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I ntroduction: One of the issues in health care delivery system is resistance to antibiotics. Many researches were done to show the causes and antibiotics which was resistance. In most researches the methods of classifying and reporting this resistance were made by researcher, so in this research we examined the International Classification of Diseases 10 the edition (ICD-10).

Methods and materials: This is a descriptive cross section study; data was collected from laboratory of Boo Ali Sina hospital, during 2011-2012. The check list was designed according the aim of study. Variables were age, bacterial agent, specimen, and antibiotics. The bacteria and resistance were classified with ICD-10. The data were analyzed with SPSS (16) soft ware and the descriptive statistics.

Results: Results showed that of the 10198 request for culture and antibiogram, there were 1020(10%) resistance. The specimen were 648(63.5%) urine, blood 127(12.5%), other secretion 125(12.3%), sputum 102(10%), lumbar puncture 8(0.8%), stool 6(0.6%) and bone marrow 4(0.4%). The E coli was the most 413(40.5%) resistance cause to antibiotics which was coded with B96.2 and the most resistance was to multiple antibiotics 885(86.8%) with the U88 code.

Conclusion: The results showed that by using the ICD-10 codes, the study of multiple causes and resistance is possible. The routine usage of coding of the ICD-10 would result to an up to date bank of resistance to antibiotics in every hospitals and useful for physicians, other health care, and health administrations.

Key words: Bacteria, Antibiotics resistance, ICD-10

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1. INTRODUCTION

Discovery of antibiotics made a major change in the history of medicine and treatment of the infectious diseases. In the past, the antibiotics administration was the absolute treatment of the infectious diseases, but in the recent years the issue of antibiotic resistance is concern of medical care system (1, 2). Improper administration of antibiotics (3) self medication (4) concurrent infection with different species of organism and incomplete treatment period (5), changes in the biological structure of the pathogen (6) and using of unsuitable antibiotics are the cause of drug resistance. Some what this problem could be solved by developing of higher generation antibiotics (8) in a way that the 3rd and 4th generations of Cephalosporin are used now.

Considering the cost of antibiotic production (9), and resistance to the new antibiotics, the causes of antibiotic resistance being under investigation by many workers worldwide (10). In addition, controls of using antibiotic by the patients, the supervision of the physician antibiotic prescriptions, education on avoid the self medication of the patients, and knowing the side effects of the antibiotics (5).

In order to reach these goals, first the mechanism of antibiotic resistance should be cleared (1, 2, 11, 12). Studies show lack of uniform report on the mechanism of drug resistance. Uniformity of reporting in all countries, make possible comparing and international exchange of the obtained data and benefiting the other relevant data (13). Otherwise each country could use its own researchers’ experiences. Study on the classification and reporting on the antibiotic resistance were done in different methods.

Karami in his study reported on the resistance of E.coli, to Cephpdoxim...

97%, Trimethoprim 60.7% and Tetracycline 58.4% (1). Rahbar in his study on Vibrio Cholera found resistance vibrio cholera to Ditrofarancian in 97% (7). In the study of Hagho, resistance of Staphylococcus aureus to Methicillin and Cepheprinax was 18.3% (12). In the study of Shokahi and Vaez resistance to methicillin was reported by the researcher’s own method of classification and reporting (3, 15). In the study of Foster the codes written in the book of ICD-9-CM was used, and was found that of the 12771 patients infected with Streptococcus species, in 1.57% resistance to antibiotic was reported which was increasing from 1997 to 2000 (16). Study of Tucker from 2000 through 2007 showed the antibiotic resistance increased from 3861 patients to 11218 cases, majority of antibiotic resistance was observed to Methicillin (43%) followed by Vancomycin (31%) cases. In 16% cases resistance in Escherichia coli (E.coli) and Klebsiella was reported to the same antibiotic (9). Hargreares et al., (using the books of ICD-9-CM and ICD-10-AM) showed resistance to Penicillin (V09 coded) in 2160 cases increased to 6532 cases, and in 2000 through 2001, Z06 code the same increased to 21824 cases. In many cases antibiotic resistance with T81.4 code (postoperative infection) was reported for Staphylococcus aureus (B95.6 code) (17). In the study of Schweizer using the book of ICD-9-CM paid to the classification of drug resistance it was cleared that, among 466819 cases approximately in 1% resistance to Methicillin with V09 code was noticed (18).

In 2002 the World Health Organization introduced the international classification of drug resistance pattern (13), but some countries before had introduced the codes themselves nationally booked and tried to collect data to save their health problems in their countries (16, 9, 18). Using the international classification pattern of drug resistance leads to the symmetric method of data collection among the member countries, which provides data exchange least among 190 countries. To my knowledge this study is done for the first time in Iran and aimed at to investigate prevalence of antibiotic resistance based on the International Classification of Disease model (ICD-10) introduced by the WHO in Mazandaran province, northern Iran.

Using the obtained data, by same standard model and classifying them, to exchange and international comparison of the data in the member countries.

2. METHODS

This cross-sectional descriptive study was done at the Mazandaran University of Medical Sciences affiliated hospital medical laboratory. Since the WHO statistical data are reported annually, hence, in this study the data collection was done by the census in a year period in 2012.

First the quality controls of the culture medium the antibiotic disks and the methodology was approved by the reference laboratory of the Mazandaran University of Medical Sciences (the methodology was agar disk diffusion). Based on the M2-A9 protocol introduced by CLSI about the using of antibiotics using the species of the Staphylococcus aureus ATCC 25923, Escherichia Coli ATCC 25922, Pseudomonas Aerogenosa ATCC 27858, Enterococcus Fae-calis ATCC 29212 (19).

A check list designed based on the aim of the study was used to collect data. The variables of the studies were the age, gender, name of bacteria, name of antibiotic, and the sample under study.

The methodology of the work was as follow: After isolation identification of the pathogenic isolate, the antibiogram was performed in case of observing any resistance, the isolate data were entered in the check list, finally the observed antibiotic resistance and the name of the bacteria with the given codes were coded in ICD-10. Analysis of the data were performed by the SPSS V16 software and using the descriptive statistic method. For data collection, a license was obtained from the university research deputy.

3. RESULTS

In one year in all 10198 samples (639 (62.8%) male and 378 (37.2%) were female) were tested for microbial examination and antibiogram, of them in 1020 (10%) resistance to antibiogram was reported that entered in the study, but the other samples were either negative for bacteria or were susceptible to antibiotics including 648 (63.5%) urine, 127 (12.5%) blood, 125 (12.3%) eye discharge, wound and placenta, 102 (10%) sputum, cerebro spinal fluid 8 (0.8%), Stool 6 (0.6%), bone marrow 4 (0.4%).

The data on the pathogen and antibiotic resistance based on the International Classification of Disease (ICD-10) are given in the table 1, 2. Escherichia coli in 413 (40.5%) showed the highest degree of resistance to several antibiotics followed by other bacteria 139

<table>
<thead>
<tr>
<th>Causes</th>
<th>ICD-codes</th>
<th>(%)F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escherichia coli</td>
<td>B96.2</td>
<td>413  (40.5)</td>
</tr>
<tr>
<td>Other bacteria(bacillus SPP., acinetobacter, entrobacter)</td>
<td>B96.8</td>
<td>139 (13.6)</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>B95.6</td>
<td>122  (12)</td>
</tr>
<tr>
<td>Pseudomonas (all type)</td>
<td>B96.5</td>
<td>86   (8.4)</td>
</tr>
<tr>
<td>Other staphylococcus</td>
<td>B95.7</td>
<td>85   (8.3)</td>
</tr>
<tr>
<td>Klebsiella</td>
<td>B96.1</td>
<td>77   (7.5)</td>
</tr>
<tr>
<td>Proteus</td>
<td>B96.4</td>
<td>35   (3.4)</td>
</tr>
<tr>
<td>Streptococcus Pneumoniae</td>
<td>B95.3</td>
<td>19   (1.9)</td>
</tr>
<tr>
<td>Other streptococcus</td>
<td>B95.4</td>
<td>14   (1.4)</td>
</tr>
<tr>
<td>Streptococcus, group D</td>
<td>B95.2</td>
<td>12   (1.2)</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>A23.9</td>
<td>9    (0.9)</td>
</tr>
<tr>
<td>Salmonella typhi A</td>
<td>A01.1</td>
<td>4    (0.4)</td>
</tr>
<tr>
<td>Shigella sonnei</td>
<td>A03.3</td>
<td>3    (0.3)</td>
</tr>
<tr>
<td>Haemophilus influenza</td>
<td>A41.3</td>
<td>1    (0.1)</td>
</tr>
<tr>
<td>Streptococcus Group A</td>
<td>B95.0</td>
<td>1    (0.1)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1020 (100)</td>
</tr>
</tbody>
</table>

Table 1. The isolates resistance to antibiotic, based on the ICD-10 in the patients referring to the medical diagnostic laboratory of Boo Ali Sina Hospital in 2012.

<table>
<thead>
<tr>
<th>ICD codes</th>
<th>Drugs</th>
<th>(%)F</th>
</tr>
</thead>
<tbody>
<tr>
<td>U88</td>
<td>Multiple antibiotics</td>
<td>885  (86.8)</td>
</tr>
<tr>
<td>U82.0</td>
<td>Ampicillin, Amoxicillin</td>
<td>72   (7.1)</td>
</tr>
<tr>
<td>U83.4</td>
<td>Sulfanamids</td>
<td>28   (2.7)</td>
</tr>
<tr>
<td>U82.4</td>
<td>Cephalosporins</td>
<td>16   (1.6)</td>
</tr>
<tr>
<td>U83.3</td>
<td>Aminogluicosid</td>
<td>8    (0.8)</td>
</tr>
<tr>
<td>U83.2</td>
<td>Quinolones</td>
<td>7    (0.7)</td>
</tr>
<tr>
<td>U83.5</td>
<td>Nitrofurantoin</td>
<td>2    (0.2)</td>
</tr>
<tr>
<td>U82.3</td>
<td>Extended spectrum beta lactams</td>
<td>2 (0.2)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1020 (100)</td>
</tr>
</tbody>
</table>

Table 2. The drug resistance based on the ICD-10 in the patients referring to the Boo Ali Sina Hospital medical diagnostic laboratory in 2012.
as ICD-10-GM, ICD-10-AM, ICD-10-CA

Table 4. The extended classes from the ICD-10 matched with the other books of classification such as International Classification of Diseases (ICD-10), (13). Therefore in this investigation the issue of drug resistance, of various does along with concurrent treatment with several antibiotics, of various does along with comprehensive program in the prevention and control of drug resistance (20). Because this method is used for the first time in classification of the pathogenic agents and drug resistance, there were certain limitations.

One of these limitations was the number of the introduced classes for classification of the drug resistance, which we did not have enough classes for more detail. Of course we could extend some classes to be able show the expected details using the classification of the pathogenic agents and drug resistance, there were certain limitations.

In conclusion, the present study showed that using the ICD-10 not only provides studying the different pathogenic agents, but also enable us to determine the drug resistance pattern in Iran (Table 4).

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4. DISCUSSION

As is pointed out, in this study the isolated pathogenic agents and the drug resistance are classified by referring to the book of International Classification of Diseases (ICD-10), (13). Therefore in this investigation the issue of drug resistance and the method used for classification are discussed. Regarding the pathogenic agents findings indicate the in most of the cases the data were similar to the other studies, but with minor difference in prevalence (1, 12, 14, 18). Therefore it seems that if routinely the codes for the pathogenic agents be used for reporting (form the in patients and out patients) it would be useful. If the medical documentation personal be more careful in coding, following and attaching the laboratory reports, particularly the culture results which are reported late, would lead to the collecting data regularly, and for the next analysis. On the other hand, if in the software programs available in the laboratories the international classification of disease would like Pars software for coding the cancers routinely it would lead to the electronic classification of the medical documentation.

Since in majority of the studies, the researchers only studies one pathogenic agent, therefore on the study of the data on the classification of the pathogenic agents we encounter limitation. For example, Shokohi, Haghgo, Mollah abbas zadeh and Schweizer a‘only studied the Staph. aureus (3, 12, 4, 18), Mohajeri, and Karami studied E.coli (1-2). Rahbar studied vibrio cholera (7) and Klantar to the β-hemolytic Streptococcus group a (6). In this study using ICD-10 we could classify all of the isolates in two general and B95-B96 classes (Table 3).

We could classify extended the pathogenic agents. Of course due to presence certain pathogenic agent of certain disease or with frequency higher than the expected rate, which is very important epidemiologically, in the ICD-10 separate codes such as A23 or A01 are considered (13).

Multidrug resistance two or more than two antibiotics was observed in 86.8% of the cases. Karami reported multidrug resistance (2–8 antibiotics) in 68.7% of the isolates. In the study of Hargreaves the increase of resistance from 1994 through 1999 was from 59 cases to 643 cases (1, 17). This incidence was a warrant from the previous year’s which led to the company against drug resistance in bacteria. Due to drug resistance and the burden of medication expenses there is a need to produce new generation of antibiotic and concurrent treatment with several antibiotic, of various does along with comprehensive program in the prevention and control of drug resistance (20). Because this method is used for the first time in classification of the pathogenic agents and drug resistance, there were certain limitations.

One of these limitations was the number of the introduced classes for classification of the drug resistance, which we did not have enough classes for more detail. Of course we could extend some classes to be able show the expected details using the classification of the pathogenic agents and drug resistance, there were certain limitations.

In conclusion, the present study showed that using the ICD-10 not only provides studying the different pathogenic agents, but also enable us to determine the drug resistance pattern in a hospital routine program or even outpatient setting and implement proper strategy based on the statistical data annually by comparing with the data from the other health centers of Iran and the world. Data of the present study would be useful health care administrators’ epidemiologic studies and even for the insurance companies.

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REFERENCES