Teaching Medical Students to use Antibiotics Rationally in a Medical School in Nepal

**Corresponding Author:**
Dr. Ravi Shankar,
Professor, Medical Education, Pharmacology, KIST Medical College, PO Box 14142, Kathamndu - Nepal

**Submitting Author:**
Dr. P Ravi Shankar,
Professor, Medical Education, Pharmacology, KIST Medical College, PO Box 14142, Kathmandu - Nepal

Article ID: WMC002329
Article Type: Case Report
Article URL: http://www.webmedcentral.com/article_view/2329
Subject Categories: MEDICAL EDUCATION
Keywords: Antibiotics, Learning objectives, Pharmacology, Rational use, Small group learning

How to cite the article: Shankar R, Bajracharya O, Jha N, Gurung S B, Singh K K. Teaching Medical Students to use Antibiotics Rationally in a Medical School in Nepal. WebmedCentral:Education in Medicine Journal 2011;2(10):WMC002329

Source(s) of Funding:
None

Competing Interests:
None declared.

Additional Files:
Comments to the editor

Education in Medicine Journal is an associate journal of Webmedcentral.
Teaching Medical Students to use Antibiotics Rationally in a Medical School in Nepal

Author(s): Shankar R, Bajracharya O, Jha N, Gurung S B, Singh K K

Abstract

Antibiotic resistance is becoming a major problem all over the world. Inappropriate use by health professionals is a major factor contributing to resistance. A variety of factors influence use of antibiotics and other medicines by doctors. Problem-based learning of pharmacotherapy has been recommended as key intervention to improve the use of medicines. At KIST Medical College, the department of pharmacology teaches students to use essential medicines rationally. The department has identified ten main learning areas in pharmacology. These areas are learning to use essential medicines rationally, the Personal or P-drug selection process, Understanding social issues in use of medicines, Understanding and responding to pharmaceutical promotion, Using independent sources of medicine information, Using antibiotics rationally, Analyzing prescribing using World Health Organization (WHO)/International Network for the Rational Use of Drugs (INRUD) indicators, Communicating with a simulated patient, Reporting adverse drug reactions (ADRs) and carrying out simple calculations in pharmacology. In this manuscript the authors describe how rational use of antibiotics is covered throughout the module and is linked with the different learning objectives.

Introduction

Antibiotic resistance is fast becoming a major problem all over the world. In Nepal, a developing country in South Asia, antibiotic resistance is increasing [1,2]. In many developing countries like Nepal, antibiotic dispensing and its use in medicine, cattle breeding, animal husbandry and agriculture are inadequately regulated and existing laws are not rigorously implemented [3]. Antibiotics are often used in predominantly viral infections like diarrhea, common cold and fever. Inappropriate prescribing of antibiotics by healthcare professionals is a major contributory factor to resistance [4]. Doctors often do not have adequate laboratory backup, are pressurized by patients to prescribe antibiotics, have inadequate knowledge in certain instances and face pressure and incentive schemes from the pharmaceutical industry to prescribe newer and more expensive medicines including antibiotics [4].

Teaching students to use medicines rationally has received increasing attention in recent years. Problem-based learning in pharmacotherapy using national essential medicine lists and standard treatment guidelines has been recommended as a key intervention to improve prescribing [5]. Problem-based learning of pharmacology has been conducted in medical schools [6,7]. There are many more examples from the literature. At the Manipal College of Medical Sciences (MCOMS), Pokhara, Nepal problem-based learning, communication skills training and personal drug selection are among the exercises carried out [8]. At KIST Medical College (KISTMC), a new medical school in Lalitpur, Nepal the department of Clinical Pharmacology has the objective of teaching students to use essential medicines rationally. Small group problem-oriented, activity-based learning sessions are conducted and student feedback about the module has been positive [9]. In Nepal, pharmacology is taught in an integrated organ system-based manner along with the basic science subjects of anatomy, physiology, biochemistry, pathology, and microbiology during the first two years of the undergraduate medical (MBBS) course.

The department has developed ten subject areas/learning objectives for students in pharmacology. These have been discussed in detail in a recent manuscript by the first author which is under review. These areas are learning to use essential medicines rationally, the Personal or P-drug selection process, Understanding social issues in use of medicines, Understanding and responding to pharmaceutical promotion, Using independent sources of medicine information, Using antibiotics rationally, Analyzing prescribing using World Health Organization (WHO)/International Network for the Rational Use of Drugs (INRUD) indicators, Communicating with a simulated patient, Reporting adverse drug reactions (ADRs) and carrying out simple calculations in pharmacology. In this manuscript the authors describe the teaching-learning process with regard to rational use of antibiotics conducted during the pharmacology practical sessions at KISTMC.

Rational use of antibiotics is addressed throughout the practical sessions. Theoretical information about
antibiotics is taught through didactic lectures during the first year of the course. Immediately following this a two hour practical session exclusively devoted to antibiotics is conducted. University practical examination in pharmacology is held at the end of the second year of the course. The practical assessment in pharmacology at the institution has been described in a recent article [10]. Table 1 shows the learning areas covered during the practical session and how the issue of rational use of antibiotics is addressed during each learning area. Table 2 shows a selection of scenarios with regard to rational use of antibiotics used with regard to different learning areas.

Essential medicines: During the session on essential medicines students are introduced to antibiotics listed in the national essential medicines list of Nepal and why these antibiotics have been chosen. Antibiotics are discussed long with other essential medicines. Rational and irrational fixed dose combinations of antibiotics are analyzed using the toolkit developed by Health Action International – Asia Pacific (HAIAP) [11]. Activities included are selecting antibiotics for primary health centers in Nepal along with justification and measures to be undertaken to improve access to antibiotics.

P-drug selection: Personal or P-drug is a first choice drug for a particular disease condition. A P-drug is selected on the basis of efficacy, safety, cost and suitability. We follow the method described by Joshi and Jayawickramarajah [12]. After the selection the suitability of the P-drug for a particular patient is verified and then a prescription is written. Antibiotics are chosen for common disease like enteric fever and pneumonia.

Understanding social issues in use of medicines: Students explore issues like use of antibiotics in predominantly viral infections, variation in cost of antibiotics, patient preference for more expensive parenteral antibiotics and why patients often do not complete the prescribed course of antibiotic treatment. Issues like patents on medicines, intellectual property rights, recent changes like Trade related Intellectual Property Rights (TRIPS) agreement and possible impact on cost of newer medicines including antibiotics are discussed.

Understanding and responding to pharmaceutical promotion: Newer antibiotics are expensive and are aggressively promoted as they provide better returns to the manufacturer. Students are taught to critically analyze drug advertisements and promotional material with reference to the WHO ethical criteria for medicinal drug promotion [13]. They learn to optimize time spent with medical representatives (MRs). Students are introduced to different pressures on doctors to prescribe newer and more expensive medicines.

Using independent sources of medicine information: Students are introduced to high quality information resources which can help them obtain impartial, objective information about antibiotics. In Nepal previously the drug information bulletin published by MCOMS used to provide the antibiogram (antibiotic sensitivity pattern) of commonly isolated organisms in the hospital. Students are taught about how information on sensitivity pattern of organisms can be used to guide prescribing decisions.

Using antibiotics rationally: During a two hour session devoted exclusively to antibiotics students are introduced to different clinical problems associated with antibiotics. They are introduced to the P-drug selection process and select antibiotics for common disease conditions. Proper antibiotic use is also stressed during the session on analysis of rationality of prescriptions. Students learn not to use antibiotics in predominantly viral infections, and to avoid use of multiple antibiotics. They are also shown and interpret a video on antibiotic resistance.

Analyzing prescribing using WHO/INRUD indicators: Prescribing indicators developed by WHO and INRUD help evaluate the quality of prescribing. One of the indicators, percentage of encounters with an antibiotic prescribed is connected with antibiotic prescribing. The book ‘How to investigate drug use in health facilities’ [14] describes different indicators and how to calculate and interpret them. Follow up questions with regard to the different indicators are also described.

Communicating with a simulated patient: Students learn to communicate information regarding the use of antibiotics with a simulated patient. With regard to antibiotics the specific points are to take antibiotics as prescribed by the doctor, to complete the course of treatment and not stop antibiotics on feeling better, to not use leftover antibiotics at home without consulting a doctor/health professional and not to self-medicating with antibiotics.

Reporting adverse drug reactions: Students learn to report ADRs to the regional pharmacovigilance center in the institution and also learn that antibiotics are a common group of drugs causing ADRs. They also carry out causality, preventability and severity assessment of ADR reports and learn that most ADRs are only probably related to a particular drug and it is not necessary to be absolutely sure that a particular drug has caused an ADR before reporting.

Pharmaceutical calculations: Students learn to conduct different calculations which will be useful both in the outpatient department and the wards. Many of these calculations are related to antibiotics. Thus the department has been active in teaching
students to use essential medicines rationally with special emphasis on antibiotics as an important group of medicines. At present sessions are only held during the basic science years (first two years) of training. In many countries sessions on clinical pharmacology have been conducted during the clinical years of training [15,16]. We are considering training programmes for students during the clinical years but less number of faculties in the department to conduct sessions all through the MBBS course remains a problem.

Student perception about their knowledge, attitude and skills with regard to these different learning objectives at the end of the two year module has been obtained recently and is under review elsewhere.

Conclusion(s)

Thus rational use of antibiotics has been embedded throughout a small group, problem-oriented learning module for medical students in a resource limited setting in a developing country. The module with modifications can be considered for inclusion in other medical schools.

"An outline of the teaching-learning activities conducted by the department of Clinical Pharmacology with the objective of helping medical students use antibiotics rationally was presented as a poster at the First Global forum on bacterial infections held at New Delhi, India from October 3rd to 5th 2011. The first author received a travel grant to attend the conference."

Reference(s)

Illustrations

Illustration 1

Table 1- Learning objectives and rational use of antibiotics

<table>
<thead>
<tr>
<th>Learning objective</th>
<th>Rational use of antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning to use essential medicines rationally</td>
<td>Antibiotics in essential drug list of Nepal, preference for single compounds, FDC like cotrimoxazole (synergism); criteria for choosing antibiotics in essential drug list, ensuring access to antibiotics</td>
</tr>
<tr>
<td>P-drug selection, verifying suitability in an individual patient, writing the prescription</td>
<td>Selection of personal drugs (antibiotics) for common infectious diseases, individualizing selected antibiotic to a patient, price issues, newer antibiotics, prescribing antibiotics correctly</td>
</tr>
<tr>
<td>Understanding social issues in use of medicines</td>
<td>Cost of antibiotics, differences in cost between brands, counterfeit and substandard medicines, patents, TRIPS, medicines for tuberculosis, HIV/AIDS, newer antibiotics, using prescribed course of antibiotics, preference for injections</td>
</tr>
<tr>
<td>Understanding and responding to pharmaceutical promotion</td>
<td>Promotion of newer medicines including newer antibiotics, analyzing drug advertisements and promotional material, verifying claims made in advertisements, analyzing visual material, optimizing time spent with medical representatives</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Using independent sources of medicine information</td>
<td>Independent sources of information like text books, formularies (Nepalese national formulary, Patan hospital formulary), Nepal drug review, drug compendia, drug bulletins, websites like MedSafe, Drugs available through HINARI scheme of WHO, high quality health information resources on the internet</td>
</tr>
<tr>
<td>Using antibiotics rationally</td>
<td>Antibiotic resistance, culture and sensitivity data and prescribing decisions, not using antibiotics in viral infections like common cold, video on antibiotic resistance, important role of prescribers in preserving the power of antibiotics</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Analyzing prescribing using WHO/INRUD indicators</td>
<td>One of the indicators is number of encounters with an antibiotic prescribed. Preliminary information on antibiotic use in primary health facilities.</td>
</tr>
<tr>
<td>Communicating with a simulated patient</td>
<td>Telling the simulated patient to use antibiotics properly, not to stop them on feeling better, taking the proper dose, do not self-medicate with antibiotics</td>
</tr>
<tr>
<td>Reporting adverse drug reactions</td>
<td>Reporting adverse drug reactions to the regional center in the hospital, ADRs with antibiotics, reducing ADRs</td>
</tr>
<tr>
<td>Pharmaceutical calculations</td>
<td>Calculating the dilution for creating a particular strength of antibiotic, calculating drip rate</td>
</tr>
</tbody>
</table>
### Table 2 - Selection of scenarios with regard to rational use of antibiotics under different learning objectives

<table>
<thead>
<tr>
<th>Learning objective</th>
<th>Scenario</th>
</tr>
</thead>
</table>
| Learning to use essential medicines rationally         | 1. Prepare an essential medicines list of antibiotics for a primary care centre in Nepal.  
  2. Analyze the rationality of the following fixed dose combinations (FDCs) of antibiotics using the tool kit developed by HAIAP: Ampicillin and cloxacillin, amoxicillin and cloxacillin, cotrimoxazole, amoxicillin and clavulanic acid |
| P-drug selection, verifying suitability in an individual patient, writing the prescription | Select an P-drug (antibiotic) for typhoid (enteric) fever. Ramkrisha is a 25 year old gentleman suffering from enteric fever who is allergic to penicillin. Verify the suitability of your selected P-drug for him. Write the prescription. |
You are a doctor practicing in Jawalakhel, Lalitpur. You have a flourishing practice and most of your patients are well to do. You do not prescribe medicines unnecessarily or prescribe needlessly expensive medicines. A couple working in an INGO have recently shifted to the locality and have become your patients. They have a three year old child who has recently developed pneumonia. You have prescribed brand A of amoxicillin for the child. The couple have however always preferred brand B of amoxicillin which is however more than two times as expensive as brand B.

- Identify the learning issues and the decisions involved for you as a doctor in this scenario.
- You have decided to convince the couple to go in for the cheaper brand of amoxicillin. You also want to educate them about the cost of medicines. Explore this situation using a role-play (maximum time 3 mins.)

1. Analyze the given drug advertisement (ampicillin + cloxacillin) against the WHO ethical criteria for medicinal drug promotion. Verify the truthfulness of the claims made in the advertisement.
2. A MR associated with a drug company has come to your clinic to promote a new antibiotic. They have very attractive schemes for doctors who prescribe their product. The product is however, nearly four times as expensive compared to an older antibiotic belonging to the same class. Explore this situation using a role-play.
### Using independent sources of medicine information

Carry out a head to head comparison of ciprofloxacin and levofloxacin using Martindale’s complete drug reference and AHFS Drug information. Compare the cost of different preparations of amoxicillin available in the Nepalese market using the Nepal Drug Review.

### Using antibiotics rationally

Mr. Baburam is a 20 year old medical student. He was recently prescribed Cap. Ampicillin 500 mg. He has read that amoxicillin is to be preferred over ampicillin and wants to switch over to amoxicillin.

- Is Mr. Baburam correct in wanting to change his medication?
- What are the advantages of amoxicillin over ampicillin?
- What are the various strengths available? What is the cost of the preparation?

### Analyzing prescribing using WHO/INRUD indicators

Analyze the given set of prescriptions using WHO/INRUD prescribing indicators. Comment on the percentage of encounters with an antibiotic prescribed. What steps can be carried out to improve antibiotic prescribing?
| Communicating with a simulated patient | The person sitting in front of you is suffering from typhoid fever. Choose appropriate drug/s from those kept on the table. Communicate well regarding the use of the drug and management of the condition. |
| Reporting adverse drug reactions | Develop a reporting form for spontaneous reporting of ADRs. A 40 year old lady has developed a maculopapular rash to amoxicillin. Report this ADR using the form developed by you. |
| Pharmaceutical calculations | Amoxicillin is available as dispersible tablet of 125 mg and as a dry syrup containing 125 mg per 5 ml. The pediatric dose of amoxicillin is between 20 to 40 mg per kg per day. Calculate the dose of amoxicillin for a girl weighing 20 kg. How many dispersible tablets should be prescribed for this girl? |
Disclaimer

This article has been downloaded from Education in Medicine Journal an associated journal of WebmedCentral. Authors must ensure that they obtain all the necessary permissions before submitting any information that requires obtaining a consent or approval from a third party. Authors should also ensure not to submit any information which they do not have the copyright of or of which they have transferred the copyrights to a third party. Contents on Education in Medicine Journal are purely for biomedical researchers and scientists. They are not meant to cater to the needs of an individual patient. The web portal or any content(s) therein is neither designed to support, nor replace, the relationship that exists between a patient/site visitor and his/her physician. Your use of the Education in Medicine Journal site and its contents is entirely at your own risk. We do not take any responsibility for any harm that you may suffer or inflict on a third person by following the contents of this website.