Evidence-Based Practice in the Use of Antibiotics for Respiratory Tract Infections in Primary Health Centers in Kuwait

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**Key Words**
Antibiotic • Upper respiratory infections • Evidence practice • Primary health care • Antibiotic resistance • Kuwait

**Abstract**

**Objectives:** The objective of this study was to evaluate the use of antibiotics in treating upper respiratory tract infections (URTIs) in primary health centers in Kuwait and investigate the extent to which antibiotic use follows international guidelines. **Subjects and Methods:** A nationwide cross-sectional study was conducted with a sample size of 615 patients selected by using a multi-stage cluster sampling method. Of these, 270 patients had URTI and were included in the analysis. Data collection was done by observing the whole process starting from patient presentation and history taking to final diagnosis and treatment by the physicians. **Results:** Our study showed that about 135 (50%) of the patients with URTIs were given antibiotics, of which only 8 (6%) could be justified according to the NICE guidelines. However, prescriptions for 132 (98%) patients who were not given antibiotics could also be considered as evidence-based. Patients presenting with symptoms such as fever (OR = 2.7; p < 0.001) and sore throat (OR = 1.9; p < 0.01) were more likely be given antibiotics than those presenting without such symptoms. Furthermore, patients diagnosed with tonsillitis (OR = 25; p < 0.002), otitis media (OR = 9; p < 0.004), common cold (OR = 3; p < 0.049) or pharyngitis (OR = 2.7; p < 0.003) were more likely be given an antibiotic treatment as well. We also found that non-Kuwaitis were prescribed antibiotics more often than Kuwaitis (OR = 2.0; p < 0.005). **Conclusion:** This study showed a very high percentage of non-evidence-based prescriptions of antibiotics in Kuwait, and should be of great public health concern. Although overuse of antibiotics in primary care settings has been well reported from around the world, our finding of non-evidence-based use at 94% is of great public health concern since this may be linked primarily to the lack of evidence-based practice in Kuwait.

**Introduction**

Since the 1940s, when the first antibiotic, penicillin, became available to the public, the use of antibiotics has led to improvements in healthcare and a significant reduction in mortality from infectious diseases. However, subsequent overuse and inappropriate use of antibiotics has led to the emergence of bacterial resistance, in addition to costly prescriptions and exposure to unnecessary...
side effects. According to an annual World Health Organization report, about 14,000 people are infected and die each year as a result of drug-resistant microbes contracted in US hospitals. More than 2 million Americans are infected each year, and more than half of these infections resist at least one antibiotic [1]. A Kuwaiti study showed a high level of antimicrobial resistance amongst the uropathogens causing urinary tract infection cases in hospitals [2].

Nearly 80% of the prescriptions of systemic antibiotics are generally made in primary care, with respiratory tract infection being the most frequent cause of indication, although there is limited evidence of the role of antibiotics in reducing both the duration and complications of symptoms [3]. With the growing interest in evidence-based practice, it has become essential to ascertain that the diagnosis and treatments are evidence-based and benefits of a particular treatment outweigh the harm to the patient and society. Various health regulatory organizations have formulated evidenced-based guidelines for diagnosis and treatment of diseases. One of the most used guidelines was developed by the National Institute for Health and Clinical Excellence (NICE), which has published a comprehensive clinical guideline that is updated regularly based on the latest available evidence [4].

Although antibiotic resistance has become an increasingly global problem, published data on the extent of the problem in the Middle East is limited. In this study, we used the latest NICE guidelines for treatments of respiratory tract infection in children and adults, particularly in terms of the antibiotic use, to assess how well the practice pattern of primary health care physicians in Kuwait correlates with the NICE guidelines. We envisaged that quantifying the amount of non-evidenced-based antibiotic prescriptions in Kuwait could pave the way to develop better public health policies to help reduce the overuse of antibiotics and eventually reduce the rate of growing resistance.

**Methods**

In this study, a cross-sectional survey was used with a sample size of 615 cases, of which 270 confirmed cases of respiratory infections were analyzed. A multi-stage stratified cluster sample was used in proportion to the population to select our sample of patients. In the first stage, all 6 governorates except Jahra were included, and in the second stage, 10 public health centers out of a total of 81 in Kuwait were surveyed. The 10 centers that were to be surveyed were selected randomly in proportion to the population.

A questionnaire designed to capture the whole patient practice process was used by the general physician (GP), starting from history taking and ending with final diagnosis. The survey form included patient demographic characteristics, GP characteristics, chart of presenting symptoms and durations, investigations carried out, primary diagnosis, complications and treatment prescribed. The questionnaire was made while keeping the NICE guideline in mind to enable us to assess the need for antibiotic prescription. The GPs were, however, not informed that the clinical data would be compared to the evidence-based guidelines to avoid any modification in their practice pattern. Ethical consents from the Faculty of Medicine, the Ministry of Health, the GP and the patients were obtained. No information about the identity of the physician or the patient were recorded anywhere in the questionnaire.

Data analysis was initiated by describing the socio-demographic characteristics, presenting symptoms, diagnosis and treatment. A computer algorithm was then used to identify the patients who should receive antibiotics according to the NICE guidelines. Based on this, the prevalence of evidence-based antibiotic prescriptions was computed among the URTI. A further evaluation was made as to whether or not the presence of a particular respiratory symptom or a socio-demographic factor could increase the chance of prescribing an antibiotic. For this, a simple univariate logistic regression was used in which one factor at a time was entered and the crude OR and 95% CI were reported.

**Results**

The socio-demographic factors and the characteristics of the study population are shown in table 1. About 45 (17%) of the patients were 2 years or younger, while

| Table 1. Socio-demographic characteristics of the patients reporting upper respiratory tract infections (n = 270) |
|---|---|
| **Age of patient (years)** | **n** | **%** |
| ≤2 | 45 | 16.7 |
| 3–12 | 102 | 37.9 |
| 13–45 | 96 | 35.7 |
| >45 | 26 | 9.7 |
| **Gender** |  |  |
| Male | 150 | 55.6 |
| Female | 120 | 44.4 |
| **Nationality** |  |  |
| Kuwaiti | 183 | 68.0 |
| Non-Kuwaiti | 86 | 32.0 |
| **Governorate** |  |  |
| Ahmadi and Mubarak Al Kabeer | 85 | 31.5 |
| Hawali | 67 | 24.8 |
| Farwaniya | 72 | 26.7 |
| Capital | 46 | 17.0 |

1 One patient’s nationality was not known.
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26 (10%) were older than 45 years. Kuwaitis made up 183 (68%) patients in the sample, which corresponded well with known Kuwaiti demography. The common presenting symptoms along with known chronic conditions and the primary diagnosis made by the GP are summarized in Table 2. The most common presenting symptoms for the primary care physician in Kuwait were: cough, 146 (54.1%); sore throat, 96 (35.6%); and fever, 89 (33.0%). The most frequent primary diagnosis was pharyngitis followed by tonsillitis. Physical examinations carried out and treatment prescribed by the GPs are summarized in Table 3. Throat (225, 83.3%) and chest (180, 66.7%) examinations were the most common physical examinations carried out. Regarding treatment, antibiotics were the most frequently prescribed with 135 (50%) patients receiving an antibiotic. Painkillers (130; 48.1%) were also prescribed frequently. Despite popular belief, only about 8 (3%) patients requested antibiotics from physicians.

We estimated that only about 6% of the antibiotic prescriptions could be justified according to evidence-based guidelines, and about 94% of those patients that were not given antibiotics could also be considered as evidence-based (Table 4). Univariate logistic regression analysis showed that patients presenting with symptoms such as fever (OR = 2.7; p < 0.001) and sore throat (OR = 1.9; p < 0.01) were more likely be given antibiotics. Furthermore, patients with a diagnosis of tonsillitis (OR = 25; p < 0.002), otitis media (OR = 9; p < 0.004), common cold (OR = 3; p < 0.049) or pharyngitis (OR = 2.7; p < 0.003) were more likely to be given an antibiotic treatment than those without. We also found that non-Kuwaitis were prescribed antibiotics more often than Kuwaitis (OR = 2.0; p < 0.005).

**Table 2.** Symptoms, diagnosis and known chronic illnesses of the patients presenting with respiratory infections (n = 270)

| Symptom                        | n  | %   |
|--------------------------------|----|-----|
| Cough                          | 146| 54.1|
| Sore throat                     | 96 | 35.6|
| Fever                          | 89 | 33.0|
| Runny/blocked nose             | 65 | 24.1|
| Ear pain                       | 27 | 10.0|
| Nausea/vomiting                | 26 | 9.6 |
| Headache                       | 21 | 7.8 |
| Shortness of breath            | 13 | 4.8 |
| Abdominal pain                 | 12 | 4.4 |
| **Known chronic condition**    |    |     |
| Asthma                         | 30 | 11.1|
| Diabetes mellitus              | 8  | 3.0 |
| Hypertension                   | 7  | 2.6 |
| **Primary diagnosis**          |    |     |
| Pharyngitis                    | 52 | 19.3|
| Tonsillitis                    | 22 | 8.1 |
| Otitis media                   | 18 | 6.7 |
| Common cold                    | 16 | 5.9 |
| Throat exudates                | 4  | 1.5 |
| Sinusitis                      | 3  | 1.1 |
| Otorrhea                       | 2  | 0.7 |

1 More than 1 symptom, known chronic disease and diagnosis is possible.
2 No patient was diagnosed with pneumonia, tender anterior cervical lymphadenopathy, mastoiditis, eye or intracranial complications.

**Table 3.** Distribution of the treatment used and physical examination done in the primary health center along with patient requests for antibiotics and sick leave (n = 270)

| Treatment         | n  | %   |
|-------------------|----|-----|
| Antibiotics       | 135| 50.0|
| Painkillers       | 130| 48.1|
| Antihistamines    | 85 | 31.5|
| Antipyretics      | 47 | 17.4|
| Steroids          | 4  | 1.5 |
| Anti-hypertensives| 2  | 0.7 |
| Antacids          | 1  | 0.4 |
| **Physical examination** | | |
| Throat            | 225| 83.3|
| Chest             | 180| 66.7|
| Ear               | 53 | 19.6|
| Temperature       | 38 | 14.1|
| Blood pressure    | 16 | 5.9 |
| Eye               | 6  | 2.2 |
| Abdominal         | 5  | 1.9 |
| **Patient requested** | | |
| Antibiotics       | 8  | 3.0 |
| Sick leave        | 41 | 15.2|

1 More than 1 treatment and examination is possible.

**Discussion**

We found that half of all upper respiratory infections were treated with antibiotics in primary care settings in Kuwait. Of these, almost 127 (94%) could not be justified based on evidence-based guidelines promulgated by the
NICE. Although over-prescription of antibiotics is a global problem, Kuwait may have one of the highest rates of unjustifiable antibiotic prescriptions at the primary care level.

Physicians’ knowledge and perception of the value of antibiotics may have the greatest role in their prescription pattern. A previous study showed that only 24% of primary care physicians in Kuwait had a reasonable understanding of evidence-based practice [5]. Our findings suggest that over-prescription was not associated with the GP’s nationality, gender or geographical region; rather it was prevalent across Kuwait. Ever since antibiotics were discovered and consequent health benefits associated with them were realized, both physicians and lay people have tended to believe that antibiotics can treat any infection [6]. There is also a belief that patients pressure physicians to prescribe antibiotics. However, our study showed that only about 3% requested an antibiotic, contrary to a UK study which showed that 72% requested antibiotics [7].

In our study, we found that 50% of patients with URTIs were prescribed antibiotics, thus confirming a study done in the USA that showed that about 47% of patients with URTI were given antibiotics [8]. Such findings of overuse of antibiotics are particularly alarming given that published studies from different parts of the world have shown that most URTIs presenting at primary care levels are viral in origin [9]. Furthermore, there is mounting evidence to suggest that there is more harm than benefit in treating such infections with antibiotics [3].

The discrepancy between clinical evidence and medical practice is of great concern in this era of evidence-based medicine. A recent multi-country study from Europe showed that about 85% of antibiotic prescriptions were not evidence-based [10], and they vary considerably [11]. Over-prescription and inappropriate use of antibiotics have been documented in primary care settings globally. For instance, Wise et al. [12] demonstrated that 50% of all antibiotics prescribed in primary health care are of questionable value. Butler et al. [11] argued that despite the fact that antibiotic treatment does not bring meaningful benefits for most patients, there are considerable barriers in implementing evidence-based guidelines. In our study, however, the prevalence of non-evidence-based antibiotic prescriptions was as high as 94%. We found that those patients presenting with fever, sore throat and acute otitis media were largely treated with antibiotics even without confirmation that they could be due to bacterial infections. This is similar to a recent study from Bahrain, which showed the greatest numbers of antibiotic prescription were given to tonsillitis and acute otitis media patients [13]. We have not carried out a multilevel modeling, although the GP data are clustered, given that the focus of the study was to quantify the prevalence and there was not much variability in terms of antibiotic prescriptions.

Health authorities in different parts of the world have been concerned about the overuse of antibiotics and associated consequences, particularly antibiotic resistance, increasing cost and side effects. In order to reduce the impact of this problem, authorities have started to develop regulatory and monitoring mechanisms. One of the main ways was to develop evidence-based guidelines that are disseminated to the physicians to help them to decide what is in the best interest of their patients. There is growing evidence that following evidence-based guidelines improves the efficacy of health care when it is practiced at the organizational level. For instance, a UK study showed that the consultation rate for any respiratory infection declined by 35%, and overall antibiotics prescription for all acute respiratory infections declined by 45% [14]. Use of procalcitonin-guided therapy was also shown to reduce antibiotic use for acute respiratory tract infections in primary care without compromising patient outcome [15]. CRP testing has been shown to be of value in patients with cough, as well as implementation of physi-
cian communication skills training [16]. However, no such evidence-based guidelines or monitoring processes exist in Kuwait, although it has been mandated that antibiotics are not to be dispensed without a prescription. The higher rate of antibiotic use that we documented in this study is not confined to Kuwait alone; rather, similar studies from other parts of the Middle East have also shown that there is substantial antibiotic overuse [12, 13, 16, 17]. A study in Bahrain showed that 51.6% of URTI patients were given antibiotics [13], while a study from UAE also demonstrated a high rate of antibiotics use [17].

Bacterial resistance associated with the overuse of antibiotics may be of particular concern to Kuwait given that a recent study reported Kuwait to have one of the fastest growing rates of antibiotic resistance [18]. In addition to resistance, various negative health effects associated with overuse of antibiotics have also been documented [18–20]. Studies have shown that children who are given antibiotics at a very young age have a higher risk of developing asthma later in life [19]. Furthermore, there is evidence to suggest that there is an association between high ambulatory antibiotic prescription and the rate of hospitalization due to complications arising from respiratory and urinary tract infections [20].

Conclusions

This study showed a very high percentage of non-evidence-based prescription of antibiotics in Kuwait and should be of great public health concern. Although overuse of antibiotics in primary care settings has been well reported from around the world, our finding of a 94% rate of non-evidence-based use is of great public health concern since this may be linked primarily to the lack of evidence-based practice in Kuwait. Given the increasing microbial resistance along with the economic and health impacts associated with the overuse of antibiotics, there is an urgent need to develop strategies, including those of a regulatory nature, to counter the serious negative effects of the overuse of antibiotics.

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