Physicians involved in the misuse of antibiotics in Tripoli

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Abstract: Interviews with 100 general practitioners across Tripoli city were carried out to establish if physicians are involved in misuse of antibiotics. It was evident from the findings that there are clear indications of misuse and abuse of antibiotics; this was manifested by the fact that nearly 80% of the interviewed physicians prescribe broad spectrum antibiotics for minor bacterial infections. Moreover, 68% of the interviewed physicians indicated that 50-80% of their prescriptions contain antibiotics. For selecting particular antibiotics, only 22% of the interviewed physicians rely on culture sensitivity data, 50% on symptoms and severity of the infection and 76% prescribe antibiotics before receiving culture sensitivity data. In conclusion, physicians are partially blamed for irrational (misuse and abuse) use of antibiotics in our society.

***Keywords**:* Antibiotics, misuse, drug resistance, physicians, Libya

Introduction

Few decades ago physicians in industrialized countries believed that infectious diseases were a scourge of the past (1). With industrialization came improved sanitation, housing, and nutrition, as well as the revolutionary development of disease fighting antimicrobials. However, over the past two decades, there has been a dramatic upsurge worldwide in the spread of antibiotics resistant microbes (2). This is mainly attributed to the indiscriminate use of these drugs, which may include, among other factors, inappropriate and indiscriminate prescribing by many physicians. The overall consequence of this problem is of a paramount concern to health authorities worldwide, because not only there is a problem in finding new antibiotics to fight old diseases (emergence of resistant strains of microbes) there is a parallel problem to find new antibiotics to fight new diseases. In addition to its adverse effects on public health, antimicrobial resistance contributes to high care cost, due to the fact that, treating resistant infections often requires the extensive use of expensive or more toxic drugs and can result in longer hospital stays for infected patients.

Materials and methods

Because general practitioners are frequently faced with different incidences of infections and dealing with antibiotics therapy, more than hospital specialists are (3). 100 male and female general practitioners (50 of each) were interviewed at work, 50 at private clinics and 50 at public practice (polyclinics and primary care units), with experience ranged from 3 to 12 years. The interviews aimed to evaluate how far (if any) physicians are involved in irrational use of antibiotics in Tripoli city. The study covered the period from November 2004 to January 2005.

Results and Discussion

This study includes 50-80% of prescriptions issued by 68 physicians (out of 100 physicians interviewed) contain antibiotics (Table 1). This percentage is considered high (3); the physicians justify this high percentage due to the prevalence of infections in the community at those interviewed physicians' areas. On the other hand, this raises the questions; "why" and "how", and the answer may be, broadness of bacterial resistance to the commonly available antibiotics with the consequences of emergence of new strains of bacteria that keep on infecting the population without being eradicated by the available antibiotics.

Table 1: Percentage of antibiotics prescribed

% of physicians interviewed	%of prescriptions containing antibiotics
12 %	10-40 %
68 %	50-80%
12 %	More than 80 %
8 %	Not specified

Moreover, close to 80% of physicians prescribe broad-spectrum antibiotics for minor infections (Table 2).

Table 2: Managing minor infections

Method of management	% of involved physicians
Broad-spectrum antibiotics	78%
No antibiotics (other measures)	22%

None of the interviewed physicians considered socioeconomic status of their patients as an important issue when prescribing particular antibiotic, in addition, only 4% of the interviewed physicians considered bacterial resistance as an important factor in choosing particular antibiotic (Table 3).

Table 3: Bases on which antibiotics are selected

Factors affecting the selection	Percentage
Symptoms & severity of infection	50%
Culture sensitivity results	22%
Location of infection	26%
Others (age, state of patients, side effects, contraindications)	34%
Socioeconomic status of the patient	0%
Bacterial resistance	4%

Inability of patients to pay for medication is likely to lead to non-compliance, which may add pressure towards the development of antibiotics resistance (4); therefore, bacterial resistance should be the primary concern influencing physician's choice of particular antibiotics (5). According to the interviewed physicians, the most frequently prescribed antibiotics belong to the Penicillin's family (Table 4). Excessive use of a particular antibiotic or class of antibiotics provides selective factor favoring the arising of resistant bacteria (6).

Table 4: Most commonly prescribed antibiotics

Type	Percentage of prescriptions
Amoxycillin	70%
Ampicillin	50%
Amoxycillin + Clavunalic acid	32%
Ampicillin + Cloxacillin	26%
Co-trimoxazole	14%
Gentamicin	12%
Doxycyclin	12%
Ceftriaxone	10%
Cefotaxime	8%
Nalidixic acid	6%
Cephalexin	4%
Erythromycin	4%

Less than 50% of the interviewed physicians at the most (Table-5) would rely on culture-sensitivity (C/S), this is unacceptable, especially with worldwide spread of antibiotic resistance, which necessitates doing C/S for all bacterial infections, and in addition, all antimicrobial therapy should conform to well-defined protocol (7):

(**a**) Formulating a clinical diagnosis of microbial infection.

(**b**) Obtaining specimens for laboratory examination.

(**c**) Formulating a microbiologic susceptibility.

(**d**) Determining the necessity for empiric therapy while waiting for antibiotic susceptibility results.

Table 5: Conditions for which samples/swabs are taken for (C/S) tests

Conditions	Percentage
Upper respiratory tract infections	48%
Urinary tract infections	32%
Abscess (superficial) and other skin infections	22%
Otitis media	22%
Septicemia	18%
Pneumonia.	18%
Tuberculosis	16%
Meningitis	8%
Umbilical infections	4%
Osteomyelitis	2%
Eye discharge or eye pus collection	2%
Rheumatic fever	2%
All of them	6%
None of them	2%

76% of physicians prescribe antibiotics before receiving the laboratory results (Table 6).

This high percentage is considered irrational, where empiric therapy should be restricted only for severe and life threatening infections, as with meningitis, and septicemia (7-9). On the other hand, 16% withheld antibiotics therapy pending laboratory results, this is irrational for serious infections, which need treatment with antibiotics immediately, and before receiving the C/S results, only 8% of physicians, indicated that, according to the state of patient, they decide whether to initiate antibiotics therapy immediately or after receiving laboratory results. This approach is rational, where the state of patient whether suffering from severe infection or minor infection, determines if he/she needs immediate antibacterial treatment or not.

Table 6: Antibiotics will be prescribed

Before receiving the laboratory results	76%
After receiving the laboratory results	16%
According to the state of the patients	8%

For managing microbial resistance to empiric therapy (Table 7); 52% of the interviewed physicians switch to specific antibiotics, this is considered rational approach, and however, 42% prescribe broad-spectrum antibiotics, which are irrational because the logic dictates that, the physician must change to the most appropriate antibiotic once sensitivity is known, if in doubt, the physician should consult with a microbiologist (8). In addition to that, 6% of physicians rely on the improvement of the patient after the empirical therapy to decide what to do next. Here, the improvement of the patient (disappearance of symptoms) may not be necessarily indicative for the eradication of the causative bacteria, it may simply be transient, as some bacteria are known to go into the stage of stagnancy (latency) where they cease activity as long as

antibacterial agent is circulating, giving false indication of improvement and at that time resistance mechanism may be initiated by such bacteria, relapse of infection will follow at later stages.

Table 7: Managing bacteria resist empiric therapy

Type of antibiotic prescribed	Percentage
Broad spectrum	42%
Specific (Narrow spectrum)	52%
According to patient improvement (clinical state)	6%

Table 8 summarizes physicians' actions to repeated positive bacterial cultures. 26% of physicians repeat C/S, which is considered to be the best way (rational), to detect if super infection has occurred with another organism or if the original organism has developed drug resistance. 20% of physicians switch to another antibiotic empiric therapy, 18% prescribe combination of antibiotics for synergistic effect and, 10% will prescribe broad-spectrum antibiotic to cover all of the likely pathogens, these are irrational actions to be taken, as there might be possibility of resistance to the chosen antibiotic, moreover, 14% of physicians continue with the same antibiotic, obviously, that would certainly be irrational.

Table 8: Actions for repeated positive bacterial culture

Action taken	Percentage
Change the antibiotic	20%
Repeat C/S testing	26%
Prescribe combination of antibiotics	18%
Prescribe broad spectrum antibiotic	10%
Reinvestigate patient by other infection screening	2%
Continues with the same antibiotic	14%
According to clinical examination, if patient is improved no further treatment	10%

34% of the interviewed physicians said that, they would prescribe combination of antibiotics depending on the type and severity of infection (Table 9); this is considered to be an acceptable practice for patients having serious microbial infections. 22% of the interviewed physicians said that, they would prescribe combination of antibiotics only for mixed infections; this also is a rational approach to cover all of potential or known causative micrroorganisms. On the hand, 20% of the interviewed physicians consider prescribing combinations of antibiotics, only if the patient's condition is not improved on a single antibiotic, however, those physicians did not explain the combination they would choose is tailored according to what. This is a crucial issue, since any chosen antibiotics combination must be specifically tailored to fit the probable strain(s) of the probable microorganism(s) (8). 14 % of the interviewed physicians would prefer prescribing antibiotic combinations, if the causative organism(s) is undetermined or unknown; again, this would be rational if the chosen antibiotics combination has a wide range of coverage to suppress all of the most likely causative microorganisms (7). None of the interviewed physicians, considered suppression of bacterial resistance as a reason for prescribing combination of antibiotics, this is not logic since it is known fact that, the addition of second antibiotic may delay or prevent the emergence of resistant strains (7).

Table 9: Basis of giving combination of antibiotics

Action taken	Percentage
Change the antibiotic	20%
Repeat C/S testing	26%
Prescribe combination of antibiotics	18%
Prescribe broad spectrum antibiotic	10%
Reinvestigate patient by other infection screening	2%
Continues with the same antibiotic	14%
According to clinical examination, if patient is improved no further treatment	10%

Managing gram negative bacterial (G-ve) infections is a challenging task for physicians, as these organisms are difficult to eradicate due to the limited choices of effective antibiotics against them, compared to gram positive (G+ve) bacteria. This is summarized by the usual say of infectious disease specialists "For Gram-positives we need better antibiotics; for Gram-negatives we need any antibiotic," This coupled with the fact that most of hospital

acquired infections are due to gram negative bacteria (5). Table 10 presents how the interviewed physicians would manage gram negative bacteria. 66% of the interviewed physicians would prescribe antibiotics with particular great efficacy on G-ve bacteria. This approach is rational, however, none of the interviewed physicians clarifies, whether his choice for a particular antibiotic would depend on C/S results of each individual patient or, would be on an empirical choice, keeping in mind the possibility of that, the causative organism may be resistant to the empiric chosen antibiotic. On the other hand, 34% of the interviewed physicians indicated that, they would prescribe broad spectrum antibiotics, this is irrational approach and not beneficial, because the extensive use of broad spectrum antibiotics will accelerate the emergence of resistant strains of bacteria (7).

Table 10: Managing G (-ve) bacterial infections

Type of Antibiotics	Percentage
Broad- spectrum antibiotics	34%
Antibiotics with greater efficacy on gram (-ve) bacteria	66%

Policy may be simplified in the following steps:

1- Prescribing specific antibiotics (based on C/S if possible)

2- In some cases, prescribing combinations of antibiotics

3- Repeating C/S testing several times, and changing the antibiotic accordingly.

However, of the 100 physicians interviewed only 28 physicians (28%) more or less follow this policy for treating patients suffering from chronic bacterial infections. Analyzing prescriptions issued by one major general hospital (Tripoli Medical Center) and one polyclinic (Aldahmani Polyclinic) during three months period revealed that; antibiotics are more frequently prescribed at the polyclinic than at the hospital (Tables 11-I & II). This trend is in agreement with the general notion that; antibiotics are prescribed more by community physicians (general practitioners), than by specialist throughout the world, because the general practitioners are faced with higher proportions of patients than those, which may be seen by specialists (3). In average, about 46% of prescriptions from both establishments contain antibiotics; however, we could not confirm whether this percentage is high or within an acceptable level, since there was no local standard reference or protocol to compare with.

Table 11: Prescriptions containing antibiotics

I-General Hospital

Collection period	Total number of prescriptions	% of prescriptions containing antibiotics
November, 2004	880	30%
December, 2004	1243	33%
January, 2005	778	40%
Average	967	34%

II-Polyclinic

Collection period	Total number of prescriptions	% of prescriptions containing antibiotics Antibiotics
November, 2004	258	59%
December, 2004	426	62%
January, 2005	505	57%
Average	396	59%

Beta-lactams were the most commonly prescr-ibed antibiotics; with average rate of 50% between both centers (Tables 12- I & II),

Table 12: Frequency commonly prescribed antibiotics

I- General Hospital

Antibiotic	Percentage
Beta-lactams: **1-** Benzylpenicillin 1% and, Phenoxymethylpenicillin 10%	11%
2- Penicillinase resistant penicillins: Cloxacillin 3% Flucloxacillin 8%	11%

3- Broad-spectrum penicillins: Ampicillin. 9 % Amoxicillin. 10% Amoxicillin+clavunalic acid. 2 %	22 %
Cephalosporins: Cephalexin	7%
Tetracyclines	25%
Co-trimoxazole	16%
Quinolones: Nalidixic acid	1%
Nitrofurantoin	1 %
Macrolides: Erythromycine	8%

II- Polyclinic

Antibiotics	Percentage
Beta-lactams: **1-** Phenoxymethylpenicillin	4%
2- Broad-spectrum penicillins Ampicillin 36% Amoxycillin 16%	52%
Tetracyclines	11%
Co-trimoxazole	12%
Macrolides: Erythromycine	22%

followed by tetracyclines (18%), macrolides (15%) and then co-trimoxazole (14%). Almost exclusively, doxycyline represented the tetracyclines, especially during the month of 'Ramadan' because of better compliance with fasting. We found that, the frequency of prescribing various types of antibiotics is, determined essentially by their availabilities from the main supplying stores, rather than by the clinical necessities.

In conclusion, physicians are partially blamed for irrational (misuse and abuse) use of antibiotics in our society, through:

a- Indiscriminate prescribing of and treatments with these drugs.
b- Extensive prescribing of broad-spectrum antibiotics even for minor infections.
c- Not relying on culture sensitivity testing in light of worldwide antibiotics resistance problems.

There are two other parties also share the blame, the consumers, and the pharmacists (10). This triangle of prescribers, dispensers, and consumers all share together the elevation and persistent of antibiotics misuse and abuse. The results of this study emphasize and confirm the need to:

1- Formulate local antibiotics use and prescribing policies and guidelines to assist physicians in their rational choice and prescribing
2- Establishing broad committee on safety of medicines in general, and antibiotics in particular. This committee should be responsible for communicating with physicians about latest problems in antibiotics use, such as the current status (effectiveness, resistant development, etc.) of the antibiotics that are in current use.

This is very important action, which should be taken by the health authorities, otherwise, if resistance to the currently available antibiotics in this country continues to broaden, unchecked and not evaluated, there might come a time, which may lead us to turn to pre-antibiotics era.

References

1. Hedrick E. Antibiotics misuse; school of health related professions and school of medicine, university of Missouri-Columbia Microsoft Internet explorer. 2000, 12: 24-43.
2. Todar K. Bacterial resistance, department of bacteriology university of Wisconsin-Madison; Microsoft Internet explorer 1999, 11: 29-45.
3. Holloway K. Who contributes to misuse of Antimicrobial, In: Essential Drugs Monitor-WHO. 2000, 9: 28-29.
4. Davey P. Antibiotic treatment failure, the hidden cost. Beta-Watch Journal, No. 10 September 1994, Meditech Media Ltd; London, 8-9.
5. O'Brian TF. Antimicrobial resistance, office of communications and public liaison; national institute of allergy and infectious diseases; national institute of health; NIAID fact sheet; Microsoft Internet explorer. 2000, 12: 35-45.
6. WHO Consultation group. Resistance to antibiotics and other antimicrobial agents. The select committee appointed to consider science and technology; Microsoft Internet explorer 1998, 11: 53.
7. Sterenl B and Richard AJ. Clinical use of antimicrobials, In: Basic and clinical pharmacology, 6th ed., Katzung BG (ed), Appleton & Lang. USA. 1995, 752-768.
8. The parliamentary office of science & technology (POST), diseases are fighting back-the growing resistance to antibiotics, In: Beta Watch Journal. 1995, 11, Mediatech. Media. Ltd. London, P 6.
9. Infectious diseases, In: Oxford handbook of clinical medicine 4th ed., Hope RA, Longmore JM, McManus SK, Wood-Allum CA, Oxford university press, New York. 1998, 170-253.
10. Targhi MS, et al. Misuse of antibiotics in Tripoli-city: role of the pharmacists and consumers. Tripolitana Med J. 2013, 2;1: 24-27.