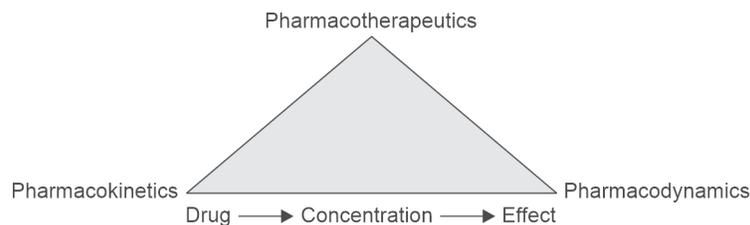


Pharmacotherapeutics

INTRODUCTION

Pharmacotherapeutics is the application of knowledge of drugs and diseases to prevent, treat, and diagnose the disease as well as alter normal functions (such as preventing pregnancy). Pharmacotherapeutics links pharmacokinetics and pharmacodynamics with the microbiologic or biochemical aspects of the disease.



The healthcare provider must determine what the expected outcome will be when he/she decides to administer drugs to patients. Thus, if an antibiotic is prescribed, a decrease in infection is the expected outcome. To determine the effectiveness of a drug, the outcome should be measurable in some way: by observation (reduced inflammation), patient reports (less discomfort), and/or assessment (decreased WBC count).

Even if two patients may have the same diagnosis, it does not mean that the same treatment or medication is indicated. When assessing a patient's need for medications and deciding on the optimum treatment for the patient, the healthcare provider must consider many issues:

- The condition for which the patient is to be treated.
- The patient's current drugs (including prescribed, OTC medications, and illicit drugs).
- Possible drug interactions that may occur.
- Contraindications.
- Patient's mental state and ability to comply with directions.
- The need for follow-up testing (such as periodic blood tests).
- The costs of the drug and whether or not the patient is covered by insurance.
- Patient's social history (homeless status, presence or absence of support system, access to transportation or other services).
- Whether patient is pregnant or breastfeeding.

- Route of administration (oral, rectal, parenteral).
- Absorption, distribution, metabolism, and excretion of the drug.
- Side effects of drugs.
- Present medical conditions that may have an impact on drug activity (such as kidney or liver disease).

Based on the assessment of the patient, the following pharmacotherapeutic steps are recommended:

1. Determine the patient's problem for which treatment is indicated.
2. Describe the treatment goal.
3. Select the appropriate treatment based on current practice and evidence-based research.
4. Verify that the chosen treatment is appropriate.
5. Start treatment.
6. Provide information to the patient and caregivers about the drug along with instructions for use and precautions.
7. Conduct regular monitoring and continue, modify, or discontinue treatment.

Scope and Objectives

Pharmacotherapeutics covers different types of therapy, some of which may overlap:

Acute therapy: This type of therapy is used to treat acute, sudden, and/or critical illnesses, like pneumonia or cancer. Acute therapy usually has to be started immediately, if the patient is to improve or recover. Treatment is usually more intense involving multiple drugs and regular monitoring. Examples of acute therapy are epinephrine for anaphylaxis and chemotherapy for cancer.

Chronic/long-term/maintenance: This type of therapy is used for maintenance and to prevent a patient's condition from getting worse or to control symptoms, but is not generally expected to cure the patient. Patients with chronic diseases like diabetes (insulin), bipolar disorder (lithium), and heart disease (diuretics, beta-blockers), may need to take drugs for a long time and often for the rest of their lives. Maintenance therapy can also be used to replace other drugs, such as long-term treatment with methadone to reduce heroin use. Long-term therapy may be required for non-illness-related reasons, such as oral contraceptives to prevent pregnancy and hormone therapy for transgender individuals.

Replacement therapy: This type of therapy is used to replace something that is missing in the body and is often critical, such as insulin. Some replacement therapy is required to be taken throughout the patient's life, but others, such as hormone replacement therapy may be used for months or years to relieve symptoms. Replacement therapy such as vitamin D replacement therapy and iron for iron deficiency anaemia may be used to treat deficiencies of vitamins and minerals.

Palliative therapy: This type of therapy is intended to give comfort rather than cure. Palliative therapy is generally used in the later stages of diseases such as cancer and heart disease. Palliative therapies include:

- Analgesics like ibuprofen and opioids are used to reduce pain and dyspnoea.
- Anti-emetics like metoclopramide are used to treat nausea and vomiting.
- Benzodiazepines like diazepam and lorazepam are used to relieve anxiety.

- Stool softeners like docusate sodium to alleviate constipation
- Antidepressants like amitriptyline and fluoxetine are used to relieve depression.
- Antidiarrhoeals like loperamide to treat diarrhoea.
- Steroids like dexamethasone to treat anorexia and fatigue.
- Antimuscarinic agents like hyoscine butyl bromide are used to decrease respiratory secretions.

Supportive therapy: This type of therapy is used to maintain bodily functions as the patient recovers from disease or injury. This may include the administration of packed red blood cells to a patient with blood loss, electrolytes to provide the energy needed for many body functions, and IV fluids for dehydration.

Prophylactic therapy: This therapy is intended to prevent disease rather than treat disease. Prophylaxis may include the administration of antibiotics before surgery, a rabies injection after exposure to a potentially rabid animal, routine immunizations, and antiretroviral therapy after exposure to HIV.

Empiric therapy: This therapy is based on the probability that a disease exists in the absence of confirming data. For example, if a patient exhibits symptoms of an MRSA or *Clostridium difficile* infection, treatment may be initiated before the culture and sensitivities can confirm the diagnosis. When patients are in critical condition and no diagnosis has been made, empiric therapy is usually administered based on their symptoms.

Rational Use of Medicines

According to WHO, rational use of medicines is defined as 'patients receive medications appropriate to their clinical needs, in doses that meet their requirements, for an adequate duration of time, and at the lowest cost to them and their community'. Irrational use of medicines is a problem all over the world. According to the estimates of the WHO, more than 50% of available medicines are used inappropriately (prescribed, dispensed, or sold). Also, 50% of the patients fail to take them in the prescribed manner. This leads to improper use of the resources that are available to humankind.

The following factors contribute to the need for rational use of medicines:

1. *Drug explosion:* As the number of medicines available for a particular indication increases, choosing the right drug becomes difficult.
2. *Prevention of development of resistance:* Irrational use of medicine may lead to the development of resistance to highly effective medicines.
3. *Growing consumer awareness:* With the rapid spread of technology, information about drug development, its uses, and side effects can be obtained from anywhere in the world and is available at the fingertips of consumers.
4. *Higher treatment costs:* The rational use of medicine can reduce the economic burden on both the public and the government.
5. *Consumer Protection Act (CPA):* The extension of CPA in the medical profession may limit the irrational use of medicines.

Common examples of irrational medicine use are:

- The use of too many medicines per patient (polypharmacy).
- Inappropriate use of antimicrobials, often in lower dosage, for non-bacterial infections.

- Overuse of injections when oral formulations would be more appropriate.
- Failure to prescribe according to the clinical guidelines,
- Inappropriate self-medication, often for medicines that are to be taken by prescription only.

Reasons for irrational use of medicines are:

- Lack of information
- Faulty and inadequate training and education of physicians
- Poor communication between health professionals and patients
- Uncertainty of diagnosis
- Patients' requests
- The defective drug supply system and ineffective drug regulation
- Promotional activities of pharmaceuticals.

Irrational use of medicine may lead to:

- Adverse effects due to antibiotic misuse or inappropriate use of drugs
- Limited efficacy of treatment regimen
- Antibiotic resistance due to overuse as well as under-therapeutic dosage
- Drug dependence
- Risk of infections due to improper use of injections
- Waste of resources leading to medicine stock-outs and increased treatment costs
- Exacerbation or prolongation of illness
- Distress and harm to the patient leading to loss of patient confidence in the health system.

The WHO has developed a 12-point strategy for promoting rational drug use. It consists of the following points:

- Constituting a national body with representatives from various healthcare departments to coordinate policies on medicine use
- Preparing and using the national essential medicine list
- Using clinical guidelines
- Establishing drug and therapeutics committees at local hospitals
- Supervising, auditing, and responding appropriately
- Proper in-service training in medical education
- Pharmacotherapy training to undergraduates
- Independent information on the use of medicines
- Public awareness about medicines
- Avoiding improper financial incentives
- Enforcing appropriate regulations
- Adequate government expenditure for making staff and medicines available

Evidence-based Medicine

Evidence-based medicine (EBM) is the conscientious, explicit, judicious and reasonable use of modern, best evidence in making decisions about the care of individual patients. EBM combines clinical experience and patient values with the best available research information. It is a movement aimed at increasing the use of high-quality clinical research in clinical decision making. EBM requires new skills of the clinician, including

efficient literature-searching, and the application of formal rules of evidence in evaluating the clinical literature. The practice of evidence-based medicine is a process of lifelong, self-directed, problem-based learning in which caring for one's own patients necessitates the need for clinically important information about diagnosis, prognosis, therapy and other clinical and health care issues. It is not a recipe book, but its good application leads to more cost-effective and better health care. The main difference between evidence-based medicine and traditional medicine is not that EBM considers the evidence while traditional medicine does not. Both consider evidence; however, EBM requires more evidence than has traditionally been used. The development of systematic reviews and the methods by which researchers identify multiple studies on a topic, separate the best ones and then critically analyse them to come up with a summary of the best available evidence is one of the greatest achievements of evidence-based medicine.

The EBM-oriented clinicians of tomorrow have three responsibilities:

- a. Using evidence summaries in clinical practice;
- b. Developing and updating selected systematic reviews or evidence-based guidelines in their area of expertise; and
- c. Enrolling patients in studies of treatment, diagnosis and prognosis on which medical practice is based.

The concept of evidence-based medicine (EBM) caused great interest among health professionals over the last decade. According to definition evidence-based medicine is the integration of clinical expertise, patient's values and best available evidence in process of making patients' healthcare decisions. Medical knowledge grows every day, so that previously accepted facts quickly become old and it seems impossible to keep up with such an explosion of scientific information. Hence, there is a need for the doctors to keep step with the new achievements published in medical journals with their limited time, read selectively, make effective selection of what they read. Family medicine is a primary care medical specialty that provides ongoing and comprehensive health care to individuals and families of all ages, genders, diseases, and parts of the body. Family medicine means by its nature, is very complicated discipline which is featured among other things, high proportion of poorly differentiated problems overlapping with the biological, psychological and social factors.

EBM application means correlating individual clinical signs and individual clinical experience with the best scientific evidences obtained through the clinical research. The revised and improved definition of evidence-based medicine is a systematic approach to clinical problem solving that allows the integration of the best available research evidence with clinical expertise and patient values. Under the individual clinical noticing, it is thought that the ability, skill that doctors gained through years of clinical practice, and clinical experience is necessary and indispensable component of what makes a good doctor.

Instead of routinely reviewing the contents of dozens of journals for interesting articles, EBM suggests that you target your reading to issues related to specific patient problems. Developing clinical questions and then searching current databases may be a more efficient way of keeping up to date with the literature. Evidence-based medicine "transforms the abstract exercise of reading and evaluating the literature into the pragmatic process of using the literature to benefit individual patients while simultaneously expanding the clinician's knowledge base."

Need for EBM approach in making decisions in family medicine

The core of family medicine is doctor–patient relationship. One of the most important aspects of this relationship is the decision-making process, which can range from simple types of clinical decisions (e.g. the patient has a sore throat, larynx was red, but without suppuration—whether antibiotic should be prescribed?) to complex decisions (e.g. patient complains about frontal headache for two weeks—do you need to perform CT of the head?)

Steps for use of evidence oriented approach in family medicine

How will family medicine doctors begin to use evidence-based approach in their daily practice? Group for evidence-based medicine resource from McMaster University identified the approach in 5 steps that each individual physician must follow when using this approach.

- a. Problem definition,
- b. Search for desired sources of information,
- c. Critical evaluation of the information,
- d. Application of information of the patient,
- e. Efficacy evaluation of this application on a patient.

Step 1: Defining Problem

Every doctor is in the position to make various medical decisions several times in a day. Often in the course of medical decision-making, many questions occur such as: for and against the use of certain therapies, whether to use a diagnostic test or screening procedure, the risk or prognosis of a particular disease or cost-effectiveness of specific interventions. It is obvious that the already busy doctor, will not be able to answer in this way all the questions that arise in practice and thus must resort to the process of determining priorities, as well as refining issues that needs to be asked.

A clinician begins his/her search for the best and the most up-to-date data needed to solve specific patient's problem by formulating an answerable clinical question. Good clinical question must be clear, directly focused on the problem, and answerable by searching the medical literature.

a. PICO format

A good clinical question should include four essential components structured in the PICO (patient or problem, intervention, comparison, outcome) format.

PICO format:

- The patient or problem—who are the relevant patients, what kinds of problem are we trying to solve?
- The intervention—what is the management strategy, diagnostic test or exposure (drugs, diagnostic test, foods or surgical procedure)?
- Comparison of interventions—what is the control or alternative management strategy, test or exposure that we will compare?
- The outcome—what are the patient-relevant consequences of the exposure in which we are interested?

b. Type of clinical question

The most common type of clinical question concerns the treatment of a disease or condition. Such questions are questions about intervention.

Clinical questions can be classified into the following categories:

- Questions about intervention
- Questions about aetiology and risk factors
- Questions about frequency and rate
- Questions about diagnosis
- Questions about prognosis and prediction
- Questions about cost-effectiveness
- Question about phenomena

Step 2: Search for Desired Sources of Information

After formulating the clinical question based on a specific patient, the next step is to search for relevant evidence that will provide the answer to the question.

This is not always easy, especially in family medicine, in which the problems are often poorly defined problems at the outset. However, there are numerous sources of information that may be useful such as medical journals which treat certain problems in the field of family medicine, search of electronic databases and communication with colleagues.

The ideal information source is valid (contains high-quality data), relevant (clinically applicable), comprehensive (has data on all benefits and risks of all possible interventions), and is user-friendly (is quick and easy to access and use).

Step 3: Critical Evaluation of the Information

When deciding which magazine to read, we must read it thoroughly because not all the published information is of equal importance and value. The process of critical assessment of the articles involves careful reading and analysis of methodology, contents and conclusions. A key question to consider is, "Do I believe in the results enough to be willing to try a similar approach or achieve similar results with my patients?" Critical evaluation skills should be learned and practised just like any other clinical skill.

Step 4: Use of the Patient's Information

The fourth step in the process of implementing evidence-based medicine in practice is deciding how to apply acquired information on the special circumstances of each patient. This is a crucial step in the process. Now we need to decide whether there is anything in our patient's case that requires us to discard the acquired information.

The questions that we should ask before the decision to apply the results of the study are:

- a. Are the participants in the study similar enough to my patient?
- b. Is the treatment available and is health care system prepared to fund it?
- c. What alternatives are available?
- d. Do the potential side effects of the drug or procedure outweigh the benefits?
- e. Are the outcomes appropriate for the patient? Does the treatment conflict with the patient's values and expectations?

If something does not exist, it is necessary to weigh the potential risk from the benefit and do all that in partnership with the patient, where our decision in the end, in fact, will be shared.

Step 5: Efficacy Evaluation of EBM Application on a Patient

The final step is the assessment of evidence-based approach and efficiency of its application to a specific patient. During this process it is critical to assess whether certain evidence, which is applied to the patient, caused changes to better and that to the extent that it is confirmed by research. If the data differ significantly, it would be necessary to investigate why some patients did not respond to the changes introduced in the expected manner and what can be done to change it.

Main Guidelines

If possible, incorporate need assessment for preventive activities as well as counseling and education in acute visit.

Estimate patient's risk factors during visits and provide counseling and education for identified risks. All clinical visits, whether acute or chronic, provide an opportunity for preventive counseling and planned care for paediatric patients.

There are specific intervals when a healthy child should visit a doctor. For adolescents—twice in age between 13 and 18 years.

Specific guidelines for adolescents-screening

- Risk estimation
- Interval anamnesis
- Physical and mental development estimation
- Physical examination
- Blood pressure
- Pap test starts with age of 18 or since beginning of sexual activity within maximal intervals of 3 years)
- Specific guidelines for adolescents—additional screening for those under high risk
- Tuberculosis screening
- Lipid levels
- Examination of testicles
- Testing on sexually transmitted diseases

Specific guidelines for adolescents-counseling and education

- Good evidences to be included in practice:
 - Limited intake of saturated fats
 - Supplement with folic acid
 - Stop smoking
 - Problems of alcohol drinking
- Fairly good evidences to be included in practice:
 - Caloric and nutritional balance in nutrition
 - Physical activity
 - Drinking and driving

- Use of seat belts
- Prevention of unwanted pregnancy
- Protection from the ultraviolet (UV) radiation
- Dental and periodontal diseases

Practical applications

- Incorporate in each visit preventive activities.
- Conduct screening and additional screenings for those under increased risk.
- Involve counseling and education for which exist good or fair evidences.

Good doctors apply their clinical observation and experience, together with the best scientific evidence from medical literature. Without constant monitoring of new medical achievements treatment may become obsolete, and, in some cases harmful to the patients. EBM reduces the value of intuition, non-systematic clinical experience and pathophysiology as sufficient basis in making clinical decisions, and emphasizes the value of evidence obtained by clinical research. Today, patients and other health care users themselves search the internet and find information that often does not correspond to scientific knowledge, so determining the validity of evidence and new knowledge should be left to doctors.

EBM requires new knowledge from physicians, most notably access to medical databases, the ability to search medical literature and basic skills in the interpretation of epidemiological and statistical findings. This should be used, not only by doctors but also nurses, patients themselves and health institutions. The importance of EBM is becoming more widely recognized in our country. Each doctor should use scientific evidence in treating their patients rather than just clinical experience and intuition. Its real purpose is for the doctor to select the best possible solution for the patient based on the best available evidence, in order to provide with the best possible healthcare in every way. It is also used to avoid major mistakes during treatment, which improves the quality of health care provided to the patient. In a broader sense, it can save the lives of our patients. EBM requires new knowledge from the physician, which includes knowledge of English language and work on the computer, which allows access to medical databases, the ability to search medical literature and basic skills in the interpretation of epidemiological and statistical results. Since each physician must, in one way or another, seek valid information, we can say that the proper use of EBM saves doctors time and raises their level as well as the quality of provided medical services, and increases satisfaction of the health professionals.

ESSENTIAL MEDICINES

The Alma-Ata Declaration, adopted in 1978 at the International Conference on Primary Health Care, underlines that health is a fundamental human right and that achieving the best possible level of health is a major global societal goal. One of the eight fundamental components of primary health care specified in the Alma-Ata Declaration is the provision of essential medicines. Medicines are essential components of health care, and modern health care would be impossible to imagine without them. Medicines are without a doubt one of humanity's most powerful weapons in the fight against sickness and illness. Not only do they save lives and promote health, but they also help to prevent outbreaks and diseases. Having access to medicines is one of the fundamental rights of every person.

The Concept of Essential Medicines

In 1977, the World Health Organization (WHO) introduced the concept of essential medicines. Essential medicines, as defined by the World Health Organization (WHO), are those that meet the population's most important healthcare needs. They are selected based on efficacy, safety, and cost-effectiveness. Essential medicines should always be provided in adequate amounts, in the appropriate dosage forms, with assured quality and adequate information, and at a price that individuals and communities can afford within the framework of functioning health systems.

While the open pharmaceutical market is flooded with a vast number of medicines, many of which have questionable value, an essential drug list contains cost-effective and safe medicines.

The concept of essential medicines has been widely accepted as a powerful tool to promote health equity, and its impact is remarkable as essential medicines are one of the most cost-effective elements in health care.

The selection of essential medicines is based on several factors like efficacy, safety, public health relevance, and comparative cost-effectiveness of available treatments. Other elements that are taken into account include local demography and illness patterns, treatment facilities, available personnel's training and expertise, local availability of specific pharmaceutical goods, financial resources, and environmental concerns. When choosing drugs for the list, the generic name of the medicine is taken into account. Lists of essential medicines also guide the procurement and supply of medicines in the public sector.

WHO Model List of Essential Medicines—22nd List (2021)

The core list presents a list of minimum medicines required for a basic healthcare system and includes the most efficacious, safe, and cost-effective medicines for priority conditions (Table 1.1).

<i>Section</i>	<i>Therapeutic category</i>	<i>Total number of preparations</i>
1.	ANAESTHETICS, PREOPERATIVE MEDICINES AND MEDICAL GASES	
1.1	General anaesthetics and oxygen	
1.1.1	Inhalational medicines	4
1.1.2	Injectable medicines	3
1.2	Local anaesthetics	3
1.3	Preoperative medication and sedation for short-term procedures	3
1.4	Medical gases	1
2.	MEDICINES FOR PAIN AND PALLIATIVE CARE	
2.1	Non-opioids and non-steroidal anti-inflammatory medicines (NSAIDs)	3
2.2	Opioid analgesics	6
2.3	Medicines for other common symptoms in palliative care	19

Contd.

Table 1.1: WHO Model List of Essential Medicines—22nd List (2021) (Contd.)

<i>Section</i>	<i>Therapeutic category</i>	<i>Total number of preparations</i>
3.	ANTIALLERGENICS AND MEDICINES USED IN ANAPHYLAXIS	8
4.	ANTIDOTES AND OTHER SUBSTANCES USED IN POISONINGS	
4.1	Non-specific	1
4.2	Specific	14
5.	ANTICONVULSANTS/ANTIEPILEPTICS	10
6.	ANTI-INFECTIVE MEDICINES	
6.1	Anthelmintics	
6.1.1	Intestinal anthelmintics	7
6.1.2	Antifilarials	3
6.1.3	Antischistosomes and other antitrematode medicines	3
6.1.4	Cysticidal medicines	3
6.2	Antibacterials	
6.2.1	Access group antibiotics	20
6.2.2	Watch group antibiotics	14
6.2.3	Reserve group antibiotics	8
6.2.4	Antileprosy medicines	3
6.2.5	Antituberculosis medicines	28
6.3	Antifungal medicines	12
6.4	Antiviral medicines	
6.4.1	Antiherpes medicines	2
6.4.2	Antiretrovirals	
6.4.2.1	Nucleoside/Nucleotide reverse transcriptase inhibitors	4
6.4.2.2	Non-nucleoside reverse transcriptase inhibitors	2
6.4.2.3	Protease inhibitors	4
6.4.2.4	Integrase inhibitors	2
6.4.2.5	Fixed-dose combinations of antiretroviral medicines	6
6.4.2.6	Medicines for prevention of HIV-related opportunistic infections	1
6.4.3	Other antivirals	4
6.4.4	Antihepatitis medicines	
6.4.4.1	Medicines for hepatitis B	
6.4.4.1.1	Nucleoside/Nucleotide reverse transcriptase inhibitors	2

Contd.

Table 1.1: WHO Model List of Essential Medicines—22nd List (2021) (Contd.)

<i>Section</i>	<i>Therapeutic category</i>	<i>Total number of preparations</i>
6.4.4.2	Medicines for hepatitis C	
6.4.4.2.1	Pangenotypic direct-acting antiviral combinations	5
6.4.4.2.2	Non-pangenotypic direct-acting antiviral combinations	3
6.4.4.2.3	Other antivirals for hepatitis C	2
6.5	Antiprotozoal medicines	
6.5.1	Antiamoebic and anti giardiasis medicines	3
6.5.2	Antileishmaniasis medicines	4
6.5.3	Antimalarial medicines	
6.5.3.1	For curative treatment	14
6.5.3.2	For chemoprevention	6
6.5.4	Antipneumocystosis and antitoxoplasmosis medicines	3
6.5.5	Antitrypanosomal medicines	
6.5.5.1	African trypanosomiasis	7
6.5.5.2	American trypanosomiasis	2
6.6	Medicines for ectoparasitic infections	2
7.	ANTIMIGRAINE MEDICINES	
7.1	For treatment of acute attack	4
7.2	For prophylaxis	1
8.	IMMUNOMODULATORS AND ANTINEOPLASTICS	
8.1	Immunomodulators for non-malignant disease	
8.1	Antineoplastics and supportive medicines	8
8.2.1	Cytotoxic medicines	35
8.2.2	Targeted therapies	12
8.2.3	Immunomodulators	5
8.2.4	Hormones and antihormones	16
8.2.5	Supportive medicines	4
9.	ANTIPARKINSONISM MEDICINES	3
10.	MEDICINES AFFECTING THE BLOOD	
10.1	Antianaemia medicines	7
10.2	Medicines affecting coagulation	15
10.3	Other medicines for haemoglobinopathies	3

Contd.

Table 1.1: WHO Model List of Essential Medicines—22nd List (2021) (Contd.)

<i>Section</i>	<i>Therapeutic category</i>	<i>Total number of preparations</i>
11.	BLOOD PRODUCTS OF HUMAN ORIGIN AND PLASMA SUBSTITUTES	
11.1	Blood and blood components	4
11.2	Plasma-derived medicines	
11.2.1	Human immunoglobulins	4
11.2.2	Blood coagulation factors	2
11.3	Plasma substitutes	2
12.	CARDIOVASCULAR MEDICINES	
12.1	Antianginal medicines	6
12.2	Antiarrhythmic medicines	8
12.3	Antihypertensive medicines	26
12.4	Medicines used in heart failure	16
12.5	Antithrombotic medicines	
12.5.1	Anti-platelet medicines	2
12.5.2	Thrombolytic medicines	2
12.6	Lipid-lowering agents	5
13.	DERMATOLOGICAL MEDICINES (topical)	
13.1	Antifungal medicines	5
13.2	Anti-infective medicines	3
13.3	Anti-inflammatory and antipruritic medicines	5
13.4	Medicines affecting skin differentiation and proliferation	10
13.5	Scabicides and pediculicides	3
14.	DIAGNOSTIC AGENTS	4
14.1	Ophthalmic medicines	4
14.2	Radiocontrast media	5
15.	ANTISEPTICS AND DISINFECTANTS	
15.1	Antiseptics	5
15.2	Disinfectants	5
16.	DIURETICS	10
17.	GASTROINTESTINAL MEDICINES	
17.1	Antiulcer medicines	4
17.2	Antiemetic medicines	8
17.3	Anti-inflammatory medicines	4

Contd.

Table 1.1: WHO Model List of Essential Medicines—22nd List (2021) (Contd.)		
<i>Section</i>	<i>Therapeutic category</i>	<i>Total number of preparations</i>
17.4	Laxatives	2
17.5	Medicines used in diarrhoea	
17.5.1	Oral rehydration	1
17.5.2	Medicines for diarrhoea	1
18.	MEDICINES FOR ENDOCRINE DISORDERS	
18.1	Adrenal hormones and synthetic substitutes	2
18.2	Androgens	1
18.3	Estrogens	?
18.4	Progestogens	2
18.5	Medicines for diabetes	
18.5.1	Insulins	3
18.5.2	Oral hypoglycaemic agents	5
18.6	Medicines for hypoglycaemia	2
18.7	Thyroid hormones and antithyroid medicines	6
19.	IMMUNOLOGICALS	
19.1	Diagnostic agents	?
19.2	Sera, immunoglobulins and monoclonal antibodies	4
19.3	Vaccines	12 (for all?)
20.	MUSCLE RELAXANTS (PERIPHERALLY-ACTING) AND CHOLINESTERASE INHIBITORS	5
21.	OPHTHALMOLOGICAL PREPARATIONS	
21.1	Anti-infective agents	13
21.2	Anti-inflammatory agents	1
21.3	Local anaesthetics	1
21.4	Miotics and antiglaucoma medicines	5
21.5	Mydriatics	4
21.6	Anti-vascular endothelial growth factor (VEGF) preparations	1
22.	MEDICINES FOR REPRODUCTIVE HEALTH AND PERINATAL CARE	
22.1	Contraceptives	
22.1.1	Oral hormonal contraceptives	4
22.1.2	Injectable hormonal contraceptives	3
22.1.3	Intrauterine devices	2

Contd.

Table 1.1: WHO Model List of Essential Medicines—22nd List (2021) (Contd.)

<i>Section</i>	<i>Therapeutic category</i>	<i>Total number of preparations</i>
22.1.4	Barrier methods	2
22.1.5	Implantable contraceptives	2
22.1.6	Intravaginal contraceptives	2
22.2	Ovulation inducers	1
22.3	Uterotonics	6
22.4	Antioxytocics (tocolytics)	1
22.5	Other medicines administered to the mother	3
22.6	Medicines administered to the neonate	6
23.	PERITONEAL DIALYSIS SOLUTION	1
24.	MEDICINES FOR MENTAL AND BEHAVIOURAL DISORDERS	
24.1	Medicines used in psychotic disorders	6
24.2	Medicines used in mood disorders	
24.2.1	Medicines used in depressive disorders	7
24.2.2	Medicines used in bipolar disorders	3
24.3	Medicines for anxiety disorders	1
24.4	Medicines used for obsessive compulsive disorders	1
24.5	Medicines for disorders due to psychoactive substance use	5
25.	MEDICINES ACTING ON THE RESPIRATORY TRACT	
25.1	Antiasthmatic medicines and medicines for chronic obstructive pulmonary disease	20
26.	SOLUTIONS CORRECTING WATER, ELECTROLYTE AND ACID-BASE DISTURBANCES	
26.1	Oral	2
26.2	Parenteral	6
26.3	Miscellaneous	1
27.	VITAMINS AND MINERALS	12
28.	EAR, NOSE AND THROAT MEDICINES	5
29.	MEDICINES FOR DISEASES OF JOINTS	
29.1	Medicines used to treat gout	1
29.2	Disease-modifying anti-rheumatic drugs (DMARDs)	6
29.3	Juvenile joint diseases	1
30.	DENTAL PREPARATIONS	3

Table 1.2: National List of Medicines 2015

<i>Section</i>	<i>Therapeutic category</i>	<i>Total number of preparations</i>
1	Anesthetic agents	16
2	Analgesics, antipyretics, nonsteroidal anti-inflammatory medicines, medicines used to treat gout and disease modifying agents used in rheumatoid disorders	15
3	Antiallergics and medicines used in anaphylaxis	7
4	Antidotes and other substances used in poisonings	14
5	Anticonvulsants/ Antiepileptics	9
6.1	Anthelmintics	4
6.2	Anti-bacterial medicines	22
6.2.3	Antileprosy medicines	3
6.2.4	Antituberculosis medicines	14
6.3	Anti-fungal medicines	5
6.4	Antiviral medicines	23
6.5	Antiprotozoal medicines	15
7	Antimigraine medicines	5
8	Antineoplastic, immunosuppressives and medicines used in palliative care	59
9	Antiparkinsonism medicines	2
10	Medicines affecting blood	13
11	Blood products and plasma substitutes	8
12	Cardiovascular medicines	30
13	Medicines used in dementia	1
14	Dermatological medicines	15
15	Diagnostic agents	7
16	Dialysis solution	2
17	Disinfectants and antiseptics	9
18	Diuretics	4
19	Ear, nose, throat medicines	4
20	Gastrointestinal medicines	16
21	Hormones, other endocrine medicines and contraceptives	23
22	Immunologicals	17
23	Muscle relaxants and cholinesterase inhibitors	5
24	Medicines used in neonatal care	3

Contd.

Table 1.2: National List of Medicines 2015 (Contd.)

Section	Therapeutic category	Total number of preparations
25	Ophthalmological medicines	17
26	Oxytocics and antioxytocics	7
27	Psychotherapeutics	13
28	Medicines acting on the respiratory tract	6
29	Solutions correcting water, electrolyte and acid-base disturbances	8
30	Vitamins and Minerals	9

Source: <https://cdsco.gov.in>

Standard Treatment Guidelines (STGs)

According to WHO, Standard Treatment Guidelines (STGs) are systematically developed statements to help practitioners and patients make decisions about appropriate health care for specific clinical circumstances.

The Drug and Therapeutics Committee (DTC) is responsible for a number of important pharmaceutical management functions. The committee is responsible for evaluating new medicines for the formulary, identifying and correcting medication use problems, and assessing and controlling adverse drug reactions among other functions.

STGs are useful in the management of pharmaceutical therapy because:

- There could be many approaches to the treatment of diseases.
- Many practitioners may forget the optimal method of treatment.
- Both the patient and the health care system will benefit from the most effective treatment.

The development and implementation of STGs is a necessary task in a health care system where a variety of treatment approaches may be available. Physicians and nonphysician providers will apply their own knowledge, expertise, and preconceived ideas to the treatment rationale for each patient. This approach is frequently successful and reasonable, resulting in optimal care. However, it is also possible that it may result in less than optimal care, and in fact, it may result in dangerous medical care, resulting in poor patient outcomes. The use of STGs is a time-tested method that improves patient outcomes.

STGs have existed for a long time. Traditional healers developed their own standard sets of conventional remedies that were passed down from generation to generation. In modern medicine, however, the concept of different treatment options has arisen for many medical conditions. This led to confusion and, in many cases, inappropriate treatment. Doctors, nurses, pharmacists, community health workers, and other health care providers study all of the treatments that could be used, instead of focusing on the best therapy that should be used. It has been observed that there is a tremendous diversity among prescribers in the treatment of even simple medical conditions. Polypharmacy is one issue; for example, three, four, five, six, and sometimes more medicines may be prescribed for acute viral gastroenteritis, for which only oral rehydration therapy is effective in reducing morbidity and mortality. Other common

problems are making wrong medicine choices, overdosing, underdosing, and selecting a more expensive medicine when less expensive ones would be equally or more effective. Thus, the development of standard treatments is necessary for the therapeutically effective and economically efficient use of medicines.

STGs list the preferred pharmaceutical and nonpharmaceutical treatments for common health issues experienced by people in a specific health system. Each pharmaceutical treatment should include for each health problem the name, dosage form, strength, average dose (paediatric and adult), number of doses per day, and duration of treatment. Information on diagnosis and advice to the patient may also be included.

Standard treatments are used at different points during the process of therapy. They may be useful in diagnosing, deciding on treatment and pharmaceutical supply, and assisting with treatment adherence. This method will more likely lead to the desired clinical outcome.

Advantages of STGs

The use of STGs can benefit healthcare providers, healthcare officials, supply management personnel, and patients in the following ways.

Healthcare Providers

- Provides practitioners with standardised guidance.
- Encourages high quality care by directing practitioners to the best medicines for specific conditions.
- Encourages the best quality of care as patients are receiving optimal therapy.
- Uses only formulary or essential medicines, so the healthcare system needs to provide only the medicines in the STGs.
- Provides valuable assistance to all practitioners, especially to those with fewer skills.
- Enables healthcare providers to concentrate on making the correct diagnosis because treatment options will be provided for them.

Healthcare Officials

- Provides a basis for evaluating the quality of care provided by healthcare professionals.
- Provides the most effective therapy in terms of quality.
- Provides a system for controlling costs by using funds more efficiently.
- Provides practitioners with information about the institution's standards of care for patients.
- Can serve as a vehicle for integrating special programs (e.g. diarrhoea disease control, acute respiratory infection (ARI), tuberculosis control, malaria) at the primary health care facilities through the use of a single set of guidelines.

Supply Management

- Since the formulary or essential medicines is utilised, the healthcare system needs to provide only medicines in the STGs.
- Provides forecasting and ordering information (because medicines and quantities for common diseases will be known).
- Provides information for the purchase of pre-packaged medicines.

Patients

- Patients receive the best medical therapy.
- Enables consistent and predictable treatment from all levels of providers and at all locations within the healthcare system.
- Improves the availability of medicines because of more consistent use and ordering.
- Provides improved outcomes because patients are receiving the best treatment regimens available.
- Lowers the cost.

Disadvantages

- Inaccurate or incomplete guidelines will provide the incorrect information to providers, causing more harm than good.
- Developing and updating guidelines is difficult and time-consuming and must be done on a regular basis or they will become obsolete quickly.
- Guidelines provide a false sense of security; that is, many providers will limit their evaluation of a specific patient as soon as it fits into a specific standard treatment.

Standard treatment guidelines are disease-oriented, whereas formulary manuals are medicine-oriented documents. These two documents provide the very essence of the DTC's efforts to provide rational pharmaceutical therapy. Every effort should be made to publish both of these manuals, have them readily available for all practitioners, and update them regularly to ensure the accuracy of the information provided.

Table 1.3: Total number of STGs developed by National Health Authority (January 2021)

<i>Sr. No</i>	<i>Specialty</i>	<i>Total number of STGs developed</i>	<i>Total number of procedures developed</i>
1	Burns	6	20
2	Cardiology	18	21
3	CTVS (cardiothoracic and vascular surgery)	62	117
4	Emergency medicine	5	6
5	ENT surgery	22	47
6	General medicine	66	102
7	General surgery	45	89
8	Intervention neuroradiology	11	15
9	Mental disorders	7	7
10	Neonatology	9	10
11	Neurosurgery	33	65
12	Obstetrics and gynaecology	48	76
13	Oncology (medicine)	80	540
14	Oncology (surgery)		
15	Oncology (radiation)		

Contd.

Table 1.3: Total number of STGs developed by National Health Authority (January 2021)

Sr. No	Specialty	Total number of STGs developed	Total number of procedures developed
16	Ophthalmology	20	51
17	Oral and maxillofacial surgery	8	15
18	Orthopaedics	52	137
19	Paediatric medicine	19	31
20	Paediatric surgery	17	35
21	Plastic and reconstructive surgery	12	22
22	Polytrauma	11	20
23	Urology	72	128
24	Infectious diseases	2	4
Total		625	1572

An example of STGs of heart failure:

1. Heart failure (HF), often referred to as congestive heart failure (CHF), occurs when the heart is unable to pump sufficiently to maintain blood flow to meet the body's needs.
2. Types of heart failure—the heart consists of two distinct parts; right and left receiving blood from different venous system and perfusing distinct parts of the body; the right heart perfusing heart failure is a condition where the heart is unable to perform its functions optimally; leading to decreased perfusion of the tissues supplied by the lungs for gaseous exchange and the left heart perfusing the systemic circulation.

Hence there are two types of heart failure

- Right heart failure.
- Left heart failure.

Right Heart Failure

The right side of the heart receives blood from the systemic veins and pumps blood into the pulmonary artery through the pulmonary valve. Hence the cause of right heart failure would be; increased pressure in the pulmonary artery (pulmonary hypertension) or pulmonary valve stenosis.

Causes of pulmonary hypertension

- i. Chronic obstructive pulmonary disease (COPD) seen commonly in smokers, cor pulmonale.
- ii. Mitral valve stenosis seen in rheumatic heart diseases.

Clinical features of right heart failure

As the right heart receives blood from the systemic veins, the main clinical features involve features of congestion in the systemic venous system.

- i. **Raised jugular venous:** Pressure with engorged superficial neck veins.
- ii. **Tender hepatomegaly:** Painful, soft liver palpable in the right hypochondrium.
- iii. **Dependent oedema:** Pitting oedema demonstrable on the shin of the tibia and ankles.

When to suspect right heart failure

- i. Right heart failure should be suspected if the clinical features are present like swelling in the legs and engorged neck vein.
- ii. Also, once the features can be demonstrated on clinical examination, the underlying causes of right heart failure should be looked for; e.g. history of smoking and signs of COPD, or signs of mitral valve disease.

Investigations for right heart failure

The diagnosis of right heart failure is a clinical one. Investigations are basically to diagnose the underlying cause of right heart failure.

Treatment of right heart failure

Right heart failure is not a medical emergency and does not cause immediate fatality. There is no direct treatment of right heart failure. This condition is alleviated by effective treatment of the cause of failure.

Hence attempts should be made to manage COPD effectively, like

- Antibiotics in acute exacerbation.
 - Effective bronchodilation using inhalers and oral long acting xanthines (deriphyllin).
 - Low flow oxygen inhalation which is the treatment of choice for Cor pulmonale.
 - Effective treatment of mitral stenosis including low salt diet, diuretics, and digoxin.

When to refer a case of right heart failure to higher centre

A case of right heart failure needs to be referred for specialized treatment only for management of nonresponsive chronic obstructive airway disease. In case, the cause of right heart failure is mitral valve disease which is not amenable to medical management, such cases should be referred to a cardiac centre for definitive management of the condition.

Left Heart Failure (Pulmonary Oedema)

The left heart receives blood from the pulmonary vein and pumps blood in the systemic circulation.

Causes of left heart failure

- i. Systemic hypertension is the commonest cause for left ventricular failure
- ii. Valvular heart diseases: Aortic stenosis, aortic regurgitation and mitral regurgitation are all causes for acute left heart failure.
- iii. Myocardial infarction involving significant part of left ventricle can cause LV failure.

Clinical features

- i. Sudden onset breathlessness is the main symptom.
- ii. There may be continuous cough with pink frothy sputum.
- iii. The patient will be very anxious and restless.

- iv. The patient will choose to be in the sitting position and unable to lie down.
- v. On auscultation of the chest, crepitation will be heard most prominently in the bases.
- vi. General examination will reveal high blood pressure which is the commonest cause.
- vii. Such patients are likely to present with cyanosis (bluish discoloration of tongue, lip, oral mucosa, fingers and toes).

Investigations

Left ventricular failure is a medical emergency and time should not be wasted in any investigation. However, after stabilizing the patient, investigations may be carried out to find the underlying cause.

Treatment

Left heart failure or pulmonary oedema is a medical emergency and speed of administration of treatment is of paramount significance.

- i. The patient should be treated in the propped-up position using a backrest or raised head end of the bed.
- ii. High flow oxygen inhalation should be given.
- iii. Sedation preferably with morphine 10 mg IV or pentazocin 30 mg is the management of choice. If these powerful narcotics are not available, any form of sedation will be of help.
- iv. Intravenous frusemide (Lasix) 60 mg IV should be administered.
- v. Acute reduction of blood pressure must be done, if the cause of left heart failure is hypertension: IV infusion of nitroglycerin (5 microgram/kg) by BP monitoring, should be tried for the purpose.
- vi. Anti-platelets, statins to be continued.

When to refer the patient?

Treatment of left heart failure must be attempted at the peripheral level. Once stabilized, the patient may be referred to higher centre for management of the underlying cause.

Failure of the patient's breathlessness to resolve, may require, endotracheal intubation or non-invasive positive pressure ventilation and patient should be referred to such a centre if facilities for the same is not available.

KEY POINTS

- Pharmacotherapeutics is the application of knowledge of drugs and diseases to prevent, treat, and diagnose the disease as well as alter normal functions (such as preventing pregnancy).
- Rational use of medicines is defined as "patients receive medications appropriate to their clinical needs, in doses that meet their requirements, for an adequate duration of time, and at the lowest cost to them and their community.
- Evidence-based medicine (EBM) is the conscientious, explicit, judicious and reasonable use of modern, best evidence in making decisions about the care of individual patients.
- Essential medicines are those that meet the population's most important healthcare needs.
- Standard treatment guidelines (STGs) are systematically developed statements to help practitioners and patients make decisions about appropriate healthcare for specific clinical circumstances.