The assessment of antibiotics use in infectious hospital by clinical pharmacist

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Abstract
Antibiotics is very important in our life, in the same time it is very risky that may lead to microbial resistance and un responsiveness for treatment that can lead to death. In this observational study in which 60 patients from infectious hospital in Iraq using different type of antibiotics with different doses, dosage form, and route of administration have been selected to show the process for antibiotics usage the results show that female, children, and citizens use antibiotics more than male, older ages and villager patients respectively. Also, there is a random use of antibiotics types and dosage form in different illness without back to the culture and sensitivity test. The aim of this study is to control the dispensing antibiotics in right methods. this study is agreed by ethical committee of Jabir Ibn Hayyan Medical University.

1. Introduction

1.1. Antibiotics

is the name given to a group of medications that are used to treat illnesses caused by bacteria and parasites, among other pathogens. It's a drug that prevents germs from developing, multiplying, or proliferating, and so kills them. They're one of the most widely prescribed drugs these days. Some antibiotics are referred to be "cidals" because they kill pathogenic germs, while others are referred to as "statics" because they restrict germ development (1).

Antibiotics, on the other hand, inhibit microbes' cellular function, preventing them from synthesizing their own cell wall (which is essential for bacteria's reproduction). Although antibiotics are used to save lives from various microbial infections, they, like other drug products, have some side effects. However, such side effects can make life difficult after a lengthy
period of use, but they are not lethal. Antibiotics have been discovered in a variety of forms, each of which is marketed under a separate brand name. Antibiotics are categorized based on their mechanisms of action (2).

1.2. Classification of antibiotics

Antibiotics are classified into several groups according to many factors (3)

- according to the chemical structure
- according to its origin
- according to the spectrum of activity
- according to the mode of action
- according to effects of their activity
- according to the route of administration

1.2.1. Classification of antibiotics according to chemical structure (4)

1. Carbohydrate containing Antibiotics
2. Pure saccharides antibiotics
3. Aminoglycosides: examples
4. Glycosides
5. Macro cyclic lactone antibiotics
6. Quinolones antibiotics
7. N-containing heterocyclic antibiotics
8. O-containing heterocyclic antibiotics
9. Alicyclic antibiotics
10. Aromatic antibiotics (Nitrobenzene)
11. Aliphatic amine antibiotics
12. Peptide antibiotics

1.2.2. Classification of antibiotics according to their origin (4)

1. Microbial origin
   - Bacterial origin
   - Fungal origin
   - Actinomycetes origin
2. Semi-synthetic antibiotics
3. Synthetic antibiotics

1.2.3. Classification of antibiotics according to the spectrum of activity (4)
   1. Narrow spectrum
   2. Moderate spectrum
   3. Narrow-Broad spectrum
   4. Broad spectrum
   5. Anti-mycobacterial antibiotics

1.2.4. Classification of antibiotics according to the mode of action (4)
   1. Inhibitor of cell wall synthesis
   2. Inhibitor of protein synthesis
   3. Inhibitor of Nucleic acid synthesis
   4. Inhibitor of folic acid synthesis
   5. Inhibitor of the cytoplasmic membrane

1.2.5. Classification of antibiotics according to their activity (4)
   1. Bactericidal can kills bacteria
   2. Bacteriostatic can inhibit the growth of bacteria

1.2.6. Classification of antibiotics according to the route of administration (4)
   1. Oral antibiotics
   2. Parenteral route:

1.3. Types of antibiotics (5)
   2. Aminoglycosides
   3. Penicillin
   4. Cephalosporin
5. Tetracycline
6. Lincomycin derivatives
7. Macrolides
8. Vancomycin
9. Carbapenems
10. Monobactams
11. Fluoroquinolone
12. Sulfonamides
13. Nitrofurantoin

1.4. Disuses of antibiotics

Misuse of antibiotics, also known as overuse of antibiotics, can result in health problems if they are misused or overused. It is a contributing element in the development of antibiotic-resistant bacteria, including the advent of multi-antibiotic-resistant bacteria, dubbed "superbugs" colloquially. Some bacteria that are normally innocuous can acquire resistance to numerous antibiotics, resulting in life-threatening situations in some cases (6).

Antibiotic misuse is exemplified by the following scenarios. When children with tympanostomy tubes acquire an ear infection, they must take antibiotics in the form of drops and apply them directly to the illness to reach the infection; respiratory disorders in children should not be treated with antibiotics until a bacterial infection is present; To avoid side effects, antibiotics in the form of drops should be used to treat external otitis rather than pills. and sinusitis should not be treated with antibiotics. Even if it is caused by bacteria, it is frequently caused by viruses. Antibiotics should only be administered in exceptional situations. Antibiotics should only be used for the bacterial conjunctiva, not for sinusitis, which commonly cures without therapy. In addition, bacteria in the urine of older persons is common, as shown by a standard urine test. Antibiotics should not be used without visiting
a doctor if a person has signs of a urinary tract infection, and antibiotics should not be used to treat skin dermatitis most of the time. Moisturizers can be used to treat dry skin and associated symptoms. Antibiotics used to heal surgical wounds have no effect on infection rates when compared to ointments (7).

1.5. Disadvantages of antibiotics:

Antibiotics cause the development of antibiotic-resistant bacteria, which prolongs the life of the disease. It is advised that antibiotics be made legal and that alternative therapy be used instead. They are frequently used for purposes other than their intended purpose, which results in the formation of antibiotic resistant bacteria that are difficult to eradicate, as well as a slew of other issues (8).

The bacteria are also better at forming a protective sheath around themselves, which prevents the antibiotic from penetrating into them, making it more difficult to destroy them. Anti-degradation enzymes were also secreted by the bacteria before they reached the bacterial cell's outer membrane, making the situation much more challenging, and doctors were unable to eradicate these bugs. What makes matters worse is that the condition, which was once healed in two or three days, has grown lengthier and more difficult, leading to respiratory failure, kidney failure, and death in certain cases (9).

Antibiotics, according to many scientists, will be one of the most significant health concerns of the twenty-first century, as antibiotic resistance is a global health crisis, and indiscriminate antibiotic usage can lead to epidemics unless innovative remedies are implemented. Antibiotic therapy and overuse, according to an American study, can lead to the growth of antibiotic-resistant bacteria (10).

1.6. Antibiotic risks

Antibiotic misuse, such as dispensing them without a prescription or failing to follow the treatment method based on culture and sensitivity testing,
scientists believe, leads to a decrease in antibiotic effectiveness and failure to benefit from them, as well as the development of antibiotic-resistant bacterial strains. Indeed, the World Health Organization established "World Antibiotic Awareness Week" in 2015 with the purpose of raising awareness about the risks of antibiotic overuse as well as how antibiotics are used (11).

1.7. The Antibiotics resistance and sensitivity

1.7.1. Antibiotic Resistance

Antibiotic resistance poses a challenge to contemporary medicine, particularly the effectiveness of a swift and decisive worldwide response to infectious diseases, as a result of widespread misuse and overuse of antibiotics in human treatment and food agriculture (12).

Indeed, the widespread or injudicious use of such pharmaceuticals in humans, animals, or crops leads to the formation of drug-resistant bacteria that have developed under this high selective pressure (13).

The World Health Organization (WHO) adopted the Global Action Plan on Antimicrobial Resistance in 2015, in response to the massive problem of antibiotic resistance. The plan is based on five strict objectives (14):

- To invest more in novel treatments, diagnostics, vaccines, and other interventions.
- To raise antimicrobial resistance awareness and knowledge.
- To increase the amount of data and knowledge.
- To use efficient hygiene practices to limit the frequency of infections.
- To make antimicrobial medications more effective in human and animal health.

1.7.2. Antibiotic sensitivity

Antibiotic susceptibility test, which is also known as antibiotic sensitivity test, is a method of determining bacteria's antibiotic susceptibility
to bacteria. It is done because some antibiotics are resistant to bacteria. The results of the sensitivity test may allow switching from empiric therapy, in which ineffective antibiotic is selected depending on the clinical manifestation of infection and common causative bacteria, to direct the therapy, in which active antibiotic is chosen based on knowledge of the organism and its sensitivities, using culture and sensitivity testing (15).

1.8. Antibiogram

An Antibiogram is a summary of a specific microorganism's antimicrobial susceptibility testing results to a battery of antimicrobial medicines. This profile is created by a laboratory utilizing aggregate data from a hospital or healthcare system; the data is compiled and provided on a regular basis, and it shows the percentage of organisms tested that are susceptible to a specific antimicrobial treatment. Clinicians should only be shown results for antimicrobial medications that have been consistently evaluated and are therapeutically useful (16).

The Clinical and Laboratory Standards Institute provided references for the use of Antibiogram which is the analysis and presentation of cumulative antimicrobial susceptibility test data. The Antibiogram should be collected at least once a year, including only the information isolate per patient in the recorded period containing antibiotics that were used and type of disease in the same period of testing. Antibiogram is mostly created by microbiology laboratory technologists, but it can also be the result of a joint effort comprising the lab, pharmacy, infection prevention, and doctors (16).

2. Method

2.1. Study individuals

In this observational study, 60 patients from infectious hospital using different type of antibiotics with different doses, dosage form, and route of administration
have been selected they were arranged in tables to determine the frequencies of each antibiotic in related to type, dose, dosage form, and route of administration

2.1.1. The inclusion and exclusion criteria

All the selected patients use antibiotics medication dispensing by the physician, other patients not use antibiotics were excluded.

2.1.2. Statistical analysis

To assessment the use of antibiotic, the data of patients group were analysis by using biostatistics graphic and frequencies.

3. Result and discussion

3.1. Distribution of the Enrolled Patients

The evaluation of the data indicated that the selected patients were distributed according to different factors. They were distributed according to sex, age, culture and sensitivity using test, habitat, prescription uses, type of antibiotic uses, dosage form, and causes for using antibiotics. The characteristics of the patients are mentioned in Table 3.1.

Table 3.1 Characteristics of patients included in the study

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (m/f)</td>
<td>52/48</td>
</tr>
<tr>
<td>Age (years)</td>
<td>36.15 ± 12.35</td>
</tr>
</tbody>
</table>
3.2. The distribution of patients according to sex

The results of this study show that the female is more than male as in figure 3.1 this predict that female is more likely to be infected than male due to many factors one of them the immune system in male is more than female also the life styles between male and female are different, all these factors can illustrate the results of this study.

Figure 3.1 The distribution of patients according to sex
3.3. The distribution of patients according to age

The effect of age as shown in this figure 3.2 was very important so, the younger patients have more chance to be infected than older patients. The causes are diverse, may be due to incomplete maturation of immune system also the younger patients require a safer environment to be healthy rather than older.

Figure 3.2 The distribution of patients according to age
3.4. The distribution of patients according to habitat

There is a very important factor that may increase infection in a population which is the closed and crowded area can increase the rate of infection also, the healthy food may affect the rate of infection due to this type of food contain many vitamins and minerals that increase immunity and decrease infection, this factors are shown in figure 3.3 in the two groups in which the rural group was less infection rate thane the city group the cause is the rural group has clear uncrownd area and the people eat a healthy food rather than the city group.

Figure 3.3 The distribution of patients according to habitat
3.5. **The distribution of patients according to types of antibiotics**

The antibiotics that are used in this study were different in classes and uses all of them were taken without culture and sensitivity test the results show that ceftriaxone was the most frequent antibiotic used while keflex, azithromycine, augmentin, amikacin, and ciprodar was the less frequent antibiotic used as in figure 3.4 this result has a more dangerous risk for antibiotic resistance because of the random use of antibiotics without culture and sensitivity tests.

![Pie chart showing the distribution of patients according to types of antibiotics](image)

Figure 3.4 The distribution of patients according to type of antibiotics
3.6. The distribution of patients according to symptoms of disease

The results of this study as shown in figure 3.5 have different symptoms in which fever is the most frequent symptoms while neck spasm, UTI, tonsillitis, and eye infection were the less frequent symptoms these symptoms must combined with true laboratory tests to be well diagnosed.

![Figure 3.5 The distribution of patients according to symptoms of disease](image-url)
3.7. The distribution of patients according to dosage form

The figure 3.6 show that injection antibiotics were more used in this study than oral antibiotics the cause is may be the severity of the disease that required quick intervention, also the oral antibiotics dose not used correctly by the patients.

![Figure 3.6 The distribution of patients according to dosage form](image)

4. The recommendation

The recommendation for this study is the use of true antibiotics, true dosage form, and true dose for the well diagnosed diseases and all these will be done by what is called culture and sensitivity test or Antibiogram strategies

5. Acknowledgments

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6. References


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