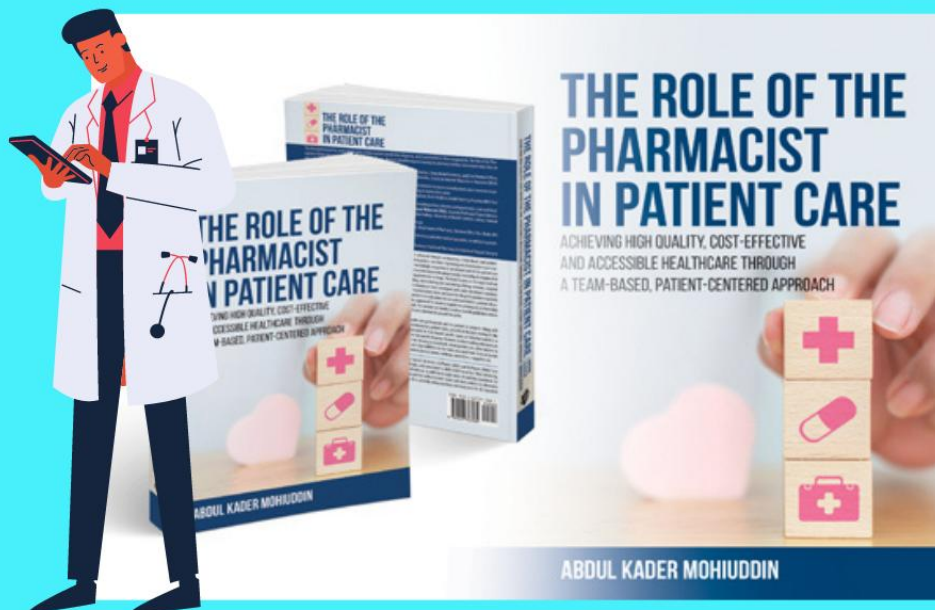




# THE ROLE OF THE PHARMACIST IN PATIENT CARE

ACHIEVING HIGH QUALITY, COST-EFFECTIVE AND ACCESSIBLE HEALTHCARE THROUGH A TEAM-BASED, PATIENT-CENTERED APPROACH

ABDUL KADER MOHIUDDIN



- The book solely focuses on job responsibilities of patient care pharmacists, separated from those of doctors and nurses, with the most recent information.
- Various aspects of pharmacist-led patient care services are incorporated in a single book.
- Career-focused discussions in every chapter with structured guidelines provided for the pharmacists.
- Content is mostly based on recent pharmacists' activities in the healthcare arena of developed countries.
- Chapter outline, abbreviations, synopsis, learning outcomes, cases, key terms and further references are added like a textbook.
- Possible errors during the patient dealing and measures to be taken in all aspects are thoroughly discussed.
- The future prospect of patient care pharmacists in different areas of health care elaborately discussed.
- Discusses patient relationship management with a caring and compassionate touch which is a very demanding approach to many high-profile healthcare settings.
- Along with professionals, undergraduate students can utilize this book as a reference for their courses like hospital and community pharmacy and pharmaceuticals.
- Scholars from countries around the world are giving their recommendation about the book.

**THE ROLE OF THE  
PHARMACIST IN PATIENT CARE**



**THE ROLE OF THE  
PHARMACIST IN PATIENT CARE**  
ACHIEVING HIGH QUALITY, COST-EFFECTIVE AND  
ACCESSIBLE HEALTHCARE THROUGH A  
TEAM-BASED, PATIENT-CENTERED APPROACH

**ABDUL KADER MOHIUDDIN**

*Secretary and Treasurer*

*Dr. M. Nasirullah Memorial Trust, Tejgaon, Dhaka 1215, Bangladesh*

*E-mail: [dr.m.nasirullah.trust@gmail.com](mailto:dr.m.nasirullah.trust@gmail.com), Contact: +8801935183385*

*Orcid Id: <https://orcid.org/0000-0003-1596-9757>*

*Web of Science Researcher ID: T-5428-2019*



Universal-Publishers  
Irvine • Boca Raton

*The Role of the Pharmacist in Patient Care:  
Achieving High Quality, Cost-Effective and Accessible Healthcare Through  
a Team-Based, Patient-Centered Approach*

Copyright © 2020 Abdul Kader Mohiuddin. All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law.

For permission to photocopy or use material electronically from this work, please access [www.copyright.com](http://www.copyright.com) or contact the Copyright Clearance Center, Inc. (CCC) at 978-750-8400. CCC is a not-for-profit organization that provides licenses and registration for a variety of users. For organizations that have been granted a photocopy license by the CCC, a separate system of payments has been arranged.

Universal Publishers, Inc.  
Irvine, California & Boca Raton, Florida • USA  
[www.Universal-Publishers.com](http://www.Universal-Publishers.com)  
2020

ISBN: 978-1-62734-308-4 (pbk.)  
ISBN: 978-1-62734-309-1 (ebk.)

Cover design by Ivan Popov

Library of Congress Cataloging-in-Publication Data

Names: Mohiuddin, Abdul Kader, 1979- author.

Title: The role of the pharmacist in patient care : achieving high quality, cost-effective and accessible healthcare through a team-based, patient-centered approach / Abdul Kader Mohiuddin.

Description: Irvine : Universal-Publishers, [2020] | Includes bibliographical references.

Identifiers: LCCN 2020018747 (print) | LCCN 2020018748 (ebook) | ISBN 9781627343084 (paperback) | ISBN 9781627343091 (ebook)

Subjects: MESH: Pharmacists | Professional-Patient Relations | Professional Role

Classification: LCC RS122.95 (print) | LCC RS122.95 (ebook) | NLM QV 21 | DDC 615.1023--dc23

LC record available at <https://lcn.loc.gov/2020018747>

LC ebook record available at <https://lcn.loc.gov/2020018748>

# Book Content

About the Book	II
Preface	III
Acknowledgement	IV
Pharmacy Practice At A Glance	1-26
Pharmacists in Clinical Pharmacy Practice	27-42
Pharmacists in Hospital Management	43-59
Pharmacists in Community Care	60-75
Patient Rights and Ethical Care	76-93
Prescription	94-110
Prescribing	111-125
Patient Counseling	126-144
Extemporaneous Prescription Compounding	145-162
Framework for Medication Safety	163-188
The Enigma of Patient Behavior	189-210
Patient Education	211-226
Patient-Provider Relationship	227-249
Patient Compliance	250-270
Patient Relationship Management	271-285
Patient Problem Solving and Preventive Care	286-305
Pharmacovigilance: Present Scenario and Future Goals	306-318
Patient Safety	319-340
Pharmaco-Economics	341-360
Long Term Care	361-375
Community Liaison Pharmacists in Home Care	376-393
Pharmacists in Ambulatory Care	394-414
The Critical Care Pharmacists	415-438
Rational Use of Drugs	439-462
Surgical Wound Enrichments	463-493
Medication Risk Management	494-516
Medication History Taking and Reconciliation	517-544
Palliative and Hospice Care	545-569
Non-Drug Pain Management	570-619
Annexure	620-666
Glossary	667-678





# Acknowledgement

It's a great gratitude and honor to be a part of healthcare research and education. All pharmacists, officials, journalists, magazine analysts and associates that I met in this purpose, were very kind and helpful. I am thankful to **Dr. Mamun Rashid** of Appalachian College of Pharmacy Oakwood, Virginia and **Dr. Arinze Nkendirim Okere** of Florida A&M University for their precious time to review my manuscript and continued inspiration. I am also grateful to seminar library of Faculty of Pharmacy, Dhaka University and BANSDOC Library for providing books, journals and newsletters. The greatest help was from my students and colleagues who continually supported me in collection and data extraction from books, journals, newsletters and providing information on various topics regarding this book. A larger portion of this book is long been lectured as course material. So, it was much helpful for me to deliver better as many more things were already prepared.

# Preface

The goal of high quality, cost-effective and accessible health care for patients is achieved through team-based patient-centered care. Pharmacists are essential members of the health care team. The profession of pharmacy is continuing its evolution from a principal focus on medication product distribution to expanded clinically-oriented patient care services. As a result of this professional evolution, the importance of, and need for, a consistent process of care in the delivery of patient care services has been increasingly recognized by the profession at large. Pharmacists in hospital, community care, dispensing and allied healthcare arena are highly appreciated for their knowledge-based contribution and dedication towards profession. The development and approval of the Pharmacists' Patient Care Process by the Joint Commission of Pharmacy Practitioners and incorporation of the Process into the 2016 Accreditation Council for Pharmacy Education Standards has the potential to lead to important changes in the practice of pharmacy, and to the enhanced acknowledgment, acceptance, and reimbursement for pharmacy and pharmacist services. As an author, it is my heartiest believe that the book will adjoin significant apprehension to future pharmacists in patient care as most of the portion created from recently published articles of different journals, bulletins and newsletters.

**Abdul Kader Mohiuddin**

# About the Book

Along with doctors and allied healthcare professionals, pharmacists are increasingly recognized as an integral part of the patient care team. This book focuses on the expanded role of the pharmacist in total patient care including prescribing, dispensing, compounding, administering and monitoring of drugs at home, hospital, community, hospice, critical care, changeover and other care settings. The purpose of this book is to guide the pharmacists in their daily interactions with patients and patient care professionals. Based on the recognition that high quality, cost-effective and accessible health care is best achieved through team-based and patient-centered care, this text combines the most recent ideas and activities regarding the expanded role of pharmacists around the globe. Along with professional guidelines, this book discusses the concepts and best practices of patient interactions, patient rights, and ethical decision making for the professional pharmacist, apprentice or student. Each chapter contains specific issues and examples to guide pharmacists in their daily interactions with patients and members of the patient care team. While many books regarding patient care focus on the doctor's or nurse's role, this book highlights the pharmacist with information and data from the most recent articles, journals, books, newsletters, and other professional sources.



# CHAPTER

# 1

## PHARMACY PRACTICE AT A GLANCE

**Outline:** Introduction; APhA Practice for Pharmaceutical Care; Scope of Pharmacists; The Healthcare Pharmacists; Pharmacist's Role Plays in Public Health; Building Relationships; Future Roles; Pharmacy Professional Organizations; Job Market in Developed Countries; Success of Pharmacist-led Interventions.

**Abbreviations:** American Association of Colleges of Pharmacy (AACP); American Association of Pharmaceutical Scientists (AAPS); American College of Clinical Pharmacy (ACCP), Accreditation Council for Pharmacy Education (ACPE); American Pharmacists Association (APhA); Academy of Pharmacy Practice and Management (APPM); Academy of Pharmaceutical Research and Science (APRS); Academy of Students of Pharmacy (ASP); American Society of Health-System Pharmacists (ASHP); American Society of Consultant Pharmacists (ASCP); Health Related Quality of Life (HRQoL); National Community Pharmacists Association (NCPA); National Association of Retail Druggists (NARD); Royal Pharmaceutical Society (RPS); Medication-Related Problems (MRPs); Clinical Pharmacist Practitioner (CPP); Health Maintenance Organizations (HMOs); Interprofessional collaboration (IPC); Emergency Operations Plan (EOP); Joint Commission of Pharmacy Practitioners (JCPP); Pharmacists' Patient Care Process (PPCP); Bureau of Labor Statistics (BLS); Health Resources & Services Administration (HRSA); National Health Service England (NHSE); Centre for Pharmacy Postgraduate Education (CPPE); General Practice Pharmacist Training Pathway (GPPTP); Pediatric Intensive Care Unit (PICU); Pediatric Pharmacy Advocacy Group (PPAG); Low- And Middle-Income Countries (LMIC); High-Income Countries (HIC); American Diabetes Association (ADA); Glycated Haemoglobin (A1c) (HbA1c); Bangladesh National Scientific and Technical Documentation Centre (BANSDOC); Medication Therapy Management (MTM); Collaborative Pharmacy Practice (CPP); Continuing Professional Development (CPD); Vaccine-Preventable Diseases (VPDs); Advisory Committee on Immunization Practices (ACIP); National Community Pharmacists Association (NCPA); Antiretroviral Therapy (ART).

**Chapter synopsis:** Pharmacy is the art and science of preparing and dispensing medications and the provision of drug-related information to the public. It involves the interpretation of prescription orders; the compounding, labeling, and dispensing of drugs and devices; drug product selection and drug utilization reviews; patient monitoring and intervention; and the provision of cognitive services related to use of medications and devices. The current philosophy or approach to professional practice in pharmacy is designated as pharmaceutical care. This concept holds that the important role of the pharmacist is "the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life." Pharmacists, then, are those who are educated and licensed to dispense drugs and to provide drug information—they are experts on medications. They are the most accessible member of today's health care team, and often are the first source of assistance and advice on many common ailments and health care matters.

**Learning outcomes:** Introduces the student to the profession of pharmacy and the role of the pharmacist within health care delivery in general including the scope and future of a pharmacist in healthcare arena. After reading this chapter, students will be able to focus their scope in different areas of pharmacy profession.

**Key Terms:** Health Management Organizations (HMO); Pharmaceutical Care Process; Hospital and Community Pharmacists; Pharmacy Professionals' Organizations; Collaboration.

## 1. INTRODUCTION

Pharmacy is the art and science of preparing and dispensing medications and the provision of drug-related information to the public. It involves the interpretation of prescription orders; the compounding, labeling, and dispensing of drugs and devices; drug product selection and drug utilization reviews; patient monitoring and intervention; and the provision of cognitive services related to use of medications and devices. The current philosophy or approach to professional practice in pharmacy is designated as pharmaceutical care. This concept holds that the important role of the pharmacist is “the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient’s quality of life.” In 2015 the RPS proposed further integration of pharmacists into general practices outlining the various benefits that pharmacists could provide. Australia, New Zealand and Canada have shown positive GP responses towards the integration of pharmacists into general practices. GPs recognized that having a practice-based pharmacist decreased their workload and allowed them to focus on their diagnostic and prescribing roles, while pharmacists provided expert medication advice and patient counselling. The profession of Pharmacy is classically practiced in the three main areas of Pharmacy Practice: community, clinical, and hospital. It is now generally accepted that the clinic for a pharmacy practitioner is not confined to the hospital wards. Every place (even a community pharmacy) where medication is used for the prevention, diagnosis, and treatment of any clinical condition, that is considered to be the interface of pharmacist and patient, should be recognized as the pharmacist’s clinic.

## 2. APHA PRACTICE FOR PHARMACEUTICAL CARE

- Developing hospital staff’s pharmacological knowledge by participating in clinical programs; training pharmacy staff, students, interns, externs, residents, and health care professionals.
- Complying with state and federal drug laws as regulated by the state board of pharmacy, the drug enforcement administration, and the food and drug administration by monitoring nursing unit inspections; maintaining records for controlled substances; removing outdated and damaged drugs from the pharmacy inventory; supervising the work results of support personnel; maintaining current registration; studying existing and new legislation; anticipating legislation; advising management on needed actions.
- Protecting patients and technicians by adhering to infection-control protocols.
- Maintaining safe and clean working environment by complying with procedures, rules, and regulations.
- Maintaining pharmacological knowledge by attending educational workshops; reviewing professional publications; establishing personal networks; participating in professional societies.
- Contribution towards team effort (**Fig. 1**) by accomplishing related results as needed [1].



**Fig. 1: The Bowtie Phenomenon of Team-Based Care [4].** As reform of the US health care system continues, the symbiotic relationship between the physician and pharmacist should be at the center of the patient care model. The Patient Centered Primary Care Collaborative described the importance of focusing on a comprehensive approach to pharmacotherapy management in chronic diseases through a team-based approach. A visual representation of this approach can be thought of as a “bowtie phenomenon”. This bowtie describes a relationship in which the diagnostician (physician) and pharmacotherapy manager (pharmacist) are able to use their specialized training to collaborate with one another. Keeping these roles and talents in mind, the pharmacy profession needs to train students how to build and be part of effective teams. Literature suggests that pharmacists’ perceptions of their professional role does not always include describing themselves as being in patient-centered roles. However, supporting information suggests that pharmacists can contribute to team-based care.

- Preparation of medications by reviewing and interpreting physician orders; detecting therapeutic incompatibilities.
- Dispensing of medications by compounding, packaging, and labeling pharmaceuticals.
- Controlling medications by monitoring drug therapies; advising interventions.
- Completes pharmacy operational requirements by organizing and directing technicians’ work flow; verifying their preparation and labeling of pharmaceuticals; verifying order entries, charges, and inspections.
- Providing pharmacological information by answering questions and requests of health care professionals; counseling patients on drug therapies.

### 3. SCOPE OF PHARMACISTS

A pharmacist with the above skills and attitudes should make himself an indispensable partner in health care system of a nation. Pharmacy a complete profession: Pharmacists reflect on every sector of society in the form of

*Artists* – designing a drug dosage form.

*Lawyer* – having fair knowledge of laws and legislation about the drug.

*Engineer* - having sound technical knowledge.

*Entrepreneur* - with sound knowledge of management, accounting, marketing, Counseling.

*Health professional* - having fair knowledge regarding health [2].

Learning “Objectives for the pharmacists” roles in health promotion and disease prevention are listed below.

- To define, compare and contrast the terms health, health promotion and disease prevention.
- To explain the significance of health promotion and disease prevention efforts.
- To list and distinguish examples of promotion and prevention activities.
- To describe the need for pharmacist and pharmacy student involvement in health promotion and disease prevention.
- To identify opportunities and challenges for pharmacists to provide health promotion and disease prevention services [3].

#### 3.1. Academic Pharmacist

In academic pharmacists focus on teaching, research and training of the upcoming pharmacist. Academic institutions are major sources of pharmacists, who add professionals into health care system. By arranging seminars, projects, or system academics, pharmacist plays valuable role in health care system. Academicians identify, educate and train student pharmacists to be change agents for the profession so they can influence and create more team-based care opportunities for pharmacy practice. Academic institutions have changed their curricula to meet the future needs of team-based care for the profession [4]. Experiential education (eg, clerkship experience) is an essential element in developing pharmacy students’ abilities to apply theory to practice, problem solve, and acquire standard competencies as pharmacists. To achieve this goal, preceptors play crucial roles in pharmacy practice experience, as a teacher, mentor, and evaluator.

They accomplish this by showing students how to apply knowledge gained in their didactic courses to actual clinical practice, by helping students engage in pharmacy activities, and by assessing student performance and providing effective feedback [66].

#### 3.2. Industrial Pharmacists

##### 3.2.1. Research and Development

Pharmacists contribute to research, and their expertise in formulation development is of particular relevance to the biological availability of active ingredients.

##### 3.2.2. Manufacturing and Quality Assurance (QA)

The pharmacist’s broad knowledge of the pharmaceutical sciences ensures an integrated approach to quality assurance (including good manufacturing practice) through the validation of the various stages of production and the testing of products before release.

##### 3.2.3. Drug Information

The pharmacist has the knowledge and expertise to provide detailed information on medicines to members of the health profession and the public. Also, pharmacists provide an information service within the company.

##### 3.2.4. Parent Application and Drug Registration

The pharmacist is ideally qualified to understand and collate the diverse information required for potent and authorization submissions.

##### 3.2.5. Clinical Trials and Post-Marketing Surveillance

The pharmacist has the knowledge of drug and health care provision required to facilitate collaboration between companies, health professionals and governments in relation to clinical trials and surveillance.

##### 3.2.6. Sales and Marketing

The pharmacist, whose professional ethics demand a concern for the interest of patients, can contribute to proper marketing practices related to health care and to the provision of appropriate information to health professionals and the public.

##### 3.2.7. Management

The inclusion of pharmacists in all levels of management promotes an ethical approach within management policies.

### 3.2.8. Primary Care Pharmacists/Prescribing

#### Advisors

These are people who work for NHS organizations that are in charge of a range of local health services - such as doctor's surgeries and community pharmacies. Their job is to ensure the best use of medicines and resources across the area. In some places, practicing pharmacist or primary care pharmacist also run medication review clinics and have lots of patient contacts.

### 3.2.9. Community Pharmacists

Pharmacists work at the frontline of healthcare in cities, towns and villages across the nation. They work from their own pharmacies or out of local healthcare centers and doctors' surgeries. Some community pharmacist owns their own business and enjoys the challenges of financial management and responsibility for staff, stock and premises that this brings. Others work for large high street pharmacy chains and have the opportunity to move around within an established company structure.

### 3.2.10. Pharmacist with Special Interest

Pharmacists with special interests are involved with developing their skill and expertise in specialist areas such as cancer or diabetes. Almost half of all pharmacists (42%) offered additional clinical and educational services to community residents including blood pressure checks, screening for cholesterol and osteoporosis, glucose screening and diabetes counseling, tobacco cessation programs, immunizations.

### 3.2.11. Hospital Pharmacist

Hospital pharmacists are a vital part of the healthcare team. Working in either the PHC or private hospitals, being a hospital pharmacist means you are part of a team where the focus is firmly on patients (WHO website).

Some pharmacists specialize as consultants (or as pharmacists with specialist interests) in many areas such as Hematology (blood), Nephrology (kidneys), Respiratory medicine, Cardiology (heart), Urology (urinary), Diabetes, Gastroenterology (stomach and intestine), infectious diseases, pediatrics (children) and care of the elderly [5-10].



**Fig. 2: Core Competency Framework [105].** Competencies refer to the knowledge, skills, attitudes and behaviors that an individual develops through education, training and work experience. When combined, these competencies form a competency framework. This framework provides a blueprint for describing the competencies and behaviors of pharmacists in their daily practice. It is intended that the framework would also be used to provide structure and guidance for CPD over the changing demands of a pharmacist's career. The framework is divided into six domains of practice and identifies a number of competencies expected of a pharmacist in each domain. A number of behavioral statements are given for each competency to demonstrate how individuals who have that competency will be behaving in practice. It is used for a number of purposes, including: Assisting pharmacists to reflect on their practice and identify learning needs for CPD; Development of programs by academic institutions; informing the educational standards for accreditation by the PSI of pharmacy degree programs. Providing a platform for the development of specialization and advanced practice within pharmacy. Providing a public statement of the professional role of a pharmacist.

## 4. THE HEALTHCARE PHARMACISTS

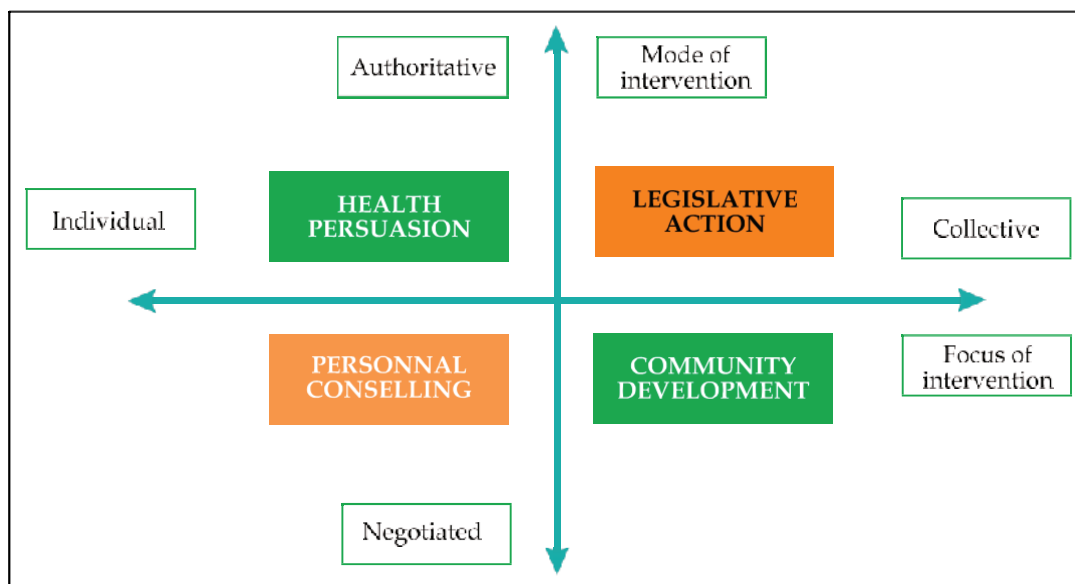
The WHO report on "The role of the Pharmacist in the health care system" states that the competence of the Pharmacist is already proven and control.

- In health promotion and social responsibilities.
- In the direction and administrative of pharmaceutical services.
- In drug regulation and control.



- d. In the formulation and quality control of pharmaceutical products.
- e. In the inspection and assessment of drug manufacturing facilities.
- f. In the assurance of product quality through the distribution chain.
- g. In drug procurement agencies and.
- h. In National and Institutional Formulary & therapeutics Committees [11].

partnerships to maintain wellness and to help modify individual behaviors, such as unhealthy lifestyles. In other words, health promotion involves community interventions that help a person increase control over and improve his or her own health. Disease prevention is defined as activities that are aimed to prevent and control disease, stop the disease processes, or reduce the consequences of disease. Disease prevention activities focus on individuals and communities with identifiable risk factors that can be targeted for effective



**Fig. 3: Beattie's Model of Health Promotion [102].** Health professionals normally lead health persuasion activities. These activities are focused at individuals. The approach is authoritative and individuals are not given any choices for decisions. An example is a pharmacist counselling a COPD patient to quit smoking for the sake of his health. Legislative actions are interventions initiated by experts or professionals to protect the health and welfare of the community. An example is the proposed new ordinance to totally ban smoking in restaurants and most indoor public areas. Personal counselling focuses on the client's specific needs and normally works on one to one basis. The health worker acts as a facilitator to discuss and negotiate client needs. Decisions are made based on the client's wishes. For example, the counselor works with drug abusers to discuss choices between methadone and conventional drug detoxification programs. Community development focuses on interventions targeted at the community level. The community identifies their health needs, seeks to empower and makes the best rational choice.

#### 4.1 In Health Promotion and Social Responsibilities

Health promotion is any combination of interventions (i.e., health education and related organizational, economic, and/or political interventions) designed to facilitate behavioral or environmental changes that will improve or protect public health. Health promotion strategies focus on community-based interventions and

intervention. Thus, in contrast to health promotion, disease prevention efforts emanate more from health providers than from individuals. A pharmacist has an important role to play in health promotion (Fig. 2) and primary, secondary and tertiary prevention, especially in relation to the management of chronic diseases [12] which is discussed below in details:

#### **4.1.1. Sexually Transmitted Diseases-Aids**

Huge resource of community pharmacist can educate people in the prevention and information of HIV/AIDS. Although many classes of antiretroviral are available like protease inhibitors, nucleoside reverse transcriptase inhibitors and non-nucleoside reverse transcriptase inhibitors, patients need close monitoring and strict dietary regimen. Pharmacy is a key player in all the NICE publications related to sexual health. They include:

- Contraception quality standard.
- Contraceptive services for under 25s.
- Long acting reversible contraception.
- One to one intervention to prevent STIs and Under 18 conceptions [13, 14].

#### **4.1.2. Pneumococcal Disease and Influenza**

The role of a pharmacist in immunizing adults against pneumococcal disease and influenza is discussed. Pneumonia is the leading cause of death due to infection worldwide in children aged < 5 years and is responsible for approximately 16% of the 5.6 million deaths in this population [15]. Pharmacists can promote immunization by assuming the roles of educator, facilitator, and immunizer. Despite lack of specific mention of it in accreditation standards, health-system personnel have a duty to vaccinate adults, just as they do pediatric patients. Pharmacists should review immunization records with patients periodically and at the time of immunization. As with other drug products, formulary decisions and the distribution, storage, and handling of vaccines are important Pharmacist responsibilities.

#### **4.1.3. Chronic Disease Management**

A pharmacist's role in the control of the chronic disease can range from the support of proven community programs such as screening and disease management clinics for diabetes etc (see **10.3. Chronic Disease Management**).

#### **4.1.4. Nutrition Counseling**

Pharmacists have unique constellation of competencies, including clinical knowledge and skills which place them in an ideal position to contribute to the delivery of nutrition support therapy to patients. Indeed, the professional roles of pharmacists have been evolving from the traditional compounding and dispensing of medications to the modern delivery of direct patient care within multidisciplinary health care teams. Pharmaceutical care (PC) is a practice philosophy, in

which the pharmacist responsibly provides medication therapy to patients to achieve definite outcomes that improve their quality of life. There is cumulative evidence to support the positive impact of PC on patient care and health care costs [16].

#### **4.1.5. Oral Health**

A Pharmacist has numerous opportunities on a daily basis to positively affect his trend. The American dental association has published pamphlets for dentists and Pharmacists that cover oral structures and diseases prevention to caries, OTC and prescription dental drugs and how these two professions can collaborate.

#### **4.1.6. Environmental Health**

About this a pharmacist should adapt his methods of health educations. A pharmacist role in environmental health is related primarily to being alert to the conditions prevailing in the community and of working with others to adequately control any of the attendant hazards.

#### **4.1.7. Epidemiology**

Epidemiology is the study of the distribution and determination of health-related events in specific population and the application of this field in the control of these events. Epidemiology relates to the interaction of hosts and their environment with attention to those particular agents in the environment that are causal factors of disease. The alert Pharmacist who can apply the basic principal of Epidemiology in their community will become a significant member of the health team.

#### **4.1.8. Health Measurement**

A pharmacist is the health professional having the most frequent contacts with the general public and this function as a community health education makes the pharmacist's role unique. By staying abreast of local health statistics Pharmacist can function as a valuable resource person to researcher's conduction epidemiological studies in the community.

#### **4.1.9. Health Education**

Pharmacists are required more than ever to contribute in the area of health promotion (HP), and it is one of the six components that contribute to the health improvement of individuals accessing pharmacy services as stated in the Joint FIP/WHO guideline on good pharmacy practice. The importance of the role of pharmacists in patient counseling is recognized and because of increased accessibility, they are in a key position to provide HP services. Several studies

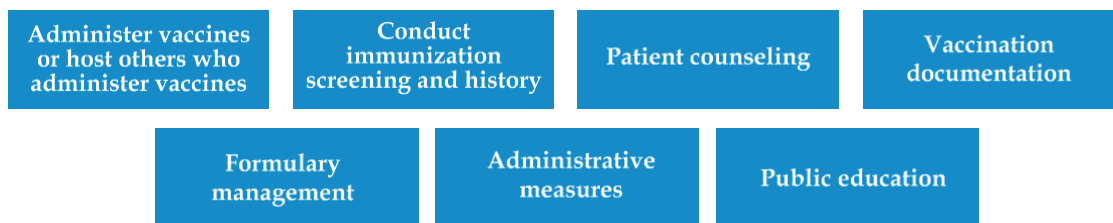
have shown the benefits of pharmacists' involvement in a wide range of important public-health issues including smoking cessation, diabetes, hypertension and contraception [17].

#### 4.1.10. Alcohols, Drug Abuse and Smoking Cessation

The diseases of alcoholism and drug abuse also come under the preview of the community pharmacist. The Pharmacist has a key role to help individuals who become dependent upon alcohol. Counseling sessions can be made by the community pharmacist to stop smoking.

#### 4.1.11. Vaccinations

Administering vaccines to patients and health care workers is enabling some health-system pharmacists to assume a prominent role in public health. Pharmacists have noticed that immunization needs were not being met and, through their advocacy, increased the numbers of patients and employees of health systems who have been vaccinated.



**Fig. 4: Categories of Pharmacist Immunization Service [103].** The NCPA has a free online home-study program, "Creating an Immunization Niche in the Community Pharmacy: A Business Guide," approved by the Accreditation Council for Pharmacy Education for 8 continuing-education contact hours. Practitioners must stay informed about current trends in VPD and immunization recommendations. Pharmacists who do not administer vaccinations may host other health care professionals to do so, but they still have an obligation to educate and promote full immunization for their patients. While immunizations may be provided upon physician order for an individual patient, standing orders or protocols may help increase vaccination levels for some VPDs, such as influenza and pneumococcal disease. This type of practice is promoted by the ACIP.

#### 4.1.12. Family Planning

Drug shops and pharmacies have long been recognized as the first point of contact for health care in developing countries, including family planning (FP) services. Drug shop operators and pharmacists should not be viewed as mere merchants of short-acting contraceptive methods, as this ignores their capacity for increasing uptake of FP services and methods in a systematic and collaborative way with the public sector, social marketing groups and product distributors. According to the service delivery guidelines of the Ministry of Health and Family Welfare, Government of India, all providers dispensing emergency contraception should be appropriately informed about emergency

contraception and should also counsel their clients on regular contraceptive usage [18, 19].

#### 4.1.13. Cholesterol Risk Management

Pharmacist care improves the management of outpatients with major modifiable CVD risk factors. Pharmacists can help fill the gap as primary care providers and can contribute to the control of CVD risk factors by their knowledge of medications, their easy accessibility for patients, and their collaborative practice with physicians. More specifically, pharmacists have the opportunity to provide medication instructions to patients at each prescription, to improve safe medication use, and to assist physicians in chronic care [20].

#### 4.1.14. Women Welfare-Pregnancy and Infant Care

Pharmacists, as the most accessible healthcare professionals, can work to empower women in their role as informal caregivers, to communicate to women the necessity to be educated and to support their health literacy. Furthermore, pharmacists can help women to take control of their reproductive health. They can help women to develop a reproductive life

plan. A reproductive life plan consists of personal goals or intentions about having or not having children. During and after pregnancy, pharmacists can provide women with essential education on contraindicated medicines, recommended prenatal vitamins and infant feeding options, such as breastfeeding and formula feeding [21].

#### 4.1.15. Individualization of Drug Therapy

Today the latest concept in medicine is towards individualization of drug therapy. Where judicious patient care is needed individualization of drug therapy becomes a need, and a pharmacist can play a vital role in this. A pharmacist can set up a separate

consultation room and provide counseling to the patient. He can store the details of patient history, allergies and other details necessary for therapy so that the concept of individualization of drug therapy could be implemented.

#### 4.1.16. Radiopharmacy

This is a specialized area of pharmacy, where radioactive materials are produced as drugs for the diagnostics of certain diseases like Thyroid problem by Iodine isotope. Here a pharmacist has a significant role to play.

#### 4.1.17. Consultancy Service

It's another area in where a pharmacist can play a role directly in public health. For independent career & business consultancy in pharmacy profession is challenging & demanding & has got a good scope of successful career build up.

#### 4.1.18. Rational Use of Drugs

The way drugs are procured, stored, distributed, and dispensed and the information given by the pharmacist/dispensers dictates the quality of their use, thus in terms influencing the rational use of medicines. Different models of practice are (1) the drug information practice model, (2) the self-care practice model, (3) the clinical pharmacy practice model, (4) the pharmaceutical care practice model, and (5) the distributive practice model. These models are practiced across the continents alone or in combination based on the understanding of the local pharmaceutical needs, expertise of pharmacist, and their recognition of role [22].

#### 4.1.19. Disease Prevention

Distinctions between the types of disease prevention measures are sometimes unclear. Three levels of prevention exist. Here pharmacists play a great role.

a) *Primary*: - Primary prevention is helping people maintain their health or improve the quality of their lives through a healthy lifestyle. For example, primary prevention is the control of infection through immunization, education about healthy and safe habits (e.g. eating well, exercising regularly, not smoking),

b) *Secondary*: - Secondary prevention in the early diagnosis and treatment of an already existing disease the use of penicillin in the treatment of a streptococcal infection prevent the onset of rheumatic fever, regular exams and screening tests to detect disease in its earliest stages (e.g. mammograms to detect breast cancer), daily, low-dose aspirins and/or diet and exercise programs

to prevent further heart attacks or strokes. Thus, a pharmacist can perform a vital service by advising patients, who present a febrile illness characterized by a sore throat to see a physician.

c) *Tertiary prevention*: - Tertiary prevention largely consists of rehabilitation. This is done by helping people manage long-term, often-complex health problems and injuries (e.g. chronic diseases, permanent impairments) in order to improve as much as possible their ability to function, their quality of life and their life expectancy. Examples include: cardiac or stroke rehabilitation programs, chronic disease management programs (e.g. for diabetes, arthritis, depression, etc.) [23, 24]. Strategic practice-related efforts that could possibly enable pharmacists to provide health promotion and disease prevention services would include:

- Knowledge of the clinical and demographic characteristics of the community.
- Targeted activities based on assessment of diseases associated with the service population in the community.
- Development of a written plan for informational and preventive efforts.
- Identification of stakeholders and collaborative community partners, such as health departments.
- Community and advocacy groups, homeless shelters, institutions, and payers.
- Marketing, documenting, and billing of professional services associated with health promotion and disease prevention in order to provide sustainable pharmacy-based interventions; and.
- Utilization of educational materials, e.g., handouts, brochures [25].

## 4.2. In the Direction & Administrative of Pharmaceutical Services

In this branch, there are opportunities for pharmacists of all education levels. The largest number of pharmacists are involved in marketing & administration. Pharmacists in product marketing educate physicians, community Pharmacists, hospital pharmacists and others about manufacturers' product. This can be a rewarding career for a pharmacist with right personality & motivation.

### 4.2.1. In Compounding and Dispensing

Pharmacists~

- Accept and check prescription details.
- Script validity.
- Safety and appropriateness.

- Review patient's dispensing history.
  - Patient-specific factors.
  - Select product.
  - Dispensing check.
  - Label and assemble dispensed products.
  - Supply prescription to patient/carer: re-check.
  - Counsel patient/carer on safe and appropriate use.
- the medicine use process, and advise on disposal of human waste from patients receiving medicines.
  - Doses of chemotherapy and other institutionally-identified high-risk medicines should be independently checked against the original prescription by at least two health care professionals, 1 of whom should be a pharmacist, prior to administration.
  - Hospital pharmacists should ensure the develop-

**Table 1:** Differences between dispensing and providing pharmaceutical care [26].

Dispensing	Pharmaceutical Care
<ul style="list-style-type: none"> <li>▪ Objective is to bring product to the customer</li> <li>▪ Decisions focus on the business.</li> <li>▪ Inventory generates revenue.</li> <li>▪ Available service supports the product.</li> <li>▪ Schedule for repeat prescription determined by customer supply of drug product.</li> <li>▪ Business is passively sought through the generation of prescriptions.</li> <li>▪ Product business</li> </ul>	<ul style="list-style-type: none"> <li>▪ Service business</li> <li>▪ Objective is to bring the pharmacist to the patient.</li> <li>▪ Decisions focus on the patient.</li> <li>▪ Patient care generates revenue.</li> <li>▪ Available product supports the service.</li> <li>▪ Schedule for follow-up determined by risk and benefit of drug therapies and needs of the patient.</li> <li>▪ Business is actively sought through the recruitment of patients.</li> </ul>

#### 4.2.2. In Hospital Management

A Pharmacist has a great role to play in hospital administration. The responsibilities of a hospital pharmacist are to develop a high quality comprehensive pharmaceutical service, properly coordinate & meet the needs of the numerous diagnostics & therapeutic departments, the nursing service, the medical staff, medical equipment of hospital & the hospital as a whole in the interest of community improving patient care. Clinical pharmacists' role inpatient safety stated below:

- Hospital pharmacists should take responsibility for all aspects of selection, implementation and maintenance of technologies that support the medicine use process, including distribution devices, administration devices, and other equipment.
- Hospital pharmacists should ensure appropriate assessment, development, implementation and maintenance of clinical decision support systems and informatics that guide therapeutic decision making and improve the medicine use process.
- Hospital pharmacists should support the development of policies regarding the use of medicines brought into the hospital by patients, including the evaluation of appropriateness of complementary and alternative medicines.
- Hospital pharmacists should take responsibility for the management and disposal of waste related to

ment of quality assurance strategies for medicines administration to detect errors and identify priorities for improvement.

- an easily accessible reporting system for adverse drug reactions should be established and maintained.
- an easily accessible reporting system for medication errors, including near misses, should be established and maintained.
- Medicines use practices should be self-assessed and compared with benchmarks and best practices to improve safety, clinical effectiveness, and cost-effectiveness.
- Systematic approaches (trigger tools) should be used to provide quantitative data on adverse drug events and optimal medicines use. These data should be regularly reviewed to improve the quality and safety of medicines practices [27-30].

#### 4.2.3. In Health Maintenance Organizations (HMOs)

HMOs are open or private associations that give and oversees extensive wellbeing administrations to people enlisted. Here a pharmacist can play a role in the administration of this kind of organization or give direction. Community pharmacies are very frequently the first contact with the health care system, often before a General Practitioner. There is a high frequency of contacts with low barriers to access to health care: no appointments, no long waiting time,

convenient opening hours, and they are located within the community. Regular contacts offer access to a wide range of people, namely, healthy persons, those showing symptoms, patients undergoing treatment, relatives and other care givers; people from all social strata. It would be necessary to pursue relevant policies to enhance the utilization of the untapped potentials of community pharmacists, especially as primary health care is the central focus of health care delivery. Pharmacists can:

- Perform patient assessment (subjective and objective data including physical assessment).
- Have prescriptive authority (initiate, adjust, or discontinue treatment) to manage disease through medication use and deliver collaborative drug therapy or medication management.
- Order, interpret and monitor laboratory tests.
- Formulate clinical assessments and develop therapeutic plans.
- Provide care coordination and other health services for wellness and prevention of disease.
- Develop partnerships with patients for ongoing (follow-up) care [31-33].



**Fig. 5: Factors of Quality care [106].** Prescription for Excellence made a clear commitment to ensuring people had access to pharmaceutical care which was delivered by pharmacist independent prescribers across all care settings. Significant progress has already been made to build a complementary mix of skills within the pharmacy team, including independent prescribing, communication skills, history taking and advanced clinical assessment skills. A further drive to recruit more pharmacists to undertake these programmes, along with an increase in training places and additional financial resources, will be needed to support the planned capacity increase in pharmacists with advanced clinical skills to meet the needs of the service.

#### 4.2.4. *Extended Role of Community Pharmacists*

Community pharmacists have the potential to not only contribute to improving patients' outcomes through safe and effective use of drugs, but also to reduce the cost of healthcare by resolving drug related problems and promoting public health issues. At the same time, the nature of pharmacy practice and community pharmacy is also changing. Along with others, they community pharmacists have following responsibilities:

- Delivery services to household patients.
- Services for groups with special needs.
- Services for residential homes.
- Out of hours services.
- Domiciliary visits.
- Distribution of welfare food.
- Disposal of unwanted medicines.
- Sale of prepayment certificates.
- Hospital discharge and admission procedures.
- Needle and syringe exchange schemes.
- Health promotion activities.
- Supply of complementary medicines [34, 35].

#### 4.2.5. *Pharmacists in ICU*

Because of the complexity of drug therapy and the critical nature of patients in intensive care units (ICUs), the attendance of a clinical pharmacist in this setting is an important issue. Studies have reported that the interventions of clinical pharmacists have resulted in a rational drug therapy and improved patient care and treatment costs [36].

#### 4.2.6. *Long-Term Care*

Residents in long-term care are often elderly people with several comorbid conditions, who may be very susceptible to inappropriate prescribing. Although complex medication regimens are often required for these individuals, pharmacists can play a vital role in improving the overall quality of drug therapy. The pharmacist's medication review saves doctors' time; this is particularly the case for patients who are not reviewed opportunistically. Overall, the evidence for the benefit of pharmacists in long-term care settings is quite mixed. Pharmacists can improve clinical outcomes by reducing potentially inappropriate prescribing and MRPs; however, the majority of successful interventions in the literature were multidisciplinary in nature. Economic evaluations of pharmacist interventions in this setting are limited, but most studies have shown no significant

difference in humanistic and economic outcomes [37]. (See **Chapter 20. Pharmacists in Long-Term Care**)

#### 4.2.7. Ambulatory Care Clinics

Ambulatory care pharmacy practice is defined as the provision of integrated, accessible healthcare services by pharmacists who are accountable for addressing medication needs, developing sustained partnerships with patients, and practicing in the context of family and community. Pharmacist services have varying effects on patient outcomes compared with usual care. CPPs deployed at the medical center's ambulatory care clinics have had a positive impact on clinical and cost outcomes, improving patient care through interventions, contributing to readmission reduction efforts, generating indirect revenue through cost avoidance, and generating new revenue through billing for patient visits [38-40], [101]. (See **Chapter 22. Pharmacists in Ambulatory Care**).

#### 4.2.8. Drug Information Services

Health care providers do not actually use these guidelines. Approximately 10% to 40% of patients do not receive care based on updated scientific evidence and more than 20% of interventions performed are not required or are potentially harmful to patients. Drug information service is a dedicated and specialized service provided by pharmacists to enhance knowledge of medicines use, promote rational prescribing among prescribers, and reduce medication errors. One of the most important aspects of drug information is to be unbiased in its contents. Thus, the unbiased nature of information is of paramount importance to enhance patient outcomes and reduce adverse drug reactions (ADRs) [41, 42]. Sources of drug information and multiple programmatic access routes to PubChem data tables are given in **Annexure 2 and Sources of drug information – a quick guide in Annexure 3** [108,109].

#### 4.3. In Drug Regulation & Control

A pharmacist in government drug regulatory affair department plays his role by regulating the quality of medications, price of the medications, applying the ethics & law about medications & industries.

#### 4.4. In the Formulation & Quality Control of Pharmaceutical Products

The formulation of any medication is only depended on pharmacist. It is one of the important roles of a pharmacist. The physical, chemical & biological quality of a pharmaceutical product intended for administration to patients in the home must be of the

highest quality attainable. This quality must be built in to the product in each step of the aseptic compounding process, that is, in the starting components, the design & operation of the compounding facilities, the control of the environment & the qualifications of operators all contribute to the final quality of the product, either in a positive or negative manner. Therefore, the control of quality is a continuous process throughout the compounding of the product. Testing of the finished product can only confirm the quality built in to the product during its preparation. Here only a Pharmacist can play his role.

#### 4.5. In the Inspection & Assessment of Drug Manufacturing Facilities

Another important duty of a pharmacist (by joining the government testing laboratory & medicine regulatory service) is inspect the pharmaceutical industries, their environment, quality of medications, facilities & assesses the medications.

#### 4.6. In the Assurance of Product Quality Through the Distribution Chain

Distribution of medication is two types –

- a. *From industry to market*: After produced, before sending to the market ensuring the quality of pharmaceutical products is must, because it is directly related with life. Here only a Pharmacist plays a significant role.
- b. *From hospital to the patient (through prescription)*: The medication distribution system in hospitals is very complex & involves in several health care professionals. The usual flow is physician prescribes, pharmacist dispenses & nurses administer medication. Here the pharmacist who dispenses, has the right to change the medicine which is prescribed by the physician to ensure the quality of that medicine.

#### 4.7. In Drug Procurement Agencies

The work of drug procurement agencies is to supply the medication & find out the possible customer in home & abroad. Here a pharmacist plays a great role.

#### 4.8. In National & Intuitional Formulary & Therapeutics Committees

During recent years, with the development of the clinical pharmacy movement, a number of clinical pharmacists on the staff of some departments have developed expertise in specific therapeutic specially areas. Therefore, it was a logical development under

the pharmacy & therapeutics committee. The formulary system has attempted to outline the scientific data on a medication, including its toxicities, untoward side effects, safety profile & beneficial effects- has been a controversial method of appraising medication therapy. All these are provided by a formulary committee of a nation & this formulary committee is constructed by the pharmacists [43, 44].

## 5. PHARMACIST'S ROLE PLAYS IN PUBLIC HEALTH

Pharmacist contributions to public health that are not widely reported. This may be partially due to some of these services not being framed within public health categories, so the population impact of their services goes unnoticed. Nearly 93% of U.S. residents live within five miles of a pharmacy, making the community pharmacy one of the most accessible healthcare institutions. The pharmacist is in a unique position to make essential public health contributions. However, there is limited evidence that patient perspectives on the role of pharmacists has changed. The role of the pharmacist as part of the interdisciplinary team is even more critical in rural locations as many of them are healthcare worker shortage areas, and the pharmacist may be one of the few healthcare professionals in the community [45]. NHS England (NHSE) is facing a growing GP workforce crisis, with continuing problems around GP recruitment, retention, and retirement rates. Approximately 30% of GP partners have reported not being able to fill a GP vacancy in their practice for at least 12 months (2017-18 survey). Recent studies support clinical pharmacists in General Practice, including their perceived competencies, scope of practice, practice environments, levels of integration, and support needs [46].

## 6. BUILDING RELATIONSHIPS

Partnerships within pharmacy and public health arenas may provide a platform for evidence-based decision making through processes that focus on common problems and build a foundation for decisions.

### 6.1. Collaboration

Interprofessional collaboration (IPC) is an integral part of the practice of Medicine and Family Medicine. The WHO defines IPC as "multiple health workers from different professional backgrounds work together with patients, families, carers and communities to deliver the highest quality of care". To provide effective, patient-centered care, family physicians must collaborate with other health and social care providers. There are many benefits of collaboration such as enhancing the

use of scarce resources as many organizations have limited capital, reduction in the duplication of cost and effort by decreasing fragmentation of health services, improving quality by integrating health outcomes for patients, improving communication by considering diverse perspectives on public health issues and increasing trust and understanding among individuals and organizations [47-49].

### 6.2. Emergency Preparedness and Response

During the events of natural disasters, industrial accidents or bioterrorist attacks, healthcare facilities are often overwhelmed by the influx of patients. This can lead to inaccuracy or errors in prescribing the proper therapy for a patient because of limited staff with little time to treat. This is when pharmacists play a critical role in individualizing medication therapy regimens to select treatment, increase medication effectiveness, and minimize adverse drug events. Pharmacy leaders should (1) review government and community disaster responses and understand the movement of drug supply for each response, (2) create a pharmacy disaster plan, (3) list the essential medications and determine their inventory levels, and (4) establish a staff training program to enhance understanding and implementation of the EOP. If successfully developed and executed, a hospital pharmacy department's EOP has a high rating of success in meeting patient-centered needs in the unforeseen event of a disaster [50].

### 6.3. Patient Advocacy

Both hospital and community pharmacists have a significant role to play in advocacy of pharmacy as a profession. Governments and pharmacy governing bodies are continuing to work to increase the scope of practice of pharmacists, leaving us with an incredible opportunity to grow. Pharmacists also need to be taking responsibility for advocating through the interactions we have with patients, other health care professionals and the public. In order for pharmacists to meet the needs of the medically indigent, further efforts are needed to show that the patient's opinion is valued. Many methods can be used to advocate for patients such as participation in community collaborations, partnerships, consumers' rights groups, advocacy groups and non-profit organizations which bring communities together for action in educating the public and supporting policy changes in public health [51].

### 6.4. Patient Centered Approach (Improving Health Outcomes)

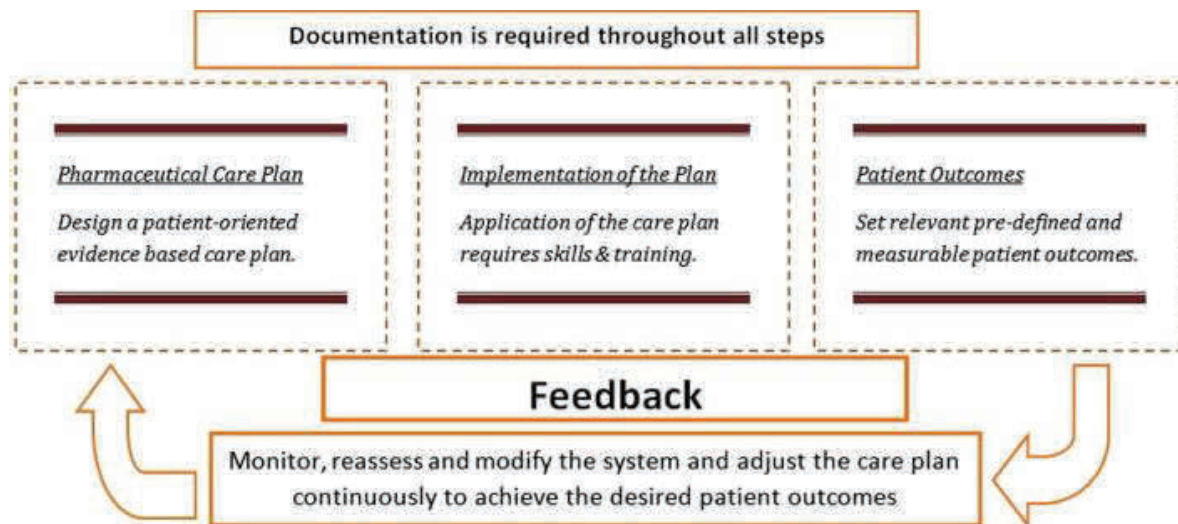
The mission of pharmacists is to help people achieve optimal health outcomes. Similarly, the mission of



public health specialists is to promote physical and mental health and prevent disease, injury, and disability. There is overlap in the two mission statements with respect to achieving optimal health outcomes. The JCPP created a profession-wide patient-centered care model known as the PPCP in 2014. The PPCP recommends that pharmacists use a patient-centered approach, in collaboration with other health care providers to optimize patient care. To accomplish this, pharmacists should use evidence-based medicine to collect necessary subjective and objective information, assess the collected information, develop an individualized patient-centered plan, implement the plan, monitor and evaluate the effectiveness of the plan – modifying as needed [52].

## 6.6. Education and Research

The ACPE and CAPE have encouraged collaboration between healthcare professions and pharmacy by building the skills and confidence of students to optimize patient care and services. They also encourage that pharmacy programs “strive to meet community needs” and evaluate faculty members for their service contributions to the community. Given that emphasis on service, teaching, and research are hallmark evaluation metrics of all institutional programs, conformance is necessary to develop pedagogical models that are adoptable. In the public health arena, these goals of pharmacy practice benefit society by creating desirable patient outcomes, minimizing overuse, underuse and misuse of medications, and achieving medication related public health goals [53].



**Fig. 6: Evidence-based pharmaceutical care [107].** As care providers, pharmacists are effective in providing high quality patient care and being members in multidisciplinary clinical teams is needed to give them the opportunity. Evidence based pharmaceutical care is a natural and logical emerging concept in the modern pharmacy practice to achieve high quality and more effective pharmaceutical care but still more efforts and resources are needed to promote new attitude toward more professional career. There is strong data showing that pharmaceutical care lead to improvement in health outcomes and cost-effective therapy. More efforts, policies and qualified staff are needed to establish the “evidence-based pharmaceutical care” as new daily professional practice. Evidence to support pharmacists in their emerging role as care providers is available to improve the efficacy and quality of pharmaceutical care. Education and specialized training practicing evidence-based approach are vital to prepare pharmacists to provide high quality pharmaceutical care.

## 6.5. Minimizing Adverse Drug Events

It has been suggested that closer collaboration between doctors and pharmacists in primary care prevent ADR. Nowadays, pharmacists also ensure the rational and cost-effective use of medicines, promote healthy living, and improve clinical outcomes by actively engaging in direct patient care and collaborating with many healthcare disciplines. With this expanding scope of practice, pharmacists are being recognized as key components in providing individualized patient care as part of interprofessional healthcare teams [37].

## 6.7. Pharmacist on the Home Care Team

Medication-related problems (MRPs) are common among home care clients who take many medications and have complex medical histories and health problems. Helping clients manage medications can be a challenge for all home care clinicians. By partnering with a college of pharmacy at a large university in the community, the agency successfully included a pharmacist as a member of their home care team. Medication-related problems are often classified four types: indication, effectiveness, safety and compliance

[54,55] (See **Chapter 21. Community Liaison Pharmacists in Home Care**)

Except these a pharmacist has important role to play as Chain Drug Store Pharmacist, Grocery Chain Pharmacist, Hospice Pharmacist, Hospital Staff Pharmacist, Managed Care Pharmacist, Military Pharmacist, Nuclear Pharmacist, Oncology Pharmacist, Operating Room Pharmacist, Pediatric Pharmacist, Pharmacist in Non-traditional Settings, Pharmacy Benefits Manager, Poison Control Pharmacist, Primary Care Pharmacist, Psychiatric Pharmacist, Veterinary Pharmacist [56].

## 7. FUTURE ROLES

Revolutionary progress in basic biomedical sciences, including human genomics, stem-cell biology, immunology, biomedical engineering, and bioinformatics, has provided an unprecedented supply of information for improving human health. The rapidly emerging fields of population genetics and pharmacogenomics highlight the significance of molecular techniques in the clinical diagnostic laboratory and the potential for application in patient-directed pharmacotherapy. Medication-prescribing decisions will increasingly rely on the results of genotyping of drug-metabolizing enzymes. New technology and practices will allow health system pharmacists to reduce treatment failures and prevent adverse drug reactions through the proper

application of pharmacogenetic principles. Advances in informatics will permit aggregation and application of population- and patient-specific clinical data in ways that will encourage development of population-specific, evidence-based disease management programs. As medication-use experts, health system pharmacists will need to apply these new tools not simply to improve patient-specific pharmacotherapy but to advance public health. Similarly, innovations in medication delivery technology will allow more complex therapies to be administered outside institutional settings. Patients, caregivers, and health professionals will require education about the safe use of such technologies, as will the legislators and other officials responsible for regulating their use [57-63].

## 8. PHARMACY PROFESSIONAL ORGANIZATIONS

Pharmacy organizations and associations offer many benefits to, and can fulfill many needs for, both pharmacists and technicians. These groups can offer networking, continuing education opportunities, free publications, and leadership opportunities. Although some pharmacy organizations are specific to just pharmacists, there are many organizations available for both pharmacists and pharmacy technicians to join, some of which provide specialty information for specific pharmacy fields. The **Table 1** lists some pharmacy organizations and their specialties.

**Table 2:** Pharmacist Organizations [6].

Name	Description
<b>APhA</b>	National professional organization of pharmacists representing pharmacy practitioners, and pharmaceutical scientists and students. Membership in one of the three academies of the APhA are APPM, APRS, ASP – offers members specialized benefits and the opportunity to influence their practice areas.
<b>ASHP</b>	Professional association of pharmacists who practice in organized health care settings. It endeavors to create an environment in which pharmacists can focus the full potential of their knowledge and expertise on patient care to provide high-quality pharmaceutical services that foster the efficacy, safety, and cost-effectiveness of drug use.
<b>AACP</b>	American Association of College of Pharmacy. The association includes institutional members - the 142 schools of pharmacy accredited by the Accreditation Council for Pharmacy Education - and individual members, including administrators, faculty and staff. It represents more than 6,400 faculty, 62,500 students enrolled in professional programs and 5,100 individuals pursuing graduate study.
<b>ACCP</b>	American College of Clinical Pharmacy will drive positive changes in health care as the professional organization most influential in advancing clinical pharmacist roles and responsibilities to optimize pharmacotherapy in the prevention and treatment of disease.
<b>ASCP</b>	Promotes the development and advancement of pharmaceutical care activities directed at patients in long-term care institutions.
<b>NCPA</b>	Membership in NCPA, formerly known NARD, dedicated to the continuing growth and prosperity of the independent community pharmacy in the United States.
<b>AAPS</b>	The members are eligible for membership in one of several disciplinary sections: Analysis and Pharmaceutical Quality; Biotechnology; Clinical Sciences; Economic, Marketing, and Management Sciences; Medicinal and Natural Products Chemistry; Pharmaceutical Technology; Pharmaceutics and Drug Delivery; Pharmacokinetics, Pharmacodynamics, and Drug Metabolism; and Regulatory Affairs.

\*List of pharmacy societies, networks, blogs, magazines, journals, social medias are listed in **Annexure 1**.

## 9. JOB MARKET IN DEVELOPED COUNTRIES

The extent of pharmacist practice is growing over the world. Pharmacist endorsing has flourished in the US, UK and Canada. In Alberta, Canada, three kinds of pharmacist recommending were characterized 1) adjusting a remedy (i.e., adjusting a current solution or expanding a medicine for coherence of consideration, 2) endorsing in a crisis, and 3) extra endorsing specialist (APA) (i.e., endorsing another medication for introductory therapy or to oversee progressing conditions). Albertan pharmacists don't require a composed concurrence with a doctor to recommend as in the US show. Moreover, pharmacists don't require extra preparing with a doctor accomplice as in the UK demonstrate [64]. National Center for Health Workforce Analysis, supported by the Health Resources and Services Administration, anticipated that somewhere in the range of 2012 and 2025 the pharmacist supply, modifying for new contestants just as exit from the work drive request would increment by 16%. The BLS gauges an expansion of 17,400 employments more than 10 years, while there are at present more than 14,500 new alumni for each year. Further, as recognized in the HRSA anticipating report, more prominent reconciliation of pharmacists into medical groups over an assortment of potential settings, alongside further developed clinical jobs, can possibly significantly help request well past current desires [65]. Government-financed health care offices in Malaysia warrants moderate health care administrations for the countries, which acquires sensible treatment charges for both standard and expert consideration. This makes high patient volumes and long holding up time a standard in these settings [66]. The incorporation of a pharmacist into private GP facilities can possibly add to quality utilization of medications. Pharmacists in the general health centers have unlimited oversight over the supply of drugs. Synergistic prescriptions the executive's administrations conveyed by pharmacists and GPs have just been effective in recognizing and settling medication-related issues, enhancing patient results, and upgrading drug use and expenses. Such administrations incorporate pharmacist-drove medication audits, where pharmacists evaluate medications, screen malady movement, and give proposals to GPs on a medication the executives plan. Customers for the most part upheld pharmacist reconciliation into private GP facilities [67]. Patients communicated worries that should be tended to if successful diabetes care is to be given from network drug stores in Malaysia [68,69]. As of late various

nations have stretched out endorsing rights to pharmacists in an assortment of organizations. The last incorporates free endorsing, which is a creating region of training for pharmacists in auxiliary consideration. Potential open doors exhibited by wide scale execution of pharmacist endorsing in auxiliary consideration incorporate enhanced recommending security, progressively proficient pharmacist medication audits, expanded extent of training with more prominent pharmacist joining into intense patient consideration pathways and improved proficient or work fulfillment [70]. NHS England (NHSE) is confronting a developing GP workforce emergency, with proceeding with issues around GP enrollment, maintenance, and retirement rates. Around 30% of GP accomplices have detailed not having the capacity to fill a GP opening in their training for no less than a year [71]. In July 2015, as a component of the Five Year Forward View 4 and the new arrangement for general practice, NHSE propelled the clinical pharmacists as a rule practice plan to address issues of limit. The plan at first gave £31 million subsidizing to general practices to utilize pharmacists more than 3 years. Stage 1 of the plan saw roughly 460 pharmacists utilized at around 650 practices crosswise over 88 locales. In April 2016, NHSE affirmed development of the plan, with an extra £112 million for a further 1500 clinical pharmacist posts by 2020– 2021 [72]. All pharmacists utilized through the plan are bolstered by the Health Education England-subsidized GPPTP, an 18-month required preparing program conveyed by the CPPE at the University of Manchester [73].

## 10. SUCCESS OF PHARMACIST-LED INTERVENTIONS

For clinic pharmacists, the extended extent of training incorporates exercises, for example, changing drug doses and different parts of patients' medicines, remedial substitution, inception of doctor prescribed drug therapy (counting therapy for minor infirmities), and requesting and understanding of lab tests, all of which have additionally centered the pharmacist's job inside a patient-focused model of consideration. Learning about drugs and illnesses and the capacity to apply this information are key segments of accomplishment. Pharmacists are engaged in an expanding scope of practice and have dramatic impacts on patient and economic outcomes. Checking on pharmacy writing uncovers that pharmacist achievement is driven by pharmacist commitment by and by exercises and natural or developed individual attributes [74-100].