

Introduction to concept of personal drugs, essential drug list and awareness of cost of drugs

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Received: 11 June 2014

Accepted: 02 July 2014

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ABSTRACT

Background: Undergraduate medical students acquire knowledge about use of drugs during teaching sessions related to prescription of drugs. Appropriate selection of drugs from the available list of numerous formulations requires skill. This can be imparted using the concept of personal drugs (P-drugs). Knowledge of the price of drugs is important consideration in selection of drug. This paper describes method of introducing medical student to the concept of P-drugs, essential drug list (ED list) and economic aspects of drug utilization.

Methods: Students are divided into groups, guided by faculty member. Each group is allotted a clinical case scenario with specific questions; students have to select suitable drugs which can be prescribed. They also have to search for the suitable drug included in the ED list and price of different brands of the same drug. The work done by the group is presented as a report to the whole class.

Results: Each group presented the list of P-drugs and ED list and price of the drugs for the selected cases viz.: pharyngitis, urinary tract infection, hypertension, diabetes mellitus. After collecting the information on these aspects each group selected the most appropriate drug for the clinical condition allotted to them. Comparison of prices of various brands provided opportunity to learn about economic aspects of drug use.

Conclusion: This method of study using patient oriented problems is a useful method to impart knowledge to medical students about concept of P-drugs, ED list and economic aspects of using drugs.

Keywords: Selection of drugs, Personal drugs, Essential drug list, Cost of drugs

INTRODUCTION

The primary objective of teaching pharmacology during second MBBS course is to impart knowledge about suitable prescription for clinical conditions. Students are given some questions about common clinical conditions. The emphasis is mainly on dose and route of drugs selected for the conditions. Students are not sensitized to selection of suitable preparations and the variations in price of different brands. Practicing physician selects some preparations based on his/her clinical experience. In order to improve awareness about the appropriate selection of drugs, suitable methods have to be adopted. This can be achieved by patient-oriented problem solving (POPS) exercises. This paper presents one method of imparting knowledge about selection of drugs using the concept of personal drugs (P-drugs), essential drug (ED) list and economic considerations regarding the use of drugs.

METHODS

Students are divided into groups, each group consisting of 15-16 students. Faculty members are allotted for each group who functions as a facilitator. Clinical problems are prepared by faculty. Each problem consists of a clinical condition along with questions related to therapeutic aspects of drugs. Each group has to prepare a list of P-drugs for the clinical case scenario. In addition, data have to be collected about cost of different brands of selected drug. This is done by searching through various drug information sources. Students are directed to search through the model list of ED and select suitable preparation from this list for the clinical condition allotted to the group. Preliminary session includes discussion on the methods to be used and a brief lecture on ED list and concept of P-drugs.

Clinical cases allotted to the groups are listed below:

- Pharyngitis with streptococcal infection.

- Urinary tract infection (UTI) in a pregnant woman.
- Moderate hypertension with hyper cholestraemia.
- Type-II diabetes mellitus with obesity.

At the end of the session, students have to present their observations and indicate the selection of appropriate drugs.

RESULTS

Presentation by each group is indicated below.

Streptococcal pharyngitis

Drugs required

Anti-microbial, analgesics and antipyretics, antihistamines if there are allergic symptoms.

List of P-drugs

- Antimicrobials:
 - Macrolides: erythromycin, azithromycin, clarithromycin
 - Penicillins: amoxicillin
 - Cephalosporins: cefuroxime, cefaclorSince this patient has history of penicillin allergy macrolides are selected. Cephalosporins are to be used if there is resistance to macrolides.
- Analgesics and antipyretics: paracetamol, aspirin, ibuprofen.
- Antihistamine: diphenhydramine, pheniramine, hydroxyzine, levocetirizine.

Drugs included in the ED list-suitable for streptococcal pharyngitis

- Antimicrobials:
 - Beta-lactam antibiotics: amoxicillin + clavulanic acid, ampicillin.
 - Penicillins: amoxicillin.
 - Cephalosporin: cefazolin, cefixime, ceftazidime, ceftriaxone.
 - Macrolides: erythromycin, azithromycin, clarithromycin.
- Analgesics: paracetamol, ibuprofen, aspirin.
- Antihistamines: diphenhydramine, pheniramine, hydroxyzine, levocetirizine.

Cost of drugs suitable for streptococcal pharyngitis presented in Table 1.

After collecting the information on the cost of drugs, the following preparations were selected by the group.

- Azithromycin: the cheapest brand was selected. 500 mg once daily. Cost for 3 days is: Rs.65/- This drug is effective safe and cheap.

- Paracetamol: the cheapest brand selected-500 mg BD for adults.
- Anti-histamines (if required): levocetirizine was selected because it is cost effective and less sedative as compare with other antihistamine, pheniramine, which is cheaper.

UTI

List of P-drugs

Amoxicillin, norfloxacin, ciprofloxacin, cephalixin, cefpodoxime proxetil, amoxicillin + clavulanic acid, nitrofurantoin, cotrimoxazole.

Drugs included in ED list

- Amoxicillin
- Amoxicillin + clavulanic acid
- Cephalixin
- Cotrimoxazole
- Nitrofurantoin
- Ciprofloxacin

Selection of drugs based on cost (Figure 1)

Drug selected for UTI in pregnant women was amoxicillin because it is safe and cheap.

Hypertension and hyperlipidemia

Selection of drugs for hypertension and hyperlipidemia

Drugs required are antihypertensive agents and statins.

List of P-drugs

Antihypertensives: amlodipine, atenolol, enalapril, chlorthalidone, hydrochlorothiazide, losartan, lisinopril.
Hypolipidemic drugs: atorvastatin, simvastatin, lovastatin.

Drugs included in the ED list

Antihypertensives: amlodipin, atenolol, captopril, hydrolazine, hydrochlorthiazide, methyldopa.
Hypolipidemic drugs: simvastatin.

Cost of drugs

Students of this group conducted an extensive survey of the price of various antihypertensive agents. Many drugs are available as combinations. Tables 3a and b show the cost of selected brands (cheapest brand from each group) by this group. The final selection of drug for the patient described in the case scenario was losartan combined with

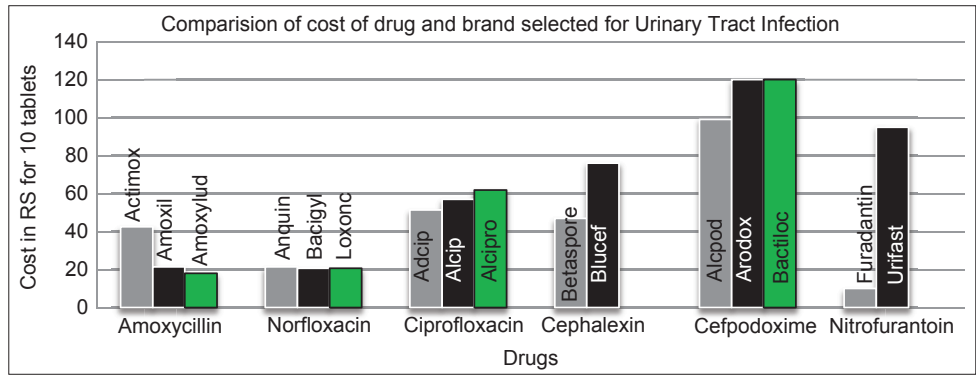


Figure 1: Comparison of drug and brand selected for urinary tract infection. Prices of different brands of selected antimicrobials are presented. Cost for 10 tablets of each is shown in Rs.

Table 1: Cost of drugs suitable for streptococcal pharyngitis.

Drug group	Generic and brand	Dose/frequency/cost	P-drug
Macrolides	Azithromycin (Acithrox)	500 mg×3 days=65	Azithromycin
	Clarithromycin (Clar)	250 mg/7 days=245	
	Erythromycin (Eltocin-DS)	1-2 g/6 hr/7 days=418	
	Roxithromycin (Roxetomin)	300 mg/day=147	
Cephalosporins	Cefuroxime (Cefakind)	500 mg/10 days=160	Cefachlor
	Cefachlor (Artichlor)	750 mg/10 days=84	
Analgesics	Paracetamol		Paracetamol
	(Calpol) 500 mg/TD	3 days=9.45	
	(Pyregesic) 500 mg/TD	3 days=5.67	
	(Crocic) 500 mg/TD	3 days=7.2	
Antihistamines	Diphenhydramine (Benadryl)	50 mg/day-13.26	Levocetizine
	Pheniramine (Avil)	50 mg/day-1.57	
	Hydroxyzine (Atarax)	50 mg/day-14.4	
	Levocetizine (Levosiz)	10 mg/day-5.7	

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Table 2: Cost of oral hypoglycemic agents.

Name of the drug (generic)	Brand	Strength	Price for 10 tablets (Rs)
Metformin	Diamet	500 mg	6.25
	Glyciphage	500 mg	8.00
	Glycomet	850 mg	11.58
	Metneed	850 mg	10.60
	(film coated)		
Glipizide	Glibetic	5 mg	7.00
	Glucolip	5 mg	8.50
Combinations	Glibenclamide+ metformin	(G) 5 mg+	13.40
		(M) 500 mg	
	Sugatrol forte	(G) 5 mg+	12.50
		(M) 500 mg	

hydrochlorthiazide (losartan 50 mg + hydrochlorthiazide 12.5 mg). This combination is based on efficacy and cost, the cheapest brand was selected. For treatment of hyperlipidemia lovastatin was selected.

Students presented detailed analysis of cost of single drug and combinations. These observations highlighted the importance of selecting suitable drug and brand as well as the importance of keeping list of P-drugs.

Students highlighted the number of combinations, which can be used for hypertension. It is necessary for the clinician to select suitable drug, based on the therapeutic response and also the affordability of the patient.

Diabetes mellitus

List of drugs included as oral hypoglycemic drugs

- Sulfonylureas : tolbutamide
- Meglitinides : repaglinide, nateglinide
- Glucagon-like peptide-1 receptor agonists : exenatide, liraglutide
- Dipeptidyl peptidase-4 inhibitors : sitagliptin, vildagliptin, saxagliptin, alogliptin, linagliptin

Table 3a: Survey of cost of commonly used antihypertensive agents and selection of cheapest brands.

Single drug		
Drug	Strength (mg)	Price for 10 tablets (Rs.Ps.)
Amlodipine	5	15
Atenolol	50	8.70
Hydrochlorothiazide	12.5	6
Enalapril	5	11.99
Ramipril	2.5	19.40
Lisinopril	5	25.10
Losartan	50	27.50
Irbesartan	150	77

Price of 10 tablets of each brand is mentioned. The cheapest brand of each drug selected by the group is only included in this table. The brands selected were of comparable strength (4-5 brands)

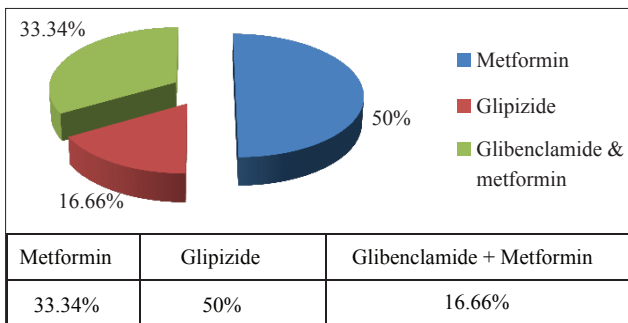


Figure 2: Prescribed drugs (Single/combinations).

- Biguanides : metformin
- Thiazolidinediones : pioglitazone
- Alphaglucoisidase inhibitors : acarbose, miglitol, voglibose
- Amylin analogue : pramlintide
- D2-agonist : bromocriptine
- Sodium-glucose cotransporter type 2 inhibitor : dapagliflozin

List of P-drugs

- Sulfonylureas : glibenclamide, glipizide, gliclazide, glimepride.
- Meglitinides : repaglinide, nateglinide.
- Biguanides : metformin.
- Thiazolidinediones : pioglitazone.
- Alphaglucoisidase inhibitors : acarbose, miglitol, voglibose.

Drugs included in ED list

- Glibenclamide
- metformin

Table 3b: Survey of cost of commonly used antihypertensive combinations and selection of cheapest brands.

Combination		
Drug combination	Strength (mg)	Price (Rs.ps)
Amlodipine+Atenolol	5 50	10.30
Amlodipine+Enalapril	10 5	27.50
Atenolol+Chlorthalidone	25/50 12.5	23
Losartan+Amlodipine	50 5	25
Losartan+Hydrochlorothiazide	50 12.5	25
Losartan+Ramipril	50 2.5	49.50
Losartan+Amlodipine+Hydrochlorothiazide	50 2.5 12.5	49.50
Enalapril+Hydrochlorothiazide	10 25	28.70
Ramipril+Hydrochlorothiazide	2.5 12.5	40
Amlodipine+Lisinopril	5 5	26
Lisinopril+Hydrochlorothiazide	5 12.5	10
Irbesartan+Hydrochlorothiazide	150 12.5	96

Price of 10 tablets of each brand is mentioned. The cheapest brand of each drug selected by the group is only included in this table. The brands selected were of comparable strength (4-5 brands)

It is observed that only two groups of drugs are included in the ED list. While analyzing the total number of drugs 16.66% are included, whereas 83.34% are not included in the ED list. Combinations are used in many patients. The observations regarding use of single drugs and combinations are presented in Figure 2 and the cost of the same is depicted in Table 2.

DISCUSSION

Selection of drugs for a particular clinical condition requires knowledge on pharmacodynamic and pharmacokinetics. In addition, there are question on practical aspects such as (a) whether to use single drug or combination. (b) Compliance which depends on the frequency of administration. (c) Price of drugs-important consideration

in rural areas and with lower socioeconomic group of patients.

The process of selecting drug can be simplified by preparing a list of "P-drugs." This list is prepared based on the inventory of effective group of drugs for disease using the criteria of safety, tolerability, efficacy and price. The physician can keep a set of drugs from the many available in the market, with which he/she will become familiar. The list is prepared for a common condition, not for a particular patient. The name of drug, dosage forms, schedule and duration of treatment are factors influencing inclusion into the list. P-drugs differ from country to country and between doctors depending on availability and cost of drugs.¹

Preparing P-drug list helps practicing physician in many ways.

1. Avoid repeated searches for a good drug to be prescribed.
2. Regular use of drugs provides reliable information on therapeutic effects, adverse effects and compliance.
3. Make appropriate adjustment when associated diseases and economic factors have to be considered for selecting suitable drugs.

ED list is a standard list of drugs prepared as a model by World Health Organization (WHO) to meet the primary health care needs of majority of the population. This list is periodically revised to meet the changing requirements. Each country prepares its national list of ED based on WHO guidelines.²

Students are introduced to the concept of ED list during lecture sessions. When a specific task is allotted, students begin to recognize the need for a short list compiled for healthcare needs of a community. By using this method of referring to ED list, awareness about rational use of drugs for common disease states can be achieved. When a patient has to be treated, the question of selection of right drug in the right dose and duration arises. This can be made easy by referring to the list of P-drugs and ED list. The guidelines for good prescribing involve the following aspects: (1) define the therapeutic objective, (2) select the right drug, (3) gather information on dosage and frequency of administration, (4) cost of drugs, newer drugs are usually more expensive, (5) combination of drugs-is the combination required and rational? Use of P-drugs list and ED list helps the physician in this process of selection of drugs. It is important that a physician should update his/her knowledge regularly and the list of P-drugs from time to time.

Methods to improve learning process have been attempted and presented in many publications.³⁻⁵ POPS exercises have been found to be good method of introducing students

to rational therapeutics.^{6,7} During second MBBS course, students begin to correlate clinical situation to knowledge acquired during lecture sessions. Patient oriented problems stimulate students to critically analyze the problems and find answers. In this method of study, students have to search for information on drugs, dose etc. as well as cost of drugs; Students are sensitized to the concept of P-drugs for rational therapeutics.

CONCLUSION

Results of this study provide information on method of imparting knowledge to undergraduate students about P-Drugs, ED list and economic considerations about use of drugs.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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doi: 10.5455/2319-2003.ijbcp20140828

Cite this article as: Indla R, Chinnathambi T, Roy R, Kuruvilla A. Introduction to concept of personal drugs, essential drug list and awareness of cost of drugs. *Int J Basic Clin Pharmacol*. 2014;3:696-700.