic names	2.5%	100

Table 2. Diagnosis categories based on most likely indication for an antibiotic prescription in a tiered fashion

Diagnosis	Number of prescriptions(n)	Number of prescriptions with antibiotics prescribed	Percentage of prescriptions with antibiotics prescribed (%)
Tier 1 (antibiotics almost always indicated)	**0**		
Tier 2 (antibiotics may be indicated)			
Sinusitis	3	3	100
Pharyngitis	6	6	100
Acute Otitis media	8	8	100
Tonsillitis	7	7	100
Tier 3 (antibiotics not indicated as per recommendation)			
Allergic rhinitis	4	3	75
Bronchitis / bronchiolitis	22	22	100
Common cold/Influenza	94	69	73

RESULTS

Total prescriptions of respiratory diseases studied were 173, out of which 144 met the study criteria of acute respiratory infections. The prescriptions pertaining to the diagnoses of Tuberculosis, Asthma, and Chronic obstructive pulmonary diseases were excluded. The majority, 74 (60%), of the cases of RTI were children in the age group of 0-12 years. The average age was 16.5 SD 17.6. There were 73 male and 67 female patients. Analysis of core prescribing indicators, including antibiotic prescribing, is shown in Table 1. The prescriptions with antibiotics were N=118 (82%) against the WHO standard of 20 to 26.8%. Various categories of RTI showed an overuse of antibiotics by 78% in tier 3 diagnoses such as cold, influenza, allergic rhinitis, bronchitis, and bronchiolitis where no antibiotic is indicated (Table 2). Inappropriate antibiotics were prescribed in 75% of patients diagnosed with allergic rhinitis (n-3/4), 73% with viral URTI (n-69/94), and 100% with bronchitis (n-22). The most prescribed antibiotics were Penicillin (53%), followed by Cephalosporins (27%), Fluoroquinolones (10.5%), and Macrolides (7.5%) (Table 3). Analysis of other core prescribing indicators showed that the average number of medicines per prescription was 3.11 (SD 1.2, range 8) (Table 1). Out of 433 medications prescribed, only 2.5% (N=10) were prescribed according to their generic names, and 79% (n-342) of the medicines were from the national drug list. Prescriptions with injections were only 1% (N=3), much lower than the WHO standard of 13.4 to 24.1%.

DISCUSSION

Drug utilization studies are an essential tool in improving the health care system nowadays. This is the first study on prescribing trends in upper respiratory infections in the region of Azad Kashmir. The findings of this study show an overuse and inappropriate use of antibiotics along with a very low predominance of generic prescribing. There is a shortage of national studies on antibiotic prescribing patterns in RTI. Findings of this study of overuse (82%) and inappropriate antibiotic prescription (78%) are alarmingly high compared to percentages of antibiotics prescribed for tier 3 diagnosis in international studies 25% to 46.2% but comparable to the figure of a national study 76%[14,15]. Unnecessary antibiotic prescriptions to all the children with bronchitis could be attributed to parent pressure or diagnostic uncertainty, which could prompt practitioners to write antibiotics to diagnose bronchitis as bacterial pneumonia.[16] Another critical finding in this study is that 79% of antibiotics prescribed are broad-spectrum including macrolides and fluoroquinolones while aminopenicillins, which may sometimes be indicated in case of bronchitis or sinusitis, are only 19%. Such overuse of broad-spectrum antibiotics causes avoidable adverse events, contributes to antimicrobial resistance *Clostridium difficile* infections, and unnecessary treatment costs.[17] There were no local institutional guidelines or national guidelines available for treating various respiratory tract infections. Interventional strategies to improve antibiotic use could be instituting antibiotic

Table 3. Classes of antibiotics prescribed

Group of Antibiotics	Name of Antibiotics	Number prescribed n=119	Percentage of antibiotic prescribed %
Penicillin	Co-amoxiclav	23	19
	Amoxil	41	34
Cephalosporins	Cephradine	1	1
	Cefixime	32	26
Macrolides	Erythromycin	1	1
	Clarithromycin	5	4.5
	Azithromycin	2	2
Fluoroquinolones	Levofloxacin	9	7.5
	Moxifloxacin	2	2
	Ciprofloxacin	1	1
Tetracyclines	Doxycycline	2	2

prescription guidelines, antibiotic stewardship programs, and financial incentives for reduced prescribing or extra counseling and close monitoring through prescription audits.[18] All 144 prescriptions contained antibiotic therapy without any microbiological evidence such as culture and sensitivities supporting the use of antimicrobials, which is alarming. This empirical use may be attributed to the lack of capacity, resources, and sufficiently trained staff to isolate bacteria and determine antibiotic susceptibility in BHUs, RHCs, and THQH, but this explanation is not justified for the DHQH, which is well equipped with all the required resources. Nonetheless, irrational prescribing of antibiotics is among the leading causes of antimicrobial resistance in developing countries. According to the World Health Organization, antimicrobial resistance is one of the greatest challenges in public health that may lead to a post-microbial era in which common infections may increase mortality again.[19,20] Analysis of other core prescribing indicators showed polypharmacy as an average number of drugs per prescription was 3.11, higher than the acceptable WHO reference range of 1.6 -1.8. Though the percentage of drugs prescribed from NEML was 80% and below the WHO standard of 100%, this figure is better than the national average of 50% and figures (72%) of low and middle-income countries. However, the meager percentage of drugs (2%) as prescribed by their generic names as compared to national (25%) and international averages (37 to 94%) from low- and middle-income countries.[21,22] There could be various factors for lack of generic prescribing, such as lack of local bioequivalence studies leading to an impression that generic medicines may be less effective, lobbying by interest groups for originator brands, and direct access of prescribers to pharmaceutical agents.[23]

CONCLUSION

The majority of patients' prescriptions attending outpatient clinics for common respiratory tract infections of viral origin in public health facilities in Mirpur Azad Kashmir contained overuse and inappropriate antibiotic prescribing along with polypharmacy and very limited use of generic prescribing.

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