

# Problem Solving and Preventive Measures: Pharmacists' Concern to Patient Care

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## Abstract

*As important members of the health care team, pharmacists work collaboratively with patients' other health care providers in all types of patient care settings ranging from community pharmacies to hospitals and long-term care facilities. Across these settings, pharmacists take specific actions that regularly contribute to improving patient safety. In addition to training on medications, pharmacist education and training include assessing the health status of patients, providing education and counselling, managing diseases, and using health care technologies. Pharmacists use this education and training to prevent medication errors, drug interactions, and other adverse medication events from reaching patients. With the expanding number and complexity of medications, pharmacists' roles and responsibilities have expanded broadly beyond medication distribution. Pharmacists are providing patient care in almost all health care settings to help people of all ages get the most from the medications that are prescribed to them. Examples of pharmacists' patient care services include providing health and wellness screenings, managing chronic diseases, assisting patients with medication management, administering immunizations, and working with hospitals and health systems to improve patient care and reduce the number of patients who are readmitted to the hospital following their hospital stay.*

**Keywords** *Pharmacists; Healthcare; Prevention; Care; Risk; Drug; Patient.*

## I. INTRODUCTION

Preventive health care aims to prevent the disease from occurring (primary prevention), reduce the progression of the disease by identifying it before it becomes symptomatic (secondary prevention), and decrease the impact of illness if it does occur (tertiary prevention). Pharmaceutical care is a straightforward concept. It involves the pharmacist working in concert with his/her patients and other healthcare providers to identify, monitor, and achieve desirable health-related outcomes through the appropriate use of medications. In daily professional practice, pharmacists are faced with numerous critical choices that could potentially affect them, their patients, and their staff. When faced with such

Choices, a pharmacist must be able to use an appropriate decision-making process to ensure that a well thought out solution is attained. Good decision-makers create decision frames designed for specific problems. Framing helps simplify the problem by including some and excluding other information. Using an economic decision-making approach, the goal is to maximize cost-effectiveness with a solution that is most profitable or least costly, depending on the situation.

**Table 1. Healthy People 2020 Focus Areas [1], [2]**

Access to quality health services	Environmental health	Injury and violence prevention	Physical activity and fitness
Arthritis, osteoporosis, and chronic back conditions	Family planning	Public Health Infrastructure	Public health infrastructure
Cancer	Food safety	Medical product safety	Respiratory diseases
Chronic kidney disease	Health communication	Mental health and mental disorders	Sexually transmitted diseases
Diabetes	Heart disease and stroke	Nutrition and obesity	Substance abuse
Disability and secondary conditions	Human immunodeficiency virus infection	Occupational safety and health	Tobacco use
Health Communication and Health Information Technology	Immunization and infectious diseases	Oral health	Vision and hearing

## A. Steps to Pharmaceutical Care

- Developing a covenantal relationship between the pharmacist and the patient
- Collection of the applicable drug, infection, and patient data
- Interpretation of data to recognize all the patient's drug-related issues
- Prioritizing patient's drug-related issues
- Identifying those drug-related issues for which the pharmacist will accept accountability and patient-explicit results for each drug-related issue for which the pharmacist has accepted responsibility.
- Developing a therapeutic plan to achieve the ideal patient-explicit results for each drug-related issue and a monitoring plan to survey whether foreordained results have been achieved



- Implementation and persuasion of the pharmacy care plan, which comprises of desired results, therapeutic plan, and monitoring plan [2].

**B. Prevention and Problem Solving**

The pharmacist's main responsibility is to maximize positive outcomes of drug therapy and minimize drug misadventures. Patient therapy should result in the achievement of definite outcomes that improve the patient's quality of life [2], [3]. Definite and desired outcomes that improve a patient's quality of life are:

- Cure of a disease;
- Elimination, amelioration, or reduction of the patient's symptoms;
- Arresting or slowing the disease process;
- Preventing further disease or symptoms; and
- I am returning the patient's physiological status to a normal healthy state.

Pharmaceutical care is patient-oriented, and it involves developing, implementing, and monitoring a therapeutic plan that is designed to achieve these outcomes. Drug-related hospital admissions may be precipitated by a host of factors including adverse drug reactions, drug-drug interactions, drug misuse, inadequate or improper therapy, and nonadherence leading to disease exacerbation or complications. To date, numerous studies have found an increased rate of hospital admission rates secondary to medication noncompliance and adverse drug reactions. The actual number of DRPs necessitating hospital admission may be higher than reported because of lack of documentation, further underestimating the problem. Initially, collecting and interpreting relevant patient information, identifying patient healthcare needs, and formulating a DRP list may be challenging for the pharmacy student. These steps require that the student learn to recognize, obtain, and process relevant drug, disease, and patient information in a problem-solving format. Problem-solving involves identifying drug-related problems, suggesting interventions, and documenting patient outcomes. Each patient is unique, and how one approaches each particular problem is specific for that individual patient. Problem-solving is a learned and developed skill which frequently requires fine-tuning over time.

**C. Identifying Drug-Related Problems**

Both clinical pharmacists and computerized physician order entry systems with clinical decision support (CPOE/CDSS) can reduce DRPs [4]. The type of pharmaceutical problem identified in the community pharmacy setting may differ from that reported in the hospital practice environment. The incidence of potential drug interactions and adverse drug reactions was found to be four-fold greater in the community setting when compared to the hospital setting.

**Table 2. Drug-Related Problems Encountered by Pharmacist Monitoring**

• Untreated condition	• Drug without indication
• Improper drug selection	• Nonadherence
• Under-dose	• Duplicate therapy
• Failure of the patient to receive drug	• Allergies
• Overdose	• Requiring renal or hepatic adjustments
• Adverse drug reaction	• Miscellaneous
• Drug-drug interaction	• Poly-pharmacy
• drug-food interaction	

**D. Making Recommendations**

Assessing the DRP list and making therapeutic recommendations or interventions requires clinical knowledge and a strong pharmaceutical foundation. Staying abreast of clinical knowledge and continually striving for improvement will aid in the transition from student learning to the application of knowledge gained during clerkship rotations and the work environment. Access to information and becoming familiar and knowledgeable of where to obtain information may help address and resolve DRPs. Reliable and validated internet resources, drug information resources, the primary medical/science literature, and national guidelines may help guide the management of one's patient [5].

**E. Patient Education**

To provide adequate patient education, the patient must know the drug name, indication, dosage or strength, and frequency of his/her medication(s). The focus may be placed on patients with a history of nonadherence, new prescriptions, new diagnosis, chronic diseases, potential drug-drug interactions, or multiple daily medications. Restructuring pharmacist responsibilities to provide pharmaceutical care will make the opportunity to provide discharge counselling for the profession attainable in healthcare settings. Through discharge counselling, the pharmacist, along with allied healthcare team members, may help the patient make the difficult transition from the controlled hospital environment to his/her home. Most states mandate outpatient counselling, and this is a beautiful encouragement, inducement, and opportunity for the pharmacy student to develop this skill during the experiential component of the curriculum [2], [6].

**F. Specified Areas of Preventive Care**

Pharmacists have embraced the opportunity to participate in the prevention and screening of a variety of other chronic conditions such as osteoporosis, osteoarthritis, diabetes, hypercholesterolemia, hypertension, asthma, chronic

obstructive pulmonary disease, sleep disorders, depression and they seem interested in becoming more involved in cancer screening [7], [8].

#### **a) Obesity Treatment/Long-term Behavioural Modifications**

According to data collected from the United States National Health and Nutrition Examination Survey, nearly 70% of US adults are overweight or obese. Pharmacists, commonly considered one of the most trustworthy and accessible health care professionals, are ideally situated to provide counselling for weight and lifestyle management [9]. Well trained pharmacists to perform basic physical assessments such as weight, waist circumference, blood glucose monitoring, and pharmacotherapy counselling, while additional training could be easily obtained for services that would encompass dietary counselling, guidance on physical activity, and behavioural counselling.

#### **b) Cancer Screening**

By 2032, the number of new cancer cases is estimated to increase by nearly 80% in Canada [10]. Patients frequently visit pharmacies for health information and have long sought advice from pharmacists regarding signs and symptoms of cancer [11]. Between 21,000 and 40,000, deaths could be avoided with proper colorectal screening [12], [13]. However, thousands of people still die unnecessarily every year because of a late cancer diagnosis, indicating that innovative ways of enhancing patient participation in these types of screening programs must continue to be explored. For women, 40–74 years of age who participate in screening every 1–2 years, breast cancer mortality is reduced by 40% [14]. The role of the pharmacist in cancer care is now growing with community pharmacists advocating, promoting, supporting and providing cancer-related health promotion [15]. It is estimated that in all over the worldwide, about 1.4 million women are living with Cervical cancer (second-most after the breast cancer) [16]. The USPSTF recommends against routinely screening women over the age of 65 who are considered low risk as evidenced by previously negative Pap smears due to increased risks of potential harms and invasive testing compared to a low perceived benefit (Grade D recommendation). In contrast, the American Cancer Society recommends screening until age 70.

#### **c) Diabetes and CVD Prevention**

According to the WHO, at least 2.8% of the population worldwide suffer from diabetes. Considering the increasing rate of type 2 diabetes, it is understood that, by 2030, the prevalence of diabetes mellitus will be double [17]. Community pharmacists are ideally placed to support in the screening, education and referral of individuals at risk of diabetes. Patients with various symptoms contact

community pharmacists and, when indicated, pharmacists refer patients to medical practitioners for further management [18]. 18 million people die each year from CVDs, an estimated 31% of all deaths worldwide [19]. Of these deaths, 85% are due to heart attack and stroke. Over three-quarters of CVD deaths take place in low- and middle-income countries [20]. In addition to medication dispensing, the pharmacist can provide more direct interventions (e.g., medication education and disease management), as a support to the physician's action, to improve medication adherence, to achieve the goals of desired therapeutic outcomes and to improve safe medication use and humanistic control [21]. Many pharmacists have gone on to become certified diabetes educators, and have practice sites in community pharmacies and ambulatory care clinics. Pharmacists in ambulatory care are becoming more involved in the management of diabetes.

#### **d) Hormone Replacement Therapy**

Hormone replacement therapy (HRT) is supplementing women with hormones that are lost during the menopausal transition. To relieve the symptoms associated with menopause, conventional HRT includes an estrogen and progesterone component to mimic hormones created by the human ovary [22]. Healthcare providers must improve the quality of lives by reducing bothersome menopausal symptoms and preventing disorders such as osteoporosis, atherosclerosis and coronary heart disease, dyslipidaemia, and so on. The lower incidence of CHD in premenopausal women is attributed to the favourable effect of estrogen on the lining of the blood vessels, the endothelium [23], [24]. Women with metabolic syndrome have six times increased risk of developing CHD, and the underlying pathophysiology could be related to insulin resistance or central obesity [25]. The risk of sustaining a fracture in a postmenopausal woman is almost twice the lifetime probability of developing breast cancer for a woman [26]. Since DHEA is available OTC, pharmacists can provide education on symptoms and replacement therapy to women interested in purchasing this product. In addition to delivering therapy-optimization recommendations and patient counselling to ensure safe and effective HRT use, pharmacists are also being asked by third-party insurance plans to discourage the initiation of or discontinue the use of, high-risk medications such as oestradiol when performing medication therapy management. The pharmacist should review the patient's profile and discuss the risks and benefits of starting or continuing therapy. If the patient wants to discontinue the hormone therapy, possible options for symptom control include local estrogen (e.g., Estrin or Premarin Vaginal Cream) for vaginal symptoms; venlafaxine, fluoxetine, sertraline, or paroxetine for vasomotor symptoms; and alendronate, calcium plus

vitamin D, or raloxifene for osteoporosis prevention [27-29].

#### e) *Osteoporosis*

The prevalence of osteoporosis is projected to rise in the US from approximately 10 million people to more than 14 million people by 2020. In 2015, direct medical costs totalled \$637.5 million for fatal fall injuries and \$31.3 billion for nonfatal fall injuries. During the same year, hospitalizations cost an average of \$30,550 per fall admission, totalling \$17.8 billion. By 2025, the cost of fractures in the US is expected to exceed \$25 billion each year to treat more than three million predicted fractures. Similar to other chronic diseases, osteoporosis has struggled with suboptimal medication adherence, resulting in an increased risk of fractures and all-cause mortality. Clinicians tend to overestimate their patients' adherence to osteoporosis medications, with physicians believing that 70% of their patients are adherent while nearly 50% of patients were actually adherent based on claims data. Furthermore, approximately 50–70% of the patients discontinue their osteoporosis medications within the first year of initiation, which results in increased morbidity and mortality. In addition to lack of interest, some studies reported the perception that physicians had poor knowledge of osteoporosis, in secondary and in primary care. Patient reminders using alarm clocks and telephone calls to promote medication-taking behaviour did not improve medication adherence, perhaps due to lack of perceived need for treatment or understanding of their disease process and its relevance to their life overall health status. In October 2010, the US FDA issued a safety communication regarding the risks of atypical fractures of the femur, with bisphosphonates drugs, the safety communication appeared to have influenced Osteoporosis utilization in Medicaid recipients. Women who have osteoporosis are generally unaware of their skeletal status due to the high cost of screening and limited access to bone density measuring devices. Pharmacists perceived to have more time than physicians to give medicine information. Osteoporosis screening in community pharmacies is a unique way of shifting the pharmacist's focus from dispensing to patient-centred care. They are in an excellent position to help patients gain compliance with and manage their medication therapy related to osteoporosis care. Most of these studies examining the effectiveness of pharmacist-provided osteoporosis screening services have looked at the impact of BMD screening on patient outcomes, specifically their decisions related to healthcare, lifestyle modifications, use of both OTC and prescription medications, and their communication with the physician, help patients in their decision-making process by keeping informed about new research that is conducted and recommendations that are released. Patient education is an integral

component of the management of osteoporosis, and patients need to be more involved in education programs [30-34].

#### f) *Thyroid Disease*

January is Thyroid Disorder Awareness Month, but the role of the pharmacist in managing this disorder can benefit the patient throughout the year. Congenital hypothyroidism, a condition involving a lack of thyroid function at birth, occurs in 1 in 4,000 live births worldwide. The condition is 10 times more prevalent in women than in men. There are only a few medications currently used to treat thyroid disorders; pharmacists can provide education on new or existing medications. Patients with hypothyroidism report poor health-related quality of life despite having undergone THRT. Levothyroxine has become one of the most widely used drugs worldwide, it is the most commonly prescribed drug in the United States (US), the third most in the United Kingdom (UK), and there is evidence that its use is steadily increasing. Patient adherence to medication therapy is critical. Clinicians judge the treatment success based on a restored reference range of thyroid hormone in the blood.

On the other hand, patients feel that the treatment is successful when they are free of symptoms such as fatigue, depression, and muscle cramps that are specific to hypothyroidism. The term levothyroxine pseudo-malabsorption has been used to describe this specific situation – that is, nonadherence to thyroid hormone replacement therapy which is not fully endorsed by the patient and which mimics decreased gastrointestinal absorption of the drug. Typically, therapy is initiated at the lowest dose possible to relieve symptoms and to achieve therapeutic levels. During counselling, patients should be reminded to take medication daily at the same time each day. Thyroid medication should not be taken at the same time as fibre supplements, calcium, iron, multivitamins, aluminium hydroxide antacids, or any medications that bind bile acids. Foods such as large quantities of papaya, soy products, coffee or a fibre-rich diet can prevent the dose from being fully absorbed. The pharmacist should decide appropriate management strategies for special populations with thyroid disorders, especially pregnant and lactating women, Myxoedema coma (early recognition and prompt treatment in the ICU is essential, and even then, mortality reaches 25% to 60%) antithyroid medications, surgery cases, elderly and patients taking beta-blockers. The elderly and patients with heart disease require lower starting doses of levothyroxine, slower dosage titration, and 20% to 25% lower replacement doses than younger patients. Levothyroxine doses may need to be increased during pregnancy and may be reduced after delivery. Hypothyroidism has been successfully treated with synthetic thyroxine (T4) since 1927. Pharmacists should explain to patients that normalization of TSH levels is not instantaneous and may take several

months. Resolution of symptoms can be documented even with treatment of mild hypothyroidism, but few studies documents longitudinal monitoring of both symptoms and biochemical parameters within individual treated patients. The association between hypothyroidism and hyperuricemia (a significant risk factor for the development of gout) has been firmly established [35-44].

#### **g) Depression**

Globally, the total number of people living with depression was estimated to exceed 300 million in 2015, equivalent to 4.4% of the world's population. This estimation increased by 18.4% between 2005 and 2015. Major depressive disorder (MDD) is a common illness, affecting 35 million people worldwide. The lifetime prevalence of depression ranges from 20% to 25% in women and 7% to 12% in men. Depression is a significant determinant of quality of life and survival, accounting for approximately 50% of psychiatric consultations and 12% of all hospital admissions. Notably, the prevalence of depression or depressive symptoms is higher in patients than in the general public. The underlying reasons include the illness itself and the heavy medical cost, unsatisfactory medical care service and poor doctor-patient relationship. Depression is a significant comorbidity of chronic medical disorders. The prevalence of depression in chronic medical conditions is as follows: asthma (27%), atopic dermatitis (5%), chronic obstructive pulmonary disease (24.6%), gouty arthritis (20%), rheumatoid arthritis (15%), systemic lupus erythematosus (22%), leukaemia (10%-15%) and stroke (30%). The overall prevalence of depression in patients with mild cognitive impairment was found to be more than 30%. The majority of suicides worldwide are related to psychiatric diseases. The WHO ranks depression as the single largest contributor to global disability and suicide deaths. PCCs could benefit from psychiatric pharmacist involvement in depression screening and follow-up processes. MDD is the second-most common chronic disorder in primary care settings, with an estimated 25% of patients presenting with MDD and 60% to 80% of antidepressants being prescribed by a PCP. Most treatment guidelines recommended continuation of ADT for 6-9 months after recovery. The average length of treatment in unipolar depression has been reported as <6 months, with 50%-60% discontinuation rates within the first 10-16 weeks of treatment. Factors contributing to early discontinuation of antidepressant medicines include adverse effects, the severity of illness, comorbidity, personality traits, and lack of support from health providers.

Pharmacists have specialized in psychiatry for nearly 50 years and have proven valuable when involved in mental health treatment. They may provide direct patient care through scheduled caseloads and/or

consultations. Studies have shown psychiatric pharmacist services are 40% less costly than psychiatrist services (i.e. assist with individual/group counselling, and assist in initiating or adjusting psychiatric medications) and can lead to better medication adherence, fewer PCP visits, and higher patient satisfaction levels. Patients recommended that pharmacists provide more proactive counselling throughout the ADT rather than passively waiting for patients to ask questions and felt safe about the confidentiality of discussions. Pharmacists can provide valuable self-care counselling to these individuals. Regardless of which antidepressant is being used, the pharmacist should explain to the patient that it usually takes at least 2 weeks for medications to exert antidepressant activity (i.e., reduction in depressive symptoms), and it may take longer for a full response (i.e., remission). It also is important to explain to the patient that many of the side effects that occur initially in treatment often subside. The pharmacist should discuss the goals of treatment with the patient-which should ultimately be the full remission of symptoms and a complete return of psychosocial functioning. A supportive relationship between the clinician and the patient can help improve treatment compliance. Pharmacies should have adequate private counselling areas to offer more in-depth information [45-52].

#### **h) Responsible Sexual Behavior (RSB)**

Estimations from the United States indicate that 3%-6% of the population develops hypersexual behaviour. Despite the advances in medical sciences, a stream in the rates of STDs like syphilis since the year 2000 has been seen in the US, the UK, Australia, and Europe, especially among men who have sex with men. Many young people are susceptible to risky sexual behaviours such as engaging in underage sexual intercourse, polyamory, participating in unprotected sex, and exposing themselves to potential sexual assault environments. The need for excessive reckless sexual contact may lead to be a harbinger for STDs. Promoting RSB is a public health strategy to decrease unplanned pregnancies and STDs. It is defined as self-advocating through actions that are consistent with personal goals and values while being aware of consequences that could threaten those goals or values. The Prevalence of STDs is a global health concern, with more than 1 million curable STDs acquired worldwide every day. There are currently >30 microorganisms including bacteria, viruses, and parasites that are transmissible through vaginal, anal, or oral sex or genital skin to skin contact. Control of chlamydia is extremely challenging because 70%-90% of infected women and over 50% of infected men are asymptomatic and can remain this way for years. Actions included mindful partner selection, communicating boundaries, and preventing pregnancy. Pregnancy in adolescence and STDs are currently the primary causes of

morbidity, could be prevented by lifestyle modification. Sexual education and health promotion should take place before sexual activity is initiated. The healthcare professional plays a fundamental role in the promotion of reproductive health and contraceptive orientation, and it is equally important to involve the parents in the dialogue about sexuality with their children. The good practices in preventive care given to adolescents and youth include the drafting of their sexual and reproductive history, tracking pregnancy and STDs, as well as counselling and access to contraceptive methods. Community pharmacies could be an appropriate setting for some STD screening. Their convenient location and opening hours improve accessibility, and pharmacists are seen as trusted health professionals in a highly regulated industry. This relationship allows for the delivery of prevention messages that are patient-specific, identifying behaviours that place patients at increased risk for STDs. Privacy is a huge issue for young people needing STD-related medications, [but] many retail pharmacies just don't have private space for a discussion or don't make it apparent that such space is available. Pharmacists can offer private consultations in a health care setting that is already involved in sexual health through sales of condoms and the provision of EHC and oral contraceptives. Sexual health education has great potential for providing the knowledge and skills necessary for adolescents to make safe choices related to sex. It can reduce misinformation and increase critical thinking, communication, and self-confidence [53-60].

#### *i) Immunization*

An estimated 40,000 to 50,000 adults die annually from a vaccine-preventable disease in the USA. On average, 12,200 hospitalizations and 3,500 influenza-related deaths occur annually in Canada. Treating these patients who go without routine and recommended vaccinations costs the health care system US\$10 billion each year. An estimated 2.5% increase in the influenza vaccination rate of elderly Canadians results in a \$16 million reduction in health care costs. Administration of vaccines increased pharmacists' involvement with and enthusiasm for enhanced patient care services and generated a revenue stream for the pharmacies. The APhA Annual Pharmacy-Based Influenza and Adult Immunization Survey found that pharmacists provide vaccinations in 86% of community pharmacy settings. With 93% of Americans living within 5 miles of a community pharmacy, community pharmacists are one of the most readily accessible health care professionals in America. The US influenza coverage for 2017-2018, approximately 38% of eligible individuals, in all age groups, had received the vaccination. Particularly when compared with childhood vaccination rates, which are often higher than 90%, adult vaccination rates remain low for most vaccines recommended by the Centers for

Disease Control and Prevention (CDC). The NHS continues to supply free of charge to all travellers' vaccines against hepatitis A, typhoid, diphtheria/tetanus/polio and cholera from surgery that is contracted to provide vaccinations. All other vaccinations remained on a private supply along with the antimalarials. Pharmacists are permitted to administer influenza, pneumococcal, and zoster vaccines in all states and territories. Rates of pharmacist-administered influenza vaccinations are increasing, rising from 20% in 2010-2011 to 25% at the beginning of the 2014-2015 season.

Community pharmacies are significantly underutilized in other adult immunization efforts. Vaccination sites with multiple locations require a more standardized approach. In addition to capturing the younger, healthier population, community pharmacies have been able to reach medically underserved and difficult-to-reach populations. Pharmacy-based immunization training for pharmacists also follows a nationally adopted certificate training program developed by the American Pharmacists Association (APhA), and the CDC's National Immunization Program recognizes the quality and content of this program in preparing pharmacists to administer vaccines. It is worth noting that pharmacists also play an important role in immunizations in the inpatient and health-systems setting. As part of the health care team, pharmacists provide immunization screening and recommendations for at-risk patients, carry outstanding orders with nursing staff, and develop protocols and collaborative agreements with physicians. As providers of medication therapy management and a source of patient medication records, community pharmacists can identify patients at risk for vaccine-preventable diseases through the use of pharmacy data and patient interviews. In this setting, pharmacists primarily serve as educators and facilitators to increase immunization rates, due to their training as patient educators, their ability to build trusting relationships with patients, the ease and convenience for patients to access their community pharmacies and their ability to partner with nurse and physician immunizers. There exists a further capacity for immunization service provision by engaging rural pharmacies, adding other vaccines and leveraging the positive relationship with public health that has been achieved. The role of the pharmacist providing immunizations in alternative community settings may further improve patient access and immunization uptake. When educated at the point of care, people with unmet vaccination needs will take advantage of the opportunity for additional vaccinations [61-72].

<b>Educator</b>	Educate and recommend the importance of and need for receiving vaccines
<b>Facilitator</b>	Use pharmacy to host an immunization event for others to immunize
<b>Immunizer</b>	Administer vaccinations consistent with state law, after assessing for indications and contraindications

#### **j) Medical Nutrition Therapy (MNT) Services**

MNT services may include An initial nutrition and lifestyle assessment, individual and group nutrition therapy services, follow-up visits to check progress in managing diet. A pharmacist with a nutrition degree could provide MNT services as an off-site consultant. Long term health conditions either wholly or partly diet-related and continue to increase. Although pharmacists and AHPs have a role in the management of patients with long term conditions, there is limited research exploring whether pharmacists and AHPs other than dietitians have a role in the delivery of dietary advice. Community pharmacists in the UK now undertake public health work as part of their contract and research has found that their role in managing conditions requiring dietary advice can be effective. Pharmacists should counsel patients thoroughly on the proper guidelines for using oral nutritional supplements. They should remind patients to refrigerate opened products promptly and to discard the unused portions after 24 hours to prevent microbial growth. Those using tube feedings should be instructed on proper aseptic technique with regard to tube-feeding supplies. Enteral feeding tubes should not hang for more than 12 hours at room temperature. The unused portion after this time frame should be discarded. The APhA's Handbook of Non-prescription Drugs states that enteral nutritional products may be classified in the following categories: Polymeric formulas, Oligomeric formulas, Modular formulas, Specialty formulas. MNT pharmacists provide proper dietary counselling to patients, as well as advice for the safe use of dietary supplements. National Centre for Complementary and Alternative Medicine (NCCAM) and Office of Dietary Supplements (ODS) with Dietary Supplement Health and Education Act (DSHEA) relate to new regulations and procedures governing herbal supplements. Over 4 billion people, or 80% of the world's population, use herbal remedies as their source of primary care. A pharmacovigilance centre at the University of Florence, Italy reveals 50% of hospitalized patients used a herbal remedy, and 23% were exposed to a potentially harmful herb-drug interaction. Herbs and supplements also have undesired effects, yet are governed by different regulations than their pharmaceutical counterparts. The prevalence of dietary supplement (vitamin D,

iron, omega-3 fatty acids, iodine, glucosamine, MSM, Q10) use has increased dramatically over the past 20 years, and they have become a matter of consumer interest. About half of the adult US population uses some form of dietary supplements. Sales of herbal dietary supplements represented 18% of the U.S. supplement industry sales in 2015 and continued to expand for the thirteenth consecutive year in 2016, reaching nearly USD 7.5 billion. According to the CDC, an average of 23,000 annual emergency visits were related to DS in the US. Unlike drugs, clinical trials on DS safety and efficacy before getting marketed are not required. The concentrated ingredients in dietary supplements carry not only the benefits but also the risk of toxicity, interaction with drugs, and adverse reactions compared with the ingredients in whole foods. Case reports on liver, kidney, and heart toxicities related to dietary supplements have been documented in a recent series of reviews. The extensive use of herbal and dietary supplements among higher-risk patients poses a potential safety concern that could be mitigated by pharmacist counselling on the appropriate use of these products. However, MNTs also broadly covers nutritional care approaches for chronic diseases such as diabetes mellitus, cardiovascular disease, renal disease, cancer, and eating disorders. Included for each disease is a set of questions the pharmacist can ask the patient to evaluate their understanding of a healthy diet in the prevention or treatment of a particular disease process. Pharmacists and AHPs should be informed about potential referral pathways to specialist services, and it should be ensured that they have access to evidence-based, written information for patients particularly for those with wholly or partly diet-related, long term conditions. Pharmacists can provide beneficial pharmaceutical care services to patients receiving Parenteral Nutrition (PN) therapy by working within (NSTs). They are educated about the physiochemical compatibilities of parenteral solutions, pharmacotherapy principles and pharmaceutical care practice. Moreover, they can receive special training on nutritional support to develop specialized practice. Nutrition Support Pharmacy is a speciality with a focus on optimizing nutrition support therapy outcomes. Their scope of practice may include various roles such as the provision of direct patient care; consultations with other healthcare professionals, including those in entrepreneurial/industry; education of patients, caregivers, students, postgraduate trainees, colleagues, and the public; supervision of the compounding and dispensing of safe and effective TPN formulations according to standard aseptic techniques; and participation in nutrition support related research activities and quality improvement. These pharmacists can collaborate with other healthcare professionals within the NST to assess patients' nutritional needs, develop and implement an individualized nutrition care plan for the patient, and

monitor the patient's response to PN therapy. They can also participate in the administrative management of nutrition support services at their organizations including the development documentation, implementation, and periodic review of organizational policies/protocols related to nutrition support therapy; and the development and the maintenance of an appropriate and cost-effective nutrition support formulary [73-86].

## II. CONCLUSIONS

Preventive care is a challenge that should be undertaken by health care providers in all practice settings. Pharmacists should "seize the moment" to educate and counsel patients regarding these various topics when the opportunities arise. Throughout this chapter, disease screening guidelines have been discussed. Several medications have evidence to their usefulness for chemoprevention of various diseases. Opportunities for pharmacists to help bring about awareness of recommendations and risk factors for the development of the disease, and educate patients as to the benefits of prevention, occur daily. It is important for the pharmacists on the "front line" to have a general understanding of current recommendations for screening and disease prevention so that they can provide appropriate counseling and care for their patients.

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