

ACCP WHITE PAPER

Pharmacy Practice, Research, Education, and Advocacy for Older Adults

American College of Pharmacy

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In the United States, older adults have become the fastest growing segment of the population and are expected to double in number to 70 million by 2030. As a whole, older adults have different health care needs than younger patients, and some of these needs should be met by pharmacists. Clinical pharmacy practice affecting older adults occurs in a variety of settings, including community, ambulatory care, primary care, hospital, assisted living, nursing home, home health care, hospice, and Alzheimer's disease units. Although specialty training in geriatrics or gerontology is not required for pharmacists to care for older adults, it is extremely helpful. Pharmacy education related to the care of older adults has improved slightly in the past several years but will need to increase even more to provide all pharmacists with the basic skills and knowledge to care for this unique group of patients. In addition, pharmacotherapy research targeting older adults needs to increase. Although it can be challenging, funding for this type of research is available. Patient and political advocacy is also important to support this growing population.

Key Words: aged, elderly, pharmacy, pharmacy education, community pharmacy services, hospital pharmacy service, research, patient advocacy.
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With the growth of the older adult population, the demand for pharmacists as key practitioners to manage drug therapy for this age group will increase. Clinical pharmacy practice for older adults can occur in any health care setting. Because of age and socioeconomic factors, older adults can respond differently to drugs,

necessitating research in this special patient population. All pharmacists must possess the knowledge and skills to care for the particular needs of this age group. Finally, advocacy for older adults will continue to be at the forefront of our political agenda. This White Paper provides a primer on the distinctive aspects of pharmaceutical care in older adults, with emphasis on clinical pharmacy practice, research, education, and advocacy.

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Older Adult Demographics

Americans aged older than 65 years are the fastest growing segment of the United States

population. In 2000, about 35 million people aged 65 years or older lived in the United States, accounting for almost 13% of the total population.¹ The size of the older population is projected to double to 70 million, or 1 in 5 people, by 2030. The population that is aged 85 years or older is projected to grow from 4 million in 2000 to 19 million by 2050. Women outnumber men among the older adult population. In the 2000 U.S. census, women accounted for 58% of the population aged 65 years or older and 70% of the population aged 85 years or older.¹ In 1998, Social Security provided more than 80% of income for older Americans within the lowest levels of income.¹ For those in the highest income category, Social Security accounted for about 20% of total income.

Life Expectancy

The American population is living longer than ever before, and much of the progress is because of efforts in fighting diseases that are responsible for the majority of deaths in this country. In 1997, life expectancy at birth was 79 years for women and 74 years for men.¹ Under current mortality conditions, people who survive to age 65 years can expect to live an average of nearly 18 more years, more than 5 years longer than people 65 years old in 1900. The life expectancy of people who survive to 85 years of age today is about an additional 7 years for women and 6 years for men. The top 10 causes of mortality in older adults have been quantified. The top three leading causes in ranked order in the United States are heart disease, cancer, and stroke, which account for about 60% of all deaths.² Other leading causes of death, by rate of occurrence, include chronic lower respiratory diseases, accidents, diabetes mellitus, influenza or pneumonia, Alzheimer's disease, kidney disease, and septicemia.²

Racial and Ethnic Diversity

The racial and ethnic diversity among older adults also is expected to increase. In 2000, an estimated 84% of people aged 65 years or older were non-Hispanic white, 8% were non-Hispanic black, 6% were Hispanic, 2% were non-Hispanic Asian and Pacific Islander, and less than 1% were non-Hispanic American Indian and Alaska Native.¹ By 2050, the percentage of the older population that is non-Hispanic white is expected to decline from 84% to 64%. Hispanic people are projected to account for 16%, non-

Hispanic black for 12%, and non-Hispanic Asian and Pacific Islander for 7% of the older population.¹

Living Arrangements

Most older adults live in the community with a spouse or another person. In 1998, 73% of older men lived with their spouses, 7% lived with other relatives, 3% lived with nonrelatives, and 17% lived alone.¹ About 41% of older women lived with a spouse, and the same number lived alone. About 17% of older women lived with other relatives and 2% lived with nonrelatives. In 1997, about 1.5 million older people (4% of the population aged 65 yrs or older) resided in nursing homes, and 75% of these residents were women. This represents a decline since the mid-1980s in the proportion of older people living in nursing homes. Other forms of residential care and services such as assisted living and home health care have become more prevalent as rates of nursing home admissions have declined. Furthermore, declines in disability among the older population might have contributed to this trend.¹

Health Care Expenditures and Use

Changes in health care expenditures and use have occurred over time as America has aged. Annual total health care spending per older adult grew from \$7554 in 1992 to \$12,028 in 2000, an increase of 59%.³ By 2010, annual health care spending per older adult is projected to reach \$21,149, an increase of 76% over expenditures in 2000. Prescription drug spending as a share of total health care spending also grew for older adults from 7.4% in 1992 to 10% in 2000.³ By 2010, prescription drug expenditures are projected to reach 13.3% of total senior health care expenditures. In 1998, annual out-of-pocket expenditures on health care, which included expenditures on health insurance, medical services, supplies, and prescriptions, were 9–16% of total expenditures among households headed by older people at different levels of income.¹ Prescription drugs account for the second largest component of older Medicare beneficiaries' out-of-pocket spending on health care, after premium payments.⁴ In 1996, the average Medicare beneficiary paid 47% of all prescription drug costs out-of-pocket.³ Physician visits and consultations increased from 10,800/1000 Medicare beneficiaries in 1990 to 13,100/1000 in 1998. Access to health care for older adults

varied by race. In 1996, about 2% of non-Hispanic white older adults reported difficulty in obtaining health care, compared with 4% of non-Hispanic black and 3% of Hispanic older adults.¹

Prescription Drug Use

Older adults have a higher rate of prescription drug use than that of the general population. In 1998, older adults consumed 34% of all prescriptions dispensed, accounting for 42% of total drug expenditures.³ Annual spending per older adult for prescription drugs grew from \$559 in 1992 to \$1205 in 2000, an increase of 116%.³ By 2010, annual spending on drugs per older adult is projected to reach \$2810/year, an increase of 133% over spending in 2000. In addition, the annual average number of prescriptions per older adult grew from 19.6 in 1992 to 28.5 in 2000, an increase of 45%.³ By 2010, the annual average number of prescriptions per older adult is projected to grow to 38.5, an increase of 10 prescriptions or 35% per older adult from 2000. These figures include refills of previous prescriptions as well as new prescriptions.

Disease Prevention

Greater emphasis on prevention is needed to overcome chronic disease in older adults. Preventable chronic diseases make up about 70% of the burden of illness and 75% of all health care costs.⁵ Heart disease, cancer, stroke, chronic obstructive pulmonary disease, and diabetes mellitus are examples of leading preventable causes of death in the United States. Preventive lifestyle choices and behaviors have a greater effect on both the quality and duration of life than does heredity.⁶ Within our society, preventive education earlier in life is the key to more responsible health, lifestyle choices, and well-being later in life. Preventive strategies include maintaining normal body weight, engaging in regular aerobic physical activity, consuming alcohol in moderation, avoiding tobacco, and adopting a healthy eating plan. Aspirin is another preventive strategy that has been proven to be beneficial in primary and secondary prevention of coronary heart disease in certain individuals at risk for thrombosis.⁷ Routine screening for chronic conditions increases the probability that older adults will receive medical treatment. For example, routine screening for osteoporosis in women should begin at age 65 years.⁸

Nutrition

Nutrition is an important factor for maintaining good health in older adults. Examples of healthy eating plans include the American Heart Association diet, the Dietary Approaches to Stop Hypertension (DASH) eating plan, and the Mediterranean diet. An optimal diet is low in saturated fat, *trans* fatty acids, cholesterol, total fat, sodium, red meats, sweets, and sugar-containing beverages and high in fruits, vegetables, low-fat dairy products, whole-grain products, fish, poultry, nuts, protein, fiber, and foods rich in omega-3 fatty acids, monounsaturated fats, magnesium, potassium, and calcium.⁹⁻¹¹

Deficiencies in certain essential vitamins and minerals, such as vitamin B₁₂ and iron, tend to increase with age. Nutritional supplements are a simple and cost-effective method to prevent diseases associated with a deficiency in a particular micronutrient.¹² Antioxidant vitamins, minerals, and other substances such as polyphenols work to neutralize free radicals that are responsible for many degenerative diseases and the aging process. Antioxidants obtained from foods are more effective than supplements, which should not be substituted for good nutrition.¹³ At least 1200 mg of calcium and 600 IU of vitamin D should be consumed daily by older adults, especially women, to maintain strong bones and teeth and to prevent osteoporosis complications.⁸

Daily Maintenance

Healthy personal habits throughout life contribute to successful aging. Sufficient sleep and rest, as well as drinking plenty of fluids each day, are important factors in maintaining optimal health.^{14, 15} Good dental hygiene, such as brushing and flossing, is important to maintain healthy teeth, which leads to better nutrition in older adults. Also, periodontal disease has been linked to serious health problems, including heart disease and stroke.^{16, 17}

Certain other lifestyle choices can improve longevity. Individuals who strive to include religion or spirituality as an integral part of their lives by engaging in some sort of spiritual practice live longer and have more satisfying lives.¹⁸ Individuals who continue to interact with others tend to be healthier, both physically and mentally, than those who become socially isolated.¹⁹ Married men and women live longer than those who have divorced.²⁰ Individuals with

higher economic status live longer because they enjoy more nutritious food, increased access to health care, and better living conditions.^{21,22}

Social Habits

Tobacco use and exposure to secondhand smoke significantly compromise life expectancy. Cigarette smoking has been clearly linked to the most common causes of death in older adults, such as cardiovascular disease, stroke, cancer, chronic obstructive pulmonary disease, and diabetes mellitus. The prevalence of at-risk problem drinking among older adults has been estimated as 1–15%.²³ At-risk or problem drinking has been demonstrated to lead to liver disease, cardiovascular disease, injuries from falls, motor vehicle accidents, dementia, delirium, depression, malnutrition, anemia, drug noncompliance, and alcohol-drug interactions. Alcohol use recommendations for older adults should not exceed one standard drink/day or seven standard drinks/week, and no more than two standard drinks on any drinking day.²³

Cancer

Because some cancers can be prevented, screening and education are critical. Skin cancer is the most prevalent cancer in the United States, and melanoma is the deadliest type of skin cancer. Older adults, especially men, have a higher proportion of morbidity and mortality from melanoma and nonmelanoma skin cancer.²⁴ In older adults, melanoma tends to be diagnosed at a later stage and is more likely to be lethal than in the general population. Basal cell and squamous cell carcinomas, in contrast to melanoma, are common, especially in older adults. However, they cause limited morbidity or mortality. The most commonly advocated screening for skin cancer is a total-body skin examination every year.²⁴ Furthermore, prevention of sunburn, skin cancers, and premature aging includes use of sunscreens and avoidance of overexposure to ultraviolet radiation.²⁵

Colon cancer is the third most prevalent cancer in men and women in the United States. For adults at average risk of colon cancer, screening should begin at age 50 years and should include one of the following: fecal occult blood test or fecal immunochemical test annually; flexible sigmoidoscopy every 5 years; the combination of annual fecal occult blood test or fecal immunochemical test and flexible sigmoidoscopy every 5

years (preferred method); colonoscopy every 10 years; or double-contrast barium enema examination every 5 years.²⁵ Men also should have a digital rectal examination and prostate-specific antigen blood test every year starting at age 50 years to screen for prostate cancer.

Breast cancer is the most common form of cancer in women. The American Cancer Society recommends that women aged 40 years or older have an annual mammogram, have an annual clinical breast examination by a health professional, and perform monthly breast self-examinations. Screening guidelines for preventing cervical cancer indicate that after three consecutive negative Pap tests, testing frequency can be reduced to every 2–3 years.²⁵ Most women aged 70 years or older who have had several recent normal Pap tests and most women who have had a total hysterectomy do not need to continue screening.

Accidental Injury

Accidents remain the fifth leading cause of death in the United States. The most common mechanisms for injury in older adults are falls, motor vehicle accidents, fights, accidental poisoning, and choking.²⁶ Appropriate interventional strategies such as home assessments for fall prevention, senior driving tests, and knowledge of poison center telephone numbers should be recommended by all health care professionals dealing with older adults.

Infections

Infections from influenza and pneumonia are the seventh leading cause of death in the United States. Adults aged 65 years or older should obtain yearly immunizations against influenza and a one-time immunization against pneumococcal disease.^{27,28} A second pneumococcal vaccination after 5 years is recommended if the patient was younger than 65 years at the time of the first vaccination or if the patient has certain comorbid conditions.²⁸ A tetanus-diphtheria booster also is recommended every 10 years.²⁹ For older people with suspicious wounds, a tetanus booster should be given if the last vaccination was more than 5 years before the injury.

Many older adults continue to be sexually active well into advanced age. Maintaining mutually monogamous relationships and practicing safe sex can prevent sexually transmitted diseases, such as chlamydia,

gonorrhoea, genital warts, human papilloma virus, genital herpes, hepatitis B, syphilis, and human immunodeficiency virus.³⁰

Alzheimer's Disease and Depression

Alzheimer's disease, the eighth leading cause of death in the United States, leads to decreased quality of life and increased mortality.³¹ Education and lifelong learning are important factors for preventing Alzheimer's symptoms.^{32, 33} Depression is a risk factor for decline in physical health, heart attacks, and stroke and can lead to suicidal tendencies.³⁴ Stressful life events also can be associated with high mortality. Interventional strategies for depression, anger, and stress include development of more and better coping skills.³⁵ Individuals who cultivate a positive outlook and approach challenges optimistically live longer than those who do not.³⁶ A sense of humor is associated with good health,³⁷ and laughter increases immune system activity and decreases the production of stress hormones.³⁸

Health professionals can effectively influence the lives of patients by helping them identify enhancements to their physical well-being and factors that improve their overall quality of life. Assessment, education, and reinforcement of positive and healthy lifestyle behaviors should be components of good health care for older adults.

Clinical Pharmacy Practice

Practice Types

With the growth of the older adult population, community-based elder health services are becoming critical components of many health systems and are creating entrepreneurial opportunities. Pharmacists are now providing services to older adults in a variety of community settings, including traditional pharmacies as well as pharmacies operating out of senior facilities and clinics, and in consultative roles. Pharmacists provide monthly drug reviews for nursing home residents and participate in committees for nursing home services. Pharmacists' roles in the care of older adults in the hospital, subacute care units, and assisted-living environments are increasing. Pharmacy services frequently are rendered as part of an interdisciplinary team. When patients are transferred between different locations or levels of care, pharmacists play an integral role in coordinating drug management. Better commu-

nication systems that allow sharing of information should be developed to enhance optimal use and safety of drugs across patient care settings.³⁹

Community Pharmacy

About 65% of pharmacists in the United States practice in the community setting, mostly in chain or independent pharmacies.⁴⁰ In addition to standard prescription services, many community pharmacies offer chronic disease management services for such diseases as diabetes mellitus and hypertension. Community pharmacists are readily accessible sources of information on over-the-counter drugs, herbal products, nutritional supplements, prescription drugs, drug costs, and other resources for the patient and family. Pharmacies operating within senior facilities and clinics further collaborate with medical providers to resolve drug-related problems and increase access to affordable drugs. Some community pharmacies specialize in providing equipment, such as walkers, mobility-assisting devices, or home health care items. Senior care pharmacies also may offer specialty services in disease states such as arthritis, dementia, or incontinence.

Ambulatory Care and Primary Care

Pharmacists provide services for older adults in general ambulatory, primary care, and specialty geriatric clinics. Specialized clinics for older adults usually are affiliated with hospitals, large group practices, or health systems. These clinics vary widely in the scope of services provided, background and skills of providers, and overall patient type. To help standardize and maintain quality of care, the American Geriatrics Society recommends seven critical components for specialized geriatric primary care clinics: continuity for the patient in a primary care model, personnel with training and experience in geriatrics, an interdisciplinary team able to coordinate care and services, access to care that is considerate of the special needs of many elders, an information system to allow for tracking of clinical items, a quality improvement program that is geriatric focused, and financial viability to ensure continuity of care.⁴¹

Although some pharmacists may provide care for older adults independently, an integrated approach remains important. Pharmacists have entered into collaborative drug therapy management agreements with physicians to

establish clinics for managing diabetes mellitus, anticoagulation, pain, asthma, hyperlipidemia, and cardiac disorders.⁴² Patients are seen at either the site of their medical provider or an alternate site focused on pharmaceutical care. Some pharmacists are involved in providing patient care from a distance by telephone, fax, Internet, or videoconferencing.⁴²

Consultant Pharmacy

Roles of consultant pharmacists have evolved with the changing spectrum of community care for older adults. Consultant pharmacists now provide a wide range of services, including pain management counseling, pharmacokinetic dosing, home intravenous therapy, and nutrition assessment and support. They practice in long-term care facilities, assisted-living facilities, psychiatric day hospitals, hospice, and home health and community-based settings. They are essential members of interdisciplinary teams and play a vital role in ensuring optimal drug therapy for their patients. Consultant pharmacists counsel patients, prevent and resolve drug-related problems, provide drug information or inservices to other health care professionals, and handle administrative duties, such as managing drug distribution. The roles and responsibilities of consultant pharmacists are varied, depending on the practice setting.

Assisted Living

Consultant pharmacists at assisted-living sites are beginning to perform drug reviews and assessments for drug errors. They work with the residence staff to identify drug-related problems and improve the drug use system. Many pharmacists have helped to implement immunization programs at these facilities. In cases where older adults pay for part or all of their drugs, the consultant pharmacist can assist with suggesting drug therapy changes that will reduce drug costs to the patient and/or see if the resident is eligible for any drug assistance programs and discount cards. Currently, federal regulations for drugs do not exist for assisted-living facilities, although voluntary accreditation through the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) or the Commission for Accreditation of Rehabilitation Facilities is possible. Pharmacists working within such facilities should be familiar with the accreditation standards of the applicable organization(s).

Nursing Homes

The consultant long-term care pharmacist has become an important part of the health care team since federal regulations through the Omnibus Budget Reconciliation Act of 1987 (OBRA '87) mandated monthly drug regimen reviews to be conducted for residents in nursing home facilities and for intermediate care facilities with patients with mental disabilities. Pharmacists work with these facilities to ensure adherence to OBRA guidelines on the use of high-risk drugs, such as psychotropic drugs, hypnotics, and anxiolytics. The OBRA regulations define accepted indications, dosing, duration, monitoring, and cases for dosage reduction for these classes of drugs. The guidelines for prescribing psychoactive drugs require assessment of target symptoms, documentation of dosage titration, assessment for adverse effects, description of patient improvement, and a plan for long-term management of the drugs.^{43, 44} Facilities also need to eliminate drugs that are duplicative in action, unnecessary, or used without appropriate diagnosis.

Besides meeting specific regulation requirements, pharmacists practicing in long-term care settings participate on drug use review boards; collaborate on research programs; perform nutrition assessment, pharmacokinetic dosing, therapeutic drug monitoring, and pain management; and provide patient counseling.^{45, 46} Other long-term care pharmacy services include compliance packaging, surgical appliance fitting, enteral feeding, and drug information services.^{45, 46} Because many residents in nursing homes have many chronic medical issues with complex drug regimens, pharmacists can help to prevent and resolve drug interactions and drug-related adverse events. The effects of consultant pharmacist services on outcomes, use, and overall costs in long-term care facilities are tremendous. Consultant pharmacist-conducted drug regimen reviews have been estimated to increase optimal patient outcomes by more than 40% and save more than \$3 billion in annual drug-related morbidity and mortality costs.⁴⁷

In the long-term care setting, pharmacists acting as consultants are more likely to provide written assessment of drug regimens to evaluate drug and dose appropriateness, drug interactions, adverse effects, and drug costs. The Fleetwood Project Research Initiative was a three-phase strategy to demonstrate the impact of consultant pharmacy services on patient outcomes and health care costs.⁴⁷⁻⁴⁹ Phase I was a pharmaco-

economic study to quantify the cost of drug-related problems in long-term care facilities and the value of a consultant pharmacist.⁴⁷ The results showed that the consultant pharmacist conducting drug regimen reviews improved therapeutic outcomes by an estimated 43%. This improvement in outcomes could save the health care industry an estimated \$3.6 billion annually in costs from averted drug-related problems. Phase II was a pilot study to develop and test methods needed for consultant pharmacists to measure their clinical impact.⁴⁸ Phase III is identifying pharmacist-sensitive outcomes in older patients.⁴⁹

Home Health Care

Home health care is increasingly being used, as acute care costs continue to increase and hospital stays shorten. Pharmacists providing home care typically manage intravenous therapy including parenteral nutrition and pharmacokinetic monitoring. Pharmacists also may be involved in drug reviews, drug problem resolution, adherence improvement, and counseling.

Hospice and Palliative Care

Hospice or palliative care is an expanding area of specialization for pharmacists. Pain management and ethical issues are important aspects of care for these patients. Surveys have shown hospice pharmacists are important members of the interdisciplinary team; they take on administrative duties and drug supply responsibilities while also participating in team meetings and rounds.^{50, 51} Pharmacists provide education, review drugs, give input on pharmacotherapy, address financial concerns, and ensure safe and legal disposal of drugs after death. They also look for creative ways to administer drugs using extemporaneous compounding of nonstandard dosage forms.

Interdisciplinary Team Care

Pharmacists may be involved with interdisciplinary ambulatory care teams or consultation teams for hospitalized older adults through specialty services such as geriatric evaluation and management or geriatric assessment units. Older patients who have complex or multiple medical, psychological, and social needs benefit from comprehensive geriatric assessment with interdisciplinary team care from medicine, nursing, pharmacy, physical and occupational therapy, mental health, and social services.

Inpatient geriatric unit care reduces unnecessary and inappropriate drug use and underuse, improves suboptimal prescribing,⁵² and reduces mortality.⁵³

The team pharmacist usually is responsible for ensuring appropriate drug therapy for prevention and treatment; monitoring drug use; identifying and resolving adverse drug reactions (ADRs) or drug-related problems; and providing drug education to health care providers, patients, and caregivers. Interdisciplinary geriatric evaluation and management in frail elderly resulted in a 35% reduction in the risk of severe ADRs compared with usual care in ambulatory older adults.⁵² Investigators also reported a significant reduction in inappropriate drug use and underuse in ambulatory older adults. Pharmacists providing inpatient drug review services can improve the quality of pharmaceutical care and possibly reduce the total cost of therapy.

Alzheimer's Disease

Patients with Alzheimer's disease and their caregivers have distinctively characteristic communication and drug-related needs. Pharmacists working in this area should be skilled in handling these different types of needs and have knowledge of ongoing advances in treatment of Alzheimer's disease. Pharmacists collaborate with other health care team members to determine appropriate and ethical treatment options for each patient, depending on the onset, severity, and progression of symptoms. They help patients and families maximize adherence to drugs, monitor and resolve adverse events and drug interactions, and educate caregivers to help optimize therapeutic effects and patient independence. As many patients with Alzheimer's disease not only experience cognitive decline but also have psychiatric and behavioral disturbances, pharmacists can play an important role in ensuring patient safety and at-home living through recommending and monitoring the use of psychotropic drugs. Pharmacists also frequently are involved in providing education to staff and caregivers. In the community or outpatient setting, early recognition of Alzheimer's disease is important because cognitive decline is not reversible. The pharmacist can help identify symptoms and educate the patient and their family on treatment options. Finally, the pharmacist can serve as a source of emotional support and help make referrals to specialized care for these patients.

Table 1. Pharmacokinetic Changes in Older Adults and Their Potential Effects on Commonly Used Drugs⁵⁴⁻⁶⁰

Pharmacokinetic Change	Potential Result or Clinical Effect	Affected Drugs
Drug absorption		
Basal and histamine-stimulated peak gastric acid secretion may decline	Decreased absorption; dissolution affected and solubility of basic drugs reduced	Ketoconazole, itraconazole, ferrous sulfate, calcium carbonate
Active transport mechanisms may decrease	Decreased absorption	Vitamins (thiamine, folic acid), minerals (calcium, iron)
Decreased gastric emptying	Delayed onset of action	Sedative-hypnotics, pain drugs, levodopa
Increased contact time for drugs	Increased ulcerogenic potential Drug interactions (binding)	Nonsteroidal antiinflammatory drugs Antacids with other drugs
Increased drug residence time at sites of maximal absorption	Increased absorption	Levodopa
Changes in regional blood flow	Reduced absorption of drugs given intramuscularly	Intramuscularly administered drugs in bedridden older adults
Drug distribution		
Decreased total body water ^a	Decreased volume of distribution, thus increased effect, of hydrophilic drugs; may result in higher plasma concentrations	Digoxin, cimetidine, lithium, phenytoin, gentamicin, meperidine, theophylline, alcohol, morphine, others
Decreased lean body mass coupled with increased total body fat	Accumulation, delay in clearance and onset of lipophilic drugs (prolonged half-life); increased effects	Lipophilic benzodiazepines (e.g., diazepam, chlordiazepoxide), antipsychotics (phenothiazines), tricyclic antidepressants, calcium channel blockers, some anesthetic agents (thiopental), others
Slightly decreased total serum albumin concentrations ^b	Increased free drug, increased effects with drugs highly bound to albumin	Phenytoin, warfarin, benzodiazepines, naproxen, valproic acid, sulfonyleureas, fluphenazine, meperidine, desipramine, salicylates, theophylline
Acute-phase protein changes in α_1 -acid glycoprotein ^c	Increased binding and decreased free drug; decreased effect	Propranolol, lidocaine
Drug metabolism		
Decreased hepatic mass and blood flow	Decreased clearance of drugs with high first-pass metabolism, thus increased drug effect and adverse reaction potential	Lidocaine, meperidine, morphine, propranolol, metoprolol, labetalol, verapamil, estrogens, barbiturates, diltiazem, nifedipine, amitriptyline, cimetidine, hydralazine, nortriptyline, desipramine, levodopa, metronidazole, imipramine, quinidine, trazodone, nitrates, chlordiazepoxide, others
Decreased phase I metabolism	Drug clearance may decrease or remain the same; increased effect	
Oxidation (dealkylation)		Amitriptyline, chlordiazepoxide, diazepam, flurazepam, meperidine, diphenhydramine, lidocaine, theophylline, tolbutamide
Oxidation (hydroxylation)		Alprazolam, antipyrines, barbiturates, carbamazepine, ibuprofen, imipramine, desipramine, nortriptyline, phenytoin, propranolol, quinidine, warfarin, others
Drug excretion		
Decreased kidney clearance	Increased drug concentrations, increased or decreased response, increased adverse effects	See Table 2 for applicable drugs

^aCaution should be used with volume-depleting drugs (e.g., diuretics).^bConsider factors affecting albumin concentration such as disease states, nutritional status, and other drugs.^cDue to increases in inflammation, trauma, and burns.

Table 2. Commonly Used Drugs That May Require Dosage Adjustment or May Not Be Effective in Older Adults with Kidney Impairment⁵⁴⁻⁶⁰

Drug Class	Drug Subclass	Specific Drugs
Analgesics	Nonsteroidal antiinflammatory drugs, COX-2 inhibitors	Ibuprofen, naproxen, ketorolac, celecoxib, others (may further impair kidney function)
	Opiates	Meperidine, propoxyphene (avoid); morphine, codeine, others (may require dosage adjustment)
Psychiatric	Sedative hypnotics	Chloral hydrate
	Antipsychotics	Risperidone
	Mood stabilizers	Lithium
Cardiovascular	Antiarrhythmics	Digoxin, milrinone
	ACE inhibitors	Captopril, enalapril, lisinopril, others
	β -Blockers	Atenolol
	Diuretics	Hydrochlorothiazide (ineffective if $Cl_{cr} < 30$ ml/min)
	α -Agonists	Clonidine
Antibiotics	β -Lactams	Cephalosporins (most), penicillins
	Aminoglycosides	Gentamicin, tobramycin, amikacin
	Fluoroquinolones	Ciprofloxacin, levofloxacin, others
	Other antibiotics	Nitrofurantoin (ineffective if $Cl_{cr} < 40$ ml/min), sulfamethoxazole, trimethoprim, vancomycin, tetracycline, aztreonam
	Antifungals	Amphotericin B, fluconazole, flucytosine
	Antivirals	Amantadine, acyclovir
Other	Gout drugs	Allopurinol, colchicine, probenecid
	Histamine ₂ blockers	Famotidine, ranitidine, cimetidine
	Hypoglycemic drugs	Chlorpropamide, acetazolamide (avoid); metformin (avoid if $S_{cr} > 1.4$ mg/dl for women, > 1.5 mg/dl for men)
	Anticonvulsants	Gabapentin
	Miscellaneous	Methotrexate

COX-2 = cyclooxygenase-2; ACE = angiotensin-converting enzyme; Cl_{cr} = creatinine clearance; S_{cr} = serum creatinine concentration.

Distinctive Aspects of Pharmaceutical Care for Older Adults

Age-Related Physiologic Changes

Drug therapy in older adults is complicated by normal physiologic changes that take place during the aging process.⁵⁴ Table 1 provides a list of commonly prescribed drugs that may be affected by pharmacokinetic changes in older adults.⁵⁴⁻⁶⁰ Increasing gastric pH and decreased gastrointestinal transit time can change the absorption characteristics of certain dosage forms; however, the extent of absorption typically remains the same. Alterations in distribution can have effects on certain drugs. With aging, adipose tissue increases (affecting highly lipophilic drugs), lean body mass decreases (affecting highly tissue-bound drugs), and total body water decreases (affecting highly hydrophilic drugs). Concentrations of serum proteins shift slightly with an increase in α_1 -acid glycoprotein and a decrease in albumin. A decrease in liver size and blood flow affects the metabolism of drugs, primarily those that undergo phase I reactions.

Renal blood flow and renal tubular function

also decrease with normal aging. The resultant decrease in glomerular filtration rate has a significant effect on many renally eliminated drugs. The glomerular filtration rate is estimated to decrease about 1%/year after age 40 years. Equations to estimate creatinine clearance in older adults typically incorrectly estimate kidney function⁶¹ but are used frequently in clinical practice. Measurement of an 8–24-hour creatinine clearance or therapeutic drug monitoring might be required for narrow therapeutic index drugs that are renally eliminated. Table 2 provides a list of commonly prescribed drugs that require dosage adjustments or may not be effective or safe in older adults with kidney impairment.⁵⁴⁻⁶⁰

In addition to changes that directly affect the pharmacokinetics of certain drugs, pharmacodynamic parameters are affected.⁵⁴ Changes in the central nervous system, resulting from decreased blood flow and receptor alterations, make older adults more sensitive to the actions and adverse effects of drugs acting on the brain. A decrease in cardiac response to β -adrenergic drugs is observed in older adults. Aging kidneys

Table 3. Commonly Used Drugs That Are Affected by Pharmacodynamic Changes in Older Adults⁵⁴⁻⁶⁰

Drug Class or Agent	Physiologic Change	Clinical Effect
Central nervous system drugs Benzodiazepines (class effect), antipsychotics, antidepressants, opiate analgesics, barbiturates, other centrally acting drugs, drugs with anticholinergic properties (dicyclomine, benztropine, trihexyphenidyl, amitriptyline, diphenhydramine, chlorpheniramine, thioridazine), others	Increased receptor response, sensitivity	Increased effect and/or adverse effects; increased dizziness, confusion, and falls
Cardiovascular drugs Isoproterenol, propranolol Diuretics, guanethidine, reserpine	Decreased response Decreased baroreceptor response, increased risk of orthostatic hypotension	Possibly less effective Increased falls and injuries
Other drugs Nonsteroidal antiinflammatory drugs, ACE inhibitors, aldosterone antagonists Warfarin	Decrease in plasma renin and urine aldosterone, decreased sympathetic innervation to juxtaglomerular cells Increased coagulation systems sensitivities, decreased activity of reductase enzyme systems that recirculate vitamin K in the liver, decreased availability of vitamin K, and decreased clotting factor synthesis	Greater risk for hyperkalemia Greater risk for bleeding

ACE = angiotensin-converting enzyme.

are affected by age-related decreases in aldosterone and renin. Table 3 lists drugs that are commonly affected by pharmacodynamic changes in older adults.⁵⁴⁻⁶⁰

Sensory and Memory Deficits

With aging, older adults experience declines in visual, hearing, and cognitive function. This can affect their ability to remain independent and have meaningful social interactions. Cognitive dysfunction can present as memory, language, reasoning, or perception deficits.⁶² Studies have shown that cognitive decline is associated with increased morbidity and mortality.⁶³⁻⁶⁵ Cognitive decline also can affect quality of life and independence. Other factors that might cause mental status changes and cognitive decline include depression, diabetes mellitus, infection, pain, and drug use or misuse. Table 4 provides a list of drugs that might cause or contribute to cognitive impairment in older adults.^{60, 66-69} If cognitive or sensory deficits are identified, the pharmacist should recognize and eliminate drug-induced effects and adjust patient counseling to the level the patient or caretaker can understand and retain.

Mobility, Falls, and Fractures

Physical activity is important in maintaining mobility, bone mineral density, muscle strength, and balance, which in turn can increase socialization and prevent falls and osteoporotic fractures.⁷⁰ Among individuals aged 64 years or older, about 33% living in the community and 50% living in institutions fall every year.⁷¹ Fractures and other serious injuries occur in 5% and 5-11% of these falls, respectively.

Many extrinsic and intrinsic risk factors for falls are known. Extrinsic risk factors include poor lighting, uneven floors, throw rugs, electrical cords, or other objects in the pathway.^{72, 73} Fall prevention includes the use of light switches at the bottom and top of stairs, sturdy handrails, even and well-maintained steps, and grab-bars and nonskid surfaces in the tub or shower.⁷³ Older adults, cohabitants, and family members should be empowered to remove extrinsic risk factors. Pharmacists can assist in preventing osteoporotic fractures by participating on interdisciplinary teams to prevent falls, increase exercise and muscle strength, and ensure preventive drugs for osteoporosis are prescribed for at-risk individuals. Community pharmacists

Table 4. Drugs Reported to Cause or Contribute to Cognitive Impairment in Older Adults^{60, 66-69}

Drug Class and Specific Agents	Behaviors Reported	Alternative Drug Therapy or Recommendations
Drugs with anticholinergic effects		
Tricyclic antidepressants, especially tertiary amines: amitriptyline, imipramine, doxepin	Confusion, disorientation, agitation, psychotic behavior	Serotonin selective reuptake inhibitors, nortriptyline, or desipramine
Antipsychotics: chlorpromazine, thioridazine, atypical drugs (e.g., olanzapine), others	Sedation, confusion (extrapyramidal side effects with higher doses)	Use lower doses
Antihistamines in cold and allergy products: diphenhydramine, chlorpheniramine, others	Sedation, lassitude and confusion, paradoxical excitation, euphoria, restlessness, nervousness, psychosis, hallucinations	Nonsedating (second-generation) antihistamines or nasal steroids for allergic rhinitis
Antiparkinsonian drugs: benzotropine, trihexyphenidyl, procyclidine	Confusion	Use lower doses, consider other antiparkinsonian drugs
Antiemetics: prochlorperazine, hydroxyzine, promethazine, others	Confusion	Use lower doses
Urinary antispasmodics: oxybutynin, tolterodine, dicyclomine	Confusion, hallucinations, illusions	Use lower doses
Gastrointestinal antispasmodics: clidinium, hyoscyamine, propantheline, others	Sedation, confusion	Evaluate need
Antiarrhythmics: disopyramide	Sedation, confusion	Evaluate need
Motion sickness drugs: transdermal scopolamine	Confusion, disorientation, incoherent speech, aggressive behavior, agitation	Evaluate need
Analgesics		
Narcotic analgesics and derivatives: meperidine, propoxyphene, pentazocine, codeine, others	Fluctuating levels of awareness, confusion, disorientation, illusions, visual and auditory hallucinations, agitation	Use alternative narcotic analgesics if needed (e.g., morphine); meperidine and propoxyphene not recommended; trial of acetaminophen recommended instead of propoxyphene
Sedative-hypnotics and other centrally acting drugs		
Sedative-hypnotics: meprobamate, others	Sedation, confusion	Avoid use and evaluate need
Older anticonvulsants: primidone, phenobarbital, others	Confusion, psychosis, auditory and visual hallucinations, agitation (toxic levels)	Monitor serum concentrations, adjust dosage, evaluate role, and consider newer anticonvulsants
Centrally acting antiparkinsonian drugs: dopamine agonists, bromocriptine, levodopa, others	Dizziness, sedation, delirium, insomnia, anxiety, episodic confusion, psychosis, illusions, hallucinations, vivid dreams	Adjust dosages, usually lower dosages appropriate in older adults
Muscle relaxants: cyclobenzaprine, orphenadrine, methocarbamol, baclofen, carisoprodol, others	Sedation, confusion	Evaluate need
Asthma or COPD drugs		
Xanthenes: aminophylline, theophylline	Irritability, agitation, confusion	Evaluate need
Cardiovascular drugs		
Central α -agonists: methyl dopa, clonidine, others	Confusion, impaired concentration, illusions, hallucinations, worsening depression	Consider other antihypertensive drugs
Reserpine		
Digitalis glycosides: digoxin	Incoherent thinking, illusions, hallucinations, delusional thoughts, irritability and labile mood, disorientation, agitation	Adjust dosage for renal impairment in older adults, use lower dosages in patients with heart failure (rarely > 0.125 mg/day)

Table 4. Drugs Reported to Cause or Contribute to Cognitive Impairment in Older Adults^{60, 66-69} (continued)

Drug Class and Specific Agents	Behaviors Reported	Alternative Drug Therapy or Recommendations
Gastrointestinal drugs		
Histamine ₂ antagonists: cimetidine, ranitidine, famotidine, nizatidine	Acute confusion, psychosis, anxiety, visual and auditory hallucinations, belligerence, disorientation, irritability	Adjust dosages in renal impairment
Prokinetic drugs: metoclopramide	Toxic psychosis, restlessness, visual hallucinations, disorientation, loss of attention span	Evaluate need, use lower dosages in older adults
Antibiotics and antiviral drugs		
Fluoroquinolones: norfloxacin, ciprofloxacin, levofloxacin, others	Agitation, insomnia, confusion, psychosis, disorientation, hallucinations, dizziness	Adjust dosage in renal impairment
Antivirals: acyclovir, amantadine, ganciclovir, others	Confusion, auditory and visual hallucinations, psychosis, agitation	Adjust dosage in renal impairment
Other drugs		
Corticosteroids: prednisone, dexamethasone, hydrocortisone, others	Mood changes, irritability, poor concentration, psychosis, racing thoughts, talkativeness, confusion	Evaluate long-term need, adjust dosage; discontinuation usually requires a dosage taper

COPD = chronic obstructive pulmonary disease.

can provide pamphlets discussing fall and osteoporosis prevention in their pharmacies.

Intrinsic conditions placing older adults at risk for falls include drugs; sensory, musculoskeletal, and behavioral-cognitive deficits; and other disease states.⁷² Table 5 provides a list of drugs that can contribute to falls.^{67-69, 74-88} Pharmacists should pay particular attention to these drugs when they are used in older adults, especially if the older adults have a history of falls. Conditions affecting gait and cognitive function include Parkinson's disease, dementia with Lewy bodies, lower limb fractures, stroke, arthritis, and Alzheimer's disease. Other factors associated with increased risk of falls include orthostatic hypotension, syncope, dizziness, arrhythmias, seizure disorders, confusion, depression, low body mass index, and glaucoma. Lifestyle risks such as alcohol abuse and inactivity lead to deconditioning.⁷⁰ Pharmacists need to evaluate if drug effects or toxicities create these risk factors. Resolutions can include discontinuing sedative or hypnotic agents or changing blood pressure drugs to eliminate orthostatic blood pressure changes.

Transportation

Transportation to medical appointments and pharmacies can be challenging for older adults and their caregivers. For many older adults, driving is important for independence,

socialization, and self-esteem.⁸⁹ Public transportation might not be accessible for individuals with certain disabilities, might not be available altogether, or might not include pharmacies on their routes. Although older adults make up only 12% of the U.S. population, older adult drivers are responsible for 29% of accidental deaths.⁹⁰ Declining cognitive, visual, psychomotor, and muscular skeletal functions place older adult drivers at risk for adverse driving events.⁸⁹ Medical conditions associated with driving cessation include fractures, angina, diabetes mellitus, and poor vision.⁹⁰ Drugs associated with decreased driving performance include hypnotic or anxiolytic agents, narcotics, antipsychotics, antidepressants, antihistamines, ophthalmic drugs, antiepileptic drugs, muscle relaxants, and hypoglycemic drugs.^{89, 90} Nonsteroidal antiinflammatory drugs (NSAIDs) are associated with increases in crashes, probably because of the underlying musculoskeletal dysfunction rather than the drugs themselves.⁸⁹ Drug use and driving safety can be an area for pharmacist involvement.

Autonomy and Advance Directives

Although older adults may need assistance with certain aspects of their lives, preserving dignity and autonomy is vitally important. Different types of living arrangements can be made to help older adults maintain some

Table 5. Commonly Used Drugs That Could Contribute to Falls in Older Adults^{67-69, 74-88}

Drug Class	Drug Examples	Causative Effects
Benzodiazepines	Long-acting: chlordiazepoxide and diazepam Others: triazolam and alprazolam	Dose-related risk; sedation, dizziness, increased body sway
Antidepressants	Tricyclics (especially tertiary amines), selective serotonin reuptake inhibitors, trazodone	Sedation, hypotension, increased body sway
Antipsychotics	Traditional (thioridazine), atypical (risperidone)	Sedation, dizziness, hypotension
α -Blockers	Class effect	Hypotension, dizziness
β -Blockers	Class effect	Hypotension, dizziness
Calcium channel blockers	Class effect	Hypotension, dizziness
ACE inhibitors	Class effect	Hypotension
Angiotensin II receptor blockers	Class effect	Hypotension
Centrally acting α -adrenergic agonists	Clonidine, methyldopa	Hypotension, dizziness
Nitroglycerin-containing drugs	Isosorbide	Hypotension
Direct-acting vasodilators	Hydralazine	Hypotension
Diuretics	Loop diuretics, thiazides	Hypovolemia, hypotension
Hypoglycemic drugs	Sulfonylureas, meglitinides	Hypoglycemia
Narcotic analgesics	Morphine, meperidine, propoxyphene	Sedation, dizziness
Anticonvulsants	Phenytoin, phenobarbital, primidone	Sedation, ataxia, dizziness
Antihistamines	Diphenhydramine	Sedation, dizziness
Muscle relaxants	Cyclobenzaprine	Sedation, dizziness
Sedative-hypnotics	Zolpidem, zaleplon	Sedation, dizziness
Antiparkinsonian drugs	Levodopa, dopamine agonists, selegiline	Hypotension, dizziness, sedation
Antiemetics	Promethazine, trimethobenzamide	Sedation, dizziness
Antidiarrheal drugs	Diphenoxylate-atropine	Sedation
Antisecretory drugs	Dicyclomine	Sedation
Antiulcer drugs	Cimetidine	Dizziness

ACE = angiotensin-converting enzyme.

independence while also receiving some assistance with care. Older adults should be encouraged to discuss making advance directive plans to protect their end-of-life choices in an emergency.⁹¹ This planning should discuss various situations, including cardiopulmonary resuscitation, the use of drugs for pain and infection, nutrition, the need for a medical power of attorney, and a living will.

Sexuality

Sexuality in older adults remains an issue that needs to be addressed by health care providers.^{92, 93} Older adults should be asked if they are or would like to be sexually active. Education about safe sex should be provided to them to prevent sexually transmitted diseases. In addition, pharmacists can provide older adults with

education regarding treatments that can improve sexual function. With the development of oral phosphodiesterase inhibitors, such as sildenafil, and more tolerable forms of topical testosterone for men, sexual activity among older adults could increase. Older women may be interested in discussing sexual health as well, especially regarding concerns about vaginal atrophy, dyspareunia, and their partner's sexual functioning.⁹³ Pharmacists are accessible health care professionals who can provide much of this education to patients, but need to appreciate this generation's discomfort with conversations about sexuality.

Literacy

Literacy among older adults is important to assess, especially in relation to health care. Older

Table 6. Funding Sources for Geriatric Research

Funding Organization (Web site)	Focus of Organization	Grant Range	Comments
Archstone (www.archstone.org)	Elder abuse prevention, fall prevention among older adults, end-of-life issues, and emerging needs within the field of aging	Proposals are accepted throughout the year, with quarterly funding decisions made by the board of directors	Predominantly for California researchers, may fund other projects with national outcomes
American Federation of Aging Research (AFAR) (www.afar.org)	Development of scientists devoted to aging research, predominantly focused on M.D.s and Ph.D.s	Merck/AFAR research scholarships for medical and pharmacy students in geriatric pharmacology: \$4000 for 8–12-wk program M.D. and Ph.D. training and postdoctorate grants	Limited amount of funding for geriatric research projects because predominantly focused on M.D. and Ph.D. training
John Hartford Foundation (www.jhartfound.org)	Health care professional training in geriatrics System innovation	Variable, request for proposals	Typically by invitation, submit brief letter first Best to become part of a center training grant
National Institute of Aging (www.nia.gov)	Basic, translational, clinical and behavioral research Some training and development grants	Variable, total annual amount in the millions	
Robert Wood Johnson Foundation (www.rwjf.org)	End of life, health insurance coverage, racial and ethnic disparities, vulnerable populations	Variable, request for proposals	

adults who have poor health literacy might not be able to make educated decisions regarding their health care, can have poorer health, and/or have poorer health outcomes.⁹⁴ Printed drug monographs in the community setting should be written at no higher than a 6th- to 8th-grade reading level. When counseling older adults, pharmacists should determine a patient's literacy level and use verbal and written forms of communication that are easy to understand. Computer literacy also should be assessed if Internet-based resources are recommended to older adults.

Prescription Expenses

Access to drugs and finances can play a large role in the care of older adults. As the number of disease states and chronic drugs increases, costs also increase. Older adults without drug coverage may not be able to afford their monthly drug bill. If appropriate, generic drugs should always be encouraged by pharmacists in order to take advantage of cost-savings. Patient assistance programs also are available and should be used for older adults. In addition, changes in Medicare policies may increase access to costly drugs for some older adults. Pharmacists should

be aware of patient assistance and drug discount card programs and know how to assist older adults in accessing drugs at lower costs. Specifics regarding patient assistance programs and discount cards are discussed further in the Advocacy section.

Family Roles

Parenting of grandchildren by older adults has increased as a result of adult children being unable to care for their children. In 1996, 1.4 million children were cared for exclusively by their grandparents, 19% of whom were older than 65 years.⁹⁵ According to the 2000 U.S. census, more than 2.4 million grandparents were responsible for at least one grandchild.⁹⁶ Family dynamics can change as a result of this new responsibility. Negative effects on health and quality of life can occur and should be assessed in older adults with this obligation.⁹⁵ Financial concerns also must be addressed to ensure that the older adult is adequately able to take care of their own matters.

Caregiver Burden

As the population ages, the number of adults who become primary caregivers for an aging

loved one increases. No matter the circumstances under which they enter into this role, the burden can become overwhelming. Caregiver roles cover a broad range of levels of care from assistance with shopping to 24-hour medical support. Caregiver burden often is an overlooked stress that can adversely affect the health of both the caregiver and the patient. Clinicians need to be aware of the substantial impact of a disease or illness on the patient's caregiver. Decisions regarding drug regimen changes that alter the level of care required should be thoroughly discussed with the caregiver before any changes are made. Referrals to agencies that provide respite care might be appropriate under certain circumstances.

Adherence

Evidence suggests that drug adherence ranges from 66.9–95% and 47–86.3% when using pill counts and self-reporting, respectively.⁹⁷ Many variables have been studied to determine risk factors for drug nonadherence. These can be patient- and drug-related factors. Although many patient-related factors have been associated with drug nonadherence, the data have not consistently supported any specific predictors of nonadherence. The most commonly associated risk factors are increased age, male sex, psychological stress (depression), poor cognition, increased number of comorbidities (more than three), and lack of knowledge about health conditions and drug purpose.^{97–99} Drug-related risk factors have been more consistent when predicting adherence. Increased number of prescription drugs, longer therapy duration, adverse drug effects, ease of the drug regimen (use of once-daily or sustained-release formulations), higher drug costs, and increased number of prescribers are risk factors of drug nonadherence.^{97–100} Other reasons for nonadherence include forgetfulness, lack of disease symptoms, perceived ineffectiveness of drugs, and unclear directions for administration.⁹⁷

A multidisciplinary team that included a pharmacist improved drug adherence (measured by pill counts) up to 30 days after patient discharge from the hospital.¹⁰¹ Although adherence measured by pill counts can be improved, changes in outcomes after a pharmacist intervention have yet to be demonstrated.¹⁰² Almost 50% of the intervention studies that have correlated drug adherence to health care outcomes have showed that an

intervention improved drug adherence.¹⁰³ However, only 17% reported a statistically significant improvement in treatment outcomes.

Poor adherence to prescribed drug regimens is not a problem isolated to older adults. Older adults on average take more prescription drugs each day than their younger counterparts, but nonadherence should not be assumed based on this fact alone. Up to 11% of hospitalizations in older adults may result from nonadherence.^{104–106} Adherence to a drug regimen is a complicated process that involves attitudes and beliefs of the patient, the prescriber, and the health care system regarding the condition being treated. To increase adherence to a drug regimen, the regimen should be tailored to the patient based on the patient's preferences, goals, lifestyle, financial resources, and willingness and ability to adhere.

Over-the-Counter Drugs and Dietary Supplements

About 33% of the over-the-counter drugs sold in the United States are used by patients older than 65 years.¹⁰⁷ More than half (57%) of all seniors have reported using dietary supplements within the past 6 months.¹⁰⁸ Although older patients do appear to be more likely to consult a health care provider before self-treatment, a majority of these patients do self-medicate. The increasing transfer of prescription drugs to over-the-counter status will likely increase the number of older adults who elect to self-treat. Health care providers, especially pharmacists, must take an active role in counseling patients on the proper use of self-treatment options and the importance of reporting their use to their providers.

Drug Abuse

Drug abuse among those older than 65 years might not be as prevalent as in younger age groups, but it does exist.¹⁰⁹ Of the drugs abused by older adults, alcohol is the most common. Health care providers, including pharmacists, must be vigilant in looking for the signs and symptoms of drug abuse in older patients and assisting in resolving the problems.

Polypharmacy

Various definitions of polypharmacy exist, from number of drugs taken to specific drug-related problems. Polypharmacy in older adults has been defined as the use of two or more drugs

without indications or for the same purpose, or the use of a drug to treat the adverse reactions of another drug.¹¹⁰ In addition, polypharmacy has been defined as the use of two or more drugs of the same chemical class or with the same or similar pharmacologic actions to treat different conditions.¹¹¹ Moreover, one study defined minor polypharmacy as two to four drugs and major polypharmacy as five or more drugs.¹¹² Triaging for care by a pharmacist or a geriatric team sometimes uses five or more drugs as the trigger.

The simultaneous use of multiple drugs can produce noxious effects.^{113, 114} Older adults are at high risk of polypharmacy and negative outcomes for several reasons: multiple chronic medical conditions, multiple providers, multiple pharmacies, frequent hospitalizations, and new drugs and disease treatments not studied adequately in older adults. Clear end points of drug therapy might not be established and patients might not be reevaluated for the need to continue drugs. A lack of communication between pharmacies and multiple providers of care also can contribute to polypharmacy.

Pharmacists play an important role in helping to reduce polypharmacy. Pharmacists can serve as a channel of communication between patients and providers to promote appropriate drug use. Drug regimens in older adults should be reviewed periodically for unnecessary drugs, including duplication of therapy; those without indications; and drugs treating adverse effects of other drugs. Whenever possible, drugs that treat more than one medical condition should be used and in certain conditions, combination formulations might be warranted.

Drug Underuse

Suboptimal prescribing of potentially effective drugs is another drug-related problem in older adults.¹¹⁵ Researchers have found that older patients are less likely to receive appropriate antihypertensive drugs, aspirin, and 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitors after coronary artery bypass graft surgery; warfarin for atrial fibrillation; and angiotensin-converting enzyme inhibitors for heart failure.^{116–120} Depression also is underdiagnosed and undertreated in older adults, and effective therapy could increase patient quality of life.¹²¹ Adverse drug reactions are more common in older adults and also may contribute to lower use rates.¹²⁰ Pharmacists should promote adherence

to standards of care and appropriate drug use in this population.

Adverse Drug Reactions

Adverse drug reactions occur at a high rate in older adults. Many circumstances, which often are connected, lead to increased ADRs in older adults. Adverse reactions sometimes go undetected because symptoms may mimic problems associated with older age, such as forgetfulness, weakness, or tremor. Adverse reactions also can be misinterpreted as a medical condition and lead to additional drugs. A 24-month study of nursing home residents found that 74% had an ADR during their stay and at least 61% of the ADRs were preventable.¹²² A direct correlation existed between the number of drugs taken and the risk of ADRs.¹²³ In patients with ADRs, the length of hospital stay was increased by 2.2–3.2 days and hospital costs were increased by \$3244–\$4655 compared with patients who did not have ADRs.¹²³ Antibiotics, anticoagulants, digoxin, diuretics, hypoglycemic drugs, antineoplastic drugs, and NSAIDs are responsible for 60% of ADRs leading to hospital admission and 70% of ADRs occurring during hospitalization.¹²⁴ Pharmacists can play a crucial role in educating patients about potential ADRs so that they are not misinterpreted as another medical problem. More important, pharmacists can help to prevent, identify, and resolve ADRs by recommending the best drug therapy for the patient.

Drug-Drug Interactions

Older adults are at high risk for drug-drug interactions, which increase with the number of drugs taken.^{125–127} In fact, when the number of drugs prescribed reaches eight, the risk of a drug-drug interaction approaches 100%.¹²⁸ Drug interactions also may contribute to avoidable hospital admissions in older adults.¹²⁶ Interactions are most often because of pharmacokinetic or pharmacodynamic properties. Drug interactions resulting in reduced efficacy of drugs might be overlooked more so than those resulting in synergistic effects because other reasons might be used to explain the lack of efficacy (e.g., poor adherence and resistant disease). The most frequently encountered drugs involved in drug interactions include furosemide, digoxin, warfarin, angiotensin-converting enzyme inhibitors, NSAIDs, and amiodarone.^{129, 130}

Patient Assessment

Patient assessment in geriatrics is complex and should include clinical, humanistic, and economic perspectives. Obtaining medical histories may take additional time in older adults because of the higher number of diseases and drugs and memory issues. If the patient has dementia, the history may be unknown, incomplete, or incorrect. Frequently, assessment will involve gathering information from caregivers, while also assessing the impact of care giving on the health and well-being of both the patient and caregiver. Attempts to retrieve previous medical records should be made, and current and previous medical histories should be verified. Assessment of older adults also should ascertain end-of-life directives, cardiopulmonary resuscitation wishes, the durable medical power of attorney, and a living will.

Time allotted to a geriatric visit may limit reliability and completeness of the assessment. Every medical issue might not be addressed at each visit. Prioritization of medical problems needs to occur, taking into account that the provider and patient priorities might not be similar. In some cases, time constraints can create inappropriate prescribing or drug problems that are not identified or resolved for long time periods.

Pharmacotherapy Assessments

Comprehensive drug use assessments, including over-the-counter drugs and dietary supplements, should be conducted frequently in older adults. Treating patients with inappropriate drug therapy can produce more severe consequences in older adults, partly because of the typically poorer health status in this population and increased possibility of taking multiple prescriptions. A controlled study of 706 older adults found 20% of all hospital readmissions to be drug related, noting that 75% of those admissions could have been prevented if appropriate drug therapy had been followed.¹³¹ The Institute of Medicine estimates the annual national cost from death because of drug errors to be \$8 billion. Many claim this number to be grossly underestimated, as others calculate estimates ranging from \$85 billion to \$100 billion annually.⁶⁰

The two most frequently used methods of drug assessment with older adults in clinical practice are the Medication Appropriateness Index (MAI) and the Pharmaceutical Care Practice Approach.

The MAI is a validated tool to assess drug appropriateness in both older outpatients and inpatients.¹³²⁻¹³⁸ A score for each drug is determined based on 10 questions that assess drug appropriateness. A weighted score ranging from 0-18 is then calculated for each drug. A higher score indicates more prescribing problems. The questions and the scores are weighted based on whether the answers to the following questions are appropriate, marginally appropriate, or inappropriate: Is there an indication for a drug (3 points)? Is the drug effective for the condition (3 points)? Is the dosage correct (2 points)? Are the directions correct (2 points)? Are clinically significant drug-drug interactions present (2 points)? Are clinically significant drug-disease interactions present (2 points)? Are the directions practical (1 point)? Is the drug the least expensive alternative (1 point)? Is there unnecessary duplication of therapy (1 point)? Is the therapy duration acceptable (1 point)?

In elderly outpatients, inappropriate prescribing as indicated by the MAI has been associated with adverse health outcomes.^{136, 137} Moreover, clinical pharmacist interventions have been measured by using the MAI.^{134, 138} For ambulatory elderly patients taking an average of 7.9 drugs, the average MAI score/drug was 2.2 and total MAI/patient was 17.7.¹³⁴ After 3 months, there was a 24% improvement (decrease of 4.3 points from baseline, $p=0.0006$) in total MAI scores for patients randomly assigned to receive a clinical pharmacist intervention. The most improvement occurred with corrected and more practical directions, changing therapy duration, and ensuring appropriate indications for existing drugs. In a long-term care facility, a statistically significant decrease in total MAI score (16.6 vs 7.9, $p<0.001$) also occurred after a clinical pharmacist intervention.¹³⁸

The Pharmaceutical Care Practice Approach recognizes assessment, establishment of a care plan, and follow-up evaluation as the three major steps in the patient care process.¹³⁹ Categories of drug therapy problems that can be identified include unnecessary drug therapy, additional drug therapy needed, ineffective drugs, dosage too low, ADR, dosage too high, and noncompliance.

Population Assessments

To enhance the abilities of medical groups and health care organizations to assess quality and improve care for older adults, the Accessing Care

of Vulnerable Elders publications were developed in coordination with the American College of Physicians–American Society of Internal Medicine Task Force on Aging.¹⁴⁰ The quality indicators describe appropriate care for a variety of disease states and conditions, including dementia, pain, heart failure, end-of-life care, and appropriate drug use. Pharmacists can use the quality-assessment tools to assist them in evaluating the care they provide.

Another reference commonly used to evaluate systemwide drug use is the Beers criteria.^{60, 141–144} The criteria were initially developed to identify inappropriate drug use in older adult nursing home patients.¹⁴¹ Updated versions include recommendations for community-dwelling older adults.^{60, 143} The criteria were developed based on recommendations from nationally recognized experts in geriatric care, clinical pharmacology, and psychopharmacology, by using a modified Delphi method.^{60, 141–143} Investigators compiled a list of drugs that are potentially inappropriate in any patient older than 65 years and a list of drugs that should be used cautiously based on certain diseases or conditions.^{60, 141, 143}

A recent study using the Beers criteria in a Medicare managed care population found potentially inappropriate drug use in 541 (23%) of 2336 patients observed.¹⁴⁴ Patients who received a potentially inappropriate drug had significantly higher total, provider, and facility costs. After controlling for sex, Charlson Comorbidity Index, and total number of prescriptions, patients receiving a potentially inappropriate drug also had a higher mean number of inpatient, outpatient, and emergency department visits.

Another study discovered that of 48 drug-related problems, 35% were Beers-related problems and the majority included inappropriate drug dosing, duration, duplication, and indication, underuse, interactions, and adverse reactions.¹⁴⁵ In addition, 78% of 156 reported ADRs were attributable to inappropriate prescribing.¹⁴⁶ One study found that 3234 patients experienced functional status decline and mortality when given an inappropriate drug based on the Beers Criteria.¹⁴⁷ After controlling for covariates, however, the study revealed no association with mortality and inappropriate drug use.

Proponents of the Beers criteria believe that their use will lead to a reduction in drug-related ADRs, an improvement in patient outcomes, and possibly a reduction in health care costs.

However, there is a lack of consensus on the true inappropriateness and rationale behind some of the drugs listed.¹⁴⁸ Others criticize the Beers criteria as being too simplistic and limiting the prescribing authority of physicians.⁶⁰ In addition, these criteria are a balance between expert opinion and evidence. Thus, evidence does not exist for all of the criteria, corrective measures for the problems are not provided, and the criteria might not automatically result in changes in prescribing habits or improved quality of care.

Accreditation organizations also recommend systemwide assessment of drug use as part of documentation of pharmacist services. The JCAHO is an organization designed to improve the quality of health care in the United States. The JCAHO surveys and accredits health care organizations using a set of minimum standards that must be met. The standards are published annually in the Comprehensive Accreditations Manual for Hospitals. Manuals also are published for specialty areas such as long-term care, behavioral health care, and home health care. The Medication Management Standards for long-term care facilities set guidelines for proper drug therapy, including monthly drug review for efficacy and safety by a consulting pharmacist, proper administration of drugs, and management of high-risk and psychotropic drug monitoring.

Pharmacist services are defined by JCAHO as the provision of professional care and services by a qualified pharmacist to optimize outcomes of drug therapy and minimize the adverse effects of drugs. These services include assessment of the appropriateness of drug orders, ongoing evaluation and review of patients' drug regimens and pharmacy care plans, ongoing monitoring of drug effects in individual patients, provision of drug information, oversight of the drug use process to improve patient safety, and other drug-related services. In long-term care and home health care practices, monthly documentation of these services is required by JCAHO¹⁴⁹ and the Centers for Medicare and Medicaid Services. Other areas of pharmacist responsibilities include care planning meetings, quality improvement goals, root cause analysis for sentinel events, and national patient safety goals. Several of the long-term care national patient safety goals relate to drugs.¹⁵⁰

Clinical Pharmacy Practice Summary

As the pharmacy profession has become more

progressive, clinical pharmacy practice also has evolved to include more services that affect older adults. Pharmacists are providing services in various sites, including community pharmacies; general and specialty ambulatory and primary care clinics; hospitals; and assisted-living, long-term care, transitional care, Alzheimer's disease, and hospice facilities. Clinical pharmacists serving older adults often collaborate with physicians and other health care providers on interdisciplinary teams.

Pharmacists are in a unique position to identify and resolve drug-related problems in seniors. Older adults with complex health conditions will require the expertise of clinical pharmacists specializing in geriatrics. To address the projected growth of the geriatric population, expansion of clinical pharmacy services for older adults will be needed.

Pharmacy Research

History of Geriatric Drug Investigation

With the aging of the American population and high drug use by older adults, clinical investigations must include seniors. Recognizing that older adults constitute a special population in research, more attention is being focused and efforts are being made to include them in clinical investigations. In 1979, the National Commission for Protection of Human Subjects of Biomedical and Behavioral Research published the Belmont Report.¹⁵¹ The justice category states fairness in distribution of the benefits and burdens of research should occur. An injustice occurs "when some benefit to which a person is entitled is denied without good reason." Historically, clinical trials have excluded patients aged 65 years or older. In 1994, the U.S. Food and Drug Administration (FDA) issued its Guideline for Industry Studies in Support of Special Populations: Geriatrics.¹⁵² This guideline was developed to increase participation of older adults in clinical trials that evaluate drugs planned to have significant use in older adults or have study populations made up of a significant number of older adults. The guideline also encourages participation of patients aged 75 years or older and states that arbitrary upper age cutoffs should not be used.

Older adults have been excluded from research studies because they may fall into the "vulnerable population" category of cognitively impaired.¹⁵³ The Nuremberg Code states, "... persons involved [in research] should have legal capacity

to give consent ..."¹⁵⁴ Patients who cannot give their own informed consent need protection from exploitation. However, a position statement by the American Geriatrics Society states that a decline in cognitive function should not necessarily preclude an elder from participating in research studies.¹⁵³

To aid in determining if a person with cognitive impairment can make an informed consent, certain conditions need to be considered. These conditions include ethical and justified research, existence of advance directive for research, degree of cognitive impairment, the ability of the person to provide informed consent, availability of surrogates as the cognitive impairment progresses, and state and federal laws as they pertain to research in individuals with cognitive impairment.¹⁵³ Health care surrogates can act for the patient in the research process or make medical decisions when the patient is incapable of decision making. The legal process for identifying a surrogate varies from state to state. Each state determines the order in which someone becomes a surrogate (e.g., spouse, child, sibling, significant other, and friend).

Consent Forms

An important part of participating in a research study is the patient's ability to comprehend the benefits and risks. No universally accepted test to determine comprehension exists, partly because of vague and inconsistent legal standards. Examples of legal standards that can help guide the consent process include the ability to express choice, understand information relevant to the treatment decision, relate information disclosed about the illness and the possible treatments to the patient's own situation, and compare and weigh outcomes for the decision made.¹⁵⁵ For patients with significant cognitive impairment, surrogate consent will be needed. Surrogate consent is not always available or easy to obtain. In one hospital study, surrogate consent could not be obtained for 49% of the older adults.¹⁵⁶ Reasons included no surrogate available; surrogate had cognitive impairment; or surrogate could not be reached in a timely manner, did not understand the protocol, did not know the desires of patient for research involvement, or did not wish for patient to participate.

In the consent process, the investigator must be willing and able to incorporate any necessary special accommodations for the patient or their

surrogate to comprehend the nature and purpose of the study. In a sample of community-dwelling older adults, the average reading ability was at the 5th-grade level, with lower educational level and minority status being independent predictors of lower literacy.¹⁵⁷ In another study, health literacy was considered inadequate in 24% of English-speaking older adults and 34% of Spanish-speaking older adults.¹⁵⁸ Among the English-speaking older adults, geographic differences existed. Seventeen percent were considered to have inadequate literacy in Tampa, Florida, and the same was true for 34% in Cleveland, Ohio.¹⁵⁸

Consent forms should be written at the 5th-grade level and with larger font size. Explanation of consent forms to older adults and their caregivers typically takes more time. Some older adults may want to discuss the project with their physician first. For patients with mild-to-moderate Alzheimer's disease, clinicians could obtain assent from the patient and consent from a surrogate.

Sample Size and Recruitment

Research with older adults may require more participants than research studies in younger individuals. The ability to obtain adequate study power can be challenging. Because older adults often have many comorbidities and take several drugs, inclusion and exclusion criteria can limit recruitment and increase the numbers of older adults who need to be screened. Large interpatient variability also increases sample size requirements. Patients can become lost to follow-up or discontinue study enrollment because of a change in health status or death, decline in cognitive function, relocation, lack of transportation, or families choosing study discontinuation. High dropout rates require increased sample sizes. Of note, one study found the dropout rate to be lower with older adults with cognitive impairment when assessments were done in the home (18% dropout rate) versus the clinic (33% dropout rate).¹⁵⁹

Recruitment challenges can be extensive, owing to a wide range of barriers. The Health Insurance Portability and Accountability Act (HIPAA) prevents access to patient information unless the patient has granted use of the information for research purposes.¹⁶⁰ Furthermore, HIPAA requirements specifically state that the exact age of patients older than 89 years cannot be collected for research purposes without

authorization from the patient. Obtaining surrogate consent for research can be challenging as previously discussed. Special permission usually is needed to post flyers in nursing homes, assisted-living centers, senior day care centers, and senior high-rise housing. Many older adults do not receive the newspaper, and some do not have a telephone. Older adults can be busy individuals, so reaching them for screening or study procedures can be difficult.

Transportation is another major barrier to recruitment. Older adults may not be able to drive themselves to appointments. Bus travel might be unavailable, limited, or unsafe, and local taxi and specialized medical transportation system (e.g., medi-van) fares usually are greater than budget capabilities.

Recruitment is improved when physicians recommend the study to the older adult or if the investigator is known and trusted. Culture and distrust of the medical system sometimes limit willingness to participate in research studies. Although most African-American older adults know about the Tuskegee experiment, this historic blunder might not be the factor limiting enrollment; distrust of the health system and other socioeconomic barriers may be the primary reason.^{161, 162}

Data Collection

Although collecting data is a challenge for all research studies, research with older adults poses additional challenges, such as recall reliability, proxy responses, and location. Both mild cognitive impairment and Alzheimer's disease can decrease information recall accuracy. Because the prevalence of Alzheimer's disease increases with age, the recall bias could be greater with aging. Besides cognition, knowledge of the "true" facts might not be known. For example, in women and men 60 years or older, measured height was about 1.6–2.1 cm less than self-reported measurements and about 4.5 cm less in older adults at least 80 years old.¹⁶³

Frequently, proxies are used during data collection, especially for patients with cognitive impairment. In nursing home residents with a Mini-Mental State Examination (MMSE) score of 23 or greater, physicians and nurses categorized patient physical function, general health perceptions, energy and vitality, and mental health worse than the nursing home residents categorized them.¹⁶⁴ No differences were seen for the social functioning, role limitations or

emotional dimensions, and role limitations or physical dimensions of the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) quality-of-life tool. In another study, professional proxies (e.g., physicians, nurses) were able to determine SF-36 dimensions better than lay proxies (e.g., significant other, daughter, son, friend) for older adults with physical disabilities.¹⁶⁵ Only bodily pain had similar scores between the lay proxies and the patients.

Timing and location for gathering research information also can influence results. Answers gathered during hospitalization, shortly after nursing home admission, in the clinic, or at home can produce different responses than those obtained during periods of stable health or consistent community residence. For the MMSE, 25% of older adults scored at least 5 points different when the examination was conducted in home versus the clinic, with most (76%) scoring higher at home.¹⁶⁶ Because transportation issues limit abilities of older adults to participate in research, other means of gathering this type of data are being investigated. A telephone interview correctly scored 97% of older adults with the Geriatric Depression Scale, and most items of the Sickness Impact Profile: Physical Function Dimension had kappa scores in the “almost perfect” and “substantial agreement” range.¹⁶⁷ Only two items were in the “fair agreement” category. The telephone interview took 11.5 minutes, and the clinic assessment took 13.4 minutes.

The method of data collection also can affect study dropout rates. In an Alzheimer's disease study, dropout rates were lower when the assessments were conducted in home versus in a clinic (18% vs 33%, respectively).¹⁵⁹

Geriatric-Specific Databases

The Minimal Data Set (MDS) is a reliable and validated assessment tool with more than 300 questions divided into 16–18 domains specific to older adults in the nursing home; this data set also has been modified for home care (MDS-HC).^{168–170} Some of the sections specific to pharmacy include the drug section that has seven items on the MDS and nine items on the MDS-HC and other sections with information that can be used as direct or surrogate markers of drug efficacy and safety (e.g., pain, falls, delirium, mood, and behavior). Both assessment tools can uncover a negative event or low score. These can then lead to implementation of a problem-

oriented client assessment protocol and to subscales for activities of daily living, instrumental activities of daily living, and cognitive function that can be used for screening, diagnosis, and monitoring of specific conditions.

Research can be conducted on some government and private databases. State Medicaid and federal Medicare databases frequently are used for pharmacoepidemiology and pharmacoeconomic investigations. Some National Institutes of Health (NIH)-funded epidemiology databases also can be used; for example, the Study of Osteoporotic Fractures contains 9704 senior women followed for more than 10 years. Approaching the senior investigator or the data center of large trials or cohorts with a proposal for data usage is another way to capitalize on previously obtained or ongoing data collection. Usually, research funds are needed to obtain and analyze these data.

Quality of Life and Health Status

Quality-of-life tools are important to study but should be validated for use in older adults. Results of one study indicate that the top five quality-of-life domains of importance for ambulatory older adults are social or leisure (95%), health (91%), family (89%), living conditions (80%), and religion (75%), whereas for young adults, they are relationships (86%), health (83%), family (62%), finances (60%), and social or leisure (59%).¹⁷¹ At the end of a person's life, the top five domains become achieving adequate pain control, avoiding inappropriate prolongation of dying, maintaining a sense of control, relieving burden, and strengthening relationships with loved ones.¹⁷²

In some cases, a specific tool has been developed to query about items appropriate for older adults. For example, in the Geriatric Depression Scale, questions related to work outside the home and sexual interest have been eliminated. Sometimes quality of life is used as a health status estimate. However, in some older adults, quality of life is listed as good even though they have low health status rankings, including poor physical capacity, dependence in at least two activities of daily living, significant psychological distress, or severe pain.¹⁷³

Challenges and issues about gathering quality-of-life and health status data also exist. As previously discussed, using proxies can be problematic. Patients' abilities to complete the surveys may be hindered by low literacy levels

and length-of-test burden. Survey completion after an acute event (e.g., hospitalization or death of spouse) can greatly alter responses.

Confounders

When conducting or evaluating research with older adults, many confounders exist. Important confounders to consider are age, residence, caregivers or guardianship, height, weight, cognitive function, health status, drug adherence, nutritional status, literacy, income, education, health insurance, drug coverage, and health care access. With the increase in the cohort aged 85 years or older, clinical trials with the very old are important; however, the very old may represent survival of the fittest, leading to bimodal versus linear results. As older adults age, they can become more resistant to study enrollment because of such issues as poor health, resistance to change, transportation, or a busy lifestyle. Thus, selection bias can result with healthier older adults being enrolled in studies. Cross-sectional studies can be hampered by early life experiences or standards. For example, wars (posttraumatic stress disorder), the Great Depression (nutrition issues), and preventive health measures (fluorinated water and vaccinations) can influence results in cohort analyses. Cognitive function and caregiver availability need to be assessed, not only for consent form barriers but also for reliability of following study procedures, adhering to drugs, and recalling and recording data correctly. Senior demographics such as finances, health, education, ethnicity, and access to health care, also influence recruitment, outcomes, and result extrapolation.

When conducting trials and health systems research, sample sizes need to be sufficient to account for the variability introduced by these confounders. Significant health disparities exist for older adults. Hence, demographic data collection for both clinical and outcomes research needs to be more extensive than other research projects to capture these data. At a minimum, analyses should be adjusted for age. Adjusting for other characteristics, such as economic variables or medical problems, might be appropriate depending on the type of research.

Influence of Residence on Geriatric Research

Living arrangements influence enrollment, external validity, and outcomes. Because nursing home residents typically are more ill and frail,

research on this population cannot be extrapolated to ambulatory older adults. Only 4% of older adults reside in a nursing home, creating a need for more ambulatory research.¹⁷⁴ When nursing home residents are excluded from ambulatory studies, however, the true prevalence and frequency of diseases and responses to drug effects are not completely represented. Older adults living with family members can respond differently because of the additional efforts of caregivers to ensure adherence to protocols, provide transportation, gather outcome data, assist with communications, and provide additional financial support. However, sometimes the caregiver or guardian is more resistant to the older adult participating in the research because of overprotection or time constraints.

Nursing home research in some aspects is easier to conduct because a captive sample exists. Health care oversight and assistance with daily activities, study procedures, and data collection are available, and a daily medical record contains much health information.¹⁷⁴ However, nursing homes have a greater number of residents with cognitive impairment. Family members have less impact, and a greater frequency of some conditions, such as falling, depression, and incontinence, exists. Nursing homes frequently are understaffed, making staff less open to collecting additional research data and research less appealing to administrators trying to control budgets. Although ambulatory patients have a limited number of caregivers, nursing home residents have a significant number of staff, all of whom would need to be trained on study design procedures. Nursing homes have high turnover and death rates, potentially increasing problems of losing patients to follow-up. When performing nursing home research, the type of nursing home, the type of residents, and the payer base can be confounders and limit extrapolation. Nursing home pilot studies should be conducted first for feasibility.

Conducting research with older patients in hospitals or ambulatory settings has advantages and disadvantages.¹⁷⁵ In the hospital, difficulties exist in getting assent and consent from the patient and family members. As a result of procedures, sedation, and feeling too sick, hospitalized patients can be uncooperative or unavailable for data collection. Data collection frequently is conducted while visitors are present. Contact after discharge can be equally challenging. Older adults who are homebound

present different challenges as home assessments are labor intensive and time consuming, require travel, and need equipment brought to the home.¹⁷⁶ To understand the full spectrum of senior care and drugs, however, homebound patients need to be included, especially when designing programs to keep older adults at home. Medical access and resources also vary between older adults residing in urban and rural areas.

Research Gaps and Opportunities for Pharmacy and Older Adults

Many opportunities exist for pharmacist involvement in research in older adults. These areas include drug-related problems, safety, adherence, caregiver and family burden, differences in practice settings, clinical trial enrollment, health disparities, and health promotion.

The literature quantifies ADRs and drug-related problems in different living situations. Inappropriate or suboptimal drug prescribing has been documented in older adults who are indigent, homeless, community dwellers, nursing home residents, assisted-living residents, and inpatients.^{133, 177-184} Pharmacist impact on inappropriate or suboptimal prescribing and ADRs has been examined either as economic savings or changes in health care outcomes. However, more research is needed to document the impact of a pharmacist on eliminating drug-related problems and the development of new types of pharmacy services.

Research has not been able to confirm a correlation between an improved MAI score and health care outcomes.^{134, 136, 138, 185, 186} However, a European study is investigating this issue.¹⁸⁷ Larger studies are needed to determine how much of a change in the MAI score is needed before statistically and clinically significant changes in outcomes, such as quality of life, ADRs, and health care resource use, are realized. Clinical pharmacist effects on other aspects of drug appropriateness, such as underuse of drugs, are other areas for future research. In addition, pharmacist roles and impact in the home health, hospice or palliative care, and assisted-living settings should be evaluated and documented.

Drug adherence in older adults is a well-recognized problem. Increased costs and morbidity and mortality that result from drug nonadherence can be significant. Measurement of adherence in clinical trials and practice is complicated, and a reliable method does not

exist. Pill counts can under- or overestimate drug adherence.¹⁸⁸ Different types of interventions have been implemented to enhance adherence and range from patient and family counseling, information brochures, telephone follow-up, mail reminders, pillboxes with and without alarms, calendars, electronic devices, and a combination. Depending on the measures used, these interventions can improve drug adherence and possibly treatment outcomes.¹⁰³ Adherence measured by pill counts can be improved by pharmacists; however, changes in outcomes after a pharmacist intervention have not yet been demonstrated.¹⁰² Thus, many opportunities exist to improve and expand research in adherence and drug education.

Areas for further research are the development of better and easier measures of drug adherence, evaluation of the most effective interventions and types of information needed to improve adherence and education, and assessment of the influence of cultural factors and health literacy on drug adherence. Barriers should be identified and used to develop programs to improve adherence with preventive health and drug use.

Pharmacists can play a critical role by providing education to caregivers and the family of older adults about goals of therapy, drug administration, and the importance of older adults enrolling in clinical trials and observation studies. A few studies have demonstrated that the pharmacist does have a role in caregiver education.^{189, 190} Future studies can be conducted to assess the impact of pharmacist education on the caregiver by measuring changes in drug adherence, outcomes, study enrollment, and quality of life of the caregiver, family, and/or patient.

Another opportunity for further research occurs in the field of oncology. The most common cause of death for those aged 60-79 years is cancer.¹⁹¹ Although people older than 65 years make up 63% of the population who develop cancer, only 25% of oncology study participants are 65 years or older.¹⁹² Research is needed to ensure that chemotherapeutic drugs are efficacious and safe in older adults even if differences exist in response and development of adverse effects. Programs should be developed to prepare pharmacists to adequately assess and monitor an older adult receiving chemotherapy.

The Healthy People 2010 initiative consists of a set of objectives that the Office of Disease Prevention and Health Promotion hopes the nation will achieve by 2010.¹⁹³ One of the two

main goals of the initiative is to increase the quality and years of healthy life. The program consists of 28 focus areas and 467 specific objectives to improve health by 2010. Examples of objectives where a pharmacist can make an impact include reducing hospitalizations due to uncontrolled diabetes mellitus or lack of immunization (e.g., preventable pneumonia and influenza), reducing hospitalizations due to vertebral fractures associated with osteoporosis, reducing hospitalizations of older adults with heart failure, and increasing the proportion of adults who receive the influenza and pneumococcal vaccine. A developmental objective of the Healthy People 2010 initiative is to increase the proportion of pharmacists who routinely review all newly prescribed and over-the-counter drugs with any patient 65 years or older. Additional areas for pharmacist involvement have been published recently.¹⁹⁴ With measurable benchmarks to be achieved by 2010, pharmacists can conduct research to determine whether pharmacist contributions helped achieve these goals.

Finally, additional future research topics for pharmacists could include the impact of computerized order entry, point-of-care technology, and bar code drug administration on preventing drug errors; discount cards, drug reimportation, and Internet drug procurement; and effect of age on drug errors. Medicare legislation providing coverage for prescription drugs and Medication Therapy Management Services (MTMS) to begin in 2006 should create ample research hypotheses and opportunities.

Centers for Geriatric Research

The government and some foundations have made a strong commitment to studying senior care. In 1974, the U.S. Congress created the National Institute of Aging (NIA) to support biomedical, social, and behavioral research and training in geriatrics and gerontology and to provide education to providers and consumers.¹⁹⁵ The NIA supports four programs: the biology of aging, the geriatrics program, the behavioral and social research program, and the neuroscience and neuropsychology of aging. In 2004, the amount of available funds was \$1.024 billion. In 1975, Title 38, part V, section 7314 established funding for 25 interdisciplinary geriatric research, education, and clinical centers within the Veterans Affairs health care system.¹⁹⁶

In 1984, the U.S. Congress established

Alzheimer's disease research centers. About 30 centers exist, with approximately \$45 million in funding.¹⁹⁵ In 1993, the NIA and NIH created the Edward R. Roybal Centers for Research on Applied Gerontology to translate research into improved patient care.¹⁹⁷ Other government-funded research centers or programs include the Centers on the Demography of Aging, Exploratory Centers for Research on Health Promotion in Older Minority Populations, Claude D. Pepper Older Americans Independence Centers, and Nathan Shock Centers of Excellence in Basic Biology of Aging.¹⁹⁸

Funding for Geriatric Research

Some of the major sponsors of geriatric research are listed in Table 6. The NIA provides the usual NIH mechanisms of research support that range from new trials (ROIs) to career developments (K awards). Requests for proposals are developed annually and can be found on the NIA Web page (www.nia.gov) or by browsing the Table of Contents for the NIH Guide for Grants and Contracts newsletter about all NIH requests for proposals (www.grants.nih.gov/grants/guide/index.html).

Certain foundations, such as the Robert Wood Johnson Foundation and the John Hartford Foundation, focus on aging issues. The American Society of Consultant Pharmacists (ASCP) conducts some of its own geriatric research through its foundation. No grants programs specifically focused on geriatric pharmacotherapy research exist from any pharmacy organization.

Pharmacy Research Summary

Research findings from middle-aged adults cannot always be extrapolated to seniors because of age and environmental-related differences in physiology, pathophysiology, socioeconomic, and other confounders. Pharmacotherapy research needs to be required in older adults. Geriatric research is associated with additional burdens, such as increased sample size requirements; greater number of patients to screen; recruitment difficulties; and such barriers as cognitive decline, comorbidities, transportation, living environment, and surrogate and proxy use. Gaps within geriatric pharmacotherapy and health services exist, creating many opportunities for pharmacist-conducted research. Various government agencies and private foundations are available for geriatric research funding.

Clinical Pharmacy Education and Training

Pharmacy Student Education

To meet the increasing health care demands of a growing older adult population, pharmacy students need to be educated and trained in geriatric care. The American Association of Colleges of Pharmacy (AACCP) Center for the Advancement of Pharmaceutical Education revised its educational outcomes in 2004 as a guide for curriculum development.¹⁹⁹ Although not specific to older adults, the outcomes focus on pharmaceutical care, systems management, and public health and are applicable to training pharmacy students to care for older adults.

To evaluate the extent of geriatrics-related education and training across various degree programs, the AACCP Geriatric Special Interest Group surveyed 81 colleges of pharmacy in 1997.²⁰⁰ Fifty-five colleges (68%) responded to include a total of 128 bachelor's degree, entry-level doctor of pharmacy, and postbachelor's degree doctor of pharmacy (traditional and nontraditional) programs. Three programs (2%) required didactic classes in gerontology or geriatrics, 65 (51%) offered electives, and 59 (46%) did not have any course offerings in this area. Ninety-four programs (73%) integrated gerontology or geriatrics topics within required courses. Twenty-six programs (20%) required experiential or clerkship experiences, and 87 (68%) offered electives as part of the experiential curriculum.

In 2001, the ASCP Council on Educational Affairs surveyed 86 colleges regarding course work, rotations, postgraduate training, and faculty resources.²⁰¹ Forty-seven colleges (55%) responded with an average of 4 hours (range 1–45 hrs) of required course work and 4.5 hours (range 1–45 hrs) of elective course work in a variety of topics related to drug use in older adults. Pharmacotherapy in the geriatric patient was included as a specific section within required courses in 12% of the colleges, 48% integrated geriatrics topics throughout pharmacotherapy sequences, and 40% reported using a combination of both. Sixty percent of the colleges offered elective course work in geriatrics.

The most recent survey of geriatric pharmacy education was conducted in 2003 by faculty of Howard University through a Web-based assessment of 84 U.S. pharmacy schools.²⁰² Forty-two (50%) of the schools responded, and all of the respondents reported that they offered some type of course material in geriatrics for an

average of 2 credit hours. Geriatrics was a required course in 14% of the colleges, integrated within another required course in 38%, and offered as an elective in 31%. The remaining schools reported teaching geriatrics in a variety of settings.

Over time, geriatric pharmacotherapy course work has increased slightly in pharmacy curricula, but more required education and training are needed. Advanced practice experiences in geriatrics are an important complement to the didactic curricula. In the 1997, 2001, and 2003 surveys, respectively, 88% (113 of 128), 96% (45 of 47), and 93% (39 of 42) of the reporting programs or schools offered advanced practice experiences in geriatrics or long-term care.^{200–202} From the responding programs or colleges, 68% (87), 83% (39), and 54% (23), respectively, offered these advanced practice experiences as elective rotations. Selection bias could exist with more schools offering programs answering the respective surveys.

No estimates are available for the number of faculty members needed to teach and train pharmacy students in the area of geriatrics. In the 2001 survey, 81% (38 of 47) of the colleges reported having at least one full-time faculty member who devoted more than half of his or her teaching and research efforts to geriatrics, and 87% (41 of 47) had preceptors devoted to geriatrics.²⁰¹ In the 2003 survey, 57% of the faculty members responsible for teaching geriatrics reported having postgraduate training in geriatrics.²⁰²

With the growing older adult population, it may be prudent for colleges to make required course work and faculty development in geriatrics a priority and to continue to strengthen the available advanced practice experiences. As an aid for course development and pharmacist professional development, ASCP has created the Geriatric Pharmacy Curriculum Guide.²⁰³ The guide is divided into three sections: general principles of aging, clinical aspects of disease, and general pharmaceutical care principles. Within each section, multiple competencies are listed and prioritized in three levels based on practice level for all pharmacists, geriatric generalists, and geriatric specialists.

Postgraduate Training in Geriatrics

For advanced postgraduate pharmacy training in geriatrics, the American Society of Health-

System Pharmacists (ASHP) and the American College of Clinical Pharmacy (ACCP) listed 17 accredited residencies, 3 nonaccredited residencies, and 1 fellowship in geriatrics for 2004.^{204, 205} The ASHP has established standards and learning objectives for residencies focused on geriatric practice.²⁰⁶ Consistent with the 1988 ACCP position statement on drug use in the elderly, the need for geriatrics-trained pharmacy faculty should still be assessed and an adequate number of training programs to meet that need should be developed.²⁰⁷

Gerontology is a social science field that encompasses the multidisciplinary study of aging with the biologic, psychological, sociologic, and economic aspects of aging. Graduate and undergraduate gerontology degrees in colleges and universities across the country have increased in the past decade. More than 750 gerontology programs (credit and postdoctoral) are offered at institutions of higher education in the United States.²⁰⁸ Gerontology curricula have grown significantly in frequency, complexity, and size.²⁰⁹ Minors in gerontology or geriatrics typically require 15–20 credit hours of course work. Masters degree programs typically require 45–50 credit hours of course work and are varied in focus. Many of these programs prepare students for administrative positions in long-term care, assisted-living, or health care facilities, whereas others are more focused on clinical careers.

The Association for Gerontology in Higher Education (AGHE) has aided in the growth of geriatric and gerontology education.²¹⁰ The AGHE, supported and endorsed by the American Geriatrics Society and the Gerontological Society of America, functions to increase commitment to and foster the development of higher education in the field of aging through education, research, and public service. The AGHE has developed a consultation program to assist colleges and universities in developing new gerontology instruction and in expanding or evaluating existing gerontology programs.

The increased availability of, and interest in, gerontology programs is important to the future of geriatric pharmacy practice. As interdisciplinary care of older adults becomes the standard, health care professionals trained in gerontology will have much to add. In addition, as every effort is made to treat patients in terms of overall health-related quality of life, quality medical and pharmaceutical care as well as the psychological, sociologic, and economic aspects

of care must be considered.

Schools of pharmacy should strive to increase the availability of gerontology programs to their students through either the development of these programs within the institution or promotion of programs within their geographic area. As interdisciplinary care of older adults becomes the standard, students, residents, and fellows with a special interest in geriatrics should be encouraged to pursue graduate degrees in this area if the degree will facilitate achieving long-term career goals.

Certifications and Certificates in Geriatrics

The expanding clinical role of the pharmacist has led to interest in gaining credentials in specialty areas of clinical practice. Many certificate programs and certifications exist across the country. A certificate program is educational in nature and has specific learning objectives emphasizing the development of specific knowledge, skills, attitudes, or practice competencies. A certification represents a credential that is awarded to pharmacists who demonstrate mastery of specific competencies.

Many universities across the United States offer certificate programs in geriatric pharmacy practice. Currently, certificate programs do not have standardized requirements. However, AACP and the Accreditation Council for Pharmacy Education (ACPE) are in the process of collaborating to develop professionwide standards for certificate programs within pharmacy. All of the existing programs have similar curricula, including 15–18 credit hours of course work on geriatric-specific content.^{211–213} Variability exists with the number of required and elective courses and the number of clerkship hours for each program. Most of the programs are to be completed simultaneously with general course work requirements for the doctor of pharmacy degree. Others are offered as continuing education for practicing pharmacists.

The certified geriatric pharmacist credential is a voluntary national certification program for pharmacists, with a focus on geriatric pharmacy practice. Certification requires passing a written examination with content focused on patient- and disease-specific principles of geriatric pharmacotherapy, quality improvement, and use management. The Commission for Certification in Geriatric Pharmacy administers the examination.²¹⁴ More than 900 pharmacists have been awarded this designation in the United

States and Canada. Pharmacists should seek this credential if doing so will allow them to justify specialty roles, gain recognition for competency, or gain reimbursement for current practices. Board certification in pharmacotherapy through the Board of Pharmaceutical Specialties also is available for those with advanced pharmacy practice knowledge and skills.²¹⁵ However, receiving added qualifications in geriatrics is not possible at this time.

Continuing Education

Each state in the United States, as well as boards of pharmacy in the District of Columbia, Puerto Rico, and Guam, requires pharmacists to continually participate in continuing education activities to renew their licenses.²¹⁶ For pharmacists involved in long-term care consulting practices, two states require that a portion of continuing education credits focus specifically on the care of older adults.²¹⁶ One state requires all pharmacists to complete 2 hours of continuing education related to end-of-life care every 2 years. With the increasing number of older adults being treated in nearly all types of practice settings, the number of available continuing education opportunities focusing on the care of older adults will need to increase.

The ACCP offers continuing education for pharmacists by publishing the Pharmacotherapy Self-Assessment Program (PSAP). The fifth edition of the PSAP series includes two modules on geriatric care in book 4 and includes a discussion on geriatric psychiatry in book 3.²¹⁷ Individual topics discussed in book 4 include fall prevention, urinary incontinence and bowel disorders, pressure ulcers, health and public policy as it affects older adults, management of chronic disease, and age-related pharmacokinetic and pharmacodynamic changes.

In addition, the ASCP has developed an online course for pharmacists who are interested in learning more about geriatric pharmacy.²¹⁸ Content from the Geriatric Pharmacy Review Web site also may be used as a method of study for those seeking to take the examination to become a certified geriatric pharmacist. Up to 40 contact hours of ACPE-approved continuing education are available. Modules include coverage of all the major body systems, as well as patient assessment and evaluation, therapeutic care planning, drug therapy problems, and evaluation and use of clinical information to improve patient care.²¹⁸

Pharmacists as Educators of Other Health Care Providers

Pharmacists often act as educators of other health care providers, such as physicians, nurses, and physician assistants. Data that quantify the numbers and types of educational roles filled by pharmacists are unavailable, but pharmacists are involved with didactic and experiential learning and continuing education for most health care providers caring for older adults. Pharmacists are employed as full-time or adjunct faculty for some schools of medicine, nursing, and allied health professions, and they often act as copreceptors of required rotations for medical students and residents.^{219, 220}

Centers for Geriatric Education

Interdisciplinary education and training in geriatrics are fostered by geriatric education centers (GECs). These centers are housed within accredited health professions schools. The GECs provide services and foster collaborative relationships among educators of students, faculty, and practitioners within defined geographic areas. The objectives of the GECs are to improve the training of health professionals in geriatric content; to provide geriatric residencies, traineeships, and fellowships; to develop and disseminate curricula on the treatment of health problems in older adults; to train and retrain faculty to provide instruction in geriatrics; to support continuing education for health professionals who provide geriatric care; and to provide clinical geriatrics training in nursing homes, chronic and acute care hospitals, ambulatory care centers, and senior centers.²²¹⁻²²³

Clinical Pharmacy Education and Training Summary

Inclusion of geriatric topics into pharmacy education has increased slightly since 1997. To prepare for the increase in the older adult population, however, pharmacy students will need to be educated on drugs, drug-related problems, and disease states prominent in this population. Postgraduate training programs in geriatrics and gerontology are available and need to be emphasized and expanded as a learning opportunity for those interested in the health care of older adults. Pharmacists practicing in geriatrics can take advantage of geriatric certificate programs and/or certification to enhance or gain recognition for their skills.

Continuing education related to the care of older adults is only required by two states in the United States, but opportunities to receive education in this area are increasing. In addition, GECs that assist in training health care providers to care for older adults can be found across the United States, with most offering programs open to pharmacists.

Advocacy

Patient Advocacy

Patient and political advocacy are important in the care of older adults. Patient advocacy includes assisting older adults in accessing social and economic support systems, while still allowing them to maintain autonomy in their life. Many older adults are either unaware or unable to take advantage of programs to assist them. Some medical clinics and hospitals employ social workers to develop an advocate relationship with patients. In other cases, patients may rely on more accessible medical professionals, such as pharmacists, to fill this role. Thus, pharmacists should have a basic knowledge of simple programs that may assist older adults.

Several national organizations, such as the American Association of Retired Persons (www.aarp.com), the Administration on Aging (www.aoa.dhhs.gov), and the National Council on Aging (www.ncoa.org) offer Web sites accessible to professionals and older adults. These Web sites can assist pharmacists in finding valuable educational and social support tools. In addition, the Benefits Check-Up Web site (www.benefitscheckup.org) provides a free and confidential way to evaluate national and state programs that may benefit older adults. Pharmaceutical assistance plans, financial programs, and health programs are matched directly with the need of the applicant. Older adults might be unaware of programs for which they are eligible and might need the assistance of a health care provider to enter their information.

Drug manufacturers have developed patient assistance programs for low-income adults who have no prescription coverage. Covered drugs typically are provided free of charge, with a low copay, or at a reduced price. In traditional patient assistance programs, patients must be enrolled by a patient advocate and/or their medical provider. Income documents may be required as part of the application, and typical annual income requirements are \$18,000 or less for an individual or \$24,000 or less for a couple.

Many manufacturer patient assistance programs are accessible through the Internet (www.helpingpatients.org). This free, confidential site allows a health care professional to search for programs by drug name, evaluate if the patient meets program criteria, and download program forms and contact information. However, some previously available programs are no longer available as some manufacturers have partnered to develop drug discount cards.

In 2001, pharmaceutical manufacturers introduced free drug discount cards for low-income older adults who did not have prescription coverage and could not qualify for patient assistance programs. Several plans offer a 25–30% discount on brand-name drugs, whereas a few other plans offer flat-fee pricing for covered drugs. Patients can enroll themselves in the programs, which theoretically increases access to the programs.

In 2002, seven major pharmaceutical companies came together to sponsor the “Together Rx” discount program (www.togetherrx.com), which offers discounts of 20–40% on covered brand-name drugs. The application can be filled out by patients and requires no financial documents to be submitted. However, annual income requirements are \$28,000 or less for an individual and \$38,000 or less for a couple.

Political Advocacy

Political advocacy for older adults in the United States has increased during the past decade and has succeeded with the passing of Medicare reform that includes a prescription drug benefit. To alleviate some of the financial burden of paying for drugs, some patients obtain their drugs through Canadian pharmacies. This practice of drug importation is considered by the FDA to be a violation of the U.S. Food, Drug, and Cosmetic Act of 1938.²²⁴ However, the FDA is not prosecuting individual people, cities, or states involved in these transactions. In addition to violating federal law, obtaining drugs through an Internet pharmacy can put patients at risk. Although Canada has a similar drug-approval process to that of the FDA, Internet pharmacies may or may not acquire their drugs from Canada. Thus, using an Internet pharmacy that states they are based in Canada does not guarantee the drug actually comes from Canada and meets Canadian or U.S. manufacturing standards. In addition, obtaining drugs from Canada bypasses counseling and evaluation by a pharmacist and does not

resolve the underlying cause of inadequate prescription access.

The Pharmaceutical Market Access Act is under review in the U.S. Senate, with some components having been passed in the U.S. House of Representatives. This act would allow drugs to be imported from 25 countries where the FDA has approved the manufacturing facility. Some states have made changes, such as considering importation at the state level for Medicaid programs. Pharmacists should educate patients and legislators about the positive and negative aspects of importation and reimportation of drugs from other countries.

With the desire to lighten some of the economic burden placed on patients, the Medicare Prescription Drug Improvement and Modernization Act became law in 2003. The act includes plans for transitional drug coverage, a standard drug benefit (Medicare Part D), MTMS, and electronic prescribing.²²⁵ The transitional drug coverage took effect in June 2004 in the form of drug discount cards. Planned discounts are 10–25% on covered drugs.

Medicare beneficiaries, who do not qualify for state Medicaid programs, are able to enroll in one discount card of their choice. Low-income beneficiaries also may qualify for a \$600 drug credit that will be applied yearly through the discount card program. Annual income requirements for the \$600 credit are less than \$12,569 for an individual and less than \$16,862 for a couple. All patients using the discount program have a prescription copay at the pharmacy. In addition, not all cards are accepted in all states, not all pharmacies accept all cards, and not all drugs are covered. Patients enrolled in the Medicare drug discount card program are still eligible for the Together Rx card program until 2006 but will be able to use only one card to get the discount. It is unknown if other manufacturer discount programs will remain in effect during this period of transition in drug coverage. Many older adults have relied on pharmacists and pharmacies to assist them in making decisions regarding the discount program. Enrollment information for the drug discount card program is available by calling 1-800-MEDICARE or by accessing the following Web sites: www.Medicare.gov/assistance/Programs/home.asp and www.benefitscheckuprx.org.

The standard Medicare drug benefit is planned to replace the drug discount card program and will take effect in 2006.²²⁵ Medicare beneficiaries have the option to enroll in a drug plan, and this

drug benefit will necessitate an estimated monthly premium of \$35. After paying a \$250 deductible, Medicare will pay 75% of drug costs between \$250 and \$2250. After that point, there will be a gap in drug coverage until total out-of-pocket spending reaches \$3600. Medicare will then pay about 95% of drug costs above \$3600.

Thus, Medicare beneficiaries will need to know their annual out-of-pocket drug costs to know whether it will save them money to enroll in the drug benefit. The amount of \$810 seems to be the annual out-of-pocket expense where savings will actually begin. With expenses less than \$810, the cost of the program will outweigh the savings. For example, if annual drug costs are \$1000, the older adult will save \$143 after paying the deductible and monthly premiums. If annual drug costs are \$2250, the older adult will save \$1080 after paying for expenses. For low-income older adults earning up to \$12,123 annually, the Medicare drug benefit premiums, deductible, and coverage gap will be waived. However, lower income older adults will no longer be eligible for state Medicaid programs and may end up paying higher costs for drugs even with the new drug benefit.

Although planned, detailed descriptions of MTMS were not provided in the Medicare Prescription Drug Improvement and Modernization Act of 2003.²²⁵ Pharmacists, along with other health professionals, can provide MTMS. High-risk patients are the planned targets for these services. However, the specific disease states that will be managed and the requirements for pharmacist reimbursement are unknown. In addition to MTMS, a voluntary pilot project for electronic prescribing to reduce drug errors is planned to begin in 2006 and will involve physicians, pharmacies, hospitals, and others. Final standards should be defined for electronic prescribing by 2008.

Advocacy Summary

Although some progress in political advocacy for older adults has been realized, significant gaps in health care quality and availability still warrant increased advocacy efforts. Pharmacists must take on the roles of patient and political advocates for older adults. Keeping up to date on available manufacturer and government programs for drug assistance is vital.

Conclusion

The expected rapid growth of the older

population over the next 50 years intensifies the need for pharmacists to better understand and meet the needs of older adults. All pharmacists, regardless of practice setting, must be prepared to welcome new opportunities, fulfill crucial roles, and face new challenges in the care of older adults. Pharmacists can improve the health and quality of life of older adults by ensuring that drugs are used correctly and safely, achieving therapeutic outcomes, eliminating or resolving drug errors, and ensuring understanding and adherence to drugs from patients and caregivers. An interdisciplinary approach is required to enhance senior health, promote independent living, and decrease health care expenditures.

Research involving older adults is necessary but presents many challenges to overcome. Pharmacy curricula need to be reviewed and enhanced to prepare all pharmacy students and pharmacists to care for older adults. More continuing education programs will be needed for practicing pharmacists to increase their geriatric and gerontology knowledge and skills. Advocacy will always be required to enable pharmacists to better care for older adults and ensure they have equity and availability of affordable and high-quality health care.

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