PART I

INTRODUCTION TO PHARMACEUTICAL MARKETING

1.1 HISTORICAL BACKGROUND OF PRESCRIPTION

The history of pharmacy dates back to early days of the mankind. The early human life encountered several diseases, which limited the life span and debilitated it. As the civilizations developed in various parts of the world, the initial attempts to understand and cure the diseases were undertaken. The development of the art of pharmacy was intertwined with the development of the science of medicine.

Pharmacy has been defined as the art and science of identifying, selecting, preserving and combining drugs of animal, plant or mineral origin. Medicine is defined as the art and science of restoring or preserving health by the administration of these substances. These sciences are closely related. Though they are practiced as separate professions today, in the older times they were usually simultaneously practiced by a person who was, more often than not, a priest or a religious person as well.

The historical aspects of both these sciences were so closely interwined with superstition and legendary stories of supernatural happenings that it is difficult to discern the truth from fiction, the reality from mythology.

Amongst the earliest practitioners of the healing arts, the names of Isis and Osiris, who practiced in Egypt, surface as noteworthy practitioners. The most prominent of these early mythical healers was Æsculapius, who was the son of Apollo and the

disciple of Chiron and practiced around 3000 B C His emblem, the single serpent on a staff, is still being used as a medical symbol.

The first real manuscript of the literature pertaining to modern medicine and pharmacy is the Papyrus, or scroll, called the *Papyrus Ebers,* which is a continuous roll of manuscript about 12 inches wide and over 250 feet in length. It dates back to around 16th century before Christ, an era prior to the time of Moses. It contained discourses on remedial agents and the methods of compounding them Many of the drugs enlisted in this historical document are in use today It is quite interesting to note that *Polypharmacy*, the practice of prescribing of multiple ingredients in one compound dates back to this early time Some of the formulas contained as many as 35 ingredients.[1]

Scientific advances in modern medicine and pharmacy really began with Hippocrates, a Greek physician who was born on the Island of Cos in 460 B.C. He was a legendary person and his influence was so majestic that his devotees formed an informal thought school, called the *Hippocrates school.* In the documents, thought to be his writings, but actually written by the members of Hippocrates school, more than 400 drugs are mentioned Many of these drugs are still in use. He is being remembered more as an author of a noble and idealistic oath called the "*Hippocratic oath*" This oath is considered to be foundation of medical ethics and it is still being administered with some modifications as a kind of ethico-medical ritual. A text of this oath appears at **Appendix 1.**

Pharmacies, as separate places where drugs were compounded and sold, were first established during the Arabic period Maimonies was the most famous Arab whose oath and prayer, an idealistic document, had earned him much fame and popularity.

The first convincing record of separation of medicine and pharmacy is found in a decree, issued in 1233 by the Emperor Frederick II of Sicily, which is an edict regulating the practice of pharmacy in his kingdom This document refers to the warehouses, where drugs and medicines were stored, as "apotheca". The compounders were called "confectionarii", the sellers of medicine were called "stationarii"; and the shops were called "stationes". The physicians were neither allowed to run pharmacies, nor to earn profit from the sale of medicine The "confectionarii were obliged to compound the medicines in accordance with the formulary laid down by a specifically empowered body. The prices of medicines were regulated by a law. The price regulation statute allowed more proportionate profit for drugs, which were less frequently ordered.

The word "pharmacy" has Greek origin The root "*pharmakon*" originally implied 'charm', subsequently it meant a 'poison' and finally it signified a 'drug'

The development of pharmacy during the nineteenth century was along more scientific lines The first national pharmacopœia was the French Codex, which was published in 1818 The historical records of the development of American pharmacy suggest that during the eighteenth century the filling of prescriptions written by medical practitioners gradually became a specialized art. This complementary role of the pharmacist carved the road to the recognition of pharmacy as a separate

profession. John Morgan, an American physician, advocated the separation of pharmacy from medicine, while delivering a lecture on the occasion of the inauguration of the first American Medical School, which was later, called as the Medical school of the University of Pennsylvania. He went on to become the first teacher of pharmacy and pharmaceutical chemistry at this school

The above narration corresponds to the development of the art and science of pharmacy, as envisaged under the allopathic system of medicine, popularly known as the modern system of medicine Apart from the allopathic system of medicine, other alternative systems also originated in different parts of the world during different times

The Indian system of medicine, known as 'AYURVED', is believed to be more ancient than the allopathic system. The word AYURVED has genesis in two Sanskrit terms: '*Ayush*' meaning 'life' and '*Ved*' implying two meanings; 'to know' and 'to achieve'. Thus AYURVED is defined as a science through which the knowledge of healthy life is obtained, more of health is achieved and the healthy life so achieved is not destroyed. [2] AYURVED has two purposes: 1. To eradicate diseases, and 2. To protect the health AYURVED did not only deal with the health of human beings; it also dealt with the health of animals and plants.

AYURVED is considered to be the creation of the God (*Apaurushey*). [3] The Hindu mythology suggests that AYURVED was created by *Brahma,* the creator of the Universe. It comprised of 100,000 verses compiled under 1000 chapters *Ashwinikumars* learned AYURVED from *Brahma* and subsequently *Indra* learned

from *Ashwinikumars.* Later on it had descended through generations of saints known as *Rishis.*

AYURVED is thought to be an *Upved* of the *Atharv ved*, which is one of the four documents of ancient Indian mythology: *Rigved, Yajurved, Samved* and *Atharv ved*[2] Numerous renowned *Acharyas* practiced and propagated the knowledge of AYURVED through generations. Prominent of them were *Dhanvantari, Divodas, Kashyap, Atrey, Agnivesh, Bhed* and *Shushrut* These *Acharyas* lived during the *Upnishadkal* (the time period when *Upnishads* were created 2900-1850 B C) Historically, this time period dates back to around 2500 B.C. *Shushrut*, the ancient surgeon, lived around 1500 B.C.; some 1200 years before *Hippocrates*. *Charak*, a renowned practitioner of Indian system of medicine, lived around 1400 B.C

Various verses in *Rigved* and *Atharv ved* suggest that the *Vaidyas*, who were knowledgeable *Brahmins* (the superior of the four *Varnas* as per Indian mythology) used to collect and cultivate the AYURVEDIC medicines. Despite the territorial and conceptual differences of these systems, the profession of medicine and pharmacy were simultaneously practiced by one and the same person. *Vaidyas* simultaneously diagnosed the diseases and treated them with herbal and mineral medicines

Homœopathy, another alternative system of medicine originated in Germany during the eighteenth century. *Dr. Hahnemann*, an allopathic physician renounced his medical practice in allopathy to take up translation of medical books for his living. *Dr. Albrecht von Haller* recorded in Swiss Pharmacopœia of 1755 that drugs must be proved on healthy persons to determine the effects they produce. During the next

fifteen years, *Dr. Hahnemann* and his co-workers worked on this concept and recorded their results in the form of a book called 'Materia Medica Pura'. He advocated the principle of 'law of similars' or 'Similia similibus curenter', i.e. similar cures similar.[4]

Siddha is also an ancient Hindu system of traditional medicine chiefly practiced in the state of Tamilnadu and surrounding areas. This system mainly employs minerals and metals and also products of animal and vegetable origin. It advocates the principle of *Panchbhutas,* comprising gold, lead, copper, iron and zinc.

Unani system of medicine originated from Greece, but it owes its spread to Arabs who made it popular. They also gave it a scientific base. It believes in the principle of the balance of four humours, namely, blood (Dam), phlegm (Balgham), yellow bile (Safra) and black bile (Sauda). Unani system also advocated surgery and employed its own surgical instruments in the ancient times.

All these systems, which developed in different geographical territories during different times had one thing in common. Initially, during the evolutionary period, the professions of medicine and pharmacy were simultaneously practiced by one and the same person. The evolution of separate professions of medicine and pharmacy is not as clearly time-demarked in other systems, as is in allopathy. Nevertheless, it can be observed that as each of the systems of healthcare developed, the intricacies of formulating the medicines increased; calling for special expertise of compounding of medicines. This expertise was developed by persons other than the physicians, who later on practiced the profession of pharmacy.

However, it can be convincingly evidenced that 'prescription' originated in each of the systems, with the separation of the professions of medicine and pharmacy. The physician was obliged to put in writing the medicine he desired to be administered to the patient. This written note then would be sent over to the pharmacist for compounding and dispensing the medicine. Thus was borne the *prescription.*

1.2 THE PHARMACEUTICAL INDUSTRY

Today's sophisticated pharmaceutical industry still conforms to the simple mathematical rules that govern commercial success. Thus its success and most of its value is determined by the difference between the money earned in sales and those spent in generating sales.[7]

The pharmaceutical industry has been categorized by the Fortune Magazine as *first* in return of revenues, *first* in return on assets and *first* in return on equity. It has been rated *fifth* for profit growth, *sixth* for total return to investors over one year and *fourth* for total return to investors over ten years. For much of the last decade of the twentieth century and also during the current century, the pharmaceutical industry has continued to pay higher dividends to its shareholders than any other industrial sector. Pharmaceutical units have scored over other Fortune 500 companies in terms of profit rates. The industry has outperformed Standard and Poor's 500 index by 90 % and has averaged more than thrice the profits of other industries of Fortune 500 list. Pharmaceutical industry has been rated either *first* or *second* in the list of the most profitable sectors for more than thirty of the past forty years.[9]

Although the investment in the pharmaceutical sector is justified by the reportedly large returns it offers, every investment opportunity is faced with what is called 'the appropriability problem'. The solution lies in the patentability of the new drug molecule. To be specific, in the pharmaceutical industry, investment is the patent. If we compare the drug industry with the auto industry, we readily realize the difference. For example, though BMW has excellent engineering capabilities, its product cannot be copied by other automaker. Copying requires manufacturing and testing infrastructure. While in case of pharmaceutical industry, at the end of the day the product is just a new chemical compound, which can be easily duplicated by another manufacturer/researcher. It may take years for a pharmaceutical industry to innovate, but may take only a few months for a copier to duplicate it. Then, what could be the source of the competitive advantage for a pharmaceutical industry? Manufacturing is important, but it is easy. The competitive advantage lies in the marketing ability of a pharmaceutical company and the patents it holds for its products.[12]

Pharmaceutical patents fall in four basic categories. First, there are patents that protect the chemical compound. Second, there are patents that protect the compositional use of the compound as a drug. Third, there are patents that protect the specific way that the drug is to be used. Finally, there are patents that protect the process the innovator uses to manufacture the drug.[13]

1.2.1 The Global Pharmaceutical Industry

The global pharmaceutical market is estimated to be around US $ 317 billions.[8] According to IMS HEALTH data, the north American continent is the largest market

contributing around 48% of pharmaceutical sales all over the world Europe follows with 23.7% share The other markets are. Japan (16.2%), Latin America (6%) and Asia (excluding Japan), Africa and Australia (5 9%) Speaking nation wise, USA leads with the sales of over US$ 130 billion, followed by Japan with sales of around US$ 53.5 billion. The other important markets are Germany, France, Italy and UK, ranked in the order of sales of pharmaceuticals [11] In 1996, the top 14 US pharmaceutical companies returned an after tax profit of some 20 billion US $ against revenue of 127 billion Compare these figures with the entire expenditure on health in Australia, which is around US $ 22 billion. The 15% profit on revenues is one of the highest of any industry. If one separates the pure pharmaceutical sales out of these companies, the profitability ascends to approximately 30%.[14]

The pharmaceutical market is a uniquely fragmented one. Individual companies do not have large market share. The largest share is enjoyed by Glaxo-SmithKline (7%), followed by Warner-Lambert (6.9%), Merck (4.4%), AstraZeneca (4.4%), Bristol-Myers-Squibb (4%). Aventis, Novartis, Johnson & Johnson, American Home Products and Pharmacia & Upjohn are next in the list with around 3% market share each [10] With the mergers and acquisitions being rampant in the pharmaceutical field, these shares fluctuate and even the places in the topper list also change frequently. The pressure on drug prices has made global pharmaceutical MNCs resort to mergers and acquisitions, in order to reduce R&D costs besides increase reach so as to spread research expenditure over a larger basis. The total number of alliances increased from 120 in 1986 to almost 400 in 1994.[26] A list of the top ten pharmaceutical companies worldwide appears at **Appendix 8** [21]

Another important criterion to segment the pharmaceutical market is the pharmacological classification or the disease management classification A pharmaceutical company generally does not specialize in all the pharmacological groups. It generally focuses on two or three diseases and develops products for treatment of these diseases GlaxoSmithKline may only hold 7% of the overall market, but it controls an estimated 46% of the anti-migraine market. Warner-Lambert controls almost 50% market of the cholesterol lowering drugs sold all over the world. Schering-Plough, which does not even feature in the top ten list, controls 40% market of anti-allergy drugs.

The world pharmaceutical market grew by around 10% during the 12 months to September, 2000. The growth was reported to be 1% point lesser than the preceding year. North America led the growth with the rise in drug sales to the tune of 18% Of the major pharmacological classes, the highest growth was reported for musculoskeletals at 38%. The sub-segment in this group, anti-rheumatics grew at the rate of 47%. Pharmaceutical sales in the top five European markets exhibited growth rate of 8%, one percent point higher than the earlier year. France and Italy achieved the growth rates of 9% and 11% respectively. **Appendix 3** exhibits the pharma sales in 13 key markets for the year to September, 2000 Segmenting down the overall sales to the pharmacological/disease categories, it may be observed that the sales in the top therapeutic category worldwide, the cardiovasculars, grew by 9%. The sub-category in this segment, hypolipidaemics (cholesterol lowering drugs) grew by a staggering 21% Sales by therapeutic category in the year 2000 appear in **Appendix 4.**[15]

1.2.2 The Indian Pharmaceutical Industry

The Indian Pharmaceutical market is estimated to be around Rs 200 billion The ORG-MARG retail audit estimated it to be over 160 billion at prices at the retail level. The Indian pharmaceutical industry is highly fragmented, with an estimated 20,000 units competing for the market share. The total imports were Rs. 14 47 billion against exports of Rs. 66 31 billion. Thus the Indian Pharmaceutical industry is a net foreign exchange earner for the country. India boasts of 8% of worldwide pharmaceutical production in volume terms. However, in value terms, it measures only 1.3%. It ranked 5th worldwide in volume terms during the year ending March, 2001. [16]

1.2.2.1 INDIAN HEALTH SCENARIO

Fifty-six years after achieving the independence, it is time to take the stock of the healthcare scenario of our country. Health is a person's most valuable possession, a source of real happiness. Healthcare is an important aspect of public administration An investment in health is an investment in human resource development on which depends the national development.

In the human development report, 1998, India was ranked a dismal 139th, on the human Development Index. Life expectancy, a measure used by WHO to measure the health status of a society, has increased from 32 years in 1951 to close to 63 years in 1998. The average life expectancy in the developed world is around 75 years The life expectancy and the adult illiteracy rates are listed at **Appendix 11**. Although the life expectancy has increased substantially, the infant mortality rate and under 5-mortality rate have not improved favourably. Medical colleges have increased from 28 in 1951 to 146 in 1992. Hospitals have increased from 2,649 in

1951 to 13,692 in 1992. Hospital beds have substantially increased from 1,17,178 in 1951 to 8,10,548 in 1991. Meanwhile the primary healthcare centers have grown from 715 in 1951 to 21,853 in 1996. The availability of doctors per lakh population is around 48 in India.

India spends 6 percent of its GDP on health care, which compares favourably with its neighbouring countries like Pakistan (3.4%), China (3.5%) and Philippines (5.3%). The per capita expenditure on drugs in India is around Rs. 160-200 per year, which although compares favourably with countries like Kenya, Bangladesh and Mozambique; certainly compares miserably with countries like Japan, Germany and United States. Annual drug expenditure per capita in various countries is listed at **Appendix 10.**[24]

World Health Report, 1997 has stated that in India, cancer, heart disease and other chronic conditions, which already kill more than 24 millions a year, will impose an increasing burden of suffering and disability. Globally, deaths are caused by three major killers-: circulatory diseases, malignant neoplasms(cancers), non-infectious respiratory diseases and infectious and parasitic diseases. Among the ten top killer diseases, ischaemic heart disease accounts for 13.8% of the deaths globally, followed by cerebrovascular disease (6.6%), lower respiratory tract infection (7.5%), tuberculosis (5.8%), chronic obstructive pulmonary disease (5.5%), diarrhoea/dysentery (4.7%), malaria (3.8%), HIV-AIDS (2.9%) and hepatitis B (2.2%). Psychosomatic disorders account for a significant proportion of disability. Around 400 million suffer from anxiety disorders and 340 million suffer from mood disorders. India's killer diseases are: Disorders of the respiratory tract accounting for

19.6%, followed by disorders of the circulatory system (10.8%), infant diseases (9.6%), accidents and injuries (8.7%), fevers of various aetiologies (7.7%), digestive disorders (6.2%) and disorders of the Central Nervous System (4.5%).[17]

The disease pattern has definite relationship with the development stage of a nation. Underdeveloped countries exhibit higher incidence of infectious diseases, thanks to poor hygienic conditions prevailing in these countries. The people in the developed world undergo continuous stress due to complicated life styles, leading to stress related disorders like cardiovascular diseases, diabetes and psychological disorders. The disease pattern exhibits a significant shift as a nation moves towards development. **Appendix 5** exhibits leading therapeutic classes worldwide, while **Appendix 6** lists the leading therapeutic classes in India.

1.2.2.2 A BRIEF HISTORY OF PHARMACEUTICAL INDUSTRY IN INDIA

It is difficult to point out the exact date when the Allopathic system of medicine made its entry into our country. Nevertheless, it is believed to have made its foray during the first part of the 19th century. These medicines were imported into India by the British of the East India Company for their personal use. Later on when they became rulers of the country, the imports became regular. The local population gradually developed liking for these imported pharmaceuticals and started using them. Germany and United Kingdom were the major suppliers of medicines during those days.

Acharya P.C.Ray, an outstanding entrepreneur, established Bengal Chemical & Pharmaceutical Works in 1901 in Kolkata; and started indigenous production of

allopathic medicines. Tropical diseases were the main concern of the day; and Indian scientists undertook research to treat and cure malaria, typhoid and cholera. Four research institutes, namely The Haffkine Institute, King Institute, Central Research Institute and Pasteur Institute were established.

First world war provided a much-needed stimulus to the development of pharmaceutical industry in India. Since the demand rose and imports were curtailed, domestic production rose significantly. However, as soon as the war was over and the imports resumed, the local industry again became standstill. Through the incessant efforts of the scientists at the Bengal Chemical & Pharmaceutical Works, indigenous production of tetanus antitoxin started in 1930. The Second World War provided yet another impetus to the nascent pharmaceutical industry in India. 1941 saw the beginning of a new era for the medicines, as the domestic industry started manufacturing various chemo-therapeutic agents like arsenicals, anti-leprosy drugs and colloidal preparations of calcium, silver, manganese and iodine. The manufacture of several formulations based on imported basic drugs was also initiated during this period. The pace of growth of the pharmaceutical industry in the pre-independence era was not satisfactory, as the support of consistent and favourable Government policies was lacking. At the time of independence, India's domestic drug production was estimated to be around Rs. 100 million.[18]

Post independence era saw phenomenal growth of the domestic pharmaceutical industry. From a meager production of around Rs. 100 million in 1947, the Indian pharmaceutical industry has today reached a stage when it produces the entire range of therapeutic products needed from the basic stages, as laid out in **Appendix**

7. What is most significant is not the quantum of production, but the technological self-reliance of the domestic industry.

1.2.2.3 THE PRESENT STATUS

The Indian Pharmaceutical Industry boasts of a vibrant research and development base for the process technology. It has a remarkable flexibility to respond to newer demands and needs. Most of the major pharmaceutical industries are vertically integrated, enabling them to control the input prices. Many units of the industry have world class manufacturing facilities complying to cGMP standards and have been approved by the Drug Control Authorities of many developed countries including US-FDA.[19] India has around 200 pharmaceutical units with approved R & D facilities. There are around 1000 bulk drug manufacturers who produce more than 350 different active drugs. There are about 250 WHO approved manufacturing facilities and 30 units possess US-FDA/TGA/MCA-U.K. approvals. The total employment in the pharmaceutical industry and trade is over 2 million jobs.[16] The Indian pharmaceutical industry is emerging as an innovative, low cost producer of quality medicines. A brief glimpse of company wise sales trends of the major pharmaceutical companies in India appears at **Appendix 9**. The details of capital investment in the pharmaceutical industry in India and the annual bulk drug production appear at **Appendix 12.** [25]

The Indian Pharmaceutical industry has ensured abundant availability of international quality drugs to the citizens of the country. It is a net foreign exchange earner (Rs. 51.84 billion for the year ending Mar.01.) for the country. It has made the country self-reliant in terms of domestic production of vital drugs. The industry

has helped develop better and cost efficient processes and has generated employment for technocrats and non-technocrats all over the country. It has kindled the spirit of entrepreneurship, which has led to the emergence of many a first generation entrepreneur in the country.

1.2.2.4 INDUSTRY STRUCTURE

The Indian Pharmaceutical industry exists in three main sectors:

1. The Public sector
2. The Indian private sector (including the organized sector)
3. The foreign sector.

Out of around 20,000 odd units engaged in pharmaceutical production, 300 units are on the list of the Director General of Technical Development (DGTD), which consist the organized sector. This sector, which accounts for less than 2% in number terms, contributes around 70% of the pharmaceutical production in value terms.

1.2.2.5 DRUG DISCOVERY

Indian Pharmaceutical industry has some glaring gaps in its development. For example, its performance in drug discovery is insignificant. It solely depends on the developed world for new molecules. The maiden drug discovery was made in India, way back in 1922, when Urea Stibamine was synthesized. Another drug, Methaqualone, was synthesized at the Regional Research Laboratories, Hyderabad. Hindustan Antibiotics limited, a public sector unit developed Haymycin. Regional Research Laboratories, Hyderabad earned credit for the fourth discovery when they developed a drug called Enfenamic acid, which was later on marketed by Unichem Laboratories under the brand name of Tromaril. Ciba-Geigy launched the fifth new drug of Indian origin by the name of Sintamil, which was an anti-depressant drug. As

against this, the six developed nations, namely, USA, Japan, U.K., West Germany, France and Italy have introduced 2567 new drug entities during the ten-year period between 1970-80. During the same period 6374 new drug entities have undergone clinical trials.[18]

India's dismal performance in the new drug discovery is attributed to the following constraints:

1 The cost of new drug discovery: The present estimate for new drug discovery is placed around US $ 500 million, with a gestation period of around 10-12 years. The volume of the domestic industry cannot support such huge R&D costs.

2. Low Profit Margin: The international pharmaceutical companies net around 20-25%. The domestic industries hardly earn 8-10% of their sales turnover as net profit. This discourages Indian companies from spending higher amount on R&D. The present expenditure is minimal: around 2% of the sales turnover.

3 Inadequate fiscal incentives: The Government policies do not provide adequate fiscal benefits to enhance R&D spendings.[18]

1.2.2.6 INADEQUATE REACH OF MEDICINES IN RURAL AREAS

A survey conducted by the Indian Institute of Public opinion, during the year 1998 established that reach of the medicines in the urban areas was 74.3% as against 25.7% in the rural areas.[20] The rural markets are generally neglected by the pharma marketers. This has created a paradoxical situation, wherein though India

manufactures and exports medicines for common worm infestation and tuberculosis, these diseases continue to cause high morbidity and mortality to its own citizens in the rural areas.

India has repository of knowledge and resources of herbal drugs. But the Indian pharmaceutical units have not developed any significant modern herbal medicines. Biotechnology is an emerging field with unlimited future prospects; but India still lags behind in this field. Thus, although the Indian Pharmaceutical industry has taken a big leap in the post-independence era, its development has remained skewed.

1.3 PHARMACEUTICAL MARKETING IN INDIA

Business is marketing. This adage applies to the pharmaceutical industry more than it does to any other industry. Any blockbuster drug is ultimately a chemical entity, which could be duplicated by reverse engineering in due course of time. Therefore, the strength of a pharmaceutical house lies in its marketing ability.

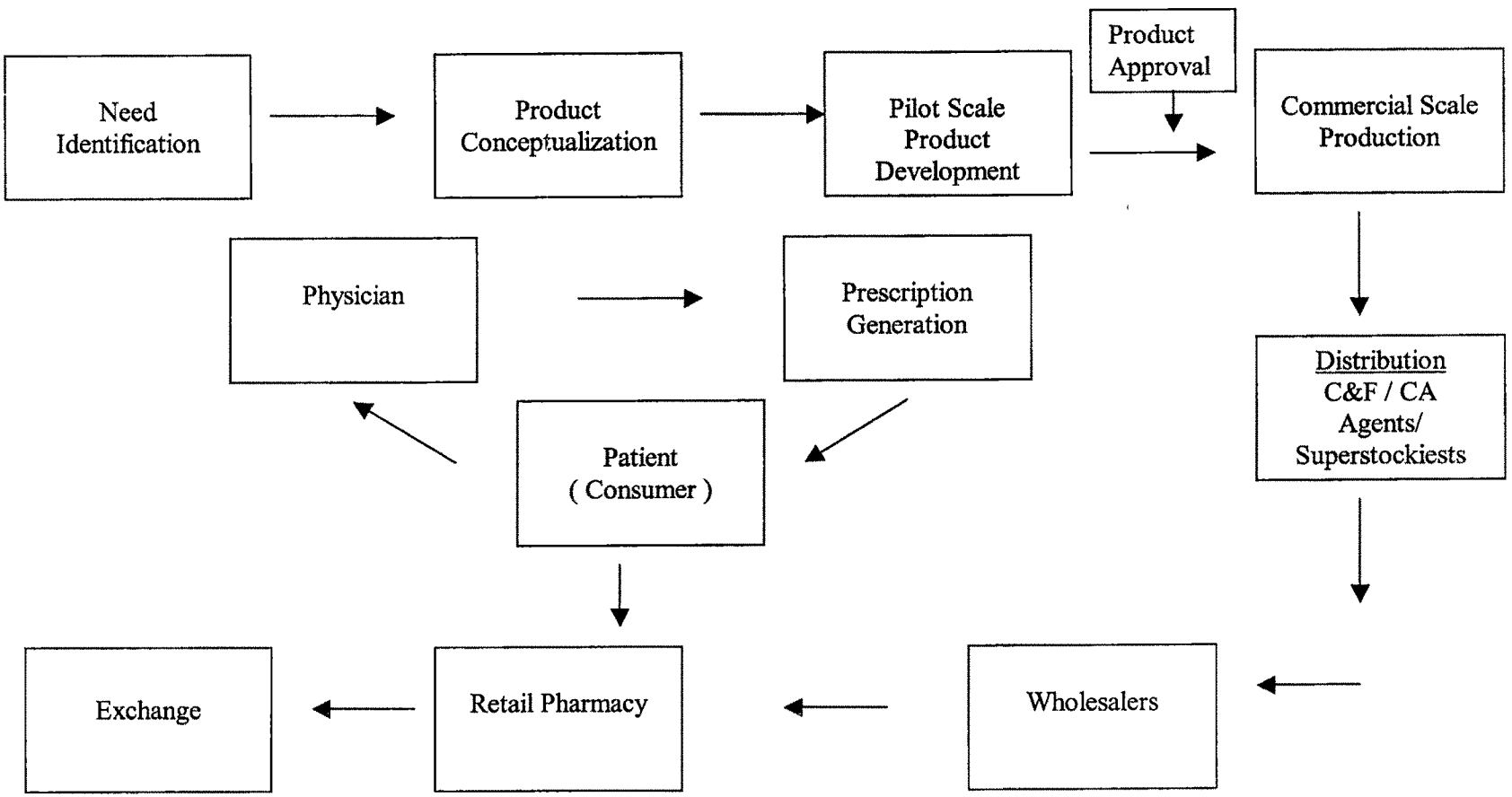
Pharmaceutical marketing is a complex process. It involves multifarious activities at different levels and spans over the entire area where the products are made available for use. It starts from the need realization for a new drug and ends when the product is exchanged for a price.

1.3.1 The Pharmaceutical Marketing Model

The marketing process starts with the 'need realization' for a new drug or a new treatment method for a disease. A marketer can judge the need from the feedback received from the physicians. This need requires to be converted into a viable

product idea. Product development efforts in India are restricted mainly to formulation development. The product is first developed at the laboratory scale; and then scaled up to the commercial production level. The next stage is product promotion. Active promotion leads to awareness among the medical practitioners. The product is distributed through the wholesale and retail channels and is offered for retail sale to the consumers, in this case the patients. The marketing process is completed when the product is exchanged in lieu of money at the retail level. Medicines being non-durable consumer products, minimal after- sales- service is required. (See Chart 1)

CHART I PHARMACEUTICAL MARKETING MODEL



Although the pharmaceutical marketing model resembles most other marketing processes, there is a vital difference. In case of most consumer products; the buying decision is made by the consumers. In case of pharmaceutical products, the buying decision for prescription products is made by an intermediary agency: the physician. The consumer of medicines, the patient, has no significant role in deciding the drug or the brand. The physician makes the choice for his patient. This necessitates that the promotion be directed to the decision maker, the physician. That is precisely what the pharmaceutical houses all over the world practice day in and day out.

1.3.2 The 4Ps of Pharmaceutical Marketing

The four Ps of marketing, viz. Product, Price, Place and Promotion, like other markets, are equally important for pharmaceutical marketing. It is their optimum interplay, which brings success to any marketing endeavour.

1.3.2.1 THE PRODUCT

In the Indian pharmaceutical industry, planning and managing the products is the key behind organizational success. There are over 200,000 brands competing for market share in different therapeutic categories. Only around 120 products account for almost 40% of the total market.

A product is essentially designed for fulfilling a specific need. When a consumer purchases a tablet of Paracetamol, what he is paying for is the relief from pain, fever or headache. Like all other products, pharmaceutical products are basically a bundle of benefits.

A pharmaceutical product may be a 'generic' or a 'brand' A generic is an undifferentiated product, which is purported to contain the specified quantity of a drug molecule, formulated in a dosage form and labelled with the name of the drug molecule. Whereas, a brand is a differentiated product, having similar claim of quantity of a drug molecule but labelled, along with the name of the drug molecule, with a specific brand name, patented or otherwise, that can be related to and is owned by the manufacturer. The brand name is the distinct identity of a product.

In a largely 'me too' predominant pharmaceutical market in India, product policy and strategy are quite crucial for organizational success. Product life cycle studies, product positioning, product differentiation, product portfolio management etc are important tools for devising a successful product strategy.

1.3.2.2 THE PRICE

Price may not be the most crucial factor in the marketing-mix in the Indian pharmaceutical industry. Nevertheless, it is important enough in a highly regulated pharmaceutical environment in India. Pricing no longer is the exclusive privilege of the top management of a pharmaceutical industry in India. The Government has a definite say in the pricing of drugs and medicines, through the pricing mechanism regulated by the Drug Policies and Drugs (Prices) Control orders, being promulgated from time to time.

The pricing is done by using one or more of the basic pricing methods: the cost based pricing, the demand based pricing, the competition based pricing and the market based pricing. Depending on the objectives of an organization, various

pricing strategies are employed like: skimming pricing, penetration pricing or marginal cost pricing.

Price is an important communication tool also. In India, the consumers believe that the higher price reflects better quality. In case of new products the marketers have a tendency to use skimming price, as there is no benchmark to which the price could be equated. It is largely believed by the pharmaceutical marketers in India that while marketing a new product, the price communicates the status and superiority of the new product.

1.3.2.3 THE PLACE: DISTRIBUTION

Place or distribution is a major ingredient of the marketing mix. Distribution channels are the pathways through which the products flow from the place of manufacture to the place where the consumers can buy them. There are two major types of distribution channels: Wholesalers and Retailers. Wholesale channels comprise C & F/ C & A agents, Superstockists, Stockists etc., whereas the retailers necessarily have to employ the services of registered pharmacists for dispensing of drugs.

The distribution costs are shouldered by the manufacturers. Distribution margins are also regulated under the Drugs (Prices) Control Order as far as the minimum distribution and retail margins are concerned. The manufacturer also pays the transportation charges up to the place of destination.

1.3.2.4 THE PROMOTION

Pharmaceutical promotion is mainly aimed at generating prescriptions from the clinicians. Pharmaceutical products are believed to be high technology products whose advantages and disadvantages cannot be deciphered by a consumer. The physician decides the medicine to be purchased by the consumer.

Personal selling is the main tool employed by the pharmaceutical marketer for promoting pharmaceutical products to the medical profession. Although costly, it is the most successful and universally acclaimed tool for pharmaceutical promotion.

Pharmaceutical organizations employ medical representatives to communicate to the physicians. Promotion is the marketing communication that informs and reminds the target audience and persuades them to accept, recommend or use the product. Pharmaceutical organizations also, of course to a lesser extent, use other promotional tools like advertising, sales promotion, publicity and public relation campaigns for promoting pharmaceutical products.

Lately, another important P: Packaging has been recognized as an important part of the marketing mix of the pharmaceutical products. Medicines need to be packed not only for aesthetic appeal, but also to protect them from environmental effects. Packaging plays an important role in advertising the product.

1.3.3 The Marketing Environment

A pharmaceutical marketer endeavours to optimize the marketing mix, which is an internal environment; and at the same time attempts to manage the external

environment. It calls for innovative skills and endless efforts. A pharmaceutical marketer is required to understand the various constituents of the external environment like the economic environment, the regulatory environment, the competitive environment, the social environment, the technological environment and the ecological environment. GNP growth rate, personal disposable income, inflationary pressure, interest rates, industrial growth rates etc. are the indicators, which suggest where the economical environment is heading for. General economic environment does affect a pharmaceutical organization, as the demand of the medicinal products is definitely related to the economic conditions prevailing in the market place.

Our country is one of the most regulated countries in the world. Several statues enacted over a period of time have formed the regulatory network through which the pharmaceutical marketer has to pave his way. The Drugs & Cosmetics Act, 1940 and the Rules there under, The Drugs & Magic Remedies (Objectionable Advertisement) Act, The Drugs (Prices) Control Order are some of the important statutes which regulate the pharmaceutical industry in India.

The Indian pharmaceutical market is a highly competitive market. There are numerous players (estimated to be over 20,000) fighting for a market share in a market, which in size is less than 2% of the world market (around Rs 200 billion). There are more than 200,000 different brands for a small number of drug molecules (just over 500). It is widely believed that apart from the customers, your competitors also decide your market share.

The social environment is the most difficult to predict. Nevertheless, the changes in the social environment throw up numerous opportunities for the pharmaceutical marketer. For example, as the affluence in the society increases, the demand for life style drugs also increases. This enables a savvy marketer to design and introduce new products to satisfy the changing needs.

The pharmaceutical industry is a technology driven industry. Technological advances change the structure of the industry and create opportunities for new therapies, which are diversely different and may render the existing technology redundant. A pharmaceutical marketer has to keep pace with the rapid changes in technology and adapt his organization accordingly.

Like any other industry, the pharmaceutical industry has a commitment to maintain the ecological balance of the physical environment around it. Ecological concerns are more pertaining to the pharmaceutical industry as the processes adopted by the industry involve chemical reactions, which may adversely affect the ecological balance. Efforts to maintain the ecological balance lead to higher production costs, which need to be offset by larger volumes and better prices.

1.3.4 The Strategic Options

Market segmentation is a time-tested strategy for pharmaceutical marketing. The segmentation can be based on pharmacological groups (like anti-malarials, antacids, hormones etc.), prescriber segments (like physicians, gynaecologists etc.) or disease segments (like anti-diabetics, cholesterol lowering drugs etc.)

When one segments the market by customer-specialty, i.e. paediatric market or orthopaedic market, what he is trying to attempt is "concentrated marketing". What one can achieve is: carve out a 'niche' for his products or organization, be cost-effective, better control his markets and provide better service to his customers.

Another strategic choice, which is largely employed by Indian pharmaceutical marketers, is "Differentiation marketing'. The differentiation can be based on novel drug delivery system, end usage, dosage convenience, quality etc. Some companies employ both concentrated marketing and differential marketing to achieve best of both the tools. An exact opposite of the differentiated marketing is the "Undifferentiated marketing", wherein the products are targeted to mass buyers like institutions and Government hospitals. Generics are promoted using undifferentiated marketing technique; however some differentiation in terms of quality or better value is a requisite for successful generic marketing.

1.4 THE COST OF PHARMACEUTICAL MARKETING

India, a country of 100 billion people hardly spends Rs. 160-200 per capita per year on medicines. The larger masses of our country cannot afford even primary healthcare. Reach of medicines in rural areas is less than one third of the same in the urban areas. The national drug policies, over the years, have been boasting of achieving the elusive goal of "abundant availability of medicines at affordable prices." The fact remains that although abundant availability of medicines is to a large extent achieved, the medicines are not affordable to the large majority of our people. S. Madhavan et al report that the cost of medical treatment is increasing dramatically.[27]Health care costs are an easy target for columnists for criticism. As the

healthcare costs inflate, both the state and the people at large are justifiably concerned. Although only approximately 16% of the healthcare costs are attributable to medicines, medicines are generally perceived to be the major contributor to the healthcare cost. This is because out of entire healthcare cost budget, medicines represent the single largest out-of-the pocket expenditure at patients' end. Further, the drug promotion costs are perceived to be the principal reason for higher cost of drugs. Probably this is due to the fact that the drug promotion efforts are visible for obvious reasons. A patient visiting his physician observes that several well-dressed medical representatives wait outside the consulting rooms of physicians. They carry expensive gifts for the doctors, give them substantial quantity of physician's samples and pay for their seminar and CME programme participation.

Consequently, the pharmaceutical industry is under strict scrutiny. Drug costs have increased at about twice the rate of inflation in our country. This increase is speedier than most other segments of healthcare costs. Healthcare costs in USA have also increased alarmingly. In 1950, $1 out of every $20 was spent on healthcare in the country. In 1995, the healthcare costs represent $1 out of every $8 spent. This represents 2.5fold increase in healthcare costs when compared to expenditure on other sectors.[28]

Marketing costs substantially contribute to the price of medicines. An estimate of the US pharmaceutical industry suggests that the money spent by the pharmaceutical industry on promotion to the physicians is around US $ 3 billion. Another estimate puts it around US$ 2.5 to 3 billion Mick T., in an article published in the *Journal of the American Medical Association*, claims that the pharmaceutical industry spends

approximately US$ 5,000 to US$ 6,000 per physician per year.[29] Leo Uzych puts the estimates of annual pharmaceutical marketing costs in US around US$ 5 billion. In the UK, the estimated pharmaceutical industry expense on promotion was 200 million pounds in1985, which represented an average of 2500 pounds spent on each physician over a period of a year.[30]

1.4.1 Marketing cost as a percentage of revenue

The pharmaceutical promotion and marketing expenditure average 20-30% of sales turnover, which is about two to three times the average expenditure on research and development.[31] This is in case of a developed country like UK. In our country, while the marketing cost is comparable with its counterpart in UK, it is 15-20 times the research and development expenditure.

In US, the pharmaceutical industry spends 20% of its revenue on inducing prescriptions from the physicians. This expenditure is directed at changing the prescribing behaviour of the physicians. A study conducted in US indicated that this expenditure does not go in vain, as the physicians do not always prescribe medicines in accordance with scientific dictates; rather they rely more upon the 'non-pharmacological basis of therapeutics'(!) This motivation can be traced back to the commercial activities of the pharmaceutical industry, i.e. their promotional efforts.

The term has several definitions. In strictly commercial terms, it denotes informational and marketing activities, which are aimed at generating prescriptions from the physicians, supplying and administering medical products. These activities are quite broad in expanse and include the activities of the medical representatives and all other aspects of sales promotion such as journal and direct mail advertising,

participation in conference & exhibitions, the audio-visual materials, sampling, gifts & trinkets, hospitality for medical profession, and seminars/CME programmes etc

1.4.2 Medical representatives: The major cost factor

Personal selling is the most widely employed method in pharmaceutical marketing the world over. Although a very costly method of promotion, it is most effective in generating prescriptions, the principal mover of pharmaceutical goods. Like all technological products, pharmaceutical products, need to be promoted on one-to-one basis. Medical Representatives (MRs) or Professional Sales Representatives (PSRs) are the most direct point of contact with the physicians. All pharmaceutical companies employ, directly or indirectly, medical representatives to promote and sell their products In fact 50% of the total expenditure on promotion is on account of the medical representatives and the managers who control and guide their activities. Similarly, in North America and Canada, one third of the company's budget is allocated to the sales force.

Large pharmaceutical companies worldwide employ 2,500 to 8,000 medical representatives. In India, it is estimated that around 50,000 medical representatives are employed by the pharmaceutical industry; and this number is constantly increasing. Samuel Kelley, a doctoral candidate at Kelley School of Business puts the estimate of keeping a medical representative in the field in US at US$ 150,000 in terms of direct expenses.[32] Another estimate is of around US$ 100,000 per annum for recruiting, training and supporting a medical representative.[28] The medical representatives are also referred to as 'detail men' and it is estimated that cost of detailing itself adds US $ 1.15 to each prescription in Canada.[33]

It is evident that most pharmaceutical companies spend 10-15% of their sales revenue on the medical representatives; and the trend on such expenditure is on increase. It could be safely concluded that this must be rewarding, otherwise the pharmaceutical companies would not continue spending huge amounts on them. It would be interesting to find out what is the return on the expenditure on the sales force of the pharmaceutical industry

ROI (Return on investment) is the measure to evaluate the efficiency of medical representatives. Leslie Harris, a pharmaceutical consultant, states that he was told by a national director of sales for a pharmaceutical manufacturer in US, that his average representative earned 100 times the costs associated with him.[34] This statement threw up an interesting debate on the ROI generated by sales force of pharmaceutical industry.

There are just too many variables in today's complex mixture of costs, profits, expenses, compensation and incentives The medical representatives are not only paid salaries but all their actual and sometimes hypothetical costs are reimbursed In addition, they also earn commission, incentives and other cash awards when they overshoot their sales targets Douglas McCormick of Physician Verification Services Inc. avers that a ROI of 100 to 1 is a little high. A 1993 OTA study "Pharmaceutical R&D costs, risks & rewards" concluded that the sales and marketing costs for an ethical pharmaceutical company average at about 22.5% (ranging from 17% to 25%). The detailing cost contributed to around 75% of this amount. It could be ascertained that about 17% of the total sales went to support the detailing efforts To sum up, it can be said that the most logical figure for ROI would be around 6·1.[35]

Dana Fabro argues that presuming that the ROI for sales force is 100:1, the average medical representative's territory should yield at least US$ 10 million in profit, when measured as a profitability ROI or US$ 10 million in sales if measured as a benchmark for sales. Looking to the average sales output of a medical representative, the ROI can be presumed to be around 10-20:1.[36] Samuel Kelley claims that considering the direct expenses of a medical representative at around US$ 150,000, a good sized territory should yield around us$ 2.5 million in sales excluding the institutional sales. He argues that 100:1 ROI is achievable only if one has a particularly highly profitable product with broad adoption potential, and the medical representative is assigned a large geographical territory. For such a high ROI, the product should not be well adopted or near the early phase of its diffusion trajectory. At this juncture, the efforts of limited sales force can appear to have a very strong effect.[31] Umar Syed complements the observations made by Kelley and adds that in order to assign a meaningful ROI to a medical representative, the only return attributable to a medical representative is the 'incremental' sales generated by him. He further stresses that the best way to judge this would be to look at some territories as "control" that are minimally or not covered by MRs and compare them to adequately covered territories. He is confident that the ROI on such incremental sales is quite closer to 3-6:1 rather than 100:1.[37]

1.4.3 Advertising and promotional information expenses

Besides the direct expenses on the sales force, the pharmaceutical companies spend heavily on samples, free-bonus goods, promotional literature, physicians' conferences, seminars, CME programmes, physicians' entertainment etc.

A survey by *A & M* on advertisement and marketing spends compared the data for 1997-98 and 1998-99. The overall marketing spends by the top 200 Indian companies rose by 17% over the previous year. As against this, the sales rose only by 2%. The drugs and pharmaceutical industry, as a whole, registered a hike of about 17% in marketing expenditure. The absolute expenditure on advertisement and marketing spends increased from Rs.6.83 billion to Rs.7.96 billion. The drugs and pharmaceutical industry topped in absolute spend values on advertising and marketing. **Appendix 13** displays a chart depicting the advertisement and marketing spends of top industrial sectors.[38]

Appendix 14 lists the advertisement and marketing spends of some of the leading drugs and pharmaceutical manufacturers. While drugs and pharmaceutical companies spend comparatively less amount on advertisement, their main expenditure is on marketing; which comprises mainly of money spent on generating prescriptions. The data in **Appendix 14** reflects spends on promotional literature, sponsorship of CME programes and hospitality to medical profession. It excludes spends on free samples, free/bonus goods and direct expenses on the sales force. The overall samples cost is reported to be around 4% of the revenue of the industry.

Though in India, Direct-to-consumer advertisement of prescription drugs is not allowed, in USA, it has been allowed by the FDA, for some categories of drugs. Nevertheless, in India, advertisement of over-the-counter (OTC) medicines is permitted; and companies manufacturing OTC preparations are visible in the media, with their aggressive advertisement campaigns. Companies like Amrutanjan,

SmithKline Beecham Pharma and Parke-Davis (India), as listed in **Appendix 14**, do spend on advertisements to promote their OTC products.

A typical pharmaceutical industry in India spends around 10-11% on direct costs on sales force, 9-10% on advertisement & promotional efforts, 4% on free samples, and11-13% on free/bonus goods. The per capita consumption of medicines in our country is among the lowest in the world. There is a large population of masses in our rural areas, who are not fortunate enough even to afford or avail the basic healthcare services. Their reach can increase only if the cost of medicines can be brought down. The major contributing factors to the cost of medicines are the material inputs, manufacturing and quality assurance costs and the marketing and distribution costs. While material input costs in India are amongst the lowest in the world, and the manufacturing & quality assurance costs cannot be compromised, it is the marketing costs, which are an easy target, need to have a re-look.

Prescription generation is at the heart of the pharmaceutical business. If business is marketing, in the pharmaceutical industry, the prescription-generation is the whole essence of marketing and the ultimate force behind pharmaceutical business. Thus, almost the entire marketing cost in the pharmaceutical industry relates to the prescription generation cost. If this cost could be curtailed to some extent, the medicines could reach the ailing masses of our country.

1.5 THE PRESCRIPTION AND THE PRESCRIBING PROCESS

1.5.1 Prescription

The prescription is an important therapeutic transaction between the clinician and the patient. It reflects the diagnostic skills and the therapeutic expertise of the clinician. For the patient, it transpires into palliation or restoration of health. However, it has to be routed through the pharmacist who will convert the prescription order in the form of compounded medicine, which the patient can take. The prescription order can be therapeutically useful only if properly communicated to the pharmacist and also contains clear, understandable instructions for the patient as regards the administration of the medicine.[5]

The word prescription has its genesis in two Latin terms; '*pre*'-'before' and '*scribo*'-'I write'. It is defined as the formula, which a physician writes specifying the substances he intends to administer to the patient.[6] Latin language was widely used in the older days for writing prescriptions; because it was the language which was understood to a large extent by the civilized world. However, later on, with the advancement of the medical sciences in United States, English language became the preferred language for prescription writing.

Traditionally a model prescription has a definite pattern, which facilitates its interpretation. A prescription consists of the following major parts.

1. *Date*: The date on which the prescription is written is very important. The controlled category drugs cannot be refilled six months after the date of prescription issuance. The date is generally written on the right hand top of the prescription form

2. *Name, address and the age of the patient:* These are essential details without which the prescription may be dispensed to some one else for whom the prescription is not intended. The specification of age helps the pharmacist in monitoring the dose of the medicine to be dispensed. The pharmacist is obliged to mention the name and address of the patient either on the label of the medicine if it is compounded in the pharmacy; or in the invoice/bill if the medicine is pre-compounded. For Schedule X drugs, the pharmacist is required to maintain a separate register, wherein he has to enter the name and address of the patient.
3. The Superscription or the symbol ℞: The symbol ℞ is an abbreviation for 'recipe', which is the Latin for the word 'take thou'. The word 'take thou' is the imperative form of the Latin word 'recipio'. The use of the inclined stroke upon the tail of the ℞ can be traced to the days of the Roman Empire, which symbolizes an abbreviation for an invocation representing a prayer to the favourite deity. The sign of Jupiter, the chief mythological divinity of the Romans, was used earlier; which was later on replaced by R. However, the last stroke of the symbol of the all-powerful Jove still continues to remain in practice.
4. The inscription or the Drug, Strength and Inert Additives: This is the body of the prescription and contains the name and strength of the prescribed drugs. It is the most important part of the prescription and calls for the greatest amount of care. The names of drugs prescribed are generally written in English. Abbreviations are avoided as a rule; as their use may lead to error in dispensing. The prescription order may contain more than one drug to be dispensed; and on such events the name and amount of each drug is written together on a line directly under the preceding one. Nowadays almost 99% of the prescribed drugs are pre-compounded. Only in 1% of the cases, the drugs need to be compounded by the

pharmacist. In our country also, compounding by the pharmacist is almost redundant. Majority of the prescriptions are for pre-compounded medicines manufactured by the pharmaceutical organizations.

5. *Directions to the Pharmacist* In this part, the physician directs the pharmacist as to the details of the compounding of drugs and the quantity of the drugs to be dispensed. In case of pre-compounded drugs, only the quantity to be dispensed is mentioned. For example, the statements like: "20 tablets", "5 vials" or "Make a solution..." etc. are included.
6. *Directions to the Patient:* The directions to the patient are written in English or in the vernacular language for the benefit of those patients who cannot read English. These are a set of instructions to the patient as to the amount of drug to be taken, the time and frequency of the dose; and also other factors like whether the drug has to precede the food or to be taken after the food or the advice as to what should be co-administered with the drug.
7. *Refill Information:* Ideally, the physician should depict his wish as to whether the prescription can be refilled, irrespective of the fact that the prescription is for controlled category drugs or not. Specific refill instructions help avoid misuse of drugs, either overuse or abuse. The prescriptions for narcotic substances cannot be refilled and hence refill instructions on such prescriptions have no relevance.
8. *Signature:* The prescription order becomes complete, only when the clinician puts his signature on the bottom of the prescription form. The name, complete address, the professional degree and the registration number of the clinician must appear along with the signature

A model prescription order form appears at **Appendix 2.**

The prescription orders can be broadly classified into two groups, based on the availability of the prescribed medicines:

1. *Pre-compounded prescription order*: Such an order calls for a drug or a mixture of drugs compounded and supplied by a pharmaceutical company by its official or a proprietary name in a form that the pharmacist dispenses without pharmaceutical alteration
2. *Extemporaneous prescription order:* While issuing such prescription order, the physician mentions the drugs, doses and the pharmaceutical dosage form; and the pharmacist complies with his directions. [5]

As soon as the diagnosis of a patient is made, the physician is faced with the challenge of deciding the treatment mode. If the treatment mode, along with other tools, comprises drug treatment, then the physician is required to prescribe.

The prescription is a decision, and like all decisions, it involves choosing amongst alternatives. The alternatives are with respect to: which drug to prescribe (the choice of molecule) and which brand to prescribe.

1.5.2 The prescribing decision: Rational or Emotional?

A physician is required to be reasonably well informed about pharmacological attributes of a drug molecule. In a given situation, he is the best judge to choose the right drug. While the ultimate consumer of medicines is the patient, the physician is empowered to decide on the behalf of the patient. Learned as a physician is, he is expected to exhibit a rational decision process, while making out a prescription.

A rational decision, as the connotation implies, is one, which is taken after taking into consideration all available information about the alternatives available to choose from. While in the medical school and thereafter, he is properly trained in pharmacology, the science of drugs; and he is also aware of the arsenal of different drug molecules and their brands, he is to choose from. The choice of the drug molecule is dependent on numerous variables: the patient's pathological history, physical condition, the disease, drug sensitivity, age, repertoire of available drugs in the market and patient's economical background. The choice of brand is also dependent on a number of variables, like company variables, MR variables, promotion and advertisement, cost of a drug and feedback from earlier use.

A rational decision is one when the process of decision-making is logical, with pre-conceived clear objectives before the decision maker, who evaluates all the alternatives available and matches his needs with the need-satisfying capabilities of the product/service and makes his decision accordingly. Whereas, the emotional decision is one when the decision maker is swept away by product attributes or advertisement appeals that have no relevance with the need-satisfying capabilities of a product. It however should be pointed out that rational decision and intelligent decision are not always identical. The same applies to emotional decision and irrational/unintelligent decision making. More often than not a decision making process is a combination of rational and emotional factors.

Marketers believe that the prescription decision is just that: a combination of rational and emotional processes.[23] The physician's choice of the drug molecule for drug therapy is a rational decision, while his choice of brand is an emotional decision.

To illustrate, consider a situation wherein the physician diagnosed malarial infection in a patient. The blood examination has confirmed that the infection is caused by P.falciparum strain and the quantum of RBCs affected exceeds 5%. The cerebrospinal system is also affected and the patient is not fully conscious. The physician has to decide for a drug, which will act fast to eradicate P. falciparum parasites from the cerebrospinal system. It has to be a schizontocidal drug which can tackle even the resistant strains of P. falciparum parasites. After scanning his knowledge base, he decides that, Arteether is the drug of choice in the given circumstance. The physician knows that this drug is in the injectable form, which would deliver the active moiety into the system quickly, will eradicate the parasites fast and will kill even the resistant strains of the parasites. Thus so far, the decision is rational; as the physician has decided the right drug and the right dosage form from among the arsenal of available weapons: chloroquine, quinine, pyrimethamine, sulphas, artesunate, arteether, mefloquine etc.

However, the rational decision making process ends here. When it comes to deciding the brand to be prescribed, it is probable that his decision may be more emotional than rational. His decision may be influenced by such factors as: the pleasant mannered medical representative, the gifts and trinkets offered by him, the corporate image of his company, an easy to remember brand name, the frequent reminders of the brand through seminars, CME programmes etc.. These attributes have nothing to do with the need satisfying properties of a product.

Psychologists say that every decision making process creates some amount of stress or tension or dis-equilibrium for the person who has to make the decision. This

stress is, of course, transient, and once the decision is made it vanishes. Prescription is also a decision, which exerts transient stress on the physician. A physician is much concerned for the health and well being of his patient and his objective in prescription decision is to relieve the patient, as quickly as possible and with the least side effects, of the ailment afflicting him. Obviously, he has to process all the information gathered by him from various sources and take the right decision for accomplishing his goal of treating the patient correctly.

Prescription is a powerful tool and it is the reflection of the will of the treating physician to cure the patient. It is not a simple decision, as many a variable are at play while the physician makes his choice. The clinical manifestations of the disease and the behavioural characteristics of the patient, his drug history, duration of disease and its progress are the clinical factors which may affect the choice of the drug. The patient is also an important factor, whose attitudes towards a specific treatment regimen and the physician may also affect the prescription decision. A Physician's own knowledge and training are also constraining factors. Doctor-patient relationship, and the organizational context of the doctor-patient interaction limit the choice of the drug Similarly the price and availability of drugs may restrict the physician's choice.

Contemporary knowledge lacks in explaining the emotional aspect of the prescription decision. However, thanks to the new discoveries in the field of neurology, the pioneering work of Dr. LeDoux helps us in understanding the emotional aspect of the prescribing process.

1.5.3 The Anatomical basis of emotional aspect of prescribing process

Daniel Goleman, in his landmark work titled "Emotional Intelligence', explains in details the anatomical basis of human emotional behaviour. He states that in humans, amygdala (from the Greek word for 'almond') is an almond shaped cluster of interconnected structures placed above the brainstem, near the bottom of the limbus ring. There are two amygdalas, one on each side of the brain, nestled towards the side of the head. The human amygdala is relatively large compared to that in any of our closest evolutionary cousins, the primates. Goleman postulates that emotional decisions are on account of neural take over which originates in the amygdala, a center in the limbic brain. His theory is supported by recent research, which supports the knowledge that while the limbic structures are responsible for all our learning and remembering, the amygdala is the specialist for emotional matters. It has been observed in scientific experiments that when the amygdala is severed from the rest of the brain; the result is a striking disability to measure the emotional significance of events, a condition, which is sometimes referred to as "affective blindness".

The amygdala acts as a repository of emotional memory. Dr. Joseph LeDoux, a neurosurgeon at the Center for Neural Science at New York University, was the first person to discover the key role of the amygdala in the emotional brain. Dr. LeDoux 's innovative methods and technology have attained new level of precision in mapping the brain at work. His discovery on the circuitry of the emotional brain has set aside the age old concepts about the limbic system being in charge of the human actions; while recognizing the important role of amygdala in emotional behaviour of human

beings. In fact, the working of amygdala and its interplay with the neocortex are at the heart of emotional intelligence.

The rational decision making process of a physician ends when he decides the drug molecule he would like to prescribe to a particular patient in a particular disease condition. When he steps on to decide on the brand to be prescribed, the impulsive feeling overrides the rational mind; and here the newly discovered role for the amygdala is pivotal. While stressing the role of amygdala, Goleman states, " In one of the most telling discoveries, about emotions, of the last decade, Dr. LeDoux's work revealed that the architecture of the brain gives the amygdala a privileged position as an emotional sentinel, able to hijack the brain. His research has shown that sensory signals from eye or ear travel first in the brain to the thalamus, and then-across a single synapse-to the amygdala: a second signal from the thalamus is routed to neocortex–the thinking brain,. This branching allows the amygdala to begin to respond before the neocortex, which mulls information through several levels of brain circuits before it fully perceives and finally initiates its more finely tailored response." [22]

LeDoux's research is the first of its kind in mapping the pathways, which are at play when the feelings bypass the neocortex These feelings take a direct route through the amygdala; and this circuit explains the power of emotion to overwhelm rationality. He discovered that a small bundle of neurons led directly from the thalamus to the amygdala. This smaller and shorter pathway, a kind of a neural back alley, enables the amygdala to receive some direct inputs from the sensory organs and initiate a response before the sensory inputs are fully registered with the neocortex.

Goleman states that Dr. LeDoux told him, " Anatomically, the emotional system can act independently of the neocortex. Some emotional reactions and emotional memories can be formed without any conscious, cognitive participation at all. The amygdala can house memories and response repertoires that we enact without quite realizing why we do so because the shortcut from thalamus to amygdala completely bypasses the neocortex. This bypass seems to allow the amygdala to be a repository for emotional impressions and memories that we have never known about in full awareness."[22]

Other research has demonstrated that in the first few milliseconds of our perceiving some situation, we not only unconsciously understand it, but also decide whether, we like it or not. The 'cognitive unconscious' makes one not only aware of a situation, but also of an opinion about it. Our emotions have a mind of their own, which can hold views quite independently of our rational mind. Such unconscious opinions are emotional memories and their warehouse is amygdala.

Research by Dr. LeDoux and other scientists has demonstrated that the hippocampus, which has been viewed upon as the key structure of the limbic system in the brain, is more involved in registering and making sense of perceptual patterns than with emotional reactions. Hippocampus provides keen memory of the context of a perception. It provides dry facts, whereas the amygdala retains the emotional flavour attached to those dry facts. Thus the hippocampus remembers the pharmacology, pharmacokinetics, dosage schedules, adverse reactions, precautions, indications and contra-indications of a drug molecule, the amygdala registers and remembers the personality of the MR of a company, the gifts and

trinkets offered by him, the brand equity of the product, the corporate image of the company offering the drug and the samples presented by the MR. The amygdala also remembers the long and honoured relationship with the MR and his regular visits and occasional favours. His brand is at the top of the mind, i.e. at the top of the emotional memory.

The arousal of amygdala seems to imprint in memory most moments of emotional arousal with an added degree of strength. The more intense the arousal of amygdala, the stronger the imprint of the memory. This leads the scientists to believe that the brain has two memory systems; one for ordinary facts and one for emotionally charged ones.

The neocortex response is slower in brain time than the hijack mechanism of amygdala. Obviously, it is because of the fact that it involves more circuitry. It is also generally more judicious and considered, as more thought occurs before feelings can overtake. Thus when we become sad after a loss or feel happy about some success, it is the neocortex, which is at work, rather than amygdala.

Goleman concludes that the connections between the amygdala and the neocortex are the hub of the battles or cooperative treaties struck between head and heart, thought and feeling. The circuitry explains why emotion is so crucial to affective thought, both in making rational decisions and in simply allowing us to think clearly. Neuroscientists use the term "working memory" for the capacity of attention that holds in mind the facts essential for completing a given task or problem. The prefrontal cortex is the brain region responsible for working memory. The emotions

ultimately are the matter for rationality. In the interplay of 'feeling' and 'thought', the emotional faculty guides our moment-to-moment decisions, working in tandem with the rational mind, enabling or disabling thought it self. Similarly the thinking brain plays an executive role in our emotions. Thus in a sense, we have two brains, two minds and also two different kinds of intelligence: rational and emotional. While a physician makes the decision about the drug molecule for therapy, the rational mind is in the forefront. But the emotional mind may take over when he decides the brand of a product

1.5.4 Prescription behaviour Models

Dr. James Couch, in an article published in *Drug Benefit Trends*[39] has attempted to analyze the prescription behaviour of clinicians through a Model approach, which is based on the stages of healthcare marketplace. These stages range from physician driven prescribing and restrictive formularies to integrated systems practice guidelines and outcomes-validated prescription-decision support system.

The study takes into account the evolvement of pharmaceutical marketplace in past several decades in US. According to the study, the evolution of the marketplace has been through four distinguishable stages:

1 The professional practice model
2. Managed payment
3. Organized care/economies of scale
4. True medical management

The professional practice model is what the senior physicians would like to refer to as, 'the good old days". During this stage the physicians and the patients had the privilege of choosing physicians, hospitals, medications and procedures. Medical care was considered a social welfare; and very few societal, regulatory and financial constraints were exercised by either the public or the private sector. The patients believed in the adage, "Doctor knows the best" The professional practice model prevailed in US during 1960s and 1970s

Managed payment system represented the second stage of development As the medical costs increased at a pace of 15 to 20% during the sway of professional practice model, the large corporations faced severe financial constraints. The smaller companies were more affected, as in their case the costs increased at double the pace. Therefore in the areas where the smaller companies were operating, the managed care system gradually evolved. Managed care system was perceived as a system which not only placed restrictions on the payment, but also placed restriction of choice, especially among physicians and their patients. The restrictions were felt more in patient's choice of physicians, hospitals, procedures and medications. During this period pharmacy benefit managers (PBMs) emerged as facilitators for the corporations. As this stage further evolved, some PBMs were bought over by large pharmaceutical companies, e.g. Medco Containment Services by Merck & Co., Diversified Pharmaceutical Services (DPS) by SmithKline Beecham PLC.

Organized care or economies of scale emerged as the third marketplace stage. It grew as a natural reaction to the growing consolidation of purchasing power. During this stage individual hospitals, physicians groups, outpatient centers, sub-acute and

long-term care facilities, and home care agencies came together to form nascent integrated delivery systems. Although incompatibility of systems, cultures and politics were the barriers to development of organized care, which aimed at achieving economy of scale, those organizations, which succeeded finally evolved to the final stage, the True medical management.

The fourth and the last stage called the True medical management is what all the participants in the healthcare- the stakeholders, the providers, the patients or the beneficiaries-should aspire. It is the stage of true accountability when both the quality and costs of care in the community can be demonstrated. The focus in this stage will again go back to the physicians and the patients, to provide them with the tools and the information to make the best possible clinical decisions.

True management care is characterized by integrated clinical and financial outcome measurement to demonstrate the comparative value of care delivered by various providers to defined populations of patients across the care continuum.

The four stages of healthcare marketplace have significant influence on the prescription behaviour of the clinicians. For example, stage I is characterized by physician driven prescribing. The only formularies are individual physician's own formularies, based on the philosophy that, "the doctor knows the best".

The second stage is characterized primarily by 'cost management'. The cost management is effected by PBMs' formularies, which restrict the physician's choice of medications and procedures.

Stage III evolved in the context of ever growing integrated delivery systems. These systems developed their own formularies to influence the choice of the physicians and the patients in terms of hospitals, medications and procedures.

The advancement of the integrated systems finally catapults the marketplace into stage IV, which is characterized by outcome-validated physician and patient clinical-decision support systems to guide physician prescribing and patient compliance to achieve optimal results per dollar expended.

In India, the pharmaceutical marketplace is still dominantly stage I, i.e. professional practice model. The physicians and the patients have a large choice in terms of physicians, hospitals, medication and procedures. Nevertheless, as the medical costs are increasing very steeply, the second stage, i.e the managed care system, has started evolving which is manifest by advancement of 'Mediclaim' insurance systems in India. It can be envisaged that gradually the second stage, which is presently in its nascent phase, will evolve in our country.

Another Model approach developed by David Armstrong, reader in sociology as applied to medicine and his research fellow, Hugh Reyburn, helps to understand the changes in prescribing behaviour of clinicians.

His study concluded that various factors are involved in physicians' decision to change their prescribing habits. He identified three models of change, which can have important implications for the design and evaluation of interventions aimed at behavioural change.

Model 1 The accumulation model of change:

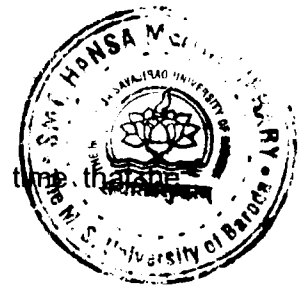
This model envisages change in prescribing behaviour as a slow process caused by accumulation of knowledge in a certain direction. The accumulation model depended on two factors: one, the sheer weight of pressure due to articles, talks, consultant's letters, etc; the other, the relative authority of these various sources of influence. One of the most authoritative sources of influence was found to be the clinician's own personal experience of a particular drug or illness.

Model 2 The challenge model of change

Generally the change in prescribing behaviour came at the end of a gradual accumulation of knowledge. However, some shifts in the prescribing behaviour were brought about by a more immediate challenge. This mechanism worked differently from the slow adaptation of knowledge accumulation in that it was the very lack of preparedness of the physician that caused the rapid reassessment of prescribing policy. The most striking examples were, 'medical disasters' brought about by adverse drug reactions hitherto not experienced or unexpected success of a treatment course.

Model 3 The continuity model of change

This model characterizes the preparedness of the clinician to change the prescribing behaviour in contrast to the earlier models. In this case the physician is prepared to change the prescribing habit and is waiting for the right cue. For example, in David Armstrong's study, one physician conceded that he started prescribing an anti-fungal shampoo after he saw a distinct advertisement showing a man with mushrooms growing from the top of his head. The physician did agree that he had been looking



for an anti-fungal shampoo for quite some time and it was the first time that he realized that one was available.

A second form of preparedness to change is a clinician's responsiveness to cost pressure. Although few doctors admit explicitly to bend to the cost pressure, but some doctors do mention an inclination to think in this direction. The third factor in facilitating a change can be the deliberation of a clinician whether a new drug 'makes a sense' or not.

Most physicians appear to try out the new prescriptions tentatively while looking for reinforcement of their behaviour. The most common reinforcement came in form of patient feedback. A patient's positive report reinforced the behavioural change, but a negative result like a serious side effect was often enough to discontinue prescription.[40]

1.5.5 Prescriber motivation

The question that bothers the marketer is: What are the tools that help a marketer to favourably affect the emotional memory of a physician. If he can choose the right tools and mix them in the right proportion, he can succeed in favourably affecting the emotional part of the prescription process.

Once a product has been successfully placed in the upper echelons of the emotional memory of a physician, the prescription is automatic. The product becomes top of the mind brand and the prescription automatically flows from the prescriber's pen.

Regular analysis of the prescribing behaviour of the physicians arms the marketer with the understanding to prepare cost effective strategies for competing in the market place. The competition in the Indian pharmaceutical market is severe and the physicians are constantly exposed to competitive stimuli aimed at changing their prescription habits.

What motivates the physician to prescribe a particular brand? What factors influence the prescription decision process of the physicians? These are the questions that are attended in the forthcoming chapter.

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