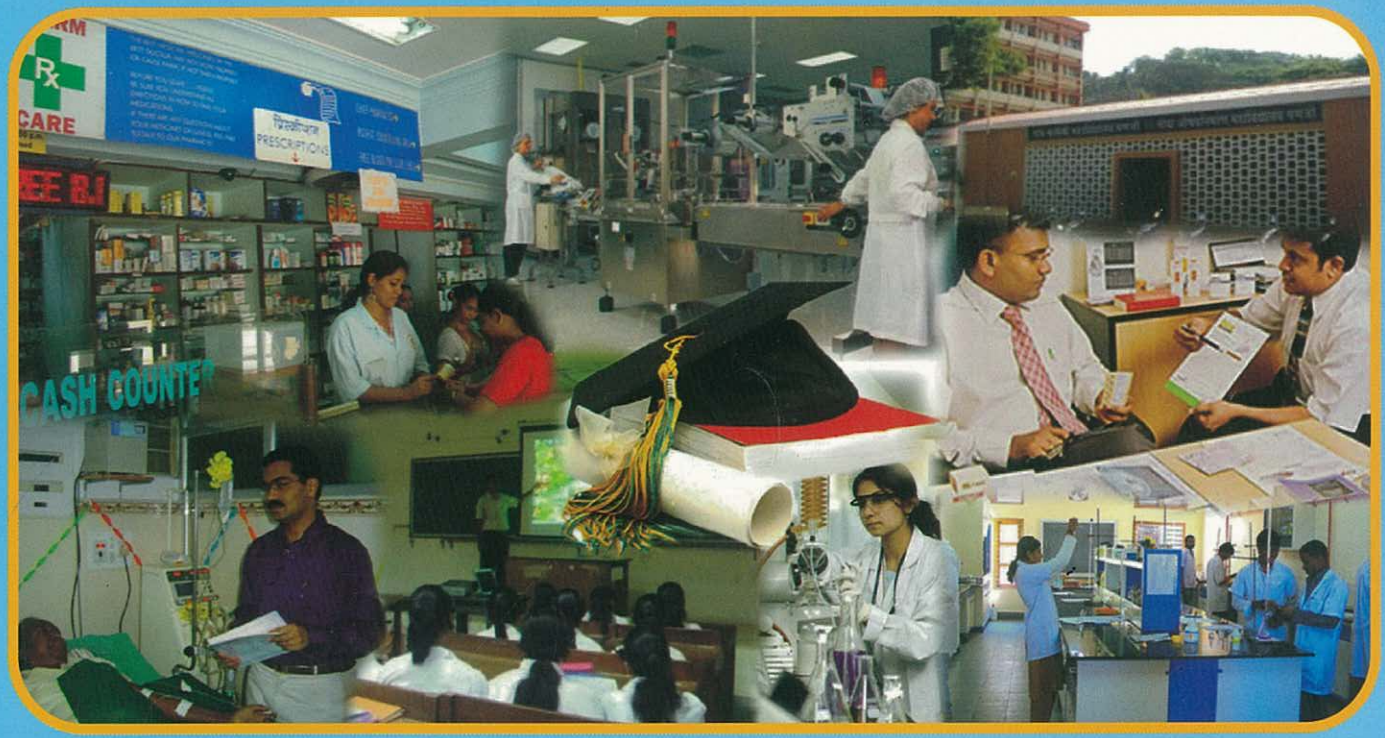
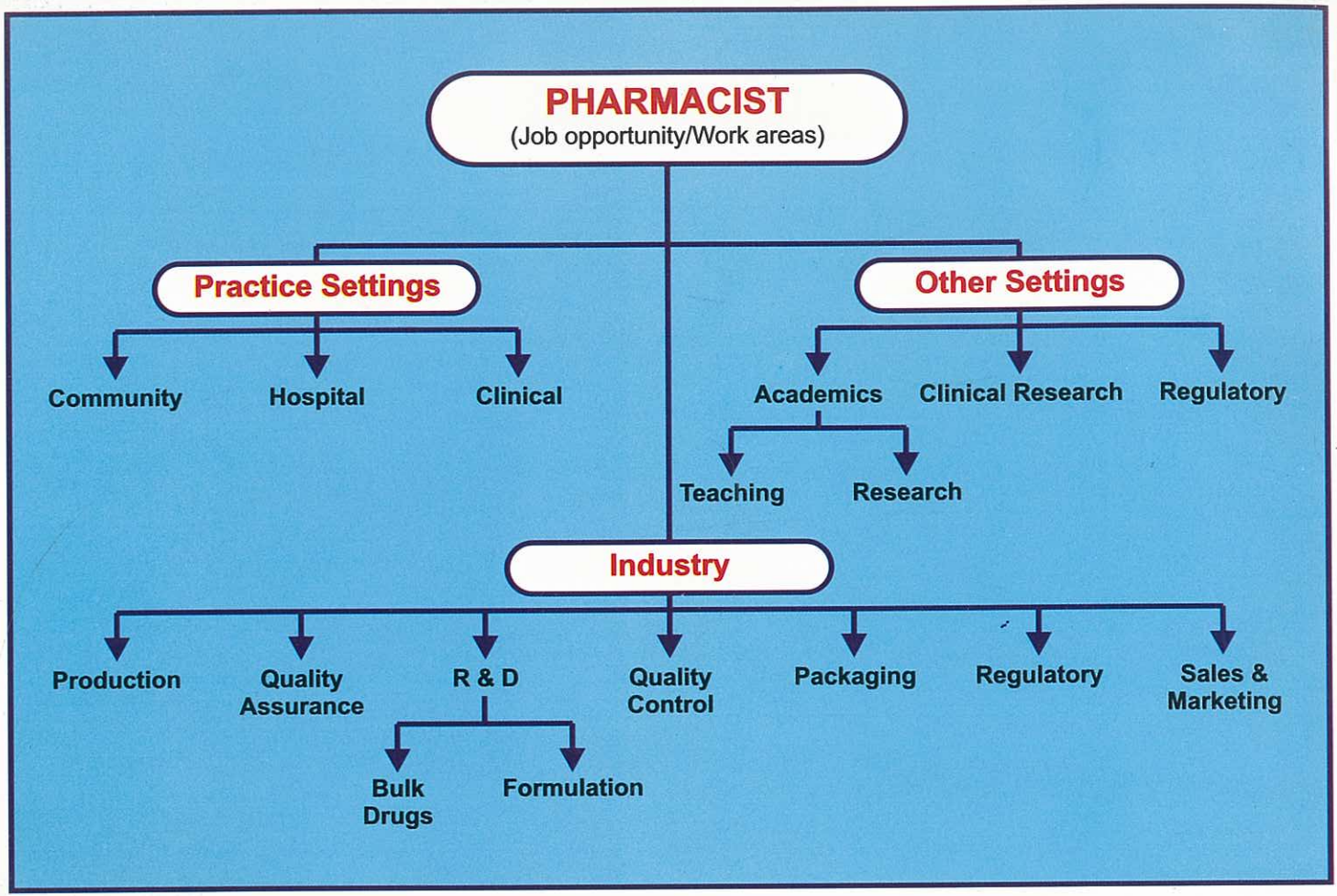
Rx A CAREER IN PHARMACY



Indian Pharmaceutical Association

NOVEMBER 2009

Pharmacy Council of India


PHARMACIST
(Job opportunity/Work areas)
Practice Settings
Other Settings
Community
Hospital
Clinical
Academics
Clinical Research
Regulatory
Teaching
Research
Industry
Production
Quality Assurance
R & D
Quality Control
Packaging
Regulatory
Sales & Marketing
Bulk Drugs
Formulation

I am a Pharmacist

I am a specialist in medications

I have information about virtually all the specific drugs and several facts about them.
I can prepare, compound and provide medicines and pharmaceuticals.
I sincerely attempt to keep myself abreast of current developments in my profession.

I am a companion of the physician

I am a counselor on the merits and demerits of different therapeutic agents.
I am the link between physician and patient and the final check on the safety of medicines.

I am a counselor to the patient

I help the patient understand the proper use of medicaments.
I assist in the patient's choice of nonprescription drugs or in the decision to consult the physician.

I am a guardian of public health

I encourage and promote sound personal health practices.
My professional services are available to all at all times.
I obey the laws governing the practice of pharmacy and support their enforcement.

This is my calling. This is my pride.

A CAREER IN PHARMACY

INDIAN PHARMACEUTICAL ASSOCIATION

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Index

Foreword

The motivation for this booklet "*A Career in Pharmacy*" has arisen to illustrate the diversity of ways in which pharmacy education and training can be applied. The booklet is intended for the new entrants to pharmacy education, existing pharmacy students and their parents, teachers and all pharmacy professionals for deeper understanding of various career opportunities for pharmacists. The booklet gives an insight of ***"Yesterday, Today, Tomorrow"*** of pharmacy profession.

The introduction of Pharm.D. Programme in India in 2008 has led to emergence of clinical pharmacy practice in the country, thus opening new career avenues for pharmacists. The PCI is in the process of framing ***Pharmacy Practice Regulations*** thereby giving statutory backing to pharmacy profession as a practicing profession in line with doctors, dentists, nurses etc. This will enable the pharmacist to work as ***Consultant Pharmacist*** as a member of the health care team.

Further the biotechnological research has added a dynamic potential to the profession of pharmacy. The investment in research and development is envisaged to expand at a fast pace. Multinational joint venture partnerships have given a thrust to this growth. Increasing number of hospitals, nursing homes and pharmaceuticals companies all over the country is a clear indication of the growing scope in pharmacy profession thus offering excellent and rewarding career opportunities both by way of jobs as well as in terms of starting own business.

In future we may have to work on special career opportunities like Nuclear Pharmacy, Nutrition Support Pharmacy, Oncology Pharmacy, Psychiatric Pharmacy, Forensic Pharmacy etc, for which, an extensive dialogue with all the stakeholders will be required.

I hope all will find this publication of great value, informative and inspirational to promote pharmacy profession in the country. Let us all work together in this direction.

Prof. B. Suresh
President
Pharmacy Council of India
&
Indian Pharmaceutical Association

INTRODUCTION

Pharmacy is a versatile, dynamic, growing, and increasingly diverse profession, one which creates an excitement because there are so many opportunities for service. It is an age old profession which has transformed into a hub for "Global Healthcare" and evolved as a multidisciplinary and multifaceted field in recent times. With the phenomenal rate of advances in the pharmaceutical industry, the health sector has thrown open a sea of opportunities for pharmacy professionals.

Unfortunately, in the eyes of the public, the role of the pharmacy profession and its contribution to health care are often not duly recognized and even misunderstood. This is possibly because both public and policymakers believe that pharmacists' role is restricted to merely buying and selling of medicines (like that of a salesperson in any ordinary shop). However, as we shall see, there is a lot more that *pharmacists* do to contribute to the health of the nation.

Pharmacists work in a wide variety of health care settings: in the pharmaceutical industry (carrying out a wide range of activities – from R & D to manufacturing to quality control, packaging, quality assurance, etc.), in practice settings (hospital & community i.e. retail pharmacy), in academics, regulatory affairs, clinical research.

Pharmacists are health care professionals whose professional responsibilities include seeking to ensure that people derive maximum therapeutic benefit from their treatments with medicines. This requires them to keep abreast of developments and advances in knowledge & technology related to manufacture & use of medicines, professional standard requirements, laws governing pharmacy, etc.

While by nature of work/practice, many *pharmacists* work silently behind the scenes, some of them who are in direct contact with patients represent the face of the pharmacy profession. Thus, pharmacy is a product, as well as a service-

related discipline, increasing its scope two-fold. It is a noble profession which unfolds a vista full of opportunity leading to a golden future for a young career aspirant.

As proof of the public's confidence in their *pharmacists*, the profession is continually ranked by the Gallup Poll (conducted in the USA) as one of the most trustworthy profession*. Holding such a respected place in the healthcare system is a point of pride among *pharmacists*, earned through their dedication to ending pain and suffering.

Pharmacists represent the 3rd largest healthcare professional group in the world, and in India today there are around 8 lakh *pharmacists*, working in various positions, applying their unique knowledge and skills, contributing to the health of the nation.

Pharmacists enjoy substantial rewards for their efforts - professional satisfaction as well as monetary. The remuneration varies depending on field of work chosen, geographical location, work responsibility, skills and experience.

Through this booklet, we hope to reach out to the young aspirants and the general public, and give them an overview of the various facets of the pharmacy profession, the various career options and job opportunities, to help make informed choice as to whether to take up pharmacy as a career or not, and also to make the public aware that *pharmacists* are *important* members of the health care profession, and there is a need to make the best use of their services in order to improve patients' quality of life !

Pharmacists serve in all areas of health care, and we hope that this booklet will open a wide vista of choices for you.

◆ ◆ ◆

*Salvatore J. Giorgianni, **Full preparation: The Pfizer guide to careers in pharmacy.**

HISTORY OF PHARMACY

Traditionally, pharmacy has been known as an *art and science of making medicines* (also called drugs). The word pharmacy is derived from the Greek word 'PHARMAKON', meaning 'drug'. The profession of pharmacy is perhaps as old as human civilization. In the ancient periods, the physicians themselves practiced pharmacy and it is believed that Hippocrates, the great Greek physician, regarded as father of medicine, used to make his owns prescriptions, or at least, supervise their preparations.

Apothecary is a historical name for a medical professional who formulates and dispenses medicines to physicians and patients — a role now served by a *pharmacist*. The earliest pharmacies were known as Apothecary shops. Here the medical professional prepared and dispensed medicines to physicians and patients. The earliest apothecary shops were in Baghdad and then they were seen in other countries across the world. Slowly, as each professional specialized, physicians moved away and apothecary shops were taken over by *pharmacists*. Today's chemists or *pharmacists* are modern day apothecaries.

The increasing complexity of medical formulae and the criticalities and labour involved in making them, prompted the separation of pharmacy from medicine. Initially, the function of pharmacy was delegated to the assistants of physicians. The separation of pharmacy from medicine was gradual and was officially separated from medicine for the first time in 1240 AD. The main reason for this separation was the need of special knowledge, skill, initiative and responsibility required for making medicines.

Pharmacists extemporaneously compounded most of the medicine needs of the people. They made preparations like

mixtures, ointments, pills, tinctures, syrups, elixirs, powders, etc. in their pharmacy, based on prescriptions given by physicians. They packed them suitably, labeled them and dispensed them along with appropriate advise for consuming them.

Like other countries, in India too, pharmacy was part of medicine in our Ayurvedic and Siddha system of medical practice. The physician himself was philosopher, physician and *pharmacist* all combined in one.

The revolution in the development of science and technology in post-World War II saw a sea of change in the pharmacy profession. Much of the work of the *pharmacists* was taken over by the pharmaceutical industries. Medicines of good quality at economical rates were made available through large scale production. The *pharmacists* were no longer were required to prepare & supply medicines on the basis of a prescription to an individual patient or at the latter's request.

As it stands today, the pharmaceutical industry has made giant strides in manufacturing medicines of the highest quality, and of world class standards.

Pharmacy being a very important profession, the independent Government of India enacted *'The Pharmacy Act'* to control pharmacy profession as well as education, in 1948.

Pharmacy education in India at the certificate level, was started in 1842 in Goa by the Portuguese, and as a University level programme in 1937 at the Banaras Hindu University (Varanasi). Since then, many institutions and universities have been offering programmes ranging from Diploma in Pharmacy to Doctor of Pharmacy across the country, and the numbers have increased considerably in the past decade.

PHARMACISTS AT WORK

Pharmacists work in various settings :

1. **Pharmaceutical industry:** *Pharmacists* perform various tasks in the pharmaceutical industry. Their work is thus usually behind the scene, not in direct contact with the patients, yet largely contributing to the health care sector.

2. **Practice settings:** *Pharmacists* perform various tasks in practice settings (community & hospital) and are generally in direct contact with the patients.

3. **Other Settings :** *Pharmacists* also work in other settings:
   - Academics
   - Regulatory (Government)
   - Clinical Research

   Pharmacists perform these various functions either by themselves, or take help of various personnel/technicians (skilled, unskilled), sales persons, other support staff. Pharmacists are responsible for training & supervision of these personnel at different levels.

1. Pharmacists in the Pharmaceutical industry

Pharmaceutical industry in India

The pharmaceutical industry in India is one of the largest and most advanced among the developing countries. Besides providing employment to millions, it ensures that essential drugs are available at affordable prices to the vast population of India.

The architect of the Indian pharmaceutical industry would be Acharya P. C. Ray, who founded Bengal Chemicals and Pharmaceuticals Works Ltd., the first pharmaceutical manufacturing facility in the country, in the year 1901. It started by making drugs from indigenous materials and then went on to manufacture quality chemicals, drugs, pharmaceuticals and employed local technology, skills and resources.

Prior to India's independence, bulk drugs were imported and a very negligible quantity was manufactured in India. However, just after independence, many multinational companies set up base in India as trading companies, later moved to

repacking of finished formulations within the country and progressed to manufacture of bulk drugs and formulations. Slowly, Indian companies too set up their manufacturing units, and today, the Indian pharmaceutical industry has made its mark in the global arena.

Over the past few decades, the Indian pharmaceutical industry has attained widely ranging capabilities in the complex field of drug manufacture and technology, and almost every type of drug is now made indigenously.

Around 70% of the country's demand for bulk drugs, drug intermediates, pharmaceutical formulations, chemicals and vaccines is met by the Indian pharmaceutical industry.

India has the highest number of U.S. FDA approved drug manufacturing units (factories) outside the U.S.A. Today, it is mandatory that all pharmaceutical manufacturing units follow Schedule M of the Drugs & Cosmetics Act, which lays down stringent standards to ensure that the units follow Good Manufacturing Practices. A large number of Indian pharmaceutical companies thus adhere to highest quality standards and are also approved by regulatory authorities in different parts of the world.

Today, in India, there are 270 large R&D based pharmaceutical companies including multinationals, government-owned and private companies. Besides, there are 5,600 smaller licensed manufacturers.

- In terms of value, the Indian pharmaceutical industry ranks globally as the 14th largest market by sales value ($20 billion), & globally ranked 3rd by volume of sales. This accounts for 8% of the world's production by volume & 2% by value.
- The Indian pharmaceutical industry is likely to grow to $ 25 billion by 2010.
- India is now one of the top five manufacturers of bulk drugs in the world.

India exports 30% of its produce to the rest of the world. It

ranks 17th in terms of export value of bulk actives & dosage forms ($ 5.8 billion). India exports pharmaceuticals to more than 200 countries worldwide, including highly regulated markets.

Global pharmaceutical companies are establishing long-term relationships with Indian pharmaceutical companies and the contract manufacturing affiliates in India, in addition to establishing manufacturing, R&D and marketing bases. Low cost R&D services, bulk drug availability, finished formulation manufacture and clinical trials with FDA approved facilities for the complete range of services for drug development, accompanied by skilled professional human resources are the major attractions for these companies.

Ayurveda, India's traditional system of medicine is also fast re-developing in the country & worldwide. There is a constantly increasing demand for ayurvedic & herbal medicines/products. India has the knowledge base, the skills, and a topography that ensures a vast resource of medicinal plants. Thus, it is the focus of manufacture and export of ayurvedic and herbal medicines across the world. In India, there are several hundreds of ayurvedic manufacturers, from small scale to very large companies, totalling more than a billion dollars of sales per year. *Pharmacists* are in large demand in this industry for their skills and knowledge in different areas of manufacture, testing, quality assurance, documentation and marketing.

In spite of the latest threat of recession, the Indian pharmaceutical industry stands strong and firm, and thus offers attractive and exciting opportunities for pharmacy personnel in the country. According to the Ministry of Commerce & Industry, the pharmaceutical sector is estimated to have 2.20 lakh employment opportunities.

1. Pharmacists in the Pharmaceutical industry

In the pharmaceutical industry, *pharmacists* perform tasks in various departments/sections:

AREA OF PHARMA INDUSTRY	• Hands on / supervisory role of *pharmacists*
RESEARCH AND DEVELOPMENT	• Drug discovery, reverse engineering, formulation and process development, upscaling from pilot to manufacture, troubleshooting, stability, packaging development.
PRODUCTION/ MANUFACTURING	• Production/manufacture of bulk drugs & intermediates, finished medicines, vaccines & other biological products, veterinary medicines, ayurvedic medicines, diagnostic products & medical devices.
PACKAGING	• Various stages of packaging of pharmaceuticals.
QUALITY CONTROL	• Product testing throughout the life cycle of the drug and finished product (from raw materials, packing material to finished goods / stability, etc.)
QUALITY ASSURANCE	• Preparing, reviewing & submitting documents, conducting trainings, internal audits etc., hence assuring overall quality management
SALES AND MARKETING	• Strategic planning, team management and marketing of pharmaceuticals. • Working as a medical representative.
REGULATORY AFFAIRS	• Preparing, reviewing, communicating, submitting registration documents on pharmaceuticals to regulatory agencies to get R & D, testing, production & marketing approvals, issues related to patents.

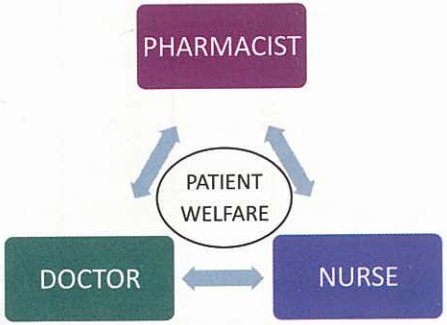
Key Strengths of the Indian Pharmaceutical Industry:*

- Strong manufacturing base
- Cost competitiveness
- Network of laboratories and R&D infrastructure
- Highly trained pool of scientists and professionals
- World-class quality products
- Strong marketing and distribution network
- Strong process development skills
- Potential ground for clinical trials
- Fast growing health care industry
- Rich biodiversity
- Growing biotechnology industry
- Highest Quality approvals from USFDA, EDQM, MHRA etc.
- Ranks 3rd in the world, accounts 8% by volume and 2% by value.
- Very strong in Indian medicine systems of Ayurvedic, Homoepathy, Unani, Siddha and Herbal medicines.
- An excellent center for clinical trials.

*www.indiainbusiness.nic.in

2. Pharmacists In Practice Settings

Pharmacists form a vital link between the doctors, nurses and the patients. They are an important component of the health care team - the ultimate goal of which is patient welfare.

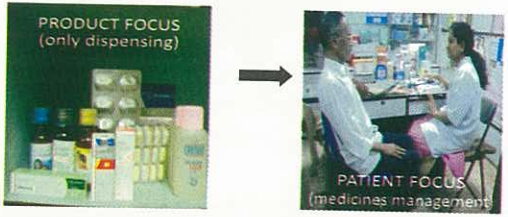


Pharmaceutical Care Services

Till many decades ago, the basic function of the pharmacy was of compounding (i.e. preparing extemporaneous preparations) and dispensing (giving of medicines across the counter). As readymade (industry made) medicines increased, the number of preparations compounded has greatly reduced, and the *pharmacists* focused more on inventory

management and dispensing of medicines.

Then, since the late 1960s in the developed countries, the focus of pharmacy practice has **moved from its original "product focus" to a "patient focus". In these countries now, *pharmacists* are increasingly playing a key role in assuring that medicines are supplied in a safe and effective manner, along with relevant information, to the patient. *Pharmacists* thus are involved in patient education, and work in collaboration with physicians to assure that the patient benefits from rational and evidence based medicine, with adequate follow-up to ensure compliance and improved patient care. Ultimately *pharmacists* are now a provider of patient care.** Pharmacy professionals have thus entered the transitionary phase, and are changing their roles from mere dispensers to "Medicine Therapy Managers"



This type of patient focused approach is known as pharmaceutical care.

> Pharmaceutical care is the responsible provision of the drug therapy for the purpose of achieving definite outcomes that improve or maintain patients' quality of life.
>
> *Douglus C Hepler & Linda M Strand 1990, & FIP 1998*

Complete pharmaceutical care is a groundbreaking concept in practice of pharmacy that has emerged over the years. This has stipulated all the healthcare professionals to work as a team to attain the ultimate goal of patient welfare.

To fulfill such obligations pharmacists need to take up various functions. The WHO has introduced the concept of a 7 Star Pharmacist and the FIP has added another function making it a **8 Star Pharmacist*.**

*W.H.O. and F.I.P. **Developing Pharmacy Practice-A focus on patient care**, 2006 edition.

8 STAR PHARMACIST

CARE GIVER

Practices integrated & caring services along with other health professionals in the healthcare system.

LEADER

Performs as a leader for the overall welfare of the patient & community.

DECISION MAKER

Ability to evaluate, synthesize data & provide efficacious, safe & cost effective use of medicines

COMMUNICATOR

Link between the prescriber & patient. Communicates health information to patients.

TEACHER

Educates next generation pharmacists

LIFE LONG LEARNER

Develops skills and updates knowledge as an ongoing process.

RESEACHER

Uses evidence base to advise on rational use of medicines & provides unbiased health information.

MANAGER

Manages men, material, machine

Pharmacists In Practice Settings

In the practice setting *pharmacists* work in the following areas:

Area Of Practice	Hands On Role/Supervisory Role
COMMUNITY (RETAIL) PHARMACY *(Medical Store/ Chemist & Druggist)* 	Employed as a *pharmacist*, or can start his own pharmacy. Managing inventory and storage of medicines and allied products. Prescription handling, checking for correctness, safety Dispensing of medicines Patient counselling, demonstration of medical devices Maintaining patient medication records Health promotion (disease prevention), nutrition advice Doing screening tests (blood pressure, blood sugar, height-weight, peak flow, etc) Responding to symptoms and recommending medicines for simple ailments

Area Of Practice	Role/Supervisory Role
HOSPITAL PHARMACY *[In Private Hospitals, Public Hospitals (PHCs (Primary Health Centres), CHCs (Community Health Centres), District Hospitals, Tertiary & Teaching Hospitals, other public sector hospitals]*	Medicine selection Managing inventory and storage of medicines and allied products. Small scale manufacturing/compounding, sterile supplies Dispensing of medicines Patient counselling Health promotion Taking part in National Health Programmes
CLINICAL PHARMACY *(In patient care settings – both in hospitals and community pharmacy)*	ADR (Adverse Drug Reaction) prevention, detection, monitoring. Reducing drug interactions and drug related problems. Taking patient medication history Taking part in ward rounds along with doctors and nurses Deciding/adjusting medication dosing for patients Providing drug information

Pharmacy Practice in India

Pharmacy practice in India is governed by the Drugs & Cosmetics Act 1940 (and the Drugs & Cosmetics Rules 1945 framed under the Act), other related legislations. Regulatory officers (Drug Inspectors, Drug Controllers, etc) appointed under the Act regulate the licensing and running of pharmacies (medical stores/chemists & druggists).

The minimum qualification for registration and practice of pharmacy is Diploma in Pharmacy (D.Pharm), or Bachelor of Pharmacy (B.Pharm) or Doctor of Pharmacy (Pharm D).

In India, against the backdrop of ongoing and profound changes in healthcare delivery systems, a slow yet steady paradigm shift in pharmacy practice is occurring. *Pharmacists* have slowly begun to realize their true potential.

Community Pharmacy :

There are around 5 lakh pharmacies (Chemists & Druggists, Medical Stores) in India in almost every nook and corner of the country. These friendly neighbourhood pharmacies are doing yeomen service to the nation by providing quick services and medicines to the public through the day and even at odd hours.

A large majority of the 5 lakh pharmacies are independent, family businesses, passed on from generations.

Pharmacies are often the first port-of-call for many common health related problems. People find it convenient to visit pharmacies for various reasons :

- Pharmacies are open all day and are conveniently located in the neighbourhood.
- There is no need of an appointment
- The *pharmacists* and salespersons behind the counter are friendly, know their clients well and are ever ready to help.
- Clients look upon the *pharmacists* to give them advice on various health related matters, diagnose their condition and even recommend medicines. People have a lot of faith in their *pharmacists*.

In the past few years, organized pharmacy chains have entered the market, and currently, around 2000 such pharmacies operate in different parts of the country, with Apollo Pharmacies being the largest chain. There is a shortage of *pharmacists* willing to work in community pharmacies, and thus there is a large potential opening with a lot of challenges in providing appropriate health care to the ailing population of the country.

The Indian retail market is worth US $330 billion & expected to grow at 10%. With the growing number of chains, and with foreign organized retail pharmacy chains eyeing the large Indian health care market, the independent *pharmacists* too have slowly started getting professionally trained and following Good Pharmacy Practices and started taking up professional tasks of providing patient counseling, health and drug information, doing blood pressure checks, blood sugar checks, etc. within the premises of their pharmacy. There is an optimistic change towards achieving the prime objective of complete patient care. The AIOCD (All India Organization of Chemists & Druggists), the largest organization of chemists and distributors in the country has taken upon itself to organize its members and also to conduct professional training programmes for them to gear up to face the challenges.

Hospital Pharmacy :

Hospital pharmacy is defined as *'practice of pharmacy inside a hospital close to the patient'* in an environment where doctors, nurses and other health care professionals interact with the *pharmacists* on matters related to medicines, surgicals and other patient care items required.

In India there are more than 15000 hospitals and around 9 lakh hospital beds. Most of these hospitals have pharmacies run by *pharmacists. Pharmacists* thus work both in private and public hospitals across the country (PHCs, CHCs, district hospitals, tertiary and teaching hospitals, hospitals of other public sector undertakings like Coal India, Railway Hospitals, ESIS Hospitals, etc.). While the *pharmacists* here fulfill the traditional role of inventory management, storage and dispensing of medicines, there is a vast scope for providing clinical services for patient benefit.

Clinical Pharmacy :

With the introduction of a Masters course in "Pharmacy Practice" more than a decade ago, clinical services in the hospitals, especially in southern India have geared up. The *pharmacists* here work in liaison with physicians and attend ward rounds, and contribute towards ADR (Adverse Drug Reaction) monitoring, treatment chart reviews, making suggestions in therapy, taking medication histories, providing drug and poison information etc. A further boost to the Clinical role of the *pharmacist* is the introduction of the 6 year Pharm. D programme in India from August 2008, in various colleges across the country. This programme is specific to prepare clinical *pharmacists* with specialized skills in patient care services.

As the experts in medicines, *pharmacists* have always been known as accessible and trusted source of advise and treatment. Today their contribution to healthcare is developing in new ways to support patients in their use of medicines and as part of clinical decision making.

Practising *pharmacists* thus have the potential of helping our country in facing these challenges. *Pharmacists* with their knowledge and expertise can help in rational use of medicines, health promotion, managing medicines and drug therapy, storage and dispensing, providing patient instructions and counselling to patients to improve compliance to therapy, assisting patients in making effective self medication choices, and decisions for their health. Thus proving that *pharmacists* are vital members of the health care team.

3. Other Settings:

Pharmacists also work in other settings :

Academics :

Pharmacists as teachers have various roles to play in the teaching institutions/pharmacy colleges: teaching students, and also carry out continuing upgradation and research work, liaison with industry and pharmacy

practice settings for overall development and promotion of pharmacy. One needs to be a postgraduate in pharmacy to qualify as a Lecturer and in order to climb up the academic ladder, a Ph.D. is very much essential.

There is a lot of demand for qualified teachers in the country and even in some countries in Asia. Those with an inclination towards teaching and research have ample opportunities and scope for development in this field. Here, there is an opportunity to develop the future generation of *pharmacists*, and thus, teachers play a very crucial role in the whole gambit of the pharmacy profession.

Teachers who wish to, can make time to get exposure to the pharmaceutical industry and the practice settings depending on their interest, so as to maintain a good rapport as well as to keep themselves updated.

Regulatory (Government) :

Pharmacists work in the Drug Control Department in various sections. The CDSCO (Central Drugs Standard Drug Control Organization) (www.cdsco.nic.in) is the central body in India for drug control, and each state of the country has its own Drug Control Department having local jurisdiction.


FDA BHAVAN, New Delhi

In this department, *pharmacists* are involved in regulating various aspects of the pharmaceutical industry and the trade/distribution network. Their task is to ensure that the pharmaceuticals in the market - right from raw material to finished product and the distribution from the manufacturing facility to the customer is regulated, so as to ensure the safety, efficacy and quality of pharmaceuticals.

They (Drug Inspectors, Assistant Drug Controllers, Drug Controller), carry out inspections, are involved in giving clinical trial approvals, manufacturing approvals, market approvals, etc. and some work in the drug testing laboratories associated with the Drug Control Department (Pharmaceutical Chemist/Analyst).

- Schedule Y
- Product Approvals
- Inspections
- Drug Testing

Clinical Research :

Clinical Research Organizations (CROs) in India are well into the playing field of clinical research worldwide. Clinical research offers ample job opportunities and is estimated to be worth close to Rs. 100 plus crores today. With inherent strength and country specific advantages, they have established themselves and have the potential to become a strong global power. A lot of multinational companies have already established a base in India, having gauged the huge potential that India offers. CROs exist in India either as departments of a large pharmaceutical company or as independent research organizations. Majority of the research being done across the world today is sponsored by the pharmaceutical industry but regulated by strict regulations and guidelines. Most of the CROs offer varied services in clinical research.

CROs in India are staffed with a highly skilled workforce, most of them armed with varied advanced technical qualifications- Clinicians, Pharmacologists, Post Doctorates, *Pharmacists*, Toxicologists, Chemists, Analysts. The unique advantage with the CROs in India is their lower operational costs, and fast work.

Services provide by CROs :

- Undertaking clinical studies from Phase 1 to Phase 4
- Feasibility studies
- Protocol development
- Case Report Form review and designing
- Report writing
- Monitoring
- Bio-analytical services
- Quality assurance and data management
- Conduction of bioavailability studies
- Data management for global trials

In other countries, some pharmacists specialize after studying and gaining thorough experience in specific fields :

Nuclear Pharmacists	Nutritional Support Pharmacists
Paediatric Pharmacists	Psychiatric Pharmacists
Oncology Pharmacists	Hypertension Pharmacists
Geriatric Pharmacists	Diabetic Pharmacists
Veterinary Pharmacists	Drug Information Pharmacists

PHARMACY EDUCATION IN INDIA

Pharmacy education in India has undergone significant changes in the last couple of decades.

India has the unique distinction that the 1st pharmacy college in Asia was started in Goa - India, in the year 1842, by the Portuguese. In 1932, Prof. Mahadev Lal Schroff (called as the Father of Pharmacy Education in India) started a pharmacy college/department at the Banaras Hindu University. Since then, the picture has changed drastically, and in the last couple of decades, we have seen a tremendous rise in the number of pharmacy colleges spread across the country, considering the huge demand for the same.

Colleges offering pharmacy education in India

Sr. No.	Course offered	No. of pharmacy colleges	Total seats available
1	Diploma in Pharmacy (D.Pharm)	564	33665
2	Bachelor of Pharmacy (B.Pharm)	382	22715
3	Doctor of Pharmacy (Pharm. D)	44	1320
4	Master of Pharmacy (M.Pharm)	132	2677

The Pharmacy Council of India has given out an advisory to all students aspiring to pursue any course in Pharmacy for the purpose of registration as a Pharmacist under the Pharmacy Act, 1948, that they should first ensure that the particular institution which they intend to join has been recognized/approved by the Pharmacy Council of India for the conduct of the course of study (approved u/s 12 of the Pharmacy Act, 1948). The lists of such institutions are displayed on the official website of the Council (www.pci.nic.in).

Pharmacy education includes a blend of theory and practical classes and examinations, besides including compulsory industrial or hospital/community training of varying periods depending on the course selected.

There will be a never-ending demand for pharmacy professionals, not only in the country, but also across the globe. Foreseeing this demand, the government and the universities have taken special steps to uplift the profession of pharmacy.

Regulation of Pharmacy Education

Formal pharmacy education began even prior to Independence. Soon after Independence, the Pharmacy Act, 1948 was enacted to regulate the profession of pharmacy.

The pharmacy Diplomas (D.Pharm) are awarded by various Boards of Technical Education, controlled by the State Governments. The details of the curriculum and evaluation are given by the PCI (Pharmacy Council of India).

The B. Pharm and M. Pharm education is under direct control of the different Universities. The respective Universities decide the details of the curriculum and evaluation. The degrees are awarded by the Universities. The AICTE (All India Council of Technical Education) lays down various guidelines and curriculum outline to conduct the degrees.

In many states, separate health Universities are established and Pharmacy education is directly under the control of these Universities. Besides UGC (which indirectly regulates pharmacy education), pharmacy education in India is mainly regulated by two statutory bodies :

1) Pharmacy Council of India (www.pci.nic.in), a central body constituted under the Pharmacy Act in 1948.

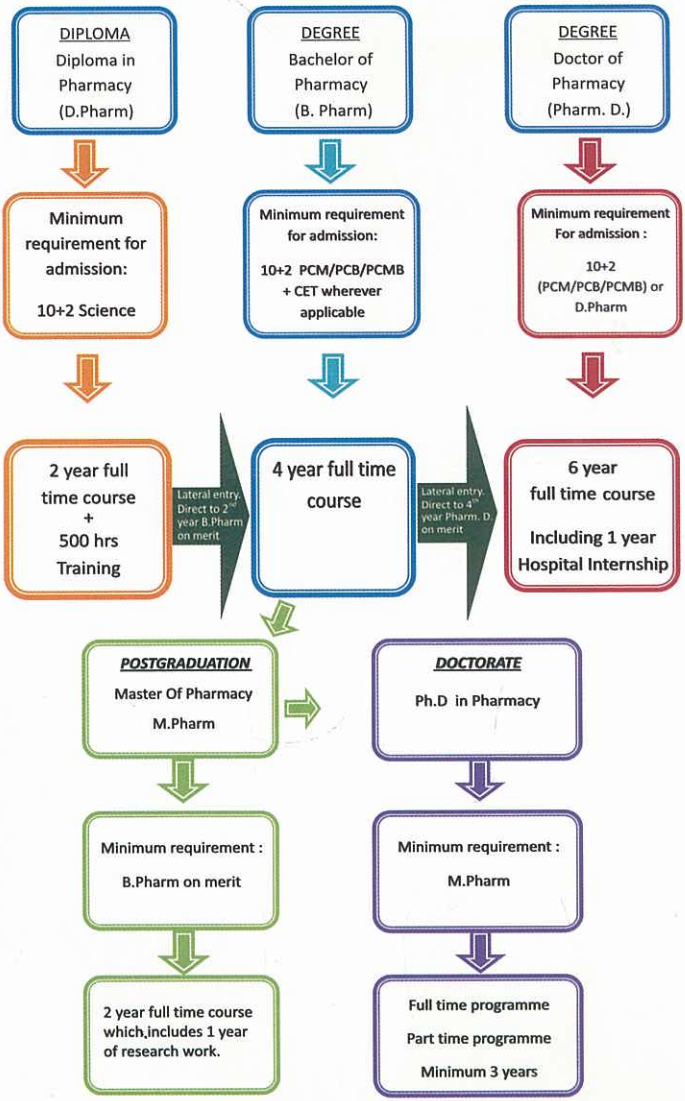
2) All India Council for Technical Education (AICTE) (www.aicte.emet.in) established under the Act in 1987.

The regulating bodies lay down various norms, guidelines, standards from time to time to ensure that quality pharmacy education is imparted to students.

In order to have uniformity in course contents, requisite standards of education, technical faculty, facilities and infrastructure of high levels, many of the colleges are going for accreditation certification from the AICTE.

Pharmacy Education is a priority area for the International Pharmaceutical Federation (FIP), the global federation representing pharmacists and pharmaceutical scientists worldwide, and is spearheading the Global Pharmacy Education Taskforce.

Eligibility & Course Requirements



AREAS OF SPECIALIZATION

- Pharmaceutics
- Pharmaceutical Analysis
- Pharmacology
- Pharmaceutical Biotechnology
- Pharmacy Practice
- industrial Pharmacy
- Pharmacognosy
- Pharmaceutical Chemistry
- Regulatory Affairs
- Quality Assurance

D. Pharm : A person who has completed D.Pharm can be employed as a Registered *Pharmacist* in a community pharmacy (Medical Store/Chemists & Druggists) or a hospital pharmacy. It is the minimum qualification to practice pharmacy, therefore, it is mandatory that all dispensing of prescription medicines has to be done under the supervision of a *pharmacist* only. He/She can also work as a medical representative & also work in an industry.

B. Pharm : As per the present curriculums in India, a B. Pharm degree mainly prepares the candidates to work in the pharmaceutical industry. The course structure of the degree includes practical training in the pharmaceutical industry environment. Practical experience goes a long way in getting the candidates ready to enter the actual work environment and develop a successful career for themselves in the field. A *pharmacist* having a B.Pharm degree is also eligible to practice pharmacy in a community or hospital pharmacy.

M. Pharm. : B. Pharm candidate is eligible to do M. Pharm. & needs to select one of the 10 specializations. After the implementation of GATT, new drug research has become more important. Those persuing higher education (M. Pharm) have advantage over pharmacy graduates in R & D.

Pharm. D : Pharm. D is a six year course after 10+2 or Diploma in Pharmacy (D.Pharm) (or 3 years after B.Pharm – called as Pharm.D. Post Baccalaureate) was started in August 2008 and includes five years of clinical and community-based theory, with ward rounds and one-year internship in hospitals.

The Ministry of Health & Family Welfare, Government of India,

on 13.3.2008, approved the Pharm.D Regulations. The Pharm.D Regulations were notified in Gazette of India, Part III, Section 4, No.19, dt. May 10 - May 16, 2008.

a) Preamble

To produce better trained, skilled, knowledgeable and competent *pharmacist* for delivering best health care to the society.

b) Objectives

As the world is moving forward in the pharmaceutical care sector and the *pharmacist* is at the interface between research and development, manufacturer, prescriber, patient and the medicine, the basic objectives of introducing Pharm.D. is to produce trained manpower for:

i) Collaborating with other health care professionals for safe and effective pharmaceutical care.
ii) Disease management.
iii) Pharmacoeconomics (effective and cost efficient care).
iv) Tracking ADR (Adverse Drug Reactions).
v) Patient counselling.
vi) Monitoring patient outcome, etc.

c) Salient Features

Pharm.D.	**Pharm.D. (Post Baccalaureate) (Interim measure till the first batch of Pharm.D comes out)**
Registerable qualification under the Pharmacy Act.	Registerable qualification under the Pharmacy Act.
Duration – 6 yrs - 5 yrs. study (Th + Pr). - 1 yr. internship in hospital	Duration – 6 yrs - 2 yrs. study (Th + Pr). - 1 yr. internship in hospital
Admission Qualification - 10 + 2 - D.Pharm	Admission Qualification - B. Pharm

The syllabus is globally standardized and also responsive to national needs. It lays emphasis on –

- Community Pharmacy
- Clinical Toxicology
- Pharmacotherapeutics
- Clinical Research
- Hospital Pharmacy & Pharmaceutical Care, etc.

On site practical training is by way of internship/residency in clinical pharmacy service in wards & ward rounds under preceptors. This on site training is a part of the examination system.

Institutions which can run Pharm.D. & Pharm.D. (Post Baccalaureate) :

B.Pharm institutions approved under the Pharmacy Act. Should have a 300 bedded hospital.

Or

- MOU with teaching hospital having pharmacy practice
- department approved by Medical Council.

Or

MOU with corporate hospital having practice department.

Pharm.D. (Post Baccalaureate) cannot be run alone.

No. of admissions permitted	
Pharm.D.	30 seats
Pharm.D. (PB)	10 seats

The Pharmacy Council of India is of the firm opinion that introduction of the Pharm.D. programme, with emphasis on clinical practice, is the need of the hour, to be in line with the proclivity in health care standards in this challenging scenario. This optimizes the *pharmacists'* contribution to pharmaceutical and patient health care. In the era of pervasive and increasing information, our *pharmacists* will be able to provide trustworthy drug information to both patient and physician. This will open new doors for patient counselling besides assisting physician about medicines. Besides, this will raise the standard of pharmacy profession in India in terms of pharmacy practices and also make this Indian pharmacy degree acceptable to other developed countries, including the U.S. and the U.K.

With the introduction of Pharm. D, pharmacy education in the country is set to undergo a sea change in the next few years, and reach international levels.

Pharmacy Curriculum /Subjects

Pharmacy curriculum includes a wide variety of subjects, thus reflecting its interdisciplinary, multidisciplinary facet :

- Pharmaceutical Chemistry
- Pharmacology
- Pharmaceutical Analysis
- Pathophysiology
- Pharmaceutics
- Pharmacotherapeutics
- Physiology, Anatomy & Health Education
- Pharmacognosy
- Biochemistry
- Pharmaceutical Management
- Pharmaceutical Microbiology
- Pharmaceutical Biotechnology
- Pharmaceutical Engineering
- Pharmaceutical Jurisprudence
- Pharmacy Practice – Hospital, Community,
- Clinical Pharmacy

PHARMACY IN OTHER COUNTRIES

In the developed countries like USA, most countries of Europe, Canada, Australia, etc., *pharmacists* have a more patient oriented role. To be a *pharmacist* in these countries, one has to go through minimum 4 – 6 years of pharmacy education, and hands on training in a clinical setting like a hospital or community pharmacy.

Pharmacists' behind-the-counter responsibilities focus on caring for the whole patient, so they provide many more patient-oriented services to maximize effectiveness of medications. The non-critical tasks of purchase, storage management, assembling and dispensing of medicines is carried out by trained technicians, while *pharmacists* take up responsibilities of scrutinizing prescriptions, ensuring correct medicines have been prescribed, and do the final check whether correct medicines have been dispensed, and give instructions and counselling about proper use of medicines.

The practice here is patient-centered, outcome-driven practice requiring the *pharmacists* to collaborate with the patient and the patient's other health care providers to promote health and prevent disease. *Pharmacists* assess, monitor, initiate, and modify patients' medications to assure that drug therapy regimens are safe and effective.

Beyond community pharmacy — where approximately 60% of *pharmacists* practice —diversity of pharmacy career options includes counselling, preventive medicine, wellness programs, patient education, technical writing or editing, retail or chain pharmacy ownership or management, or pharmacy practice within hospitals, nursing homes, extended care facilities, neighbourhood health centers, health maintenance organizations, managed care pharmacies, or government service, as well as pharmaceutical industry research, sales, administration or marketing.

Pharmacy education and job opportunities outside India

Pharmacy graduates may consider venturing into pursuing higher studies outside India to make their career even more lucrative and challenging. One can enroll for masters as well as Ph.D in desired field of study after obtaining B.Pharm degree in India. Learning opportunities for higher studies exist in both the practice as well as research streams. The details of avenues/approaches to get admissions to pharmacy colleges in different countries, are easily available on the respective websites of various colleges.

Generally, one needs to answer one or more of the following entrance/qualifying exams

- GRE (Graduate Record Exam)
- TOEFL (Test of English as a Foreign Language)
- IELTS (International English Language Testing System).

Further, after seeking admissions into a pharmacy college in these countries, one may have to take up certain subjects or electives before getting equivalency and eligibility to pursue further studies.

In order to work as a registered *pharmacist* in a particular country, one will have to answer registration exams, which will be country specific.

Ample job opportunities await qualified pharmacy professionals in various countries including the U.S.A., Canada, European countries like U.K., France, Germany, African countries like South Africa, Nigeria, Yemen, Gulf countries like UAE, Saudi Arabia, Kuwait, South East Asian countries like Singapore, Korea, Japan, etc. and the Australian continent including New Zealand. In some countries, the job opportunities are in the industrial setting, while in some countries, they are in the practice setting.

There are thus plenty of higher education and research opportunities in different countries along with excellent job openings. ***The pharmaceutical career is one of the highest rewarding careers especially in the developed countries.***

PHARMACY ASSOCIATIONS

The International Pharmaceutical Federation – FIP

www.fip.org

Founded in 1912, the International Pharmaceutical Federation (FIP) is the global federation of national associations of *pharmacists and pharmaceutical scientists*, in official relations with the World Health Organization (WHO). Through its 122 Member Organizations and 4000 Individual Members, FIP represents and serves almost two million pharmacy practitioners and scientists around the world.

2020 Vision - FIPs Vision, Mission and Strategic Plan.

Both internal and external forces are steering the course of modern healthcare, and in turn, how each profession can best contribute to it. Recognizing this fact, FIP has developed a new Vision, Mission and Strategic Plan with the goal of firmly integrating the Federation and those it serves, in global healthcare decisions and actions.

The Vision that FIP sets forth is that:
Wherever and whenever decision makers discuss any aspects of medicines on a global level, FIP is at the table.

FIP is enabled to succeed in this Vision, through the recognition and respect it gains through the fulfillment of its Mission, which is to *"improve global health by advancing pharmacy practice and science to enable better discovery, development, access to and safe use of appropriate, cost effective quality medicines worldwide."*

FIP's three strategic objectives are advancing pharmacy practice and pharmaceutical sciences in all settings and reforming pharmacy and pharmaceutical sciences education. These objectives are being achieved through tactical approaches. An example of a tactical approach is building constructive partnership. Through partnerships with WHO and other healthcare professional organizations, FIP promotes achievement of the Millennium Development Goals of reducing mortality of the mother and newborn child. In addition, as a founding partner of the World Health Professions Alliance (WHPA), FIP has played a key role in bringing together *pharmacist*, nurses, physicians and dentists in initiatives of common interests and value addition in patient care. The creation of the regional FIP pharmaceutical forums in six regions of WHO has served to

promote the role of *pharmacists* in WHO's health agenda. The SEARPharm Forum is a FIP-WHO forum of National Pharmaceutical Associations in South East Asia wherein India is represented by the IPA (Indian Pharmaceutical Association).

Indian Pharmaceutical Association

www.ipapharma.org

The Indian Pharmaceutical Association (IPA) is the premier professional association of *pharmacists* in India, with a member base of over 10,000, spread across the length & breadth of the nation. IPA operates in India through 17 state branches & more than 33 local branches.

The members represent various facets of pharmaceutical profession, viz. Industry, regulatory, community pharmacy, hospital pharmacy & education. IPA is also actively associated in managing several academic programmes. IPA is affiliated/member of international pharma associations like FIP, FAPA (Federation of Asian Pharmaceutical Association/Organisation- www.fapa-asia.org), CPA (Commonwealth Pharmaceutical Association- http://www.commonwealthpharmacy.org/site/), AAPS, AAiPS, IPSF & WHO, for carrying out various collaborative professional activities, which include organizing training programmes for professionals from industry, academics, regulatory & practice, making representations to the authorities on matters of professional interest & working towards constantly upgrading the standards of professional services offered by pharmacists.

Through student bodies like IPA - SF (Indian Pharmaceutical Association (Student Forum), the students get opportunities to have a dialogue with IPSF (International Pharmaceutical Students' Federation - (www.ipsf.org) globally.

Indian Pharmaceutical Congress Association (IPCA)

IPCA is a federation of five national pharmaceutical associations as its constituents – IPCA is the apex body representing the Indian *pharmacists* working in various

capacities in various disciplines and areas of work.

IPCA has more than 20,000 pharmacists as its members:-

- The Indian Pharmaceutical Association - IPA
- The Indian Pharmacy Graduates' Association – IPGA
- The Indian Hospitals Pharmacist Association – IHPA
- The Association of Pharmaceutical Teachers of India – APTI
- The All India Drugs Control Officers Confederation - AIDCOC

One of the main activities of IPCA is to organize the Indian Pharmaceutical Congress (IPC) every year. It is the largest gathering of *pharmacists* and pharmacy students from across the country, who come together for attending symposia and scientific lectures, scientific/research paper presentations, exchange of knowledge and news, camaraderie, etc. The first IPC was organized at Calcutta in December 1948, with Prof. M. L. Shroff as its President.

Thereafter, each year, the IPC has been organized successfully in different parts of the country.

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THE FUTURE OF PHARMACY AND CHALLENGES

The pharmacy profession has exciting opportunities, as well as challenges.

Accessibility to health care and essential medicines still remains a problem. One third of world's population does not have regular access to essential medicines. Rising cost of healthcare, increasing disease burden (both communicable, and now non-communicable too) and advent of new diseases, irrational use of medicines, non-availability of health care providers in sufficient numbers especially in rural areas are all challenges we have to overcome.

The number of individuals having lifestyle diseases like

diabetes, hypertension, coronary heart diseases, cancer, etc, in India, is steadily rising. *Pharmacists* thus have the potential to help our country in facing these challenges. *Pharmacists* with their knowledge and expertise can help in production, distribution, storage and dispensing of quality medicines, and also promoting rational medicine use, health promotion, managing medicines and drug therapy, providing patient instructions and counselling to patients to improve compliance to therapy, assisting patients in making effective self medicine choices and decisions for their health etc.

India has a vast and growing pharmaceutical industry. With the implementation of the WTO (World Trade Organization) proposals on intellectual property rights, the Indian pharmaceutical industry will quickly have to increase its focus and invest more in terms of money, infrastructure and manpower on research and development of new medicines, both for tropical diseases as well as lifestyle/chronic diseases.

All these factors indicate that Indian healthcare industry has a long way to go and *pharmacists* have to play a vital role in it.

In rural areas, where often availability of doctors is a serious problem, *pharmacists* can take up active roles in providing basic health care and advice on medicine use, health promotion, and self medication. *Pharmacists* can also look upon new avenues in immunizations, tobacco cessation, home visits for medication review and care, counselling services, etc.

In the coming years, there will be an increasing demand for qualified *pharmacists* in all sectors, namely research, regulatory affairs, manufacturing, marketing, clinical, community, academics, etc. both in our country as well as across the world.

Pharmacy is a rewarding career, in terms of personal satisfaction and financial compensation, as well as service to the people. So start planning from today.

As the old Chinese saying goes *"A journey of a thousand miles begins with one small step".*

FURTHER READING

- Pharmacy Council of India : www.pci.nic.in
- Indian Pharmaceutical Association : www.ipapharma.org
- All India Council of Technical Education : www.aicte.ernet.in
- India Organization of Chemists & Druggists (AIOCD) www.aiocd.net
- Central Standard Drugs Control Organization : www.cdsco.nic.in
- University Grants Commission : www.ugc.ac.in
- Indian drug manufacturers association - www.idma-assn.org
- Organisation of Pharmaceutical Producers of India- www.indiaoppi.com
- Maharashtra State Pharmacy Council : www.mspcindia.org
- Karnataka State Pharmacy Council : www.kspcdic.com
- Pharmaceutical society of Singapore : www.pss.org.sg
- SEARPharm Forum : www.searpharmforum.org
- Canadian Pharmacists Association : www.pharmacists.ca
- IPSF : International Pharmaceutical Students' Federation : www.ipsf.org
- The Royal Pharmaceutical Society of Great Britain : www.rpsgb.org.uk
- National Pharmcy Association, U.K. : www.npa.co.uk
- Pharmaceutical Society of Australia : www.psa.org.au
- U.S. FDA Website : www.fda.gov
- W.H.O : www.who.int/en
- Pharmacy Guild of Australia – www.guild.org.au
- The American Society of Health-System Pharmacists (ASHP) : www.ashp.org
- International Pharmaceutical Federation : www.fip.org
- American Association of Pharmaceutical Scientists.: www.aaps.org
- PharmaWeb : www.pharmaweb.net
- Pharma InfoNet : www.pharmainfonet.org

Pharmacist Oath

I swear by the Code of Ethics of Pharmacy Council of India in relation to the community and shall act as an integral part of the health care team.

I shall uphold the laws and standards governing my profession.

I shall strive to perfect and enlarge my knowledge to contribute to the advancement of pharmacy and public health.

I shall follow the system, which I consider best for pharmaceutical care and counseling of patients. I shall endeavour to discover and manufacture drugs of quality to alleviate sufferings of humanity.

I shall hold in confidence the knowledge gained about the patients in connection with professional practice and never divulge unless compelled to do so by law.

I shall associate with organizations having their objectives for betterment of the profession of Pharmacy and make contribution to carry out the work of those organizations.

While I continue to keep this Oath inviolated, may it be granted to me to enjoy life and the practice of pharmacy respected by all, at all times!

Should I trespass and violate this oath, may the reverse be my lot!

Pharmacy Council of India

PHARMA VISION 2020

Strategy for Pharmacy
Mission and Vision 2020

The Mission

To optimize health of all members of society through the promotion of safe, effective and rational medicine use, patient counselling and monitoring of disease management (through pharmaceutical care).

The mission is fundamental and is the reference point to promote the highest professional and ethical standards of pharmacy, focus the image of pharmacists as competent healthcare professionals, sensitize the community, government and others on vital professional issues and support pharmaceutical education and sciences in all aspects.

The Vision 2020

In the year 2020, pharmacists and pharmaceutical scientists working within various disciplines of pharmacy will be established and recognized as the medicines expert and an expert in health promotion and disease prevention.

- The pharmacists will interact with other professionals as the preferred source of information and advice on prescribing and medicine management of disease.
- Pharmacists will develop their pharmaceutical expertise and facilities in order to deliver high-tech and individually-tailored medicines in the primary care setting.
- Pharmacists will actively involve in the national health programmes like promotion of essential medicines, primary health care, HIV/AIDS, TB, Malaria, tobacco use or family planning.
- Pharmacists will become knowledgeable to participate in medication management and outcome monitoring, including the ability to alter doses and change medicines with agreed therapeutic protocols.

Pharmacy Council of India

Indian Pharmaceutical Association