Measurement of Antibiotic Utilization in the Internal Medicine Ward of a Tertiary Hospital in Bangladesh

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Abstract
Tertiary care hospitals are a potential source for the development and spread of bacterial resistance. Excessive and inappropriate use of antibiotics contributes to the development of bacterial resistance. Information on DDD (Defined daily dose)/100 bed days of commonly used antibiotics in tertiary hospitals of Bangladesh is lacking. Hence, the present study has been designed to meet the demand. Descriptive cross-sectional study was conducted in the department of medicine of Sir Salimullah Medical College and Mitford Hospital for 3 months from 1st January 2009 to 31st March 2009. Admitted patients of medicine unit-I who got antibiotics were included in the study. The DDD/100 bed days of commonly prescribed antibiotics were calculated. 300 out of 1563 patients were prescribed antibiotics. Total DDD/100 bed days of oral and parenteral antibiotics were 55.09 and 23.65 respectively. Total DDD/100 bed days of both oral and parenteral antibiotics were 78.74. Unnecessary use of antibiotics is expensive and potentially dangerous. So, continuous surveillance of antibiotic utilization should be carried out.

Introduction
Antimicrobial drug resistance is a growing problem worldwide. The widespread and often inappropriate use of broad spectrum antibiotics is recognized as a significant contributing factor to the spread of bacterial resistance and the development of resistance to multiple drugs. The hospital setting is particularly conducive to the development of antibiotic resistance as patients who are severely ill, immuno-compromised or have devices or implants in them, are likely to receive frequent courses of empirical or prophylactic antibiotic therapy.

The clinical use of antibiotics was introduced in the early 1940s and a short time thereafter, their misuse and abuse potential were recognized.¹ Several studies performed in the 1970s demonstrated that antimicrobials were often used inappropriately in the hospital setting, and between 14% and 43% of all courses of antimicrobial therapy were deemed unnecessary because there was no evidence of infection.²⁻⁴ Recent studies have reported that 14.65% of the given antibiotic treatments were unnecessary and inappropriate.⁵⁻¹⁰

At a symposium in Oslo in 1969 entitled “The Consumption of Drugs”, it was agreed that an internationally accepted classification system for drug consumption studies was needed. By modifying and extending the European Pharmaceutical Market Research Association (EPhMRA) classification system, Norwegian researchers developed a system known as the Anatomical Therapeutic Chemical (ATC) classification. To deal with the objections against
A DDD will only be assigned for drugs that already have an ATC code. It should be emphasized that the defined daily dose is a unit of measurement and does not necessarily reflect the recommended or prescribed daily dose. However, they provide a fixed unit of measurement independent of price and formulation and enable the researcher to perform comparisons between population groups. DDD/100 bed-days provide a rough estimate of consumption of drugs among hospital inpatients. Information on D.D.D (Defined daily dose)/100 bed days of commonly used antibiotics in tertiary hospitals of Bangladesh is lacking. Hence, the present study has been designed to meet the demand.

Table I: DDD/100 bed days Oral Antibiotic

<table>
<thead>
<tr>
<th>Name of antibiotic</th>
<th>ATC code</th>
<th>DDD/100 bed days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>J01CA01</td>
<td>3.54</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>J01MA02</td>
<td>6.85</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>J01AA07</td>
<td>5.99</td>
</tr>
<tr>
<td>Cloxacillin</td>
<td>J01CT02</td>
<td>1.25</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>J01XD01</td>
<td>0.96</td>
</tr>
<tr>
<td>Cephradine</td>
<td>J01MA12</td>
<td>1.01</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>J01MA12</td>
<td>3.75</td>
</tr>
<tr>
<td>Quinine</td>
<td>J01BC01</td>
<td>0.35</td>
</tr>
<tr>
<td>Fluoxacin</td>
<td>J01CF05</td>
<td>0.37</td>
</tr>
<tr>
<td>Cefixime</td>
<td>J01DD08</td>
<td>0.67</td>
</tr>
<tr>
<td>Amoxyclov</td>
<td>J01CR02</td>
<td>0.63</td>
</tr>
<tr>
<td>Phenoxymethyl penicillin</td>
<td>J01CI02</td>
<td>0.26</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>J01FA01</td>
<td>1.63</td>
</tr>
<tr>
<td>Clarithromycin</td>
<td>J01FA08</td>
<td>0.56</td>
</tr>
<tr>
<td>Doxycyclin</td>
<td>J01AA02</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Traditional units of measurement, a technical unit of measurement called the Defined Daily Dose (DDD) to be used in drug utilization studies was developed.

The basic definition of D.D.D by the WHO Collaborating Centre for Drug Statistics Methodology Oslo (Norway), is:

"The D.D.D is the assumed average maintenance dose per day for a drug used for its main indication in adults."

Materials and Methods

Descriptive cross sectional study was conducted in the Department of medicine of Sir Salimullah Medical College and Mitford Hospital for 3 months from 1st January 2009 to 31st March 2009. Admitted patients of medicine unit-1 who got antibiotics were included in the study. All the information was taken from the patient's treatment record file.

The DDD/100 bed days of commonly prescribed antibiotics in the internal medicine ward was calculated. The DDD/100 bed days of individual antibiotics were added together to get the total antibiotic consumption. DDD/100 bed days was calculated by the following formula:

\[
\text{DDD/100 bed days} = \frac{\text{no. of units administered in a given period (mg/day)} \times 1000}{\text{DDD (mg) of individual drug} \times \text{no. of days in the period} \times \text{no of beds} \times \text{occupancy index}}
\]

DDD (mg) of individual drug was collected from the website of "WHO Collaborating Centre for
Drug Statistics and Methodology. (<www.whocc.no/atddd/>).

No. of days in the period was 90 days and no. of beds was 42. Occupancy Index was 1.

**Results**

During the study period, 1563 patients were admitted in the internal medicine ward under unit-1. 500 patients were prescribed antibiotics. Antibiotic prescribing rate was 31.98%. Total DDD/100 bed days of oral and parenteral antibiotics were 55.69 and 23.65 respectively. Total DDD/100 bed days of both oral and parenteral antibiotics were 78.74.

**Discussion**

This study found that 31.98% of admitted patients of unit 1 of internal medicine ward got antibiotics. Several studies in developed countries showed that, this rate was lower in some countries. For example, in Switzerland (University Hospital Basel) it was 19.4%. In Scotland (Acute Medicine Assessment Unit in Aberdeen, Scotland) it was 17%. In Norway, (Norwegian University Hospital) it was 16.6%. In eight (8) Swiss non university hospitals, this rate was 25%. In Netherlands this rate was 22.9%. In a developing country like Bangladesh, prevalence of infections diseases is higher than the developed countries. That is why, our antibiotic utilization rate was higher than that of developed countries.

In a study, at Manipal teaching hospital in Nepal, this rate was 29.5%. This rate is very similar to our rate. In India St. John’s Medical College Hospital, Bangalore this rate was 56%. Other Indian studies report figures of 20% to 42%. Antibiotic utilization rate was higher in some countries of the world also. For example, in Italy, it was 45.5%. In Turkey, 36% of hospitalized patients were under antibiotic treatment. Three years before, antibiotic use in the same hospital was 42.8%.

According to the literature, nearly one-third of all hospitalized patients were given antibiotics in general. Nevertheless, different rates can also be seen with respect to the country and the hospital in which these studies were conducted. For instance, rate of antibiotic use was reported as 77.8% in a university hospital in China, while it was reported as 65% in a study conducted in Costa Rica.

The total antibiotic use in our study was 78.74 DDDS/100 bed days. In a Nepal Study, it was 108.5 DDDS/100 bed days. In Israel, Raveh reported 124 DDD/100 bed days. Castro reported that the use of antibiotics in Brazilian hospital had increased form 83.8 DDD/100 bed days in 1990 to 123.6 DDD/100 bed days in 1996.39 In Europe Vlahovic-Palcevsky, found that DDDS were 45.9 in a university hospital. In a teaching hospital in Netherlands DDD/100bed days was 32.1 in 2001, 37.7 in 2003 and 42.6 in 2004.16 Kiivet reported antibiotic use were 41DDD/100bed days, 51DDD/100bed days and 47 DDD/100bed days in three university hospitals in Estonia, Spain and Sweden respectively. In 15 hospitals of 14 countries of Europe antibiotic consumption were 29.6 to 110.8 DDD/100 bed days.

**Conclusion**

Unnecessary use of antibiotics is expensive and potentially dangerous. Antibiotic may alter a patient’s endogenous flora which favors the development or emergence of resistant strains. Antibiotic use may also result in allergic or other serious side effects. So, continuous surveillance of antibiotic utilization should be carried out.

**References**

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