

Teaching P-drug selection: experiences from a Medical School in India

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ABSTRACT

Background: Incorporation of Personal drug (P-drug) selection exercise into medical undergraduate curriculum was recommended to reduce irrational prescribing during future practice. At Melaka Manipal Medical College (MMMM), India, P-drug selection exercise was included in pharmacology curriculum in 2010 for 2nd year MBBS students.

Objective: The study was conducted to develop a module to teach P-drug selection and to investigate students' perceptions regarding P-drug selection teaching and assessment.

Materials and method: Module was developed to teach P-drug selection for an acute attack of angina and dry cough based on a manual called as 'Guide to Good Prescribing' developed by the WHO Action Program on Essential Drugs. Power point slides, handouts with drug costs and current guidelines were used during teaching learning activities. Later students were assessed on P-drug selection by asking them to derive a P-drug for an acute attack of angina. Students' answers were assessed using a checklist. Later students' perceptions regarding P-drug selection teaching and assessment were collected using a questionnaire. Data was analyzed using SPSS 16. Students' responses were expressed as median and inter quartile range. Responses to open ended questions were tabulated in the decreasing order of frequency of appearance. % of students who scored ≥ 4 (= pass) marks was noted.

Result: 90% (95/106) of students responded in the questionnaire. Most of the items in the questionnaire related to teaching and assessment had a median score of ≥ 3 . 94.3% of students had scored ≥ 4 in P-drug selection exercise. 84% of students felt that P-drug selection teaching helped them to understand pharmacology better. They wanted more such exercises and more explanation to understand P-drug concept better.

Conclusion: Study led to development of P-drug selection teaching module acceptable to students. Furthermore it also provided scope for the refinement of newly developed module based on students' perceptions.

KEY WORDS: Undergraduate, student, P-drug, questionnaire, pharmacology, teaching, perceptions, medical.

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INTRODUCTION

Rational use of drugs requires that patients receive medicines appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community.^[1] Irrational prescribing is a global problem. Over the past 40 years several community based and hospital based studies done in developed as well as in developing countries had described irrational drug use.^[2-7] Many studies described an irrational prescribing pattern that included prescribing unnecessarily expensive drugs,^[8] poly pharmacy,^[9] inappropriate use of antibiotics and other drugs.^[10-13] All these patterns of irrational prescribing increase the economic burden on patients, where, in most of the cases patient were not even able to afford essential medicines.^[11, 14] In spite of introducing various interventions namely, educational, managerial and regulatory, at prescriber level to promote rational prescribing,

irrational prescribing is still a global problem.^[15] WHO describes irrational prescribing as a disease which is difficult to treat.^[16] Hence only way to prevent the irrational prescribing by future doctors is by training medical students on rational prescribing.

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Traditional pharmacology teaching in medical schools concentrates on transferring knowledge about drugs, rather than training students to treat patient in a most rational way.^[17] Moreover, immediately after leaving medical schools, young doctors are exposed to various factors that influence their prescribing behaviours. Some of these factors may include drug promotional materials, patient pressures, examples of seniors and colleagues and other influences of pharmaceutical companies. In a study, majority of medical students copied therapeutic drug choices from their teachers due to the lack of experiences.^[18] Furthermore, students needed pharmacotherapy knowledge to apply pharmacology knowledge to clinical practice.^[19-21] Though the impact of medical education on subsequent prescribing behavior is not well known, it has been suggested that ideally, medical students should be trained in the principles of rational prescribing before they enter the wards; and these concepts should be reinforced during the clinical training.^[17] For this purpose, the normative model for pharmacotherapeutic reasoning for students was presented in 1994 in a manual called as 'Guide to Good Prescribing'.^[22] Later another manual called as 'Teachers' Guide to Good Prescribing'^[16] was developed to help medical teachers to use the 'Guide to Good Prescribing' to teach undergraduate medical students in a better way.

Melaka Manipal Medical College (Manipal Campus) incorporated P-drug selection exercise in to the curriculum in 2010 for 2nd year Bachelor of Medicine and Bachelor of Surgery (MBBS) students. As there was no standard teaching-learning method for pharmacotherapeutic teaching, we conducted this study with following 3 objectives: 1. To develop a module to teach P-drug selection, 2. To develop an assessment tool for P-drug selection exercise 3. To investigate students' perceptions regarding P-drug selection teaching and assessment.

MATERIALS AND METHODS

Educational context

Melaka Manipal Medical College (MMMC) under Manipal University, India, offers the Bachelor of Medicine and Bachelor of Surgery (MBBS) program. The first year students study anatomy, physiology and biochemistry whereas pathology, microbiology, pharmacology and forensic medicine are taught in the second year. Students are exposed to clinicals only from 3rd year of the course. In 1st two years, the curriculum delivery is through Problem Based learning (PBL), Self-Directed Learning (SDL), practical classes and the more familiar, traditional didactic lectures.

Study design:

This was a quasi-experimental study with an intervention but, without a comparison group and pre-test. The study was approved by the Institutional Research Committee of MMMC.

Instruments:

To assess students' perceptions regarding P-drug selection and teaching a questionnaire with closed (Likert type) and open ended questions were prepared after an extensive literature review.

Questionnaire had items related to teaching, assessment, satisfaction and value. Face and content validity of the questionnaire was checked by experts in medical education.

To assess students on all the 6 steps of P-drug selection exercise, a checklist was developed by the author. The checklist had 6 items related to the 6 steps of P-drug selection process. The first 2 steps carried 1 mark each and later 4 steps carried 1.5 marks each. Face and content validity of the checklist was checked by experts. Later in the department faculty meeting the checklist was finalized by consensus.

Study population:

Students of 2nd year of MBBS course (n=106) participated in this study. Students' perceptions regarding P-drug selection teaching and assessment was taken after their practical examination in which one of the questions was on P-drug selection. Students responded in the questionnaire after giving informed consent. Students' responses were anonymous.

Development of module:

Teaching module was developed with the objective that at the end of 2nd year of MBBS course, students should be able to select their own P-drug for the given disease using their pharmacological knowledge of drugs and handouts having drug costs. For the study, two disease conditions without any comorbidities, acute attack of angina pectoris and dry cough were chosen. Teaching learning materials like power point slides and handouts were prepared based on recommended pharmacology text book, 'Guide to Good Prescribing',^[22] current guidelines and Current Index of Medical Specialties (CIMS) for drug costs. The proposed module was discussed and revised in the department faculty meetings before finalizing.

Teaching learning activity:

The whole teaching learning activity was conducted in 3 phases. In phase 1, pharmacology of drugs used in angina pectoris and cough was taught in 6 didactic lectures of 1 hour duration each. After two days of last didactic lecture, phase 2 of teaching learning activity was conducted which lasted for 2 hours. During this phase overview on P-drug selection was demonstrated to students using a disease condition, acute attack of angina pectoris. Step 1 and 2 of P-drug selection process was taught as an interactive session with whole class. Whereas steps 3 to 6 of p-drug selection process was taught as small group activity (n=10), which was guided by a faculty. At the end of the small group activity, faculty presented the expected P-drug selection process for the same case to the whole class. After 2 days of phase 2, students (N=10) were asked to select a P-drug for dry cough in groups (phase 3). Students were provided with handouts containing drug formulations and their costs. They were allowed to use text book. This small group activity lasted for 2 hours. At the end of this activity each group was asked to present their P-drug selection process to the whole class. During the presentation common mistakes done were noted and at the end of presentations faculty gave feedback.

Assessment:

During examination students were asked to select a P-drug following stepwise approach to select a P-drug for acute angina pectoris in 30 minutes. Students were asked to list advantages and disadvantages of groups/drugs and select a drug based on their own judgment. They were provided with a handout containing various formulations of drugs used in angina pectoris, frequency of administration and cost range of each drug. Considering our students practice in Malaysia and not in India, students were not provided with cost of various brands of anti-anginal drugs available in Indian market. Students were not allowed to use either text book or any other drug information sources. Students followed all steps on P-drug selection and prepared tables comparing efficacy, safety, suitability and cost of various groups/drugs by on their own. Later students' responses were assessed for a maximum of 8 marks using a newly developed checklist. The examination was done to understand the feasibility of assessing P-drug selection exercise and the marks obtained by students were not considered for any summative or formative assessment.

Statistical analysis:

Quantitative data was analysed using SPSS version 16. The score for each item was expressed as median and inter-quartile range (IQR). Students' responses to open ended questions were initially tabulated in decreasing order of frequency of their appearance. Later they were grouped into various categories. A score of ≥ 4 ($\geq 50\%$) was considered as pass. Percentage of students who scored ≥ 4 mark was noted.

RESULTS

90% (95/106) of students responded in the questionnaire. All students (n=106) were present during P-drug teaching and assessment. The reasons for 11 students not to respond in the questionnaire were not looked into.

Table 1 shows median score with IQR of each item in the questionnaire. Most of the item had a median score of ≥ 3 . Item numbers 2 and 4 had a median score of 2 (2-3) but they were negatively worded. 83% of students opined that P-drug selection teaching-learning activity helped them to understand the pharmacology of drugs better. Responses to open ended questions were grouped as those related to role of P-drug selection exercise in deeper understanding of topics, other perceived benefits and students tips for making P-drug selection teaching better (Table 2).

When assessed, 94.3% of students had scored ≥ 4 marks in P-drug selection exercise and 75.47% of students had a score of ≥ 5.2 .

In this study, students selected a P-drug during small group activity using a text books and handout provided by the department. In literature various methods like Multi-attributive utility analysis

Table 1.
Students' perceptions [median with inter quartile rang (IQR)] regarding P-drug selection teaching and assessment.

Items	Median	IQR
A. Teaching		
1.Allocated time (2hr) was adequate	4	(4-4)
2.Teaching method needs to be Revised	2	(2-3)
3.Explanation was clear	4	(3.5-4)
4.Explanation was not adequate	2	(2-3)
5.Understood the steps very well	4	(4-4)
6.More exercises are required to understand the process better	4	(3-4)
B. Assessment		
7.Assessment was fair in testing knowledge and skills	4	(2-4)
8.Scores reflected performance	4	(2-4)
9.Not been given the deserved score	3	(2-3)
10.Marks (8 marks) allotted was Adequate	4	(3.5-4)
11.Score highlighted areas of weakness	3	(2-4)
12.Time allotted (30 min) is adequate	4	(2-4)
C. Satisfaction and value		
13.Should be taught to all medical students	4	(3-4)
14.Relevant to future practice	4	(3-4)
15.Confident in selecting a P-drug for the case scenarios taught	4	(3-4)
16.Motivate students to study Pharmacology	3	(2-3)
17.Improve understanding of various pharmacological aspects of the drugs used	4	(3-4)
18.Improve understanding of pathophysiology	4	(3-4)

(MAUA)^[16], modified MAUA,^[23] and awarding positive and negative points or plusses and minuses to the various criteria for each drug^[16] were used for selecting a group/drug. In our study, during teaching learning activity, students listed all positive and negative aspects of various groups/drugs and later they selected a group/drug by group consensus. During examination students followed the same method but selection was based on their own judgment.

Table 2:
Perceived benefits of P-drug selection teaching and students' tips for making P-drug selection teaching better

P-drug teaching		Tips
Promotes deeper understanding as it involves ♦ Application ♦ Critical analysis ♦ Compare and contrast ♦ Rearranging ♦ Judgment ♦ Sequential decision making process ♦ Interaction	Helps to ♦ Study systematically ♦ Remember ♦ Identify important drugs and their aspects ♦ Improve confidence in answering in exam ♦ Identify commonly used drugs in practice	♦ Introduce from the beginning of 2nd year ♦ More exercises ♦ In all blocks ♦ Introduce in clinical year ♦ Conduct as Self Directed Learning followed by discussion/Problem Based Learning ♦ Exercise after each topic ♦ More explanation ♦ Simplify ♦ Make it less stressful ♦ Reduce content

DISCUSSION

In this study P-drug selection was taught to 2nd year medical students before entering into clinical phase of the course. Teaching was done by exposing students to sequential decision making process for solving a disease problem. The present study showed students' satisfaction and acceptance of developed P-drug selection teaching module and its assessment. This study also demonstrated the retention effect of P-drug selection teaching. However the transfer effect of this teaching learning method was not tested in this study.

In this study we developed module only for teaching P-drug selection and its assessment. The entire process of rational prescribing teaching is more complex than P-drug selection teaching. Moreover, all faculty in our pharmacology department were not competent to teach rational treatment. Furthermore, we found that it is feasible to train faculty without clinical knowledge in P-drug selection than in rational treatment as P-drug selection requires more pharmacology knowledge than clinical knowledge.

During teaching learning activity, author found that instead of defining the diagnosis many students had written the diagnosis of the case. Moreover, objectives of treatment were not defined but just stated. In addition, majority of students had mistakenly understood the step 6 of P-drug selection as writing a prescription to the patient. These mistakes were addressed by the faculty during feedback.

Median score for most of the items in the questionnaire was ≥ 3 which means that teaching and assessment of P-drug selection was acceptable to students (Table 1). Item no. 16 had a lowest median score of 3 (2-3) which means that P-drug selection exercise did not motivate our students to study pharmacology. Reason could be that students might have perceived this exercise as stressful as they had to remember most of the aspects of drugs while selecting a P-drug during teaching-learning activity (Table 2). Furthermore, students were not provided with text books during the assessment. This might have made the examination more stressful for students. Moreover, students' perceptions were taken just after two P-drug

selection exercises. Students may not have developed interest and realized the importance of this exercise for their future practice. In addition, we did not teach how to apply selected P-drug to patient cases. Teaching whole process of rational treatment with suitable patient problems may motivate students to study pharmacology.

In this study, students selected a P-drug during small group activity using a text books and handout provided by the department. In literature various methods like Multi-attributive utility analysis (MAUA),^[16] modified MAUA,^[23] and awarding positive and negative points or pluses and minuses to the various criteria for each drug^[16] were used for selecting a group/drug. In our study, during teaching learning activity, students listed all positive and negative aspects of various groups/drugs and later they selected a group/drug by group consensus. During examination students followed the same method but selection was based on their own judgment.

Median score for the item no. 11 was 3 (2-3). Students opined that though they were given deserved score (item no. 9, Table 1) and their score reflected their performance (item no. 8, Table 1), but it did not reveal their areas of weakness. This is due to the fact that students were provided with the total score but the checklist used by faculty for marking the P-drug answer was not given to the student. However, students opined that time given for P-drug selection exercise in the examination was adequate. In addition, the median score for other items related to assessment showed that students were satisfied with the assessment. Thus this study led to the development of a checklist for assessing students' P-drug selection process. As checking students' factual pharmacological knowledge was also important, we decided not to provide them with text books during examination. Hence in examination, we were able to assess students' factual pharmacological knowledge as well as rational decision making skills pertaining to p-drug selection. This was possible as we had carefully aligned intended learning outcomes of selected topics for P-drug selection with methods of assessment. Students' examination score in P-drug

selection exercise showed that students were aware of the process of P-drug selection and able to critically analyze known information to select the P-drug.

I do agree that this study did not teach students to analyze the drug promotional materials, one of the important aspects of rational prescribing. Considering we teach students of Malaysia and after graduation they practice in Malaysia and not in India, author provided them with the faculty prepared handout with only generic names of drugs and their price range in rupees. With the resources available at our institution, author decided to concentrate only on the process of P-drug selection and not on retrieving information from books like CIMS. At MMMC, retrieving information from drug information sources was incorporated into the pharmacology curriculum in 2011.

The study objective for assessing students in P-drug selection was to explore the feasibility of including P-drug selection exercise for the summative assessment and also to see whether students have understood the process of P-drug selection, but not to assess students' skills in P-drug selection. Hence the same case which was used for teaching P-drug selection process was used for student assessment. Students require many such P-drug selection exercises to develop skills to select a correct P-drug for the given case by on their own.

Students' opinion that P-drug selection exercise helped them to understand pharmacology of drugs better. Students' responses (Table 2) showed that this exercise directed them to undergo various process mentioned in the Blooms' taxonomy of cognitive domain for higher order thinking^[24] which promoted deeper understanding of topics covered.

It was heartfelt to see that students perceived many other benefits which helped them in learning pharmacology (Table 2). This could be the reason for their opinion that this exercise should be done after didactic lectures on each topic.

Problem faced during the exercise:

As reported in a study,^[23] our students also opined that inadequate knowledge about the disease made this exercise difficult. Our students attend clinicals only from the third year of the course and this study was conducted when they were in 2nd year. This could be the reason for their opinion that, P-drug selection exercise should be taught to 3rd year students and not for 2nd year students. Students wanted this training to be implemented in the first block of 2nd year of the course and more such activities for different disease conditions to be held to understand the P-drug concept better.

Future directions:

Students' skills gained on P-drug selection need to be ensured by giving some exercises for homework which later can be used as formative assessment to give feedback. The impact of these teaching-learning activities on their clinical training and compulsory service to Malaysian government can be explored.

The study had some limitations. Study was partially based on students' perceptions which were taken just after two P-drug selection exercises. Students' feedback taken after many such exercises over the whole 2nd year of the course might have given clearer picture of our method of teaching and assessment. Moreover, to what extent our teaching-learning activity made students to understand the process of P-drug selection is not clear as students were asked to select a P-drug for one of the disease conditions that was taught in the class. Furthermore, in examination, mere recall of what had been documented in practical record cannot be ruled out in this study.

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REFERENCES

1. Management Sciences for Health. Managing Drug supply. West Hartford, Connecticut, USA; Kumarian Press, 1997.
2. Maronde RF, Seibert S, Katzoff J, Silverman M. Prescription Data Processing- Its Role in the Control of Drug Abuse. *Calif Med* 1972;117:22-8.
3. Obaseiki-Ebora EE, Akerelea JO, Ebeab PO. A survey of antibiotic outpatient prescribing and antibiotic self-medication. *J Antimicrob Chemother* 1987;20: 759-63.
4. Shewade DG, Pradhan SC. Auditing of prescriptions in a government teaching hospital and four retail medical stores in Pondicherry. *Indian J. Pharmacol* 1998;30: 408-10.
5. Kumari R, Idris MZ, Bhushan V, Khanna A, Agarwal M, Singh SK. Assessment of prescription pattern at the public health facilities of Lucknow district. *Indian J. Pharmacol* 2008;40: 243-47.
6. Zaveri HG, Mansuri SM, Patel VJ. Use of potentially inappropriate medicines in elderly: A prospective study in medicine out-patient department of a tertiary care teaching hospital. *Indian J. Pharmacol* 2010;42:95-8.
7. Thomas M, Murray-Thomas T, Fan T, Williams T, Taylor S. Prescribing patterns of asthma controller therapy for children in UK primary care: a cross-sectional observational study. *BMC Pulmonary Medicine* [Internet]. 2010 [cited 2012 Feb 24];10(29): [about 9 p.]. Available from: <http://www.biomedcentral.com/1471-2466/10/29>.
8. Kara CK, Sunay D, Caylan A, Donderici D. The effect of medication costs on physician's drug selection. *Bratisl Lek Listy* 2011;12:196-99.

9. Patel V, Vaidya R, Naik D, Borker P. Irrational drug use in India: A prescription survey from Goa. *J Postgrad Med* [serial online] 2005 [cited 2012 Feb 14];51:9-12. Available from: <http://www.jpgmonline.com/text.asp?2005/51/1/9/14015>.
10. Gaash, B. Irrational Use of Antibiotics. *Indian Journal for the Practising Doctor* [Serial online] 2008-03-2008-04 [cited 2012 Feb 15];5(1):[about 1 p.]. Available from: <http://www.indmedica.com/journals.php?journalid=3&issueid=124&articleid=1656&action=article>.
11. Kotwani A. Availability, price and affordability of asthma medicines in five Indian states. *Int J Tuberc Lung Dis* 2009;13:574–79.
12. Kotwani A, Holloway K. Trends in antibiotic use among outpatients in New Delhi, India. *BMC Infectious Diseases* [Internet] 2011 [cited 2012 Feb 15];11(99): [about 9 p.]. Available from: <http://www.biomedcentral.com/1471-2334/11/99>.
13. Kotwani A, Chaudhury RR, Holloway K. Antibiotic prescribing practices of primary care prescribers for acute diarrhea in New Delhi, India. *Value Health*. 2012;15(1 Suppl):S116-9.
14. Ahmed HMA, Ibrahim MIM, Babar Z. Affordability of essential medicines used for treating chronic diseases in Malaysia: An academic perspective. *The Internet Journal of Third World Medicine* [Internet] 2009 [cited 2012 Feb 14];8(1): [about 10 p.]. Available from: <http://www.ispub.com:80/journal/theinternet-journal-of-third-world-medicine/volume-8-number-1/affordability-of-essential-medicines-used-for-treating-chronic-diseases-in-malaysia-an-academic-perspective.html>.
15. Soumerai S, Quick J, Avorn J, Tawfik Y. Changing the unchangeable: principles and experiences in improving prescribing accuracy. *World Paediatrics and Child Care* 1987;3: 287-91.
16. Hogerzeil HV, Barnes KI, Henning RH, Kocabasoglu YE, Moller H, Smith AJ, Summers RS, de Vries TPGM. *Teachers' guide to good prescribing*. Geneva: World Health Organization; 2001.
17. Hogerzeil HV. Promoting rational prescribing: an international perspective. *Br J Clin Pharmacol* 1995; 39:1-6.
18. Tichelaar J, Richir MC, Avis HJ, Scholten HJ, Antonini NF, De Vries Th PGM. Do medical students copy the drug treatment choices of their teachers or do they think for themselves? *Eur J Clin Pharmacol* 2010;66:407–12.
19. Collins IS. Therapeutics, a neglected speciality? *Med J Austr* 1971;2:526-8.
20. Walson PD, Hammel M, Martin R. Prescription writing by pediatric house officers. *J Med Educ* 1981;56:423-8.
21. Peck CC, Halkin H. Therapeutic decision-making for second year medical students. *J Med Educ* 1981;56:1024-6.
22. De Vries TPGM, Henning RH, Hogerzeil HV, Fresle DF. *Guide to good prescribing*. Geneva: World Health Organization; 1994.
23. Shankar PR, Palaian S, Gyawali S, Mishra P, Mohan L. Personal Drug Selection: Problem-Based Learning in Pharmacology: Experience from a Medical School in Nepal. *PLoS ONE* [Internet] 2007 [cited 2010 Nov 7];2(6): e524: [about 5 p.]. Available from: doi:10.1371/journal.pone.0000524
24. Bloom B, Englehart M, Furst E, Hill W, Krathwohl D, editors. *Taxonomy of educational objectives: The classification of educational goals, Handbook 1: Cognitive Domain*. New York: David McKay;1956.
