VI. Rational Use of Medicines

RATIONAL USE OF MEDICINES

Most leading causes of death, disease and disability in developing countries can be prevented, treated, or at least alleviated with cost effective essential medicines. Despite this fact, millions of people are deprived of access to essential medicines. Many of those who do have access, are given the wrong treatment, receive too little or too much medicine for their illness, or do not use the medicine correctly, adding to the problem of irrational use of medicines.

Rational use of medicines is essential in today's situation, especially in a country like India, where there is a wide disparity in the availability of medicines amongst cities and villages.

The concept of the rational use of medicines has not yet penetrated the minds of health care providers and the public, and as a result there is rampant irrationality in both the medicines available, as well as the medicines prescribed.

This module, attempts to explain to pharmacists, the various aspects related to essential medicines, their rational use, their irrational use, and the role of the pharmacist

AIM OF THIS MODULE:
To lay down guidelines for pharmacists to promote rational use of medicines.

OBJECTIVES:
By the end of this module, pharmacists will be able to understand

- The essential medicines list and its importance.
- The concept of the rational use of medicines.
- The adverse impact of, and factors influencing the irrational use of medicines.
- The concept of Fixed Dose Combinations (FDCs).
- The role of the pharmacist in promoting the rational use of medicines
- The importance of patient education.

To make the module easy to understand, it has been divided into the following sections :-

1. Essential Medicines
1.1 The essential medicines concept
1.2 The WHO Model List of essential medicines
1.3 The importance and advantages of the essential medicines concept.

2. Rational Use of Medicines
2.1 The rational use of medicines concept
2.2 Irrational use of medicines
   - Examples of irrational use of medicines
   - Banned medicines
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- Medicines of doubtful efficacy
- Adverse impact of the irrational use of medicines
- How the pharmacist may be promoting irrational use of medicines.

3. Fixed Dose Combinations
3.1 Rationale for combination therapy
3.2 Advantages of Fixed Dose Combinations
3.3 Disadvantages of Fixed Dose Combinations
3.4 Rational combinations recommended by WHO

4. Role of the Pharmacist

1. ESSENTIAL MEDICINES:

1.1 The Essential Medicines concept:
"Selecting a limited range of medicines to improve access to health care and quality of health care'.
The implementation of the concept of essential medicines is intended to be flexible and adaptable to many different situations.

Essential medicines are those that satisfy the priority health care needs of the population. Careful selection of a limited range of essential medicines results in:
- A higher quality of care,
- Better management of medicines (including improved quality of prescribed medicines)
- More cost effective use of available health resources.
- Better inventory management.

1.2 The WHO Model List of Essential Medicines:
The WHO Model List of Essential Medicines is a useful reference, derived from the consensus of recognized international experts and updated every two to four years. The medicines that appear on this list are recognized as safe, efficacious and cost effective.
This list contains medicines that have been studied carefully to gauge their effectiveness in treating specific conditions, and comparing the value (effect or cure) they provide, in relation to their cost.
The essential medicines concept (then known as the Essential Drugs Concept) was defined in 1975, and followed up in 1977, with the first WHO Model List of Essential Medicines. The Model List has formed a key component of the information required by countries, in relation to their medicine procurement and supply programmes.
(*The WHO Model List of Essential Medicines has been provided in Annexure II)

The National List of Essential Medicines - (INDIA):
The Ministry of Health and Family Welfare, Government of India came up with a National List of Essential Medicines in 2003. The list includes 392 medicines in 27 different categories. Unfortunately in India this list has so far not been strictly followed, as a result of which thousands of drugs and FDCs continue to be manufactured and marketed. The rationality of many of these continues to be
doubtful, and the consequence is that the people continue to consume irrational drugs and drugs of doubtful efficacy. On the other hand, some medicines listed on the Essential Medicines List are not easily available in our country.

1.3 The importance and advantages of the essential medicines concept

A list of essential medicines is an immensely useful tool for:

1) Policy making.
2) Selection, procurement, distribution and quality assurance.
3) For financing.
4) For promoting rational use:
   - When a limited list of essential medicines represents the physician's consensus on the treatment of first choice, the quality of care improves.
   - Irrational treatments are avoided.
   - Physicians become familiar with a smaller number of medicines - thus promoting rational drug use.
5) For training health professionals: A selected list of essential medicines can form the basis for training health professionals in the proper use of medicines.
6) For providing information and imparting education relating to medicines: Patient education and efforts to promote proper use of medicines by patients are enhanced when centered on specific medicines.

Advantages of having an Essential Medicines Concept to a pharmacy:

- Fewer number of medicines, leading to a fewer number of brands that need to be stocked.
- Better inventory control.
- Easier to remember names because of a fewer number of medicines.
- Less confusion in brands because of a fixed number of medicines.
- Fewer drug interactions and adverse drug reactions.
- If there are fewer medicines, pharmacists can remember more information about each medicine, rather than remembering bits of information for all the medicines in the market.

2. RATIONAL USE OF MEDICINES

2.1 The concept of the rational use of medicines

The aim of any medicine management system is to deliver the right medicine to the patient who needs the medicine. The steps of selection, procurement, and distribution are necessary precursors to the rational use of medicines.
The Conference of Experts on the Rational Use of Drugs, convened by the World Health Organization (WHO) in Nairobi in 1985, defined rational use as follows:

“The rational use of drugs requires that patients receive medications 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.”

The requirements of the rational use of medicines can be fulfilled only if the process of both prescribing and dispensing is appropriately followed. This includes steps concerned with proper diagnosis, correct prescribing, dispensing, and giving proper information to the patient. In this module, we shall focus on the role of a pharmacist in promoting the rational use of medicines.

2.2 Irrational use of medicines

The irrational use of medicines includes cases in which

- A medicine is prescribed where none was needed.
- Medicines are not prescribed according to Standard Treatment Guidelines (STGs), or ineffective or unsafe medicines are prescribed.
- Effective and available medicines are underused.
- Medicines are used incorrectly.

The irrational use of medicines has an adverse impact on the outcome of therapy and cost, and may cause adverse reactions or negative psychosocial impacts.

Examples of the irrational use of medicines

Prescribing patterns, unfortunately, do not always conform to fixed criteria, and hence can be classified as inappropriate or irrational. Common patterns of irrational prescribing, may, therefore be manifested in the following ways.

A. The medicine is a rational one, but:

1. **It was used even though it was not needed**

   Example:
   - Unnecessary prescribing of antibiotics for viral colds and coughs, and viral diarrheas. (Such viral infections cannot be cured by antibiotics since antibiotics are antibacterial, and do not work against viruses).
   - Use of injections to give placebo effect to patient, or where oral medicines would have been sufficient.

2. **Medicines not prescribed according to Standard Treatment Guidelines (STGs)**

   Physicians often do not prescribe in accordance to STGs.

   Example:
   - Use of a higher generation of antibiotics, e.g. cefotaxime, cefuroxime, where narrow spectrum antibiotics would have done the job.
3. **Under use of available effective medicines**
   Failure to provide available, safe, and effective medicines
   Example -
   - Failure to prescribe, or insufficient information about ORS for acute diarrhea.
   - Prescribing antibiotics for less than the required duration.

4. **Incorrect use of medicines**
   The use of correct medicines with incorrect administration, dosages, and duration
   Example:
   - Patients are given the wrong dose (either under dose or overdose)
   - Patients are not given proper instructions, and may swallow a chewable tablet.

B. **Use of Irrational Medicines**

1. **Ineffective medicines and medicines with doubtful efficacy.**

Excessive and unnecessary use of multivitamin preparations or tonics is an example of this prescribing pattern.

2. **Unsafe Medicines.**

The likelihood of adverse reactions outweighs the therapeutic effects when unsafe medicines are prescribed.

<table>
<thead>
<tr>
<th>Common examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>The use of anabolic steroids for growth and appetite stimulation in children or athletes.</td>
</tr>
<tr>
<td>In many countries, dipyrrone (metamizol), analgin, a drug banned in most developed countries, is used indiscriminately in both health facilities and the community for several minor ailments.</td>
</tr>
</tbody>
</table>

**When are medicines banned?**

- When side effects are unacceptable, and safer alternatives are available [for example Analgin (blood disorders) and Rofecoxib (Cardiovascular disease)].
- When superior medicines with fewer side effects are available (metformin v/s phenformin).
- When side effects are more dangerous than the disease e.g. furazolidone and nitrofurazone (can cause cancer).

The use of these medicines should be discouraged.
VI. Rational Use of Medicines

The following table lists drugs that have been discarded internationally, but are still allowed to be marketed in India.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Indication</th>
<th>Reason for ban</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Analgin</td>
<td>Analgesic</td>
<td>Can cause bone marrow depression</td>
</tr>
<tr>
<td>2. Cisapride</td>
<td>Acidity, GERD, constipation</td>
<td>Can cause irregular heart beats (arrhythmias)</td>
</tr>
<tr>
<td>3. Furazolidone</td>
<td>Anti diarrhoeal</td>
<td>Carcinogenic</td>
</tr>
<tr>
<td>4. Nimesulide</td>
<td>Pain killer, fever</td>
<td>Hepatotoxic</td>
</tr>
<tr>
<td>5. Piperazine</td>
<td>Anthelmentic</td>
<td>Can cause nerve damage</td>
</tr>
<tr>
<td>6. Phenylpropanolamine</td>
<td>Cough and cold</td>
<td>High doses can lead to stroke</td>
</tr>
<tr>
<td>7. Nitrofurazone</td>
<td>Antibacterial cream</td>
<td>Carcinogenic</td>
</tr>
</tbody>
</table>

The pharmacist can play an important role in preventing the misuse of these drugs, which if used, could have disastrous consequences.

Medicines of doubtful efficacy

These are medicines with little or no therapeutic value and no clinically proven evidence is available about their use.

Examples

- Appetite stimulants (Cyproheptadine and Buclizine HCl) should not be used in children. Overdosage may produce hallucinations, CNS depression, convulsions and even death.
- Digestants (given to boost digestion) contain concentrations of amylase, papain, pepsin or pancreatin, which are inadequate, and are generally not suitable in an acidic medium.

The pharmacist can play a vital role in preventing the circulation of these medicines, and thus reducing the exposure of the patient to dangerous medication. He can play a key role in providing the patient with only those medicines that have proven therapeutic efficacy.

Adverse impact of irrational use of medicines

The inappropriate use of medicines on a wide scale can have significant serious effects on health care costs as well as on the quality of drug therapy and medical care. Other negative effects are, increased likelihood of adverse reactions, and a patient's inappropriate dependence on medicines.

Impact on quality of drug therapy and medical care

- Inappropriate prescribing practices can, directly or indirectly, jeopardize the quality of patient care.
and negatively influence the outcome of treatment.

- The under use of ORS for acute diarrhoea, for example, can hinder the goal of treatment: - to prevent or treat dehydration, and thus prevent death in children.
- The likelihood of Adverse Drug Reactions increases when medicines are prescribed irrationally. Misuse of injectable products, for example, has been implicated in a high incidence of anaphylactic shock.
- Over dosage or under dosage of antibiotics and chemotherapeutic agents also leads to the rapid emergence of resistant strains of bacteria or the malaria parasite.

**Impact on cost**

- Overuse of medicines, even essential ones, leads to excessive expenditure on pharmaceuticals, and waste of financial resources, by both patients and the health care system.
- In many countries, expenditures on nonessential pharmaceutical products, such as multivitamins or cough mixtures, drain limited financial resources that could otherwise be allocated for more essential and vital medicines and related products, such as vaccines or antibiotics.
- Inappropriate under use of medicines during the early stages of a disease may also produce excess costs by increasing the probability of prolonged therapy and eventual hospitalization.

**Psychological Impact**

- Over prescribing communicates to patients that they need medication for all conditions, even trivial ones.
- The concept that there is a pill for every ill is harmful.
- Patients begin relying on medicines, and this reliance increases demand.
- Patients may demand unnecessary injections because during their years of exposure to modern health services they may have become accustomed to having practitioners administer injections.

**How a Pharmacist may be promoting irrational use of medicines:** -

- By recommending prescription medicines on his own even though the law does not permit it.
- When recommending OTC medicines, he may recommend/provide:
  - Irrational medicines and combinations.
  - Inappropriate dosage.
  - Improper medicine for a particular condition.
  - Insufficient or inappropriate information about the medicine/s, dosages, timings, etc, leading to improper dosing by the patient.
- By being tempted to stock and push/recommend medicines that are costly, or those which offer better schemes/profit margins, but compromise on genuine need and rationality.
- By following/copying prescribing patterns similar to those of physicians.
- By passing on misleading information from pharmaceutical companies/medical representatives to clients.
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**Forces promoting irrational use of medicines**

- Patients
  - Drug misinformation.
  - Misleading beliefs.
  - Patient demands/expectations.

- Prescribers
  - Lack of education and training.
  - Inappropriate role models.
  - Lack of objective drug information.
  - Generalization of limited experience.
  - Misleading beliefs about drug efficacy.
  - Marketing pressures and lucrative offers.

- Work place
  - Heavy patient load.
  - Pressure to prescribe.
  - Insufficient staffing.

- Drug supply system
  - Unreliable suppliers.
  - Medicine shortages.
  - Supplying expired medicines.
  - Supplying irrational medicines.

- Drug regulation
  - Availability of non-essential medicines.
  - Presence of non-formal prescribers (Quacks).
  - Lack of regulation enforcement.
  - Sluggish judiciary.

- Industry
  - Promotional activities (through advertisements or medical representatives)
  - Misleading claims.

**Developing a strategy for pharmacists to promote rational use of medicines:**

Pharmacists need to motivate themselves to promote rational use of medicines. They should make an effort to:

1. Acquire knowledge about *Essential medicines* and rational use.
2. Prepare a list of rational OTC medicines.
3. Recommend only these medicines to their clients.
4. If clients ask for irrational OTC medicines, try to explain to them why they should not use those...
particular medicines. They should recommend rational ones.

5. The rational medicine recommended must be used correctly, and its misuse should be avoided. Pharmacists should talk to the client about the medicine, and its proper use and advise against misuse.

6. Starting with their clients, pharmacists must try to educate the public about the rational use of medicines through leaflets, pamphlets and poster displays in the pharmacy.

3. FIXED DOSE COMBINATIONS (FDC)

Fixed-Dose Combinations (FDCs) are combinations of two or more active drugs formulated as a single formulation. If combined rationally, they provide the advantages of combination therapy while reducing the number of prescriptions and the associated costs. If combined irrationally, they may have adverse effects or improper dosing, and also lead to increased cost.

3.1 Rationale for Combination Therapy

All drugs have unwanted side effects in addition to the desired therapeutic effect. The idea of combining two or more drugs with complimentary modes of action is to produce additivity of the desired therapeutic effect but not of the side effects.

For example, consider the combination co-trimoxazole (trimethoprim + sulfamethoxazole). The 2 FDC drugs in this, block 2 consecutive steps in biosynthesis of essential nucleic acids and proteins in bacteria, thus killing bacteria more effectively than each drug could have done independently.

3.2 Advantages of Fixed Dose Combinations

- Combination medicines have the advantages of combination therapy as well as advantages related to reducing the number of pills to be taken.
- Reduced administration costs stem from simplified packaging, fewer prescriptions, and lesser dispensing time and cost.
- Reducing the number of pills diminishes the complexity of the regimen, so that improved patient adherence is expected with FDCs.
- FDCs can improve compliance in the treatment of chronic infectious disease, where partial adherence can lead to the development of drug-resistant strains, treatment failure and a threat to public health. An example of this is the treatment of TB and HIV.
- The side effects of one medicine can be reduced by combining it with another medicine in a FDC. (e.g. carbidopa reduces the side effects of levodopa)
- The efficacy of one medicine can be synergistically increased, by combining it with another. (Some examples of this are the combination of estrogen and progesterone in oral contraceptives; the combination of sulfamethoxazole and trimethoprim; pyrimethamine and sulfadoxine for the treatment and prophylaxis of falciparum malaria).
3.3 **Disadvantages of Fixed Dose Combinations:**

- Flexibility of dosage (titration of dose of medicine/s to suit individual patients) is not possible with fixed combinations (e.g. FDC of 10mg Atorvastatin + 5mg Amlodipine)
- Fixed drug combinations increase the price of the medication if unnecessary drugs are included. (for example, FDC of Ibuprofen + Paracetamol + Caffeine)
- One of the drugs in the combination may be superfluous or wasteful. (for example, the Combination of vitamins with iron.)
- Most combinations do not have a sound rationale, (for example, the FDC of more than one analgesic).
- With combination medicines, the incidence of adverse effects increases, (for example, the FDC of more than one NSAID).
- In FDCs, there is always a chance that individual medicines may not be present in adequate amounts, (for example, multivitamins).
- Incompatible pharmacodynamics (FDC of antihistaminic with an antidiarrheal is dangerous. The antihistaminic action may mask other symptoms and make accurate diagnosis and treatment difficult)
- The physician's and the pharmacist's ignorance of contents and composition of formulation can cause serious problems.
- It is difficult to identify/pinpoint which medicine in the FDC has caused an adverse effect.

3.4 **Rational combinations recommended by WHO**

The W.H.O. through its Essential List recommends only the following FDCs:

- Amoxicillin + Clavulanic acid
- Artemether + Lumefantrine
- Benzoic acid + Salicylic acid (external use)
- Carbidopa + Levodopa
- Ethinylestradiol + Levonorgestrel
- Ethinylestradiol + Norethisterone
- Ferrous salt + Folic acid
- Imipenem + cilastatin
- Iopinavir + Ritonavir
- Isoniazid + Rifampicin
- Isoniazid + Ethambutol
- Isoniazid + Thioacetazone
- Lidocaine + Epinephrine
- Neomycin + Bacitracin (external use)
- Rifampicin + Isoniazid + Pyrazinamide
Surprisingly, even in the presence of regulatory guidelines and the WHO model list of essential medicines (which recommends only the above FDCs), hundreds of other FDCs are being used widely in our country.

The most widely prescribed FDCs that do not have a rational basis are mostly analgesics, multivitamin combinations, and cold and cough mixtures!!

Some examples of Irrational Fixed Drug Combinations available in today's market
- Combination of antibacterials and antiamoebics.
- Multivitamin preparations.
- Painkillers often combined with caffeine.
- Tonics containing incorrect proportions of vitamins and minerals.
- FDCs of Nimesulide with other drugs.
- Cough suppressants and expectorants in the same cough mixtures.

4. THE ROLE OF THE PHARMACIST

The Pharmacist's role in promoting rational use of medicines:

Although all health care providers and the public are involved in the rational use of medicines, the WHO has recommended a special role for pharmacists, particularly in Quality Assurance and in the safe and effective administration of medicines. Pharmacists are in a strong position to promote the rational use of medicines because of their extensive knowledge of medicines and good communication skills.

Pharmacists, particularly those in community pharmacies, play a key role in instructing patients in the correct use of medicines.

Pharmacists have the following important role to play in promoting rational use of medicines.

A. Medicine procurement:
The selection and range of medicines to be recommended by the pharmacist to clients can be based on the essential medicines concept. The escalating cost of medicines is a major problem in India. Pharmacists should recommend affordable and quality medicines.
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- Procure the most cost effective medicines in right quantities.
- Select reliable suppliers of high quality products.
- Ensure timely delivery.
- Achieve lowest possible total cost.

B. Inventory control:
Pharmacies should maintain adequate stocks of essential medicines (including those that are not often required, but are critical and life saving) and minimize 'out of stock' situations by adopting good inventory control measures.

C. Information and Education (Health Care Providers) :
The pharmacist should interact with other healthcare providers and promote rational medicines in spite of pressure to do so otherwise from both patients and company representatives. They must also inform clients about policy changes, specific warnings/ banning of medicines, non-availability of medicines, and medicine related problems. Any adverse drug reactions noted should be reported to appropriate monitoring (Pharmacovigilance) centers in the region or in the country.

D. Public education:
Patient or consumer education plays an important role in promoting rational use of medicines. The pharmacist can play a key role in patient education to promote the rational use of medicines. Inappropriate prescribing patterns may arise from the demands or misconceptions of patients, although these demands are often exaggerated by prescribers to justify their prescribing habits.

The vicious cycle which leads to misuse of drugs
**VI. Rational Use of Medicines**

One way to educate patients about the rational use of medicines is through individual communication during contact between the physician and the patient. This communication, however, cannot take place very often because of time limitations and heavy patient loads. The average patient contact time is often only one to three minutes which is too short for effective communication. Another reason may be the physician's unwillingness to communicate with patients or a lack of skill or interest in doing so. Physicians are often not adequately trained in patient communication, or are not sensitive to its importance.

Pharmacists are in a better position to talk to patients, because of the relatively friendly environment of the pharmacy, and because of their easy accessibility. Pharmacists can use their knowledge and communication skills effectively to enhance responses to therapy prescribed. Patient compliance is an important factor in the rational use of medicines, and pharmacists can influence the patient's decision to adhere to the dosage prescribed.

The need for public education about appropriate use of medicines:

The knowledge, attitude, and education of the public in relation to disease, etiology and treatment are critical determinants in the decision:

- To seek health care
- Affecting the choice of healthcare provider
- Related to the use of medicines
- Related to the success of the treatment.

The patient is the one who initially decides whether he/she wants to consult a health care professional (physician/pharmacist). The patient also chooses the person he/she wants to consult, i.e., whether to first speak to a pharmacist or to a doctor, and choose between the alternatives available of so many pharmacies and doctors. If medicines are recommended or prescribed, the decision of taking them or not, or of complying with the therapy or not, is ultimately made by the patient. Family, close friends and the community may, however, influence this decision.

The public needs to be educated about

- Essential medicines.
- Rational medicines and selecting OTC medicines.
- Irrational medicines and Fixed dose combinations.
- Minimal/ optimal use of medicines.
- Advertisements: Not to be misled by them or believe them fully.

**Information to be given to the patient seeking OTC medicine:**

- Select single ingredient medicines.
- Do not select irrational medicines or Fixed dose combinations
- Do not select medicines of doubtful efficacy.
- Do not select toxic medicines when simpler, less toxic options are available.
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Providing information is much easier than changing behavior.

Public education provides individuals and communities with information that enables them to use medicines in an appropriate, safe, and judicious way. Inappropriate use of medicines has serious health and economic consequences for both individuals and the community. Counselling by pharmacists not only creates awareness but also decreases health care costs.

The Role of the Pharmacist:

The pharmacist can perform the following functions:

- Educate the community about rational medicines, hazardous and useless medicines, and alternative remedies, using patient information leaflets, posters, slide shows, public meetings, articles and letters in the local newspapers, publication in local languages, etc.
- Form an action committee of concerned groups and individuals to create awareness of the situation, and bring about change.
- Encourage local health workers to recommend medicines only when necessary, & to suggest appropriate home remedies for trivial complaints.
- Help facilitate monitoring of continued sales of banned medicines.
- Introduce local doctors and health workers to sources of unbiased, up to date information, so they are not solely reliant on the sales literature and commercial prescribing guides of pharmaceutical companies.
- Do a drug utilization study in your area to find out how medicines are being misused or overused, how much people are spending on irrational medicines, whether they are using hazardous medicines, whether health workers have up-to-date medicine information from unbiased sources, how many medicines are sold over the counter, and how many by prescription only, etc. Results of such studies can be publicized to create awareness and improve the situation.
- Study the commercial prescribing guides, sales literature of the pharmaceutical companies and the labels/package inserts of medicines. Compare this information with standard textbooks. Look particularly for contradictions and side effects.
- Study the contents of popular brands of OTC medicines. Find out whether they contain any irrational or hazardous medicines, and whether the active ingredients are appropriate and included in sufficient amounts to be useful.
- Educate the community about the irrationality of certain medicines.
- Ensure that anyone who has been prescribed antibiotics or put on long-term treatment, as for TB or leprosy, is told to take his/her medicine regularly and for the required length of time to avoid emergence of drug resistance.
What the pharmacist would have learnt from this module

It is estimated worldwide that over half of all medicines are prescribed, dispensed or sold inappropriately, and that half of all patients fail to take their medicines correctly.

- Medicines of assured quality for which strong evidence of efficacy and safety exists should be available at all times, in sufficient quantity, at affordable prices and with adequate information for physicians and patients.
- The pharmacist plays a vital role in the rational use of medicines. He should discourage use of irrational, unsafe, banned medicines and medicines of doubtful efficacy.
- Only a few FDCs have proven to be advantageous, not only in reducing the associated costs but also in providing the advantage of synergistic action. Most others are of doubtful rationality.
- The pharmacist is in a strong position to promote the rational use of medicines through optimum medicine procurement, inventory control, dispensing, patient information, and recommendation of rational OTC medicines.
- The pharmacist also plays a major role in the education of health care providers and the public.

In spite of available tools and information about how to measure medicine use, and the intervention strategies needed to achieve this, irrational use continues to occur. This is wasteful, expensive and dangerous, both to the health of the patient and to the population as a whole. Actions or intervention programs should, therefore, be continuously implemented and systematically incorporated as an integral part of the health care system to promote the rational use of medicines and to prevent misuse.

Further reading :-

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4) Banned and Bannable Drugs Unbiased Drug Information Essential Drugs and Rational Drug Policy 5th Revised Edition Dr. Mira Shiva and Dr. Wishvas Rane VHAI (Voluntary Health Association of India), New Delhi, India.
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11) A Decade After Hathi Committee, Edited by Dr. B. Ekbal, Kerala Sastra Sahitya Parishad, India.
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