

Assessment and Promotion of Essential Drug Use at Selected Tertiary Care Hospitals and Pharmacies in Mysore City

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Abstract: Although India is known as “Pharmacy of Global South,” 65% of its population does not have access to EMs. Pharmacists play a crucial role in providing quality health care. EMs concept, adapted for a particular national setting depending on prevalence pattern of diseases and availability of new medicines is currently a highly rational and sensible strategy to provide the best of modern, evidence-based, safe and cost effective health care. The study objective was to assess and promote the Essential Drug Use (EDU) at selected tertiary care hospitals and pharmacies in Mysore city. It’s a prospective, observational and survey study conducted in CSI Holdsworth Memorial Hospital, Bharath Hospital and Institute of Oncology and Asha Kirana Hospital; selected hospital and community pharmacies for a period of 6 months. The study was approved by Institutional Ethics Committee. A total of 546 patients were enrolled in the study. Among them average number of drugs prescribed per encounter-10.29, drugs prescribed by generic names-27.2%, drugs prescribed from NEML-77.0%, total number of treatment charts with antibiotics-65.20% and total number of treatment charts with injections-99.81%. NEML 2015 was available in only 8 out of 35 pharmacies. More than half the pharmacists, 60.0% had no idea of what EMs are before the awareness whereas the percentage increased to 81.80% after the promotion of EMs concept indicating an update of knowledge in pharmacists. Lack of knowledge and availability of EMs was found to be the major constraint for inappropriate prescribing and dispensing of drugs in hospitals and pharmacies. EMs, a basic need of majority of population, should be available to all the people in adequate amounts at all times. Periodic awareness and continuous pharmacy programs can be implemented to update each and every practicing pharmacist on the latest updates in pharmacy profession.

INTRODUCTION

According to Indian constitution on the right to healthcare, accessibility to EMs (Essential Medicines) is the fundamental right of every citizen. [1] WHO (World Health Organization) prioritizes some barriers that can result in poor access to EMs including unaffordable medicine prices, irrational use of drugs, unfair health financing mechanisms, unreliable medicine supply systems, varying quality of medicines and lack of new medicines for diseases that affect the poor. [2]

The rapidly changing global economic situation in India [3] and the demand for pharmaceuticals has necessitate the need for safe, effective and affordable drugs for use in pediatrics, adults and elderly people. [4] A swift increase in incidence of chronic diseases and cancer in India has become a serious public health issue, particularly because they require long-term therapy. [5] Also, the highest consumption of antimicrobials in Indian subcontinent has been linked to the existence of antimicrobial resistance. [6]

WHO criteria of EMs concept are adapted for a particular national setting depending on prevalence pattern of diseases and availability of new medicines [7] and should be available within the context of functioning health systems at all times, in adequate amounts, in appropriate dosage forms, with assured quality and adequate information and at a price the individual and the community can afford. [8] The EMs concept is currently recognized as a highly rational and sensible strategy to provide the best of modern, evidence-based, safe and cost effective health care. [1] It focuses on medicines that address conditions which creates the greatest public health threats with an emphasis on common infections and chronic diseases. [1] It also confronts several other issues in

therapeutics and saves money for individuals, hospitals, health care providers and the country. [9]

Pharmacists play a crucial role in providing quality health care as community pharmacies are often the first-port-of-call for minor ailments. [10] They bridge the gap between the physician and the patient and serve as the gatekeeper of the drug supply system. [10] The responsibility of a pharmacist has increased due to easy access of ready-to-use drugs and the practice of self medication especially in suburban and rural areas where patients have limited access and money for modern health care services. [11, 12]

Although India is known as “Pharmacy of Global South,” 65% of its population does not have access to EMs. [13] Medicines are an essential component of many disease prevention programmes and virtually all disease treatment when accessed. [14] Pradhan Mantri Bhartiya Jan Aushadhi Pariyojana Kendras (PMBJP) are launched by the Govt. of India in 2016, to provide quality medicines at affordable prices to the population. They have been set up to provide generic drugs, which are available at affordable prices and are equivalent in quality and efficacy as expensive branded drugs. [13]

The concept of EMs has been accepted worldwide as a powerful tool for the attainment of the highest possible level of health. [8] The use of EMs according to the NEML has shown an improvement in procurement, storage, distribution and dispensing of drugs. [7] The challenge is to regularly update medicines to choose in the light of new therapeutic preferences, changing therapeutic needs, the need to ensure drug quality and continued development of better drugs, drugs for emerging diseases and drugs for coping with changing resistance patterns. [7]

A pharmacist is expected to dispense quality medicines according to the Good Pharmacy Practice (GPP), a key element to promote rational drug use. [11] However, prescribing and dispensing of ineffective, unsuitable, sub-

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Table 1: Assessment Scores of Pre- Questionnaire and Post- Questionnaire

Improvement Score	Assessment
0	No Knowledge on the EM concept
1-2	Poor Knowledge
3-4	Good Knowledge
5-6	Excellent Knowledge

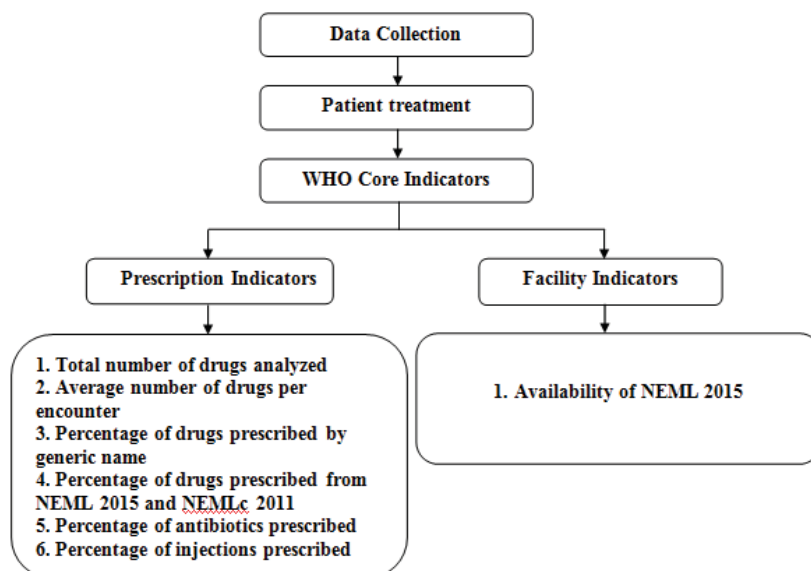


Figure 1: Flow chart of data collection from patient treatment charts

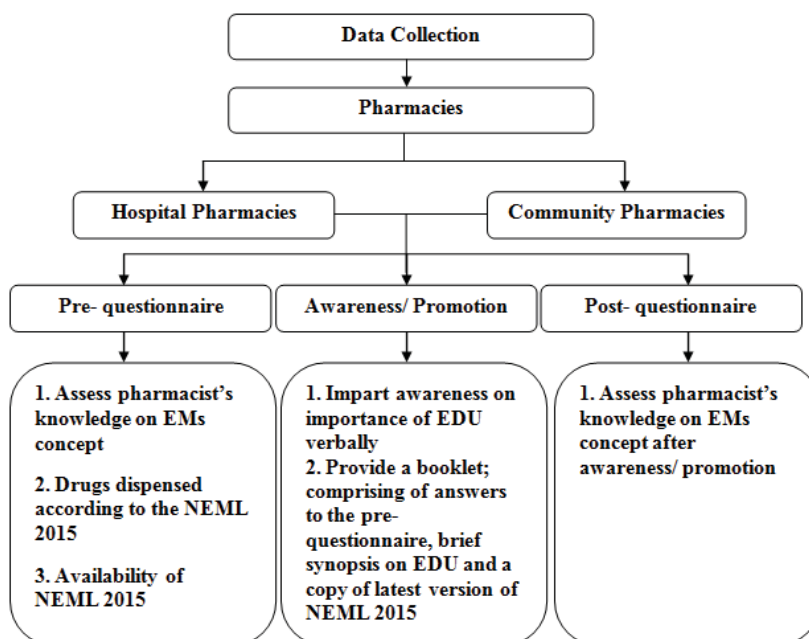


Figure 2: Flow chart of data collection through survey

optimal or unsafe pharmaceutical products is widely noticed in pharmacies, especially community pharmacies. [15] The contributing factors for this irrational dispensing include lack of knowledge of pharmacist on EMs and National Essential Medicines List (NEML), unavailability of EMs and lack of update of pharmacist on pharmacy profession. [13, 15] This study aims to identify and assess availability and use of EMs in tertiary care hospitals and selected hospital and community pharmacies, promote

NEML and its concept by personal interaction and awareness to practicing pharmacists working in various settings.

MATERIALS AND METHODS

This was a prospective, observational and survey study conducted for a period of six months (September-February 2019) in the inpatients of CSI Holdsworth Memorial (Mission) Hospital, Bharath Hospital and Institute of

Table 2: Details of Patient Treatment Charts Reviewed from Different Hospitals and Clinical Departments

Hospitals	Patient Treatment Charts	Clinical Departments
CSI Holdsworth Memorial (Mission) Hospital	440 (80.7%)	General medicine - 339 (66.84%)
		Surgery - 44 (8.1%)
Bharath Hospital and Institute of Oncology	80 (14.6%)	Pediatrics - 38 (7%)
		OBG - 19 (3.5%)
Asha Kirana Hospital	26 (4.7%)	Oncology - 80 (14.6%)
		General - 26 (4.7%)

Table 3: Details of Gender and Age Distribution of Patients

Characteristics	Category	Number of Patients	Percentage
Sex	Male	293	54.2%
	Female	250	45.8%
Age (years)	0-12	38	6.9%
	13-20	14	2.56%
	21-40	147	26.9%
	41-60	207	37.9%
	61-80	110	23.8%
	>80	10	1.83%

Oncology and AshaKirana Hospital; selected Hospital and Community Pharmacies of Mysore. The pharmacies were selected based on the inclusion and exclusion criteria. This study was approved by the Institutional Human Ethics Committee of Farooqia College of Pharmacy (Appendix I). In-patient's data was collected from the patient treatment charts in a study proforma (patient data collection form) and assessed on their compliance to NEMLC 2011 (Appendix IX) and NEML 2015 (Appendix X) by calculating the WHO Core Indicators- Prescribing and Facility Indicators (Appendix VIII). The pharmacies data on availability of EMs was obtained through survey using pre- and post-questionnaires. The EDU concept was promoted by imparting awareness to the practicing pharmacists regarding the importance of EDU verbally and through an awareness booklet (Appendix VII), comprising of answers to the pre-questionnaire, a brief synopsis on EMs concept and a copy of latest version of NEML 2015. The collected data was evaluated and assessed for the usage of NEML and its promotion. The compiled data was subjected to descriptive statistical analysis using Microsoft Excel and the result was expressed in terms of numbers and percentage. An improvement score were given based on the pre- and post-questionnaires answered by the pharmacists on the EMs concept.

Study Criteria

1. Criteria of Patient Treatment Charts

All the inpatient treatment charts of different departments of tertiary hospitals which have a memorandum of understanding with the college were randomly included in the study.

2. Criteria for Selection of Pharmacies

- a. Inclusion Criteria
 - i. Pharmacies located in different areas of Mysore city
 - ii. Pharmacies located within the hospital premises
- b. Exclusion Criteria
 - i. Pharmacist not interested to participate in the study

Sources of Data

1. Patient treatment charts
2. Pharmacies:
 - a. Hospital Pharmacies
 - b. Community Pharmacies

Study Materials

1. Patient Data Collection Forms
2. Questionnaires:
 - a. Pre- Questionnaire
 - b. Post- Questionnaire

RESULTS

Patient Treatment Charts

1. Details of Patient Treatment Charts Reviewed from Different Hospitals and Clinical Departments

A total of 546 patient treatment charts reviewed; of which 442 (80.7%), 80 (14.6%) and 26 (4.7%) were from CSI Holdsworth Memorial (Mission) Hospital (CSI HMH), Bharath Hospital and Institute of Oncology (BCH) and Asha Kirana Hospital (AKH) respectively (Table 2).

2. Details of Gender and Age Distribution of Patients

The proportions of males were higher 54.2% (293) as compared to females 45.8% (250). The demographic profiles of the patients showed that majority of patients 37.9% (207) were in age group of 41-60 years in both males and females (Table 3).

3. Assessment of WHO Core Indicators

a. Prescribing Indicators

From the total number of treatment charts reviewed (546); the total number of drugs prescribed was 5622 with an average of 10.29 drugs per encounter. More than half of the patients, 65.20% were prescribed with antibiotics. Only 27.2% drugs were prescribed by generic name. The number of injections prescribed was at majority with an average of 99.81% (Table 4). A significant of percentage, 77.0% (4325) of drugs were from National Essential

Table 4: Assessment of WHO Core Indicators

Parameters	Observed Value
Prescribing Indicators	
1. Total number of treatment charts analyzed	546
2. Total number of drugs prescribed	5622
3. Average number of drugs prescribed	10.29
4. Drugs prescribed by generic names	27.2% (1531)
5. Drugs prescribed from NEML	77.0% (4325)
6. Total number of prescriptions with antibiotics	65.20%
7. Total number of prescriptions with injections	99.81%
Health Facility Indicator	
1. Availability of NEML 2015	No (In all the three hospitals)

Table 5: Details of Drugs Prescribed from NEML

Drugs Prescribed	Number of Drugs	Percentage (%)
Drugs prescribed from NEML (4325)	4153 (NEML) 172 (NEMLc)	77.0%
Drugs prescribed outside NEML	1297	23.0%

Table 6: Comparison of the WHO Prescribing Indicators Values Obtained in Our Study with Similar Other Indian Studies

WHO Prescribing Indicators (%)	Our Study*	Asha Pathak et al. ^[16]	Shanmugapriya S et al. ^[17]	Sartaj Hussain et al. ^[18]	Tharunasree et al. ^[19]	Vaishnavi PRR et al. ^[20]
1. Average number of drugs prescribed	10.29	5.11	2.95	2.91	6.43	3.15
2. Drugs prescribed by generic names	27.20	89.88	6.42	10.05	30.0	91.15
3. Total number of prescriptions with antibiotics	66.20	24.27	15.42	19.70	3.80	-
4. Total number of prescriptions with injections	99.81	24.05	8.14	2.20	10.87	4.32
5. Drugs prescribed from NEML	77.0	76.06	90.67	22.57	90.35	47.92

*Our Study- Assessment and promotion of essential drug use at selected tertiary care hospitals and pharmacies in Mysore city

Table 7: Details of Selected Pharmacies

Total Number of Pharmacies (35)	Hospital Pharmacies	37% (13)
	Community Pharmacies	63% (22)

Medicine List and remaining 23.0% (1297) were out of NEML. Out of the total number of National Essential Medicines calculated i.e, 4325; 77.71% were from NEML 2015 and 61.87% were from NEMLc 2011 (Table 5).

b. Health Facility Indicator

No Essential Medicine List was available in health facilities of study area.

4. Comparison of the WHO Prescribing Indicators Values Obtained in Our Study with Similar other Indian Studies

Refer Table 6.

Survey Results

1. Details of Selected Pharmacies

The total number of pharmacies enrolled in the study was 35; 37% (13) hospital pharmacies and 63% (22) community pharmacies (Table 7).

2. Details of Gender and Qualification of Pharmacists

Out of 35 pharmacists, 69% (24) - females and 31% (11) - males (Table 8). Majority of pharmacists had a D-Pharm qualification-68.60% (24) (Table 8).

3. Assessment of Availability of NEML 2015 in Pharmacies

Only in 23% (8) pharmacies, National Essential Medicines List 2015 was accessible whereas 77% (27) pharmacies didn't have any essential medicine list (Table 9).

4. Assessment of Availability of Essential Medicines in Pharmacies

Out of 13,160 drugs, nearly half of the drugs, 45% (5965) from the NEML were available in the pharmacies; whereas remaining 55% (7195) were unavailable (Table 10).

5. Details of EMs Available in Pharmacies from NEML 2015 Drug Categories

Table 8: Details of Gender and Qualification of Pharmacists

Characteristics	Category	Number of Pharmacists	Percentage
Sex	Male	11	31%
	Female	24	69%
Qualification	D Pharm	24	68.6%
	B Pharm	10	28.6%
	Pharm D	1	2.9%

Table 9: Assessment of Availability of NEML 2015 in Pharmacies

Total Number of Pharmacies	Availability of NEML	Number of Pharmacies	Percentage (%)
35 Pharmacies	Available	8	23%
	Unavailable	27	77%

Table 10: Assessment of Availability of Essential Medicines in Pharmacies

Total Number of Drugs	Availability of EMs	Number of Drugs	Percentage (%)
13,160 Drugs	EMs Available	5965 drugs	45%
	EMs Unavailable	7195 drugs	55%

Table 11: Details of EMs Available in Pharmacies from NEML 2015 Drug Categories

Essential Drugs Category	No. of EMs Available	Percentage of EMs Available
Anaesthetics	144	2.41%
Anti-Convulsants	157	2.63%
Antidotes	48	0.8%
Anti-Histamines	265	4.44%
Anti-Infectives	730	12.24%
Anti-Leishmaniasis	6	0.1%
Anti-Malarials	32	0.54%
Anti-Migraine	15	0.25%
Anti-Neoplastics	228	3.82%
Anti-Parkinsonism	51	0.85%
Anti-Retrovirals	39	0.65%
CVS	774	12.97%
Dermatologicals	194	3.25%
Disinfectants	95	1.59%
Electrolytes	144	2.41%
GIT	347	5.81%
Haematinics	198	3.32%
Hormones	280	4.69%
Immunologicals	52	0.87%
Muscle relaxants	53	0.89%
NSAIDs	303	5.08%
Nasal ENT	148	2.485
Ophthalmologicals	294	4.93%
Oxytocics	131	2.2%
Psychotherapeutics	285	4.78%
Radio contrast agents	13	0.22%
Respiratory Tract	226	3.79%
RNTCP	113	1.89%
Urology	159	2.66%
Vaccines	71	1.1%
Vitamins and Minerals	256	4.29%
Miscellaneous	114	1.91%

Table 12: Comparison of Survey Results between Hospital and Community Pharmacies

Total Pharmacies (35)	NEML Availability	EMs Availability
Community Pharmacies (22)	18.20% (4)	40.00% (3308)
Hospital Pharmacies (13)	30.80% (4)	54.35% (2657)

Table 13: Comparison of Survey Results between Private Community Pharmacies and Jan Ashaudhi Kendras

Community Pharmacies (22)	NEML Availability	EMs Availability
Private Community Pharmacies (20)	15.00% (3)	39.22% (2952)
Jan Ashaudhi Kendras (02)	50.00% (1)	47.34% (356)

Table 14: Assessment of Pharmacist's Knowledge on Essential Medicines Before and After Promotion

	Before Promotion	After Promotion
0 (No knowledge)	60.0% (21)	0
1-2 (Poor)	17.1% (6)	3.0% (1)
3-4 (Good)	14.3% (5)	15.2% (5)
5-6 (Excellent)	8.6% (3)	81.8% (27)

The availability of Essential Medicines was highest in CVS category- 12.97% (774) followed by Anti-Infectives - 12.24% (730) (Table 11).

6. Comparison of Survey Results between Hospital and Community Pharmacies

Out of 22 community pharmacies surveyed, NEML were accessible only in 18.20% (4) and the EMs availability was found to be 40.0% (3308). Also out of 13 hospital pharmacies surveyed, NEML were found to be accessible in 30.80% (4) and the EMs availability was found to be 54.35% (2657) (Table 12).

7. Comparison of Survey Results between Private Community Pharmacies and Jan Ashaudhi Kendras

Refer Table 13.

8. Assessment of Pharmacist's Knowledge on Essential Medicines Before and After Promotion

More than half the pharmacists, 60.0% had no idea of what EMs are before the awareness whereas the percentage increased to 81.80% after the promotion of EMs concept indicating an update of knowledge in pharmacists (Table 14).

DISCUSSION

There are thousands of drugs in the market of which as many as 70% are duplicative or 'me-too' drugs and hence non-essential. [3] So it is important to derive a system to facilitate selection of essential drugs from the numerous drugs available.

The data collected was analyzed to find out the EDU in the hospital using the WHO core indicators namely: Prescribing indicators and Health Facility indicators which measured the EDU prescribing patterns of the prescribers and availability of copy of NEML respectively. These indicators help to assess the EDU prescribing patterns of the prescribers use of drugs in a healthcare facility. [18]

In the present study, 546 patient treatment charts analyzed contained a total of 5622 drugs. WHO Prescribing Indicators showed a greater deviation from other studies (Table 6). The average number of drugs prescribed was 10.29. This is much higher than the recommended limit of 2.0. This value is almost double of the same in other studies by Asha Pathak *et al.*, [16] (5.11) and Tharunasree *et al.*, [19]

(6.43). Increase in the average number of drugs may elevate the risk of drug interactions and may lead to increase cost of treatment. It may also result in unwanted adverse effects and emergence of drug resistance.

Drugs prescribed by generic names were only 27.2%; much lower than the recommended value, 100%. This value is however higher than the other studies by Shanmugapriya S *et al.*, [17] (6.42%), Sartaj Hussain *et al.*, [18] (10.05%). Prescription under generic name can be encouraged as it reduces the chances of dispensing errors, improves inventory control, eases the purchase of drugs, decreases the economic burden of patient and decreases confusion among the pharmacist and the patients alike.

Antibiotics prescribed constituted 66.20% out of all other drugs. This is much higher than the ideal value of 30.0%. Antibiotics use was extensive when compared to all the other studies. Appropriate use of antibiotics is absolutely necessary to prevent emergence of drug resistance. Most of the acute respiratory and acute gastroenteritis cases are due to viral infection and may not need antibiotics. Therefore, antibiotics should be used only after culture sensitivity testing. An antibiotic policy should be formulated so that the clinicians can use them judiciously according to patients need.

The percentage use of injections was 99.81%, almost equal to 100 percent, violating the ideal value of less than 25%. It's required to reduce the unnecessary use of injectables to prevent HIV and other blood borne infections. Medicines like multivitamins, minerals, enzymes shouldn't be prescribed by physicians unless absolutely required by the patient.

Only 77.0% of drugs were prescribed from the NEML. This value doesn't comply with the ideal value recommended by the WHO, 100%. A total of 23.0% of the concomitantly prescribed drugs are not present in the NEML for either the prescribed dose or indication or both. The percentage of drugs prescribed from NEML is lesser than the study by Shanmugapriya S *et al.*, [17] (90.67%) and Tharunasree *et al.*, [19] (90.35%). This may be due to inappropriate prescribing of drugs in hospitals because of lack of awareness and availability of medicines. EMs should be the first choice during medical practice. However, the prescribing of drugs may vary with factors like time, region, patient characteristics, physician's discretion and knowledge, availability and accessibility to EMs. NEML list requires more discussion and revision for the missed

drugs. Also, IAP (Indian Academy of Pediatrics) can review the NEMLC every two years.

From total 35 pharmacies included in the study, 8 (23%) pharmacies had an availability of NEMLC 2015. The availability of EMs in all the 35 pharmacies was only 45%; nearly half of the ideal value recommended by the WHO (100%). The access to EMs as a part of the fulfillment of the right to health can be enforced through law.

Comparison between hospital and community pharmacies from our survey results showed that EMs availability in hospital pharmacies (54.35%) is higher than the community pharmacies (40%). The EMs are expected to be 100% available in all the pharmacies at all times, especially in hospital pharmacies.

Comparison of average EMs availability between private community pharmacies and Jan Ashaudhi Kendras was found to be 39.22% and 47.34% respectively. The Govt. should take steps to ensure 100% availability of EMs in Jan Ashaudhi Kendras as they are launched for the noble cause – quality medicines at affordable prices for all.

Assessment of Pharmacist's knowledge on EMs concept before and after promotion of the NEMLC showed a huge difference of improvement. Before the promotion, more than half the pharmacists (60%) had no knowledge on the EMs concept. This may be due to lack of update of knowledge of pharmacists after their completion of degree/ diploma in pharmacy. The update in pharmacist's knowledge can be accomplished by providing Continuous Pharmacy Education (CPE) for each and every practicing pharmacist on the latest updates in pharmacy profession. They should also make the act of hiring non licensed pharmacists to dispense medicines in pharmacy a punishable offence.

CONCLUSION

In a tertiary care centre, prescribing is expected to be judicious, appropriate, safe, effective and economical. Inappropriate drug use may lead to increased medical cost, antimicrobial resistance, adverse effects and patient mortality.

From our study, lack of accessibility, availability and affordability of medicines was found to be the major constraint for inappropriate prescribing of drugs in hospitals. EMs, which is a basic need of majority of population should be available to all the people in adequate amounts. Also, EMs should be the first choice during medical practice. The concept of EMs has been worldwide accepted as a powerful tool for the attainment of the highest possible level of health. The challenge is to recurrently bring up-to-date medicine to choose in the light of new therapeutic preferences, changing therapeutic needs, the need to ensure drug quality and continued development of better drugs, drugs for emerging diseases and drugs for coping with changing resistance patterns. This can be accomplished by multimodal approach that includes regulatory changes, conducting educational programs for the doctors and imparting modifications in medical curriculum to inculcate the best prescription practices among the doctors.

From our promotion, it was found that lack of latest knowledge on the EMs was the reason behind the irrational dispensing of drugs. Periodic awareness and continuous pharmacy programmes can be implemented to update each and every practicing pharmacist on the latest updates in pharmacy profession. More Jan Ashaudhi Kendras can be set up by Govt. to promote dispensing of generic medicines in light of rapidly changing global population and their needs.

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Abbreviations

AIDS	- Acquired Immune Deficiency Syndrome
B Pharm	- Bachelor in Pharmacy
CPE	- Continuous Pharmacy Education
CSI	- Church of South India
CVS	- Cardio Vascular System
Dept.	- Department
D Pharm	- Diploma in Pharmacy
EDU	- Essential Drug Use
EMs	- Essential Medicines

ENT	- Ear, Nose, Throat
GIT	- Gastro Intestinal Tract
Govt.	- Government
GPP	- Good Pharmacy Practice
IAP	- Indian Academy of Pediatrics
ICMR	- Indian Council of Medical Research
IEC	- Institutional Human Ethics Committee
MOU	- Memorandum Of Understanding
NEML	- National Essential Medicine List
NSAIDs	- Non Steroidal Anti-Inflammatory Drugs
OBG	- Obstetrics and Gynecology
Pharm D	- Doctor of Pharmacy
PMBJPK	- Pradhan Mantri Bhartiya Jan Aushadhi Pariyojana Kendras
RNTCP	- Revised National Tuberculosis Control Program
WHO	- World Health Organizatio.

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