



# Ten basic competencies for undergraduate pharmacology education at KIST Medical College, Lalitpur, Nepal

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## BRIEF REPORT

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## Abstract

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Medical schools have a major challenge in teaching students to choose and prescribe medicines safely and effectively. Problem-based learning based on national essential medicine lists and standard treatment guidelines has been strongly recommended to improve prescribing. In Nepal, pharmacology is taught during the first two years of the undergraduate medical course. At KIST Medical College, Lalitpur the Department of Clinical Pharmacology teaches students to use essential medicines rationally. Small group, activity-based learning is used during practical sessions. In this article the author lists the 10 basic competencies which students should have developed by the end of the pharmacology practical module and also describes a selection of activities with regard to a particular competency used during the practical module and an exercise used to assess these competencies during the practical examination.

### Key Words

Competencies, Nepal, Pharmacology, Small groups

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Traditional pharmacology teaching-learning has been criticised for not preparing students for medical practice nor teaching the safe and rational use of medicines. Medical schools have a major challenge in teaching students to choose medicines based on objective, scientific principles and to use them in a safe and effective manner.<sup>1</sup> Problem-based

undergraduate medical education in pharmacology, based on national essential medicines lists and standard treatment guidelines, has been strongly recommended as a key intervention to improve prescribing.<sup>2</sup> In Nepal, pharmacology is taught in an integrated organ system-based manner with other basic science subjects during the first two years of the undergraduate medical (MBBS) course.<sup>3</sup> At KIST Medical College (KISTMC), Lalitpur, Nepal the Department of Clinical Pharmacology and Therapeutics is committed to teaching medical students to use essential medicines rationally.

Pharmacology practical learning sessions are conducted in small groups. The large cohort of students is divided into five small groups with facilitators rotating between groups.<sup>3</sup> The author was previously a faculty member at the Manipal College of Medical Sciences (MCOMS), Pokhara, Nepal. At MCOMS analysing prescriptions using drug use indicators, evaluating drug advertisements, critical analysis of journal articles, selection of personal drugs for disease conditions, writing prescriptions and conveying information to the patient are some of the educational activities carried out during the practical sessions in pharmacology.<sup>4</sup> Based on his experiences with pharmacology teaching-learning at MCOMS and KISTMC the author shares 10 basic competencies which he feels medical students should have developed by the end of the undergraduate practical sessions in pharmacology.

The two year learning module in pharmacology at KISTMC stresses the development of these 10 competencies (see Table 1) which are assessed during practical examination in the subject.<sup>5</sup> I will now discuss our teaching-learning methodology and assessment method for each of these competencies in detail. Table 2 shows one activity used during the learning sessions and one question used during the practical exam for each competency.

*Essential medicines:* All students are provided with an electronic copy of the latest version of the essential drug list of Nepal and learn about essential medicines and their importance using a combination of activities, videos and



mini lectures. During the exam the skill is tested at an objective structured practical examination (OSPE) station and students get three minutes for the exercise. Theoretical aspects related to essential medicines are also discussed during the viva-voce.

*P-drug selection:* Personal (P) drug selection is carried out using the principles outlined in the WHO publications, 'Guide to good prescribing' and 'Teacher's guide to good prescribing'. We follow the method described by Joshi and Jayawickramarajah.<sup>6</sup> The skill is practiced during many practical sessions in pharmacology and is assessed during the examination using a 60 minute exercise where students select an appropriate P-drug, verify its suitability for an individual patient (paper and pencil scenario) and write the prescription.

*Social issues in use of medicines:* These issues are mainly addressed during a session held at the beginning of the first year. These issues are then addressed again during different sessions. Students explore these issues through group activities and role-plays. During the exam students identify the learning issues involved in a particular scenario at an OSPE station and they get three minutes for the exercise.

*Understanding and responding to pharmaceutical promotion:* There is a separate two hour session dedicated to pharmaceutical promotion and issues related to it are covered during different practical sessions. We also teach students about disease mongering and other issues. Students also verify the claims made in advertisements and promotional material against standard textbooks and other references. During the exam students analyse a given advertisement (five minutes for the exercise).

*Using independent sources of medicine information:* Various independent sources like textbooks, formularies, American Hospital Formulary System (AHFS) drug information and Martindale's complete drug reference are available in the practical room. During the sessions students obtain different information about medicines and use independent information sources to solve different problems including P-drug selection. During the exam students are assessed at this skill at a three minute OSPE station using a computer-based information resource.

*Using antibiotics rationally:* Proper use of antibiotics is addressed during a two hour session. The issue is also covered during the activity of analysis of rationality of prescriptions and during the session on social issues in use of medicines. The issue is also addressed during antibiotic P-drug selection exercises, during the exercises on pharmaceutical promotion and essential medicines. Percentage of encounters with an

antibiotic prescribed is also one of the indicators during the exercise on analyzing prescribing using World Health Organization (WHO)/International Network for the Rational Use of Drugs (INRUD) indicators. The rationality of prescriptions with special emphasis on use of antibiotics is analysed by students during a three minute OSPE station.

*Analyzing prescribing using WHO/INRUD indicators:* This exercise is conducted giving students a set of prescriptions from primary healthcare facilities from which they calculate different WHO/INRUD indicators. The emphasis is on the importance of these indicators and why medical students should be familiar with them. During the exam at an OSPE station students calculate one indicator (usually average number of drugs per prescription, percentage of encounters with an injection or an antibiotic prescribed) from a set of five prescriptions.

*Communicating with a simulated patient:* We usually do this as the fourth step of the P-drug selection process. After writing the prescription in the case of common diseases students communicate with a simulated patient regarding drug and non-drug measures and management of the condition. The problem is tackled using group work and explored using role-plays. The important points to be covered are emphasised and it is stressed that information should be communicated using simple language and in laymen's terms. The points to be included are definition of the disease, non-pharmacological measures, drug history, choice of drug, method of using the drug (dose, frequency and duration), important adverse effects, precautions while using the drug, follow up, patient feedback (where the patient is made to repeat the instructions to ensure the patient has understood them properly) and any questions. The exercise is assessed at a three minute OSPE station using a simulated patient by a faculty member using an observation check list.

*Reporting adverse drug reactions:* Students as future doctors play an important role in reporting adverse drug reactions (ADRs). The college runs a regional centre under the national pharmacovigilance programme. There is a two hour session dedicated only to pharmacovigilance. Among the different activities students design a spontaneous ADR reporting form. Students also carry out a causality, severity and preventability assessment of a given ADR. We do not assess this skill at present.



*Pharmaceutical calculations:* These are important as many doctors often do not have a good idea of pharmaceutical calculations which may result in medication errors. Students solve simple problems during the sessions and skills are assessed at an OSPE station during the exam. We have not conducted sessions on this important skill for all cohorts of students. We are working towards making this an integral part of the practical curriculum in future.

*Possible impact of the practical sessions:* The author and colleagues recently studied the impact of the pharmacology small group learning sessions on knowledge, attitudes and skills scores in different competencies/subject areas.<sup>7</sup> The median knowledge and attitudes scores were high but the skills scores were about 65% of the maximum possible score. The median effectiveness scores as perceived by the students were also high. Student performance in the internal and university practical examinations was excellent with only one student not clearing the examination in the first attempt. He cleared the examination at the second attempt. The author has not compared the impact of the method used with those practiced in other schools and so would not be able to comment whether the methods being used in KISTMC are superior or inferior to those being practiced elsewhere. The prescribing skills of graduated doctors from KISTMC can be compared with those of doctors from other medical schools in the country in future. Also pharmacology is only taught during the first two years of the course and other factors including influences during the clinical years can influence prescribing. During the clinical years of training and practice after graduation promotional activities of the pharmaceutical industry can be an important factor modifying prescribing. Also the sessions are relatively new (being conducted for two years for two cohorts of students) and studies in future can provide more information about the possible impact.

Thus the Department of Clinical Pharmacology has delineated the competencies students have to possess at the end of the two year pharmacology practical module. Some of these competencies have to be delineated in more objective terms. Also not all aspects of the competencies are being measured. At present pharmacology teaching-learning is restricted to the first two years of the course. During this period students have limited clinical exposure, going to the hospital only for four hours every week. Sessions during the clinical years of training are required and we are working towards this. Ours is a new medical school and the first cohort of students only entered the clinical years of training six months ago. We have recently obtained student feedback on their knowledge, attitude and skills in these different subject areas and also suggestions for further improving the sessions.

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## PEER REVIEW

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## CONFLICTS OF INTEREST

The author declares that he has no competing interests



**Table 1: Ten basic competencies to be developed by undergraduate medical students at the end of the practical training in pharmacology at KISTMC**

S. No	Competency
1.	The student will be familiar with the national essential medicines list, the criteria on which the list was developed, the advantages of essential medicines and be able to use these medicines in the student's daily practice.
2.	The student will be able to select personal or P-drugs for common disease conditions based on objective criteria, individualise the selected P-drug for a particular patient and write a correct prescription.
3.	The student will have an understanding of important social and cultural issues in Nepal which can affect the use of medicines and be able to consider them while providing treatment.
4.	The student will be aware of pharmaceutical promotion and be able to respond effectively to the same.
5.	The student will be aware of various independent sources of medicine information and use them in the process of prescribing and providing treatment.
6.	The student will be able to use antibiotics rationally.
7.	The student will be able to analyse prescribing in primary health facilities using WHO/INRUD prescribing indicators and be able to use the same for self-analysis and improvement of their own prescribing behaviour.
8.	The student will be able to communicate drug and non-drug information about common diseases with a simulated patient.
9.	The student will be able to report adverse drug reactions to the pharmacovigilance centre in the appropriate format.
10.	The student will be able to carry out common pharmaceutical calculations required in the outpatient department and wards.

**Table 2: A selection of activities used during learning sessions and questions during assessment for each major competency**

Competency	Activities	Assessment question
Essential medicines	Prepare an essential medicines list of cardiovascular drugs for a primary health centre in Nepal. What are key drugs? What are the differences between key drugs and essential drugs?	Prepare an essential medicines list of antibiotics for a primary care centre in Nepal.
P-drug selection	Select a P-drug for bipolar depression. Kunti is a 55-year-old lady suffering from bipolar depression for the last month. Verify the suitability of your selected P-drug for Kunti. Write the prescription.	Select a P-drug for anxiety. Vibhisana is a 32-year-old suffering from severe anxiety for the last three weeks. Verify the suitability of your selected P-drug for Vibhisana. Write the prescription.
Understanding social issues in use of medicines	You are a general practitioner in Gorkha, Nepal. Purna Bahadur works as a daily wager in a nearby quarry. He had come to you two days ago suffering from high fever and cough. You had suspected a lower respiratory tract infection and had started him on a course of Ciprofloxacin. He has come back to you today and complains he is not feeling better. He has not been able to go to work for three days and has not been paid for three days. He demands that 'daktar saab' give him a 'strong' injection so that he can get better quickly.  Identify the learning issues and the decisions involved for you as a doctor in this scenario.  You have decided to convince Purna Bahadur to continue with oral antibiotics and to not give in to his demand for injections. Explore this situation using a role-play (maximum time three minutes).	You have been recently posted as a medical officer in a PHC in Dhanusha district after graduation. You have to come to know about a girl Sundari who has been diagnosed as suffering from leprosy. The villagers have driven her out of the village into the forest. She subsists on wild plants and her condition is pitiable. The villagers think that Sundari is paying for the sins of her earlier life and has been cursed by the Gods.  Identify the learning issues and the decisions involved for you as a doctor in this scenario.
Understanding and responding to pharmaceutical promotion	Kindly assess the given drug advertisement and the promotional material against the WHO ethical criteria for medicinal drug promotion.  You are a doctor attached to a famous hospital in Nepalgunj. You and your colleagues are planning to organise a national conference in Nepalgunj. Discuss in your group whether you should accept sponsorship from the pharmaceutical industry.	Kindly assess the given drug advertisement against the WHO ethical criteria for medicinal drug promotion.
Using independent sources of medicine information	Using the WHO model formulary and the Nepalese national formulary list important drug interactions of the medicine, phenytoin.	Using the independent drug information source installed on the computer (Martindale's complete drug reference) list two important drug interaction of fluoxetine.
Using antibiotics rationally	Mainly covered during analysis of rationality of prescriptions. Issues like not using antibiotics in viral infections like upper respiratory infections and coryza, not using irrational antibiotic	Analysis of rationality of prescriptions is an exercise during an OSPE station.



	combinations are addressed. During social issues using older antibiotics and using less expensive antibiotics are stressed.	
Analysing prescribing using WHO/INRUD indicators	Calculate the WHO/INRUD prescribing indicators from the set of prescriptions provided to you. Compare the values with the national standards and comment on the quality of prescribing.	Calculate any one indicator of your choice from the set of prescriptions provided.
Communicating with a simulated patient	Ms. Reshma Adhikari and Mr. Hemang Tuladhar are students of Kathmandu College of Management. They want to start having a sexual relationship but do not yet want to start a family. They have heard about birth control pills and have come to you a doctor at KIST Medical College for advice.  Communicate well regarding the use of the drug and management of the condition.	The person sitting in front of you is suffering from multibacillary leprosy. Choose a drug kept on the table for him. Communicate well regarding the use of the drug and management of the condition.
Reporting adverse drug reactions	Design an ADR reporting for spontaneous reporting of ADRs by prescribers  Kindly do a causality assessment of the ADR provided.	Not assessed
Pharmaceutical calculations:	How many ml of a liquid medicine would provide a patient with two table spoon full twice a day for eight days?  Using a vial containing 200,000 units of penicillin G potassium, how many millilitres of solvent should be added to dry powder to prepare a solution having a concentration of 25,000 units/ml?	Similar questions are asked during the exam and students solve them at a three minute OSPE station