

# Pharmacists as Providers



*For Health Care Providers*

# Pharmacists: The Medication Experts

Pharmacists are the medication experts on the health care team, with the most advanced knowledge of medication therapy of any health professional. The doctorate program completed by pharmacists takes a minimum of six years. In addition, many pharmacists complete post-doctorate education, including specialized residency and fellowship training programs, based on their area of interest.

Pharmacists practice in hospitals/health-systems, communities, long-term care facilities, physician offices and as consultants making contact with patients in almost every aspect of health care. In addition to the services listed above, pharmacists are uniquely qualified to perform a variety of other patient care services, including medication compounding, nuclear pharmacy, and health care medication utilization management.

Learn more about various areas in which pharmacists provide direct patient care by reading through the topics listed on the next page.

**Anticoagulation**

**Asthma**

**Cancer**

**Cardiac Care**

**Diabetes**

**Emergency Medicine**

**Geriatrics**

**HIV/AIDS**

**Immunizations**

**Intensive Care**

**Nephrology**

**Organ Transplant**

**Osteoporosis**

**Pain Management**

**Pediatrics**

**Pharmacy Technician Practice**

**Point-of-Care Testing**

**Public Safety**

# Anticoagulation



## Introduction to Anticoagulation

Anticoagulants are also known as blood thinners. They are used for prevention or treatment of blood clots, including pulmonary embolism and stroke. Some anticoagulants can be difficult to manage because there is no standard dose and each patient can respond differently. Others are dosed based on the patient's weight or kidney function. Too little drug may lead to or worsen a blood clot, while too much may increase the risk of bleeding. Blood testing is the usual way to determine an appropriate dose for a traditional anticoagulant. In addition, there are many interactions with other medicines, herbs, supplements and even foods that must be evaluated when managing anticoagulants.

## What a Pharmacist Provides

Pharmacists assist physicians in the individualized patient dosing and monitoring of anticoagulant therapies. Pharmacists assist the physician with drug selection, establishing an initial dosage regimen, making dose adjustments, ordering appropriate laboratory tests and interpreting the laboratory results to ensure that anticoagulation therapy is safe and effective. Pharmacists help patients while in the hospital as well as on an outpatient basis (e.g., anticoagulation clinic, emergency department, vascular laboratory) by counseling them on problems that could arise if they stop an old medication, take new medicines, change their diet or miss doses of their anticoagulant medication. Pharmacists also educate patients, families and caregivers regarding how medications work, how to appropriately take or administer medications and the importance of monitoring therapy. Pharmacists can also draw blood samples and interpret dosing through point-of-care testing devices. Pharmacists may even be involved in the evaluation of the patient's insurance coverage, arranging for payment assistance and follow-up services.

A two-year study at a hospital found that a pharmacy-directed anticoagulation service boosted the quality and efficiency of care for heparin-induced thrombocytopenia (HIT) in patients using direct thrombin inhibitors. **During the study there were significant improvements in target levels of time to anticoagulation, 6.4 hours versus 18.9 hours,** and time within therapeutic range, 84.7 percent versus 64.4 percent, with pharmacists running the hospital's anticoagulation service. The key improvement resulting from pharmacist oversight of anticoagulation might have been an increase in positive HIT assays from 55.4 percent to 75.6 percent. That means **more patients were treated appropriately and avoided potentially serious adverse events.**

# Asthma

## Introduction to Asthma

Asthma is a complex lung disease that is characterized by unpredictable periods of wheezing, breathlessness, chest tightness and coughing. It is the most common chronic disease in children, affecting approximately 9.5 percent of children in the United States. Many patients experience frequent symptoms that can impair their quality of life. However, this impairment is preventable with appropriate use of medications. If asthma is not managed or treated appropriately, the disease may lead to additional physician visits, hospitalizations, lost days at work or missed school days. When a patient is experiencing an asthma attack and has trouble breathing, expensive emergency services are required to resolve the patient's condition. These unexpected medical services lead to rising health care costs, an estimated \$14.7 billion, and diminished quality of life.



## What a Pharmacist Provides

Pharmacist-provided asthma services can improve patient care by ensuring appropriate medications are prescribed and treatment plans are followed. Patients can be at an increased risk of exacerbations and potentially death if they do not use these medications properly. Pharmacists can educate patients on their disease to improve understanding of how to prevent asthma attacks by avoiding triggers and how to use inhalers properly. Pharmacists' knowledge of asthma medications and their regular interaction with patients allow them to promote medication adherence, which is a critical component to managing asthma. These services are offered in the hospital environment as well as in community pharmacies and health clinics. In some clinics, pharmacists are also involved in administering nebulizer treatments and listening to lung sounds with a stethoscope to check for wheezing. Pharmacists communicate care issues with the patients' primary care providers throughout the course of care. By incorporating pharmacists into a patient's asthma care team, they can live a healthier and happier life.

Poor inhaler technique is frequent in asthma, but its long-term consequences have been seldom assessed. Pharmacists are ideally positioned to teach inhaler technique. In a study involving 727 patients who were in need of improved inhaler technique and adherence, **optimal inhaler technique rose from 24 percent to 79 percent after pharmacist-provided training.** In addition, a greater change in overall asthma management was seen in those patients who received training from a pharmacist.

# Cancer



## Introduction to Cancer

Cancer occurs when cells in the body grow out of control. Medications used to treat cancer are referred to as chemotherapy; the chemotherapy used depends on the type of cancer. Traditional chemotherapy works primarily by inhibiting fast-growing cells. Some newer chemotherapy agents have been developed to be more selective for cancer cells; these agents tend to have fewer side effects, however, they are not yet available for all types of cancer. The complexity of cancer treatment requires the knowledge and skills of health care professionals from several disciplines to minimize adverse effects and maximize treatment outcomes.

## What a Pharmacist Provides

Pharmacists have many responsibilities in the care of cancer patients in both the inpatient and outpatient settings. Pharmacists play a key role in creating safe medication processes. Pharmacists serve as a safety check throughout all steps of cancer treatment ensuring that the best combination and dosages of chemotherapy agents are being administered for a patient's type of cancer. Pharmacists also make recommendations to physicians for medication dosage adjustments, discontinuation of unnecessary medications, addition of medications for untreated conditions and changes in the chemotherapy medications that are being used. Pharmacists verify that the chemotherapy medications are correctly prepared by pharmacy technicians and safely administered by nurses. Pharmacists are also involved in the selection and dosing of medications for the treatment of pain, side effects and infections for cancer patients. Aside from practicing in a laboratory setting for medication development, pharmacists play a key role in the success of clinical trials, designing, implementing and interpreting clinical trial results. These clinical trials allow for continuous patient outcome improvement.

In a pediatric hospital setting, pharmacist interventions were documented across the general medical, general surgical and hematology-oncology wards for drug therapy changes for cancer patients. Clinical pharmacists reviewed 2,891 patients across the three settings and documented a total of 982 interventions. **The acceptance rate of the pharmacists' active interventions by physicians was high, strengthening existing evidence supporting the confidence that patients, caregivers and other health care professionals have in pharmacists' contributions toward improving the quality of pediatric cancer care.**

# Cardiac Care



## Introduction to Cardiac Care

The human heart pumps blood in order to deliver oxygen and nutrients to the rest of the body and remove waste. A strong heart is essential for healthy living. Poor diet, lack of exercise, smoking and stress can lead to heart disease—high cholesterol levels (hyperlipidemia), high blood pressure (hypertension), narrowing of blood vessels, lack of oxygen to the heart (heart attack) and heart failure. Although deaths related to these conditions have recently declined, about 610,000 people die of heart disease every year, which is one in every four deaths.

## What a Pharmacist Provides

Pharmacists evaluate and monitor patient's blood pressure and make treatment recommendations so patients get the most from their medications. The pharmacist's goal is to ensure patients are placed on the right medications, to simplify complicated drug regimens and to educate patients to help ensure that they adhere to their medication therapy. Since several over-the-counter medications interact with heart disease medications, it is important for pharmacists to educate patients about which products are safe to take and which ones to avoid. Pharmacists help patients prevent heart disease by addressing pertinent lifestyle issues. They educate patients about the importance of avoiding foods high in saturated fat, limiting their salt intake and increasing their level of physical activity, as well as help a patient make these lifestyle changes. Some pharmacists may also draw a sample of the patient's blood to obtain a lipid profile, which helps assess the patients' risk for developing heart disease. Since smoking is a major risk factor leading to heart disease, pharmacists help patients quit smoking. Pharmacists identify barriers, habits or situations that may interfere with a patient's ability to quit smoking, and develop a plan, which frequently includes medications like gums or patches, to overcome those obstacles. Together, the pharmacist and patient establish a target quit date. Pharmacists support patients through follow-up phone calls and face-to-face visits, making adjustments to the original plan as needed and ensuring the patient is using medications appropriately.

In a study, 47 patients were followed over a six-month period. **Results showed that increased patient counseling on adherence and lifestyle changes along with increased disease state monitoring and medication adjustment led by a clinical pharmacist can decrease the number of risk factors for cardiovascular disease (CVD).** Statistically significant reductions occurred in the total number of CVD risk factors, systolic and diastolic blood pressures and A1c. Reductions also occurred in LDL level, weight, and changes in smoking behavior and physical activity were identified.

# Diabetes



## Introduction to Diabetes

More than 25 million children and adults in the United States have diabetes, accounting for 8.3 percent of the population. Diabetes is a progressive disease where the body loses its ability to utilize dietary sources of glucose, which is converted into energy that the body uses to function. Both genetics and lifestyle factors such as obesity and lack of physical activity play an integral role in the development of diabetes. Individuals who are unable to control blood sugars with lifestyle changes may require medications, including oral or injectable medications or daily insulin doses. Failure to manage diabetes well can result in long-term complications such as blindness, kidney failure, heart attacks, strokes and nerve damage with subsequent amputations as well as premature death.

## What a Pharmacist Provides

Pharmacists are an integral part of the health care team in the management of patients with diabetes. Pharmacists work with patients and other health care providers to develop a treatment plan specific for each individual patient. In addition, pharmacists are able to counsel patients and other health care providers on the various medications used to care for diabetes and assist in selecting the best treatment option(s) for each individual patient. Pharmacists educate patients on the changes diabetes is causing and help them incorporate appropriate modifications in diet and physical activity level into their lifestyle. Pharmacists also teach patients how to manage their diabetes through self-monitoring of blood glucose, recognizing signs of low or high blood sugar, and proper management and proper administration of medications, including how to self-administer insulin or other injectable agents. Many times, pharmacists routinely meet with patients to address their concerns and emphasize the importance of continual lifestyle changes and medication adherence, while ensuring that they receive preventive immunizations and screenings for blindness, heart disease and kidney disease.

Throughout a six-month period, Hemoglobin A1c levels fell by 2.4 percent in veterans with diabetes at a pharmacist-led diabetes clinic, compared with a 0.2 percent drop in similar patients who did not attend the clinic. **This translates to an estimated \$9,104 reduction in three-year medical costs for each patient seen in the clinic.**



# Emergency Medicine

## Introduction to Emergency Medicine

Patients in the emergency department are in need of immediate medical care for illnesses and injuries, many of which may be life-threatening. Patients then receive care from a medical team that has special training in emergency medicine. After patients are initially diagnosed and treated in the emergency room, they will either be admitted to the hospital for further care, transferred to another medical facility for treatment that the hospital cannot provide, or discharged with any necessary prescriptions and detailed instructions concerning their diagnosis and follow-up care.



## What a Pharmacist Provides

Emergency rooms can be chaotic places, with many medications being administered quickly to seriously ill patients. Pharmacists in this setting help by using their knowledge about medications to ensure that each patient gets the best therapy, based on his or her specific medical needs. Pharmacists are readily available to answer medication-related questions from physicians and nurses. Pharmacists make recommendations to doctors to help choose the best medication and dose for each patient based on age, weight and other disease states. Pharmacists collect a complete list of all prescription, over-the-counter and herbal medications that patients may be taking at home. This speeds up the admission process and increases patient safety by helping to prevent potential drug interactions with medications that may be administered in the emergency department. Pharmacists also review physician orders for proper medication dosing and possible drug interactions, side effects and allergic reactions. In this way, pharmacists help to reduce the potential for medication errors and increase patient safety. Pharmacists can help teach patients about their medications and, in this capacity, can prevent future visits to the emergency room.

An analysis was conducted of pharmacist interventions and resuscitation experiences, including pharmacist participation in a hospital emergency department (ED), and the potential cost avoidance associated with the interventions made by the pharmacists. During the study, 2,150 pharmacist interventions were documented. Pharmacists participated in the care of 1,042 patients triaged to the resuscitation area of the ED. **Cost avoidance during the study was determined to be \$1,029,776.**

# Geriatrics



## Introduction to Geriatrics

Geriatrics is the practice of health care that focuses on the elderly. The number of people over the age of 65 years is on the rise. By 2030, one in five Americans will be older than 65 years and by 2050, one in four adults will be 85 years or older. As people age, their bodies undergo changes that put them at risk for developing medical conditions, which often means that they will end up taking an

increased number of over-the-counter and prescription medications. The changes in the body that are seen with aging also affect the way elderly patients react to certain medications. They may be more sensitive and more likely to experience side effects seen with medications.

## What a Pharmacist Provides

Pharmacists play an important role in the medical management of elderly patients. Since elderly patients are frequently on numerous medications, pharmacists will obtain detailed medication histories from the patients or the patient's family members and/or caregivers. This also includes reviewing all the medications for potential drug interactions and making sure they are dosed appropriately. Pharmacists often assist physicians with choosing the correct dose of medication and can provide information on which medications may cause fewer side effects in an elderly patient. Pharmacists will go over the medications with the patient to make sure they know why they are taking them, ask about side effects they may be experiencing, and ask if they have trouble remembering to take their medications or difficulty paying for their prescriptions. If problems are found with a patient's medication regimen, the pharmacist can recommend changes to the patient or to their doctor. These recommendations can include ideas such as discontinuing a medication because of side effects or suggesting the patient use a pill box to help them organize and remember to take their medications. Some pharmacists also educate patients on choosing prescription insurance coverage so they can choose the plan that best fits their medical needs.

An observational study at a mid-Michigan community hospital in Ann Arbor found that after its geriatric emergency department (ED) opened, **patients 65 years of age or older had a lower risk of hospital admission** than when that population was seen in the general ED.

# HIV/AIDS



## Introduction to HIV/AIDS

Human immunodeficiency virus (HIV) is one of the many viruses that infects humans and attacks the immune system. HIV may be transferred through blood products, sharing needles, sexual contact and mother to child transmission. Acquired immunodeficiency syndrome (AIDS) occurs when a patient has a very weak immune system or is diagnosed with an opportunistic infection (an infection that can only be contracted by those with a depressed immune system). Therefore, a patient can have HIV, which is simply a virus, without having AIDS. In the United States, more than one million people are living with HIV. While there is not yet a cure for HIV/AIDS, with adherence to their medications, patients with HIV can suppress the virus, prevent disease progression and prevent the development of resistance.

## What a Pharmacist Provides

Pharmacists can help patients improve adherence to suppress the virus by providing education about HIV/AIDS, medical terminology and how the HIV medications work to suppress the virus as well as answering patient questions about their medication. Pharmacists are well positioned to deliver this knowledge as well as to provide patients with practical tips such as the use of pillboxes, timers, planners or alarm watches, to enhance medication adherence. HIV pharmacists keep in close contact with each patient to evaluate and help with the management of any unwanted side effects they may experience from the HIV medications. By helping patients work through these side effects and remain adherent to their medications, pharmacists contribute to the success of medication therapy and health of the patient. In the hospital setting, pharmacists help initiate HIV medication therapy to ensure that patients receive the correct doses of the medications. These pharmacists also assess for any drug-drug interactions and other potential medication-related problems during hospital admission. There are few other disease states where complex medication regimens play such a critical role in the outcomes of patients; pharmacists provide an essential role to allow patients to live much longer and with a greater quality of life than ever before.

A study examined medication adherence for patients using HIV-specialized pharmacies, found that HIV patients were more adherent to their anti-retroviral and comorbid therapies. For patients taking angiotensin converting enzyme or angiotensin receptor blocker (drugs used to treat hypertension), **HIV-specialized pharmacy users had significantly higher mean proportion of medication adherence (82.6 percent days covered compared with 79.6 percent of days covered) than in patients not taking advantage of these services.** HIV-specialized pharmacy users also had better medication adherence measured as achieving a higher mean proportion of days covered at 83.7 percent than those not utilizing these services (81.3 percent).

# Immunizations



## Introduction to Immunizations

Our immune system is composed of cells, glands, organs and fluids located throughout the body to fight invading bacteria and viruses, recognizing germs that enter the body as “foreign” invaders or antigens, and produces proteins called antibodies to fight them. The cells involved in antibody production remain and become “memory cells.” Memory cells remember the original antigen and then defend against it when the same type of antigen attempts to re-infect a person, even after many decades. This protection is called immunity. Vaccines contain the same antigens or parts of antigens that cause diseases, but the antigens in vaccines are either killed or greatly weakened. When vaccines are injected the vaccine antigens are not strong enough to produce the disease, but are strong enough for the immune system to produce antibodies against the disease. The memory cells that remain prevent infection if that disease is encountered in the future. Thus, through vaccination, immunity can be developed without actual disease infection.

## What a Pharmacist Provides

Today, pharmacists are recognized as routine providers of influenza vaccinations as well as many other adult and adolescent vaccinations such as Tetanus-diphtheria-pertussis, shingles, pneumococcal and meningococcal. Pharmacists carefully follow immunization guidelines recommended by the Centers for Disease Control and Prevention to ensure the appropriate use of the vaccines and maximize their effectiveness. Pharmacists can routinely determine whether or not a vaccine is needed, screen for allergies and provide and administer the vaccine. They also offer supportive care and report administration of the vaccinations to the proper health authorities. Some pharmacies even offer “travel clinic” programs where specific immunizations can be recommended and administered as required for travel into foreign countries.

In a recent study, a dedicated pharmacist immunizer practicing in an indigent care primary health care clinic had a significant impact on increasing adult immunization rates. The immunization needs assessment conducted by the pharmacist demonstrated a significant effect on influenza and pertussis vaccination rates. The use of an identical tool by other health care providers did not have an impact on individual vaccine rates or the likelihood of patients who were considered current with vaccinations. **The availability of a pharmacist immunizer had a significant impact on the number of patients who were current on all immunizations at the completion of the study.**

# Intensive Care



## Introduction to Intensive Care

Every year, 2.1 million patients are admitted to an intensive care unit (ICU). These patients have serious and often multiple life-threatening complications that cannot be managed on general hospital units, often requiring life-sustaining measures such as the use of a ventilator or other comprehensive procedures and medication therapies. ICUs are areas where patients receive rapid, specialized and around-the-clock management from a multidisciplinary health care team. With advances in medicine, ICUs have evolved into specialty areas, each providing a high level of care to manage the specific needs of patients. Common ICUs include cardiac, surgical, medical (respiratory/pulmonary), neurotrauma, burn, oncology, pediatric and neonatal care.

## What a Pharmacist Provides

Pharmacists review all patient medication orders and assure timely preparation and delivery of medication to the patient care area. More importantly, pharmacists are involved at the point of decision making, participating in rounds with the medical staff, making suggestions on drug therapy before a medication is even ordered. This proactive approach optimizes medication therapy management and dramatically reduces the incidence of errors. ICU pharmacists counsel patients, family members and/or caregivers on medications that the patient is prescribed to take upon discharge. Pharmacists also provide education to other health care professionals, providing in-services or other educational presentations to nurses and physicians. ICU patients frequently have multiple diseases that affect organ function, which can ultimately influence the effects of medications in the body. Pharmacists review and adjust each patient's medication regimen for appropriate indication, dosing, drug interactions, intravenous medication compatibilities, adverse effects and cost-effectiveness, allowing them to recommend appropriate adjustments.

Correct dosing of antimicrobial drugs in septic patients receiving continuous renal replacement therapy (CRRT) is complex. A recent study aimed to evaluate the effects of dosing adjustments performed by pharmacists on the length of intensive care unit (ICU) stay, ICU cost and antimicrobial adverse drug events (ADEs). Pharmacists made 183 antimicrobial dosing adjustment recommendations for septic patients receiving CRRT. **Dosing adjustments were related to a reduced length of ICU stay from 10.7 days to 7.7 days in the intervention group, and to cost savings of \$3,525 per septic patient receiving CRRT in the ICU.**

# Nephrology



## Introduction to Nephrology

Twenty million Americans (one in nine adults) suffer from chronic kidney disease (CKD), and another 20 million are at risk from diseases like uncontrolled diabetes and high blood pressure. Undiagnosed and untreated, CKD can lead to serious health problems, including end-stage renal disease (ESRD) requiring dialysis or transplantation. Many aspects of kidney disease can cause poor quality of life for these patients.

## What a Pharmacist Provides

Patients with kidney disease often have other serious medical conditions such as high blood pressure and diabetes. Because of these other diseases and the kidney disease itself, these patients are often on multiple medications, sometimes more than 10 different medications per day. Pharmacists have an important role in helping patients manage their various medications. Pharmacists ensure that all doses of medications are properly adjusted for the patient's degree of kidney disease or dialysis therapy, and manage the potential drug interactions from the various combinations of medications. In the hospital setting, clinical pharmacists are essential to assist in the medication management of any acute issues leading to hospitalization, including dose adjustment and therapy optimization. Hospitalized patients may also suffer from acute kidney failure as a complication of their current medical issues or treatments. Pharmacists adjust medication doses and therapy for these acute kidney failure patients to design the safest and most cost effective medication regimen. Pharmacists work closely with the medical team to assess outcomes and evaluate laboratory and other patient care data to design medication regimens.

In four studies investigating the number and type of clinical pharmacist interventions and physician acceptance rates, a mean acceptance rate of 79 percent was reported. The most common reported drug-related problems were incorrect dosing, the need for additional pharmacotherapy and medical record discrepancies. **These four controlled trials (three of which were randomised) revealed that clinical pharmacy interventions had a positive impact on patient-oriented outcomes in the intervention group as compared to the available standard of care.** In addition, most of the studies reported that a significantly higher proportion of patients managed by a clinical pharmacist maintained relevant target ranges (e.g., haemoglobin and haematocrit) as compared to patients receiving standard care.

# Organ Transplant

## Introduction to Organ Transplant

Organ transplantation is a complex process in which a whole or partial organ from one person is transplanted into another to replace the recipient's damaged or failing organ. Solid organs, including liver, kidney, pancreas, heart and lung, are frequently transplanted to treat end-stage organ failure in order to prolong and improve the quality of life.

During 2012, more than 28,000 solid organ transplants were performed in the United States. Bone marrow and peripheral stem cell transplants have become a standard of care in the treatment of many malignancies, including solid tumors and leukemias, and noncancerous diseases such as aplastic anemia. Once the donor tissue (referred to as the graft) is placed into the recipient, the recipient's body recognizes it as "foreign material." The recipient's immune system is activated and, if not suppressed by medications, it can attack the donated organ leading to rejection. Advances in treatment of transplant patients have decreased graft rejection and improved patient survival. Unfortunately, the complexity of immunosuppressant regimens has also increased and has often made patient care more complex.



## What a Pharmacist Provides

Most transplant patients take 10 or more medications. Pharmacists are integrally involved in helping to manage, monitor and recommend appropriate therapeutic regimens for transplant patients. Pharmacists often design therapeutic plans for transplant patients and will educate patients and their caregivers on the medications. The pharmacist reviews the medications with the patients, nurses and physicians to help prevent interactions and drug toxicities. Many of these medications and regimens are extremely expensive, and pharmacists also evaluate the therapy in order to maximize benefits of treatment while managing its costs. In addition, pharmacists evaluate medication therapy and ensure that the appropriate medications are prescribed for patients when they are discharged from the hospital.

Over a five-week period, three transplant pharmacists recorded all interventions that they made practicing under a collaborative practice agreement with a physician. A total of 1,060 interventions were made by the transplant pharmacists during this time period. **Total estimated savings were more than \$107,000, or roughly \$36,000 per pharmacist, during the study period.** When these results are extrapolated out further, it is estimated that each transplant pharmacist would save more than \$373,000 per year for the institution.

# Osteoporosis



## Introduction to Osteoporosis

Osteoporosis is a disorder characterized by reduced bone density and altered bone structure, which increases the risk of fracture. Previously thought to only affect postmenopausal white women, it is now known that everyone is at risk for developing osteoporosis. Deficiencies in calcium and vitamin D can increase the risk of developing the disease, but some medications and diseases can decrease bone mass and cause osteoporosis as well. In the United States, it is estimated that eight million women and two million men are faced with the disease. Osteoporosis is frequently without symptoms until complications such as a bone fracture, shortened stature or a curved spine occur. These can be painful and decrease a patient's quality of life. Both oral and injectable medications are available to treat osteoporosis. With proper prevention and treatment, individuals will be at a reduced risk for fractures, further increasing quality of life.

## What a Pharmacist Provides

Pharmacists can assist all individuals with changing their lifestyles to improve bone strength and prevent bone fractures. They can provide information on selecting the best calcium and Vitamin D supplements to meet the individual's needs to help prevent osteoporosis. Pharmacists can assist patients with smoking cessation programs to further decrease their osteoporosis risk. In addition, a pharmacist can review a patient's medication profile to identify medications that could cause or worsen osteoporosis. The pharmacist can then work with the patient's other health care providers to adjust treatment to reduce the risk of bone fracture. Adherence to prescription osteoporosis medications is often a challenge for patients. Pharmacists can identify and resolve barriers, allowing the patient to more easily utilize their medications. Some pharmacies offer osteoporosis screening. After participating in this screening, pharmacists can direct patients to a proper regimen of supplementation or recommend medication therapies to the patient's doctor.

A pharmacist-led quality assurance program targeting osteoporosis management was evaluated in two primary care (general practice) clinics. Significant improvements were seen in the prescription of anti-osteoporosis medicines, vitamin D and calcium supplements. **The proportion of patients without documented contraindications to osteoporosis therapies who were prescribed an anti-osteoporosis medicine increased significantly (59 percent vs. 70 percent). The proportion of patients for whom vitamin D and/or calcium supplement use was documented also increased significantly (63.9 percent vs. 85.4 percent).**



# Pain Management

## Introduction to Pain Management

The number one reason patients seek medical advice is pain. Pain management, however, can be complicated because of the subjective nature of this problem. Health care professionals must balance what patients tell them about their pain with what they know about the risks and benefits of the many pharmacologic and nonpharmacologic treatments. In addition, health care providers must know how to assess a patient's level of pain, have good understanding of the patient's personal background, and thoroughly communicate to the patient the goals of therapy and how medication is appropriately utilized.



## What a Pharmacist Provides

Pharmacists involved in pain management provide a variety of services depending upon their practice setting. Most pharmacists are involved in conducting a thorough medication history. Medication history is crucial so that the pain management team understands what the patient has already tried to control the pain, how the patient responded to other therapies and what other medications may interact with pain management therapies. Pharmacists can be intimately involved in designing the treatment regimen in collaboration with other health care providers. Pharmacists counsel the patient on the goals of drug therapy and possible adverse effects as well as helpful hints to deal with side effects. Pharmacists teach patients how to correctly self-administer injections, apply skin patches and inhale nasal sprays for optimal pain relief. Personal interaction and dialogue are as important to appropriate pain management as the medications. Pharmacists in all settings communicate to patients and their caregivers the importance of taking the medications exactly as directed in order to improve the patient's quality of life.

Over a six-month period, a hospital developed a novel, pharmacist-directed, pain management service. At nine months post-implementation, **1,335 interventions were documented with an estimated indirect cost savings of \$1,622,449.** Of these interventions, 81 percent were the result of prescriber consults, with opioid stewardship comprising the remaining 19 percent. The acceptance rate of pharmacist recommendations was 88 percent. **The group won a Best Practices Award from the American Society of Health-System Pharmacists for this study.**

# Pediatrics



## Introduction to Pediatrics

The pediatric population, composed of infants, children and teenagers, are about 24 percent of the population in the United States. They receive an average of four prescription medications per year. Choosing safe and effective medication therapy for children can be difficult. One challenge is that children cannot be treated as “small adults.” In fact, their bodies

process medications very differently. Medications are not always available in a formulation that a child can take such as liquid formulation. Another challenge is that infants and young children cannot talk about symptoms they may be feeling from medication, resulting in hidden reactions to medications.

## What a Pharmacist Provides

Pharmacists are available at community pharmacies to help parents with their children’s medication therapy. The pharmacist can show parents how to give medications to children correctly such as using oral syringes for liquid medications. Pharmacists can counsel parents about what side effects to look for after giving a medication. They can also share what to do if a child does experience a side effect from a medication. The pharmacist can speak with parents about the correct use of over-the-counter medications for their children. With the help of a pharmacist, parents can be sure their child is getting a safe dose of medicine for the purpose or reason. Within a hospital setting, most pharmacists provide care for all patients and check medication orders for correct doses based on the child’s age and weight. However, some pharmacists focus on specific areas such as pediatrics and pediatric intensive care. A pharmacist also monitors for any interactions between medications that are being taken at the same time. Pharmacists also act as investigators in research projects that are being done to increase our knowledge of how medications work in infants and children, leading to better patient care.

Pharmacy professionals from a Michigan college of pharmacy and state pharmacy association collaborated on a statewide initiative to standardize the concentrations of compounded oral liquids for pediatric patients. Prior to this initiative, standard concentrations of compounded oral liquids had not been established, which was reported to contribute to medication errors and patient harm. This study resulted in creation of a Web site, [www.MIpedscompounds.org](http://www.MIpedscompounds.org), containing standard concentrations, a toolkit for criteria of use and additional resources available to all health care providers. **This initiative has received national recognition, including an award from the Institute for Safe Medication Practices. The group continues to promote the standards, with the goal of expanding them to the national level.**

# Pharmacy Technician Practice

## Introduction to Pharmacy Technician Practice

Pharmacy technicians are being called on to expand their role in the pharmacy as more demands are being placed on the pharmacist. In addition to their normal duties, pharmacists are now administering immunizations, providing medication therapy management services and monitoring patient medication adherence.

## What a Pharmacy Technician Provides

Today, pharmacy technicians are required to be proficient in a wide range of tasks. Traditionally, customer service and administrative duties were the primary responsibilities of technicians, including processing prescription requests, collecting patient information and maintaining patient profiles, receiving medication orders and entering them in the pharmacy computer system, and compounding simple preparations (e.g., as creams, ointments, suppositories), to name a few. Because pharmacy technicians are now required to be licensed in most states, including Michigan, the role of a pharmacy technician is evolving. Now technicians can be seen practicing in unique or nontraditional roles such as research, law enforcement, teaching, manufacturing, insurance, disease state management, hospice care, health care administration, pharmacy informatics and nuclear pharmacy. In order to serve patients and the pharmacy in the most efficient way, pharmacy technicians must commit to memory a myriad of Bank Identification Number (BIN)-Pre-assigned Control Number (PCN) combinations as well as formulary lists for the countless pharmacy benefit managers. This will help lead to improved patient outcomes by speeding up the process of interacting with insurance companies to find the best medication within the patient's budget or find answers to billing or reimbursement questions.

The role of the pharmacy technician will continue to expand, as additional states adopt licensure and certification requirements for individuals in these positions. Having trained and experienced pharmacy technicians is the best way to ensure the pharmacy runs in the smoothest, least stressful and safest way possible.

Tech-check-tech (TCT), a practice model in which pharmacy technicians rather than pharmacists check the accuracy of order filling by other technicians, has been the subject of many recent literature reviews. **Across 11 published studies, the accuracy of TCT protocols was comparable to a pharmacist checking for prescription order accuracy.**



# Point-of-Care Testing



## Introduction to Point-of-Care Testing

Most individuals, at some point, visit a doctor's office to determine if they have an infection. One group of evaluative tools physicians often use to help them diagnose such infections is rapid diagnostic tests (RDTs), with results in about 15 to 20 minutes. These point-of-care tests allow health care professionals to quickly and efficiently decide whether patients are suffering from an infection like strep throat, influenza, hepatitis or human immunodeficiency virus (HIV). The information derived from RDTs allows providers to decide whether starting treatment is appropriate or if further testing is needed. These tests can be extremely useful in ensuring patients receive appropriate medical care in a reasonable amount of time.

## What a Pharmacist Provides

One of the suitable uses of RDTs by pharmacists is in the field of infectious diseases at the community level. Patients suffering from various infections often present to retail pharmacies in search of over-the-counter (OTC) remedies for their symptoms. Due to this fact, pharmacists are commonly the first health care provider patients will come in contact with. With appropriate training, pharmacists can employ RDTs, along with physical evaluation, and collaborate with physicians to determine the appropriate course of treatment. For certain infections like strep throat and influenza, pharmacists are partnering with physicians to allow pharmacists to initiate therapy if criteria are met that suggest patients are likely to be infected and based on the results of RDTs. Pharmacists are also able to screen for more severe infections like HIV and hepatitis C. If patients screen positive on an RDT for HIV or hepatitis C, they can be referred by the pharmacist to the appropriate provider for follow-up. The implementation of RDTs has allowed pharmacists, in collaboration with physicians, to develop the most effective treatment plan for each patient. This is helping to decrease the overuse of antibiotics and the disease burden of the communities they serve.

As part of an ongoing initiative in Michigan, Minnesota and Nebraska, a study was conducted to evaluate pharmacy-based point-of-care testing. More than 90 percent of patients that used the service were satisfied with the quality of care and health outcomes achieved. In addition, **patients with a rapid diagnostic test for flu had lower influenza-related health care costs (\$62.46) than patients who had no rapid diagnostic test (\$192.83).**

# Public Safety

## Introduction to Public Safety

Pharmacists play an integral role in public health and safety. Two specific areas include emergency preparedness and medication safety. Emergency preparedness means a “state of readiness” to meet the public health demands should tragedy strike. Pharmacists are well trained to respond to these events and are involved in emergency preparedness planning at the local, state and federal level. Over the past decade, awareness of the potential for medication errors and medical misadventures has surged. The Institute of Medicine and other organizations have estimated that medication errors are prevalent, with the potential to harm at least 1.5 million people each year. Sadly, many medication errors are preventable. Medication safety has evolved into a science of assessing the problem-prone, complex steps of the medication use process (e.g., prescribing, dispensing, administering and monitoring), developing safeguards and “preventive checks” to improve the safety of the medication use system.



## What a Pharmacist Provides

Pharmacists involved in emergency preparedness are well informed of the potential biological, chemical, radiological and nuclear methods that may be used to conduct a terrorist attack. They fully understand the clinical consequences, along with the pharmaceuticals available to respond to and manage potential attacks. Pharmacists collaborate with their local hospitals and communities to assure that procedures are in place, and participate in drills to test those procedures so they may efficiently respond to any disaster. Pharmacists are also called upon to collaborate with other emergency responders in managing drug therapy of individual victims. They work with state and federal organizations to coordinate availability, distribution and appropriate allotments of pharmaceuticals in a timely fashion to designated areas should a disaster occur. Medication safety pharmacists regularly monitor data such as analyzing drug event reports generated from practitioners within a health care system. They then analyze this data for trends to identify events that are preventable and those occurring with greatest frequency and severity that require further investigation of the medication use process. The next step is to assess processes in place (or in need of implementation) to prevent errors reported elsewhere. Pharmacists also monitor medication recalls and safety alerts for the potential to impact patients at their practice sites as well as national safety standards. Medication safety pharmacists are well-versed in quality and process improvement to make the medication use system as “error proof” as possible.

Pharmacy practice can provide a convenient arena for public health community outreach during an emergency. Consumers shop at food retailers and pharmacies an average of 1.9 times per week, and about 93 percent of those consumers live within five miles of a community pharmacy. **Coordination and planning between health departments and pharmacies to offer education materials to the public as well as aid during disaster response can ensure more consistent messaging that reaches all populations** in a community, leading to improved access to needed medication.



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