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INSTRUCTIONS

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pharmacy PRACTICE + BUSINESS

eCortex.ca

A guide to Caring for Seniors

by Sarah-Lynn Dunlop, BA, MEd, RPhT

Learning objectives

After completing this lesson, the pharmacy technician participant will be able to:

1. Identify the effects of aging on the body.
2. Understand chronic conditions commonly affecting seniors in Canada.
3. Recognize challenges associated with managing multiple chronic conditions and multiple medications.
4. Review the role of the pharmacy technician in providing care for and supporting seniors.

Introduction

In Canada, the number of seniors (individuals who are 65 years of age or older) exceeds the number of children, with more than 7 million seniors and growing.[1,2] It is expected that the growth of this population will continue to accelerate, with about 1/3 of the population in Canada forecasted to be 65 years of age or older by 2056.[2-4] Seniors account for "nearly half of all healthcare spending" in Canada, with the annual cost of health care for the average senior at $12,000 compared to $2,700 for individuals under 65 years of age.[2] It is expected that, with an aging population, the cost of health care over the next 10 years will increase by an additional $93 billion.[2]

Most pharmacy technicians will provide care for seniors throughout their careers, whether working in community, hospital, or long-term care pharmacy, and must be able to effectively

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TABLE 1 - Effects of Aging on the Body[6-9]

Body System or Organ	Effects of Aging	Consequences:
Brain & Nervous System	Decreased levels of some chemical substances, receptors on nerve cells & blood flow	Brain may function slightly less well; Slower reaction times & time to complete tasks, however, seniors should be able to complete tasks accurately with time
	Nerves may conduct signals more slowly	Seniors with damaged nerves may experience a decrease in sensation & strength, however, usually these changes are so minimal that they are not noticed.
Eyes	Lens stiffens causing presbyopia	Becomes difficult to focus on objects up close
	Lens becomes darker, less transparent	Becomes difficult to see in dim light
	Pupil reacts more slowly to changes in light	Takes longer to adjust to entering a dim or dark room and can increase risk of falls
Ears	Presbycusis (difficulty hearing high-pitched sounds)	Words can become more difficult to understand; Consonants (such as as, k, t, p, ch) are high pitched; Can be more difficult to hear women & children, as they tend to have higher pitched voices; May experience difficulty hearing in loud places because of background noise
Mouth, Teeth & Gums	Decreased saliva production	Mouth tends to feel more dry; Contributes to decreased ability to taste food
	Gums slightly recede & tooth enamel tends to wear away	Exposes lower parts of teeth to food particles & bacteria; Increases susceptibility to decay and cavities; Increases likelihood of tooth loss
Skin	Decreased production of collagen & elastin; Collagen & elastin become chemically changed & less flexible	Skin tears more easily
	Decreased number of nerve endings	Decreased sensitivity to pain, pressure & temperature; Likelihood of injuries may increase
	Fat layer under skin thins & skin wrinkles; Decreased number of sweat glands & blood vessels	Decreases cold tolerance; Increased risk of heat related disorders (e.g., heat stroke); Skin becomes more slow to heal
	Decreased number of melanocytes (pigment-producing cells)	Skin has less protection against ultraviolet (UV) radiation
	Decreased ability to form Vitamin D when exposed to sunlight	Increases risk of Vitamin D deficiency
Skeletal System	Loss of bone density	Potential for development of osteoporosis and bone fractures
Muscles	Decrease in muscle mass due to decreased levels of testosterone & growth hormone and decreased levels of physical activity	Muscle weakness can increase risk of falls
Cardiovascular System	Heart & blood vessels become stiffer; Heart fills with blood more slowly & arteries become less able to expand when blood is pumped through them.	Increases blood pressure
Respiratory System	Respiratory muscles, diaphragm & intercostal muscles weaken and lungs become less elastic; Decreased number of alveoli & capillaries in lungs	Slightly less oxygen absorbed from air; May make exercising or breathing at high altitudes more difficult, but generally should not impact seniors who do not smoke or have a lung disorder
	Decreased function of cilia (cells in respiratory tract that sweep microorganisms out of airway)	Decreases ability to fight infections
Immune System	Cells of immune system act more slowly	Vaccines can be less protective (however, vaccines such as influenza, pneumonia, shingles, and COVID-19 are essential for seniors and offer some protection); Infections such as influenza and pneumonia can be more common and more serious

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>> TABLE 1 CONTINUED

Body System or Organ	Effects of Aging	Consequences
Digestive System	Decreased production of lactase (enzyme needed to digest milk)	May increase likelihood of developing lactose intolerance
	Decreased movement through large intestine	Can contribute to constipation
Liver	Decreased number of cells & blood flow; Enzymes that help process drugs & other substances work less efficiently	Decreases ability of liver to help remove drugs & other substances from body; Effects of drugs may last longer
Kidneys	Number of cells decrease & less blood flows through kidneys	Kidneys begin to filter blood less well which raises risk for adverse drug reactions; May excrete too much water and too little salt, leading to dehydration; May not remove waste products from blood as well
Urinary System	Maximum volume of urine bladder can hold decreases; Bladder muscles may become overactive; Bladder muscles weaken; Urinary sphincter is less able to close tightly	Controlling urination becomes more difficult & increases urinary incontinence; Increases frequency of urination; Increases ability of bladder to fully empty; Increases likelihood of leakage; Decreases ability to postpone urination
	In men, prostate gland tends to enlarge & can interfere with passage of urine	Prevents bladder from emptying completely; Increases time to start stream of urine, decreases force of urination, increases frequency of urination; Increases urinary retention (difficulty urinating when bladder is full)
Reproductive System	Women: Decreased levels of hormones, especially estrogen	Ovaries & uterus may shrink; Atrophic vaginitis (tissues of vagina become thinner, drier, and less elastic); May lead to itching, bleeding, pain during intercourse, and urinary urgency
	Men: Decreased levels of testosterone	Decreases sperm & gradual decrease in sex drive; Erections may not last as long, may be less rigid, or require more stimulation to maintain; Erectile dysfunction is more common

TABLE 2 - Overview of Osteoarthritis, Rheumatoid Arthritis and Gout[4, 9-14]

Osteoarthritis	• Most common type of arthritis affecting Canadians, with more than 38% of seniors diagnosed • May commonly be known as "wear and tear" arthritis, where the cartilage surrounding the bones in a joint breaks down and bones come in direct contact with each other, leading to pain, swelling, and inflammation of the affected joint.	
	Non-Modifiable Risk Factors include: • Age (risk increases with age) • Gender (More common in women) • History of joint injury or surgeries • Genetics/family history	Modifiable Risk Factors include: • Overweight or obese • Occupation • Participation in certain sports • Mechanical stress
Rheumatoid Arthritis	• Type of inflammatory arthritis affecting 3.3% of Canadian seniors • Autoimmune disease where the body's immune system attacks the body's own healthy tissues, causing irreversible damage to joints, which may gradually change shape and develop deformities over time.	
	Non-Modifiable Risk Factors include: • Age • Assigned gender at birth (more common in individuals designated as female at birth) • Family history	Modifiable Risk Factors include: • Smoking • Obesity
Gout	• Type of inflammatory arthritis affecting 6.1 % of Canadian seniors • Body's immune system attacks uric acid crystals that have formed in joints • Typically affects joints in lower limbs (e.g.: big toe, knees, ankles)	
	Non-Modifiable Risk Factors: • Age • Family history • Kidney disease (may result in decrease uric acid excretion) • Gender (more common in males)	Modifiable Risk Factors: • Alcohol (especially beer) • Diet high in purines (e.g., red meat, oily fish, shellfish) • Drinks high in fructose • High blood pressure • Obesity

TABLE 3 - Medications used in management of arthritis[11,15-18]

Drug Class & Medications	Therapeutic Use & Benefits	Adverse Effects & Warnings*
Non-opioid Analgesics acetaminophen	• Osteoarthritis; • Analgesic & anti-pyretic properties; • Fewer side effects & drug interactions than NSAIDs (e.g.: acetaminophen is gentler on the stomach than NSAIDs); • Drug of first choice for several conditions & patient populations (e.g.: osteoarthritis, patients at risk of GI bleed or on anti-coagulants, patients with renal disease)	• Hepatotoxic (toxic to the liver); Should not exceed a total dose of 4 g in a 24-hour period in order to avoid liver damage; • High -risk populations should use doses lower than daily maximum and for shorter periods of time • Regular & excessive consumption of alcohol and acetaminophen increases risk of hepatotoxicity; • Watch for inadvertent administration of excessive doses of acetaminophen through concomitant use of multiple acetaminophen-containing products (e.g., cough and cold remedies, arthritis formulations, products for muscle spasm, antipyretics)
Non-Opioid Analgesics – NSAIDs acetylsalicylic acid (ASA), celecoxib, diclofenac, ibuprofen, indomethacin, ketorolac, ketoprofen, naproxen	• Osteoarthritis, Gout, Rheumatoid arthritis; • Analgesic, anti-inflammatory, anti-pyretic & anti-thrombotic properties	• Chronic use associated with stomach side effects (e.g: ulcers and bleeding) & kidney failure; • Taking with food or combining with a stomach protecting medication (e.g.; misoprostol or a proton pump inhibitor) can help to protect the stomach; • Significant drug interactions when taken concomitantly with: corticosteroids (increased risk of GI bleeding), cyclosporine (additive risk of renal failure); medications that increase the risk of bleeding, such as anti-coagulants and anti-platelets (additive risk of bleeding), lithium (increase levels of lithium), higher doses of methotrexate (increased levels and toxicity of methotrexate)
Corticosteroid Injections methylprednisolone, triamcinolone	• Osteoarthritis, Rheumatoid arthritis, acute gout flare; • Can relieve symptoms for several weeks to months	• Can raise blood glucose levels; • Should not be administered more often than every 6 weeks & injections should be limited to 3-4 per year
Disease Modifying Anti-Rheumatic Drugs (DMARDs) azathioprine, hydroxychloroquine, leflunomide, methotrexate, sulfasalazine	• Indicated for Rheumatoid Arthritis; • Blocks effects of immune system to suppress inflammation & help prevent joint damage; • Slows progression of disease	• May take 6-12 weeks to show effect • azathioprine may result in leukopenia or thrombocytopenia; • methotrexate is listed as a high alert medication with ISMP (Institute for Safe Medication Practices) as it has an increased risk of causing significant patient harm; • methotrexate used for rheumatoid arthritis is typically dosed once weekly & fatal errors have occurred when incorrectly administered daily
Biologics abatacept, adalimumab, anakinra, certolizumab pegol, etanercept, golimumab, infliximab, rituximab, sarilumab, tocilizumab, ustekinumab	• Indicated for Rheumatoid arthritis; • Disrupts inflammation processes by blocking proteins & their ability to cause inflammation	• Administered via injection; • Can compromise immune system and, therefore, body's ability to fight foreign pathogens, potentially increasing the risk of infections
Antigout Agents allopurinol, colchicine	• allopurinol used to reduce uric acid levels and to help prevent an acute attack; • colchicine used to help treat an acute attack	• Can cause GI upset (e.g: nausea, vomiting, diarrhea) • Colchicine has a narrow therapeutic index and can build up to toxic levels in the body

*List of adverse events and warnings is not comprehensive. Please refer to product monographs

TABLE 4 - Blood Pressure Targets[21]

Patient Parameters	Target Systolic Blood Pressure (SBP)	Target Diastolic Blood Pressure (DBP)
Select people at high risk of heart disease, including those over 75 years of age	< 120 mmHg	-
Individuals with diabetes	< 130 mmHg	< 80 mmHg
Most other individuals	< 140 mmHg	< 90 mmHg

TABLE 5 - Risk Factors for the Development of Hypertension[4,22]

Non-Modifiable Risk Factors	Modifiable Risk Factors	Health Conditions
Age Family history Gender (more prevalent in men)	Excessive alcohol consumption Physical inactivity/sedentary lifestyle Smoking Unhealthy diet	Diabetes (Type 1 and type 2) Kidney disease Sleep apnea

TABLE 6 - Medications Used to Help Manage Hypertension

Drug Class & Examples of Medications	Therapeutic Use & Benefits	Adverse Effects & Warnings*
Loop diuretics furosemide	• Helps kidneys eliminate sodium and water from body	• Loop diuretics and thiazide diuretics may reduce potassium levels; • Potassium-sparing diuretics may result in increased potassium levels
Thiazide diuretics hydrochlorothiazide, metolazone		
Potassium-sparing diuretics spironolactone		
Angiotensin-converting enzyme (ACE) inhibitors benazepril, captopril, enalapril, fosinopril, lisinopril, perindopril, quinapril, ramipril, trandolapril	• Helps relax blood vessels by blocking the formation of angiotensin II, which is a potent vasoconstrictor	• Unproductive, dry, hacking cough; • May increase potassium levels
Angiotensin II receptor blockers (ARBs) candesartan, irbesartan, lorsartan, olmesartan, telmisartan, valsartan	• Help relax blood vessels by blocking the action, not the formation, angiotensin II	• May increase potassium levels • Dizziness
Calcium channel blockers amlodipine, diltiazem, felodipine, nifedipine, verapamil	• Help relax the muscles of blood vessels by preventing calcium from entering cells;	• When taken with grapefruit or grapefruit products, blood levels of some calcium channel blockers can be increased; Patients should avoid consuming grapefruit & grapefruit products
Alpha blockers doxazosin, prazosin	• Decreases peripheral resistance by preventing norepinephrine from tightening wall of blood vessels	• Orthostatic hypotension; • Vertigo
Beta blockers acebutolol, atenolol, bisoprolol, carvedilol, labetalol, metoprolol, nadolol, pindolol, propranolol	• Reduces the workload on the heart & can help relax or widen the blood vessels	• Reduces heart rate and may cause adverse effects such as fatigue & dizziness

*List of adverse events and warnings is not comprehensive. Please refer to product monographs

TABLE 7 - Symptoms of Type 2 Diabetes[23-26]

Common Symptoms of Type 2 Diabetes	Unique Symptoms Seniors with Type 2 Diabetes May Experience
Frequent or increased urination Unusual thirst Extreme fatigue or loss of energy Blurred vision Frequent or recurring infections Slow healing of cuts or bruises Numbness or tingling in hands or feet Weight change (loss or gain) Trouble getting or maintaining an erection Diabetic ketoacidosis (DKA)	Dehydration Dry eyes Dry mouth Confusion

communicate with and provide safe and effective care for seniors. In order to accomplish these goals, pharmacy technicians should understand the unique challenges facing many seniors, including the effects of aging on the body, chronic conditions commonly affecting seniors, and challenges associated with managing multiple medications. Pharmacy technicians must also be able to apply their knowledge of pharmacy services and the role of the pharmacy technician to help support optimal outcomes in senior patients.

Effects of Aging on the Body

As we age, it is normal to experience a decline in the functioning of many organs and body systems. Most cells in the body are programmed to divide a certain number of times and each time a cell goes through the process of cell division, the telomeres shorten. Telomeres are the caps on the end of each DNA strand that protect our chromosomes as cells divide and are thought to play an important role in aging. Over time, the telomeres can become too short for the cell to divide, leading to cell death.[5] See Table 1 for an brief overview on the effects of aging on the body.

Conditions Affecting Seniors

As age increases, so does the risk of developing a variety of chronic conditions, such as arthritis, hypertension, diabetes, osteoporosis, COPD (Chronic Obstructive Pulmonary Disease), and Alzheimer's disease, among others. While these chronic conditions cannot be cured, symptoms can be managed through pharmacological and non-pharmacological treatment options.

Arthritis

Arthritis refers to more than 100 chronic diseases characterized by inflammation in joints or other areas of the body and affects approximately 46% of Canadian seniors, making it one of the most chronic diseases in Canada.[3,9,10]

While there are different types of arthritis, including osteoarthritis, rheumatoid arthritis, and gout (see Table 2 to review differences between these types of arthritis), arthritis generally includes symptoms of inflammation, such as redness, swelling, and pain that leads to stiffness in the joint or area affected, and decreased mobility, which can impact both physical and mental health, decreasing an individual's overall quality of life.[9,10] The pain associated with arthritis can be severe enough to interfere with activities of daily living, such as washing, bathing, dressing, and walking[10] Table 3 reviews

TABLE 8 - Complications Associated with Diabetes[23,27,28]

Body System or Organ	Complication
Cardiovascular	Coronary artery disease - hardening of the arteries, which can lead to myocardial infarction (MI or heart attack)
	Heart Disease – individuals with diabetes tend to develop heart disease 15 years earlier than those without diabetes
	High blood pressure
	High cholesterol
	Stroke – Individuals with diabetes are more likely to experience a stroke at an earlier age
Eyes	Retinopathy - damage to the blood vessels supplying the retina caused by high blood glucose levels Can lead to blindness
Mental Health	Diabetes stress, anxiety, depression, distress, decreased mood; Mental health issues can affect ability to cope with and manage diabetes
Nervous System	Neuropathy - damage to the nerves Increased risk of foot ulcers & amputation
Renal System	Diabetic nephropathy - high blood sugar can damage blood vessels that filter waste from blood; Progressive kidney disease leading to kidney failure in some cases

some medications used in the treatment of arthritis.

Hypertension

Blood pressure, the force of blood pumped from the heart against blood vessels, is required in order for blood to deliver oxygen, nutrients, and hormones to tissues and organs throughout the body and remove carbon dioxide and waste. However, high blood pressure, or hypertension, can cause damage to blood vessels. Hypertension affects 43.8% of Canadian seniors and can lead to a variety of health risks, including heart attack, stroke, heart failure, dementia, kidney disease, erectile dysfunction, and retinopathy.[19,20] Table 4 reviews blood pressure targets. See Table 5 for risk factors for hypertension and Table 6 for a review of some medications used to help manage hypertension.

TABLE 9 - Medications Used in Diabetes[23, 29]

Drug Class & Medications	Therapeutic Use & Benefits	Adverse Effects & Warnings*
Biguanides metformin	• Lowers glucose production in the liver; • Improves body's use of insulin by enhancing insulin sensitivity; • Recommended by Diabetes Canada guidelines as first medication prescribed for Type 2 diabetes	• GI upset (abdominal pain, bloating, nausea, diarrhea)
Sulfonylureas gliclazide, glimepiride, glyburide	• Stimulates pancreas to secrete more insulin	• High risk of causing severe hypoglycemia; Generally, not used in seniors; • Weight gain
Alpha-glucosidase inhibitor acarbose	• Slows digestion of glucose by Inhibiting action of intestinal enzymes that normally break down carbohydrates into glucose	• Negligible when used alone
Glinides nateglinide, repaglinide	• Stimulates pancreas to secrete more insulin; • Faster acting than sulfonylureas but shorter duration of action	• Low blood sugar, but lower risk compared to sulfonylureas; • Weight gain
Thiazolidinediones pioglitazone, rosiglitazone	• Increases sensitivity of body tissues to insulin	• Risk of congestive heart failure, bladder cancer (pioglitazone), bone fractures; • High cholesterol & suggested increased risk of heart attack with rosiglitazone; • Weight gain
DPP-4 inhibitors alogliptin, lingagliptin, saxagliptin, sitagliptin	• Helps pancreas produce more insulin when needed & reduces amount of insulin produced when it is not needed	• Risk of pancreatitis; • Joint pain
GLP-1 receptor agonists dulaglutide, exenatide, liraglutide, lixisenatide semaglutide	• Helps lower blood glucose levels & slows digestion • Often associated with weight loss; • May decrease risk of heart attack and stroke	• Risk of pancreatitis; • Nausea, vomiting, diarrhea
SGLT2 inhibitors canagliflozin, dapagliflozin, empagliflozin	• Inhibits return of glucose to blood stream (excreting it in urine) by altering blood-filtering functions of kidneys; • May reduce risk of heart attack & stroke • Weight loss	• Risk of amputation, bone fractures, genital mycotic infections, UTI, hypotension (canagliflozin); • Low blood pressure; • High cholesterol

*List of adverse events and warnings is not comprehensive. Please refer to product monographs.

TABLE 10 - Risk Factors for the Development of Osteoporosis[31]	
Non-Modifiable Risk Factors	**Modifiable Risk Factors**
Age Family history Gender (more prevalent in women) Menopause	Low calcium intake Low Vitamin D intake More than 3 alcoholic drinks per day Physical inactivity/sedentary lifestyle Non-weight bearing exercises Smoking Low estrogen

Diabetes

Type 2 diabetes accounts for 90% of all cases of diabetes in Canada, with 48% of Canadians living with diabetes aged 65 or older.[4,23,24] Type 2 diabetes can present with a variety of symptoms. It is important for pharmacy technicians, as well as patients, to recognize typical symptoms of Type 2 diabetes, as well as the unique symptoms seniors may present with. See Table 7 to review symptoms.

Uncontrolled blood glucose levels pose considerable risks for seniors, including a decreased ability to function independently and an increased risk of institutionalization and death.[23] Table 8 reviews additional complications associated with diabetes.

While hypoglycemia is a potential complication for all patients with diabetes, seniors tend to be at a greater risk due to the following contributing factors: taking more than five medications, poor diet, and other illnesses or conditions.[23] Signs of hypoglycemia include confusion, disorientation, an inability to concentrate and irritability, and can often be confused with other conditions, such as dementia.[23] Table 9 reviews medications used in the management of diabetes.

Osteoporosis

Osteoporosis, a loss in bone density, affects approximately 25.1% of Canadian seniors, with 80% of those diagnosed being women.[30] Both bone and muscle mass continually grow from birth until they reach their peak around age 40, when they start to decline, with bone mass decreasing by 0.5% or more per year.[30] Loss in bone mass is more prominent in females after menopause with the decrease in estrogen production, which plays an important role in the activity of the bone building cells, osteoblasts. Table 10 identifies risk factors for developing osteoporosis.

Osteoporosis places patients at an increased risk of suffering from fractures. Fractures due to osteoporosis, which occur most commonly in the hips, spine, wrist, and shoulders, are more common than heart attack, stroke and cancer combined with 1 in 3 women and 1 in 5 men expected to experience a fracture.[31,32] Osteoporosis can also contribute to a decrease or loss of mobility, lack of independence and a decreased quality of life.[27] Table 11 reviews

TABLE 11 - Medications Used in Osteoporosis[34]		
Drug Class & Medications	**Therapeutic Use & Benefits**	**Adverse Effects & Warnings***
Estrogen Many different dosage forms (e.g., tablet, patches, topical cream, vaginal cream)	• Indicated for postmenopausal women with osteoporosis who also experience symptoms such as hot flashes and night sweats	• Increased risk for breast cancer, stroke and cardiovascular disease when taken for more than 5 years • Must be taken with progesterone in women with a uterus • Increased risk of blood clots
Bisphosphonates alendronate, etidronate, risedronate (daily, weekly or monthly oral tablets); *zoledronic acid (annual IV infusion)	• Increases bone density by inhibiting bone resorption of osteoclasts	• Stomach upset & heartburn, esophagitis; • Patients should avoid laying down or bending over for 30-60 minutes after taking medication to help prevent these adverse effects; • Important to follow directions for dosing that are unique to each drug and dosage form • Small risk of osteonecrosis of the jaw
RANK Ligand Inhibitor denosumab	• May be appropriate for those who cannot take a bisphosphonate (e.g.: individuals with reduced kidney function) • Administered via subcutaneous injection every six months	• Hypocalcemia; • Small risk of osteonecrosis of jaw
Selective Estrogen Receptor Modifier (SERM) raloxifene	• For postmenopausal women • Mimics effects of estrogen to help increase bone density	• Hot flashes; • Increased risk of blood clots

*List of adverse events and warnings is not comprehensive. Please refer to product monographs

TABLE 12 - Chronic Bronchitis versus Emphysema[36]	
Chronic Bronchitis	**Emphysema**
Airways become red, swollen, and irritated; Glands in airways produce excess mucous, which can block air from passing through making breathing difficult	Alveoli (structures in the lungs that exchange gasses with the surrounding capillaries) become damaged & stiff; When they stretch, air can get trapped inside of them, making it difficult to breathe

TABLE 13 - Symptoms of Dementia[37,39]	
Loss in memory	Forgetting appointments or a friend's name and not being able to remember them later; Getting lost in a familiar place; Losing or misplacing familiar objects
Decreased ability to make decision	Poor or impaired judgement (dressing inappropriately for weather); Losing abstract thinking skills
Change in personality and/or how a person expresses emotions	Sudden shifts in mood; Changes in personality (becoming uncharacteristically irritable, suspicious, fearful)
Increased mental illness	Paranoia, hallucinations, depression, anxiety
Problems coping with daily living	Problems with familiar tasks; Losing desire to carry out simple but important day-to-day activities
Problems with speech & understanding language	Difficulty finding words; Using wrong words in a sentence
Physical changes	Loss of coordination; Incontinence (bladder and fecal); Weak and stiff muscles; Difficulty standing, sitting, walking; Inability to carry out activities of daily living

TABLE 14 - Risk Factors for the Development of Dementia[37,41,42]	
Non-Modifiable Risk Factors	**Modifiable Risk Factors**
Age Genetics Medical conditions (Multiple sclerosis, Parkinson's disease, HIV, chronic kidney disease, atherosclerosis, stroke) Gender (more common in women)	High alcohol consumption (more than 14 drinks per week for women & more than 21 drinks per week for men) Lack of physical activity later in life Obesity in midlife Smoking Unhealthy diet high in saturated fats, salt, sugar Hypertension (consistently high blood pressure in mid-life) Type 2 diabetes in mid-life Low levels of cognitive engagement

medications used in the management of osteoporosis.

Chronic Obstructive Pulmonary Disease

Chronic Obstructive Pulmonary Disease (COPD) is a progressive, debilitating disease that affects approximately 7.6% of Canadian seniors.[2, 34] COPD symptoms include shortness of breath, cough and sputum production that can be caused by a number of diseases, but most often by emphysema and chronic bronchitis.[35] Table 12 reviews chronic bronchitis versus emphysema. COPD is generally caused by long term exposure to lung irritants, which can include chemicals and air pollution, however, in Canada, the primary irritant that contributes to the development of COPD is tobacco smoke.[34-36] COPD treatment options consist of a number of inhaled medications that include bronchodilators (to open up airways), anticholinergics (to relax airways and reduce mucus production) and combinations of these together and with anti-inflammatories (to reduce inflammation).

Pharmacy technicians should monitor senior patients for vaccine eligibility as it is important that seniors, especially with COPD, be protected against respiratory infections, such as influenza, pneumonia, and COVID-19.

Dementia

Dementia is an overall term for a set of chronic, progressive symptoms caused by disorders affecting the brain where brain cells become damaged and eventually die, causing changes in an individual's ability to engage in normal daily activities including, thinking, speaking, bathing, and socializing.[37,38,39] Table 13 reviews symptoms of dementia.

The changes in the brain that lead to a diagnosis of dementia are not a normal part of aging, yet over 500,000 Canadians are living with dementia, and this number is projected to grow to 912,000 by 2030 with 76,000 Canadians newly diagnosed with dementia each year.[40]

Table 14 reviews risk factors for the development of dementia.

Alzheimer's disease is one form of dementia, and the most common form, accounting for 60-80% of all dementia diagnoses.[43] However, it is important to keep in mind that there are other forms of dementia, including Lewy Body disease, vascular dementia, and frontotemporal dementia. Table 15 reviews medications used in the management of dementia. It is important to note that no medication can prevent,

TABLE 15 - Medications Used in Dementia		
Drug Class & Medications	**Therapeutic Use & Benefits**	**Adverse Effects & Warnings***
Cholinesterase Inhibitors donepezil, galantamine, rivastigmine	• Increases action of acetylcholine by blocking action of the enzyme acetylcholinesterase, which breaks down the neurotransmitter acetylcholine; • Improves mental function (such as memory, attention, the ability to interact with others, speak, think clearly, and perform regular daily activities)	• May cause GI upset (decreased appetite, nausea, vomiting, diarrhea); Taking with food can help decrease these adverse effects • Dizziness, fatigue, insomnia
NMDA Antagonists memantine	• May slow the loss of the ability to think and remember	• Headaches, tiredness, sleep disturbances, dizziness; • Constipation, vomiting, loss of appetite; • Anxiety

*List of adverse events and warnings is not comprehensive. Please refer to product monographs

reverse, or slow the brain damage seen in dementia, but they can help improve symptoms in some individuals.

Taking and Managing Multiple Medications

Living with more chronic conditions, seniors are the "largest users of prescription medications" with approximately 1/3 of Canadian seniors taking at least 10 different types of medication.[3,6,8,44] Polypharmacy, the use of multiple medications, increases the risk of adverse reactions and drug interactions. This risk is heightened in senior patients due to multiple conditions, as well as age-related changes in the body, including decreasing renal and liver functioning.[3,8,44] Pharmacy technicians should understand the risks of polypharmacy, including increased drug interactions and frequency or severity of side effects, poor medication adherence, decreased quality of life, and increased risk of falls and avoidable hospitalization.[3,7,45] Chronic conditions, such as diabetes, COPD, and hypertension, may require patients to use devices to administer their medications or to help monitor their condition(s). Pharmacy technicians play an important role in teaching patients how to administer some of these medications, as well as in selecting devices.

Pharmacy technicians should use open-ended questions when interacting with patients to gather information as to how the patient is feeling and managing with their conditions and medications. Simply checking in with how a patient is doing can provide insight into potential problems that can be resolved, providing more optimal outcomes for the patient.

Pharmacy technicians should recognize issues with medication adherence. This can be done in community pharmacy when processing refills, and when conducting a best possible medication history in both community and hospital pharmacy practice. Pharmacy technicians can monitor timing of refills and use open-ended questions to identify the root of any compliance issues. If problems adhering to a medication regimen are discovered, pharmacy technicians can gather further information from the patient and collaborate with the patient, pharmacist, and prescriber to offer solutions that will provide additional support for the patient.

TABLE 16 - Measuring Blood Pressure[47]

Do	Do Not
Rest quietly for 5 minutes before taking blood pressure; Sit with feet flat on the floor; Sit with back and arm supported; Keep arm at heart level; Apply blood pressure cuff on bare arm; Measure blood pressure twice in the morning and twice in the evening for 7 days before doctor's appointments or after a change in medications; Keep track of blood pressure readings in a log	Smoke 30 minutes before taking blood pressure; Drink caffeine 30 minutes before taking blood pressure; Try not to speak while taking blood pressure measurement

TABLE 17 - Factors to consider when choosing a blood glucose meter

Consideration:	Examples:
Ease of use	How much blood is required for testing? Are the strips easy to handle? Does it require calibration or coding with new test strips?
Special features	Illuminated screens Large, easy to see numbers on the screen Large, easy to handle buttons Audio capability
Technology – Information Storage & Retrieval	Will it track dates, times & results of blood glucose testing? Will it monitor for trends? Can results be shared with healthcare provider? Can results be downloaded?

Best Possible Medication Histories and Medication Reviews

Pharmacy technicians should monitor patients who are eligible for and would benefit from a medication review with a pharmacist. Medication reviews have been found to be essential in managing and preventing unintended drug interactions and adverse drug reactions, thereby maintaining patient safety.[20] Best possible medication histories (BPMH) and medication reviews allow the pharmacy team and the patient to obtain a comprehensive overview of all medications, including over-the-counter (OTC) items and natural health products a patient may be taking, along with how the patient is taking them. This is important as patients may have a variety of prescribers and the pharmacy team may be the only healthcare providers with a complete picture of the patient's medication profile. BPMHs and medication reviews can help detect inappropriate prescribing, including drug therapy problems and prescribing cascades. Prescribing cascades are "a sequence of events in which an adverse drug event is misinterpreted as a new medical condition, leading to the addition of another, potentially avoidable medication", and can also contribute to polypharmacy and its associated risks.[46]

Compliance packaging

Managing multiple medications involves remembering when and how to take each medication, which can present a challenge to patients. Providing medications in compliance packaging is one way that pharmacies can assist patients in taking their medications correctly. Issues with adherence may be an indicator that a patient is struggling to manage their medications. Pharmacy technicians in both community and hospital pharmacy can work to identify patients who may benefit from this pharmacy service.

Product Selection

Patients with hypertension and/or diabetes may be required, or advised, to monitor their blood pressure and/or blood glucose levels at home.

Blood pressure can be measured in a community pharmacy or at home with the use of a home blood pressure monitor. Pharmacy technicians can assist patients with taking their blood pressure in the pharmacy, as well as with selecting an appropriate home blood pressure monitor and teaching patients how to correctly measure their blood pressure. Table 16 reviews important steps to take when measuring blood pressure.

Pharmacy technicians should familiarize themselves with a variety of blood glucose meters and be prepared to demonstrate their use to patients. Patients should use a blood glucose meter that best fits their needs and lifestyle. Table 17 identifies factors to consider when helping patients choose a blood glucose meter.

Device Demonstrations

Patients managing diabetes with insulin and those managing COPD with inhaled medications will have to learn how to effectively administer these medications. Pharmacy technicians play a vital role in supporting optimal outcomes of senior patients by ensuring correct techniques are applied when using these devices.

If a patient is new to using insulin and the prescriber has not indicated on the prescription if the patient should be using a vial, cartridges, or pre-filled pens, pharmacy technicians can review the use of these with the patient and allow the patient to decide which device would be best suited for them. If a patient has been using a vial in the past and pens are available, follow up with the patient to see how they are managing, as some may find pens easier to use. Pharmacy technicians should be aware of insulin that is available in different forms and ensure patients receive the correct form. For example, insulin glargine is available in a vial, cartridges, and in pre-filled pens. If the patient incorrectly receives the wrong form, they will not be able to administer their insulin. It is also extremely important that the right strength of insulin is dispensed as some insulins come in higher concentrations (e.g., 200 IU/mL or 300 IU/mL) than the usual 100 IU/mL strength.

It is important to consider additional supplies patients will need, including alcohol swabs, lancets, syringes or pen tips, and sharps containers. Cost may need to be considered when assisting senior patients with choosing devices as not all supplies are covered by provincial/territorial health plans and not all seniors will have a private insurance plan. In addition, some seniors may be adjusting to a change in their financial status after retirement, or even after the loss of a partner. While most provincial plans will cover the cost of blood glucose test strips, some may have restrictions on the number of test strips covered in a 365-day period.

TABLE 18 - Risk for Falls[7]

- History of falling
- Fear of falling
- Impaired balance
- Muscle weakness
- Decline in senses (vision, hearing)
- Peripheral neuropathy
- Changing positions too quickly
- Trying to maintain independence by completing tasks on their own rather than asking for help
- Impaired judgement
- Medications (See Beers list)
- Being on more than 4-5 medications

Inhaled medications used to help manage the symptoms of COPD come in a variety of dosage forms and devices, and technique of administration is critical in ensuring the medication reaches the lungs and can work optimally for the patient. Pharmacy technicians can teach patients how to correctly administer their inhaled medications, whether these are metered dose inhalers and a valved holding chamber (also known as a spacer), a dry powder inhaler (diskus, turbuhaler, ellipta, handihaler) or soft mist (respimat). It is recommended that patients using a metered dose inhaler use a valved holding chamber to administer this medication to increase the medication reaching the lungs.

When teaching patients how to use a device (blood pressure monitor, blood glucose meter, or inhaled medication), pharmacy technicians should not only demonstrate how to use the device to the patient, but have the patient demonstrate use of the device back to the technician to help ensure thorough understanding. To further enhance patient learning and understanding on the use of their devices, pharmacy technicians should also be prepared to share additional educational material to patients, such as images or videos that can patients can refer to at home when needed.

It is important to check in with patients on a regular basis to ensure they are using their devices correctly. Pharmacy technicians should ask patients how they are feeling, what their blood pressure and/or blood glucose readings have been, how their breathing has been, etc. and work to identify if pharmacist intervention is required regarding medications and/or if there may be any issues with technique of device use. Again, pharmacy technicians should ask the patient to demonstrate how they are using their device in order for the technician to get an accurate look at patient technique and help make any necessary corrections.

Health Promotion

Receiving a diagnosis of a chronic condition and/or managing multiple chronic conditions can be overwhelming for any patient. Pharmacy technicians can help senior patients manage their chronic conditions not only through their technical functions in drug distribution, but by providing information and education on non-pharmacological strategies to manage their health.

Reducing the Risk of Falls

Pharmacy technicians should familiarize themselves with medications that are considered inappropriate for seniors, such as those listed on the Beers list, an internationally recognized list of medications that should be avoided or used with caution in seniors because they may be ineffective or pose unnecessary high risk when a safer alternative may available.[44] Medications included on the Beers list include, but are not limited to, benzodiazepines such as lorazepam and diazepam, duloxetine, paroxetine, tricyclic antidepressants such as amitriptyline, and anti-cholinergic antihistamines such as diphenhydramine. Many medications on the Beers list place the senior patient at risk of experiencing orthostatic hypotension, increased sedation, dizziness, confusion, and unsteady gait, all of which can increase the risk of a fall.

Reports estimate that approximately 30% of seniors in community will suffer a fall each year, with 30-50% of falls resulting in minor injuries, like bruises and lacerations, and with 5-10% of falls resulting in serious injuries such as fractures and traumatic brain injuries.[6,7] Falls with serious injury can

result in disability, decreased mobility, loss of independence, an increased fear of falling, and a decreased quality of life, along with an increased likelihood of hospitalization or admission to a long-term care facility.[6] Table 18 reviews additional risk factors for falls.

Communication

In addition to using open-ended questions instead of close-ended questions to gather

TABLE 19 - Reducing Risk of Falls[7]

- Use a non-slip bathmat on shower floor
- Install grab bars for extra support moving into and out of the tub/shower
- Keep home clean and clutter free
- Remove loose rugs from the home or secure loose rugs with double-sided tape or slip resistant backing
- Use extra lighting, including night lights to keep hallways and stairways well-lit
- Slow down movement, especially when transferring from sitting to standing, walking on an unstable surface or maneuvering changing heights (ramps, stairs, getting into or out of a vehicle)
- Review medications with a pharmacist

TABLE 20 - Non-pharmacological Strategies to help Manage Chronic Conditions and Improve or Maintain Health[48,49,50]

Adopting a healthy, nutritious diet • Unhealthy diets high in saturated fats, sugars, and salt are risk factors for developing hypertension, gout, diabetes, and dementia; • Adopting a healthy diet high in fiber, whole grains & fruits and vegetables can help prevent the development of chronic diseases, help manage chronic diseases and contribute to a healthy weight	Refer patients to reliable nutrition resources that outline principles of healthy eating & can provide healthy recipes: • **Canada Food Guide** https://food-guide.canada.ca/en/ • **DASH Diet** https://www.heartandstroke.ca/healthy-living/healthy-eating/dash-diet • **The Mediterranean Diet** https://www.heartandstroke.ca/articles/an-all-canadian-healthy-diet • **Healthy Eating from Diabetes Canada** https://www.diabetes.ca/nutrition---fitness/healthy-eating With the rising cost of food in Canada and limited incomes for many seniors, pharmacy technicians should also connect with community partners offering healthy food at affordable prices and be able to refer senior patients to these resources.
Increase physical activity • A sedentary lifestyle is a risk factor for developing hypertension, diabetes, dementia, osteoporosis, and obesity • Increasing physical activity can reduce the risk of developing chronic conditions, as well as reduce the risk of falls	Refer senior patients to resources to help get them started: • **Movement Guidelines** https://csepguidelines.ca/guidelines/adults-65/ Seniors should aim for 150 minutes of physical, aerobic activity each week. This can include moderate to vigorous activity if able, however, light physical activity, including standing, will be beneficial as well. Walking is a good, low-cost physical activity seniors can engage in that has many health benefits. Physical activity can be broken down into 10-minute sessions. Muscle strengthening exercises should be completed twice a week. Balance exerices should be incorporated. Seniors should consult with a primary healthcare practitioner to determine any concerns or limitations. Seniors should find an activity they enjoy Refer patients to local community programs for seniors that may help them increase their activity levels in a fun and safe environment.
Weight Loss • Overweight or obesity is a risk factor for developing arthritis, hypertension, diabetes, dementia, and osteoporosis	Adopting a nutritious diet and increasing physical activity will help patients achieve a healthier body weight.
Quitting Smoking • Smoking is a risk factor for developing hypertension, dementia, COPD, rheumatoid arthritis, and osteoporosis	Pharmacy technicians can refer patients to the pharmacist as part of a smoking cessation program. Pharmacists can recommend OTC nicotine patches or gum to patients and in some jurisdictions, pharmacists can initiate a prescription for smoking cessation.
Build Social Connections • Social isolation is a key aspect of overall health and risk factor for ill health and mortality and has been highlighted throughout the COVID-19 pandemic. • According to Dr. Keri-Leigh Cassidy, clinical academic director of Dalhousie's Geriatric Psychiatry/Seniors Mental Health Program of the Nova Scotia Health Authority, "social isolation can reduce longevity by about 3 years, similar to the impact of obesity or smoking."[21]	Pharmacy technicians should be able to refer seniors to community groups or programs that can help seniors meet new people, engage in physical activity, have fun, or offer support in adjusting to and managing an illness or condition, or even grief after the loss of a partner.

information from senior patients, pharmacy technicians should consider the effects of aging when communicating with seniors and consider employing the following strategies when appropriate:

- Speak slowly and clearly, using simple language. Ensure the patient has heard what you have said by asking them to repeat back important information. Ask if they have any questions about their medications. Recall that with increasing age, it can become difficult to hear high-pitched voices and sounds, especially in loud places. Both community pharmacies and hospitals are busy spaces with many competing voices and sounds.
- Increase font size on prescription labels
- Discuss medication packaging with patients. Vials with child-resistant lids may be challenging for some seniors to remove, and snap caps or ointment pots may be better options.

Conclusion

Seniors in Canada are at an increased risk of developing chronic conditions, and of experiencing adverse drug reactions due to the effects of aging on the body, chronic conditions, and polypharmacy. Pharmacy technicians play an integral role in maintaining patient wellness and safety through patient education, and by promoting effective medication management and healthy lifestyle.

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QUESTIONS

Please select the best answer for each question and answer online at eCortex.ca for instant results.

1. AG is a 72-year old patient with several chronic conditions including rheumatoid arthritis, hypertension, and COPD. AG is managing their conditions with the following medications:
   - budesonide + formoterol
   - infliximab
   - irbesartan

   Which of the following statements is true?

a) AG should have up-to-date vaccine status for influenza, COVID-19, and pneumonia as they are at risk of infection due to their medical conditions.
b) AG should have up-to-date vaccine status for influenza, COVID-19, and pneumonia as they are at risk of infection due to their current medications.
c) AG should not receive new vaccines for influenza, COVID-19, and pneumonia as they are at an increased risk of adverse effects reactions due to their medical conditions
d) A & B

2. CA, a pharmacy technician in community pharmacy, is demonstrating how to use a valved holding chamber with a metered dose inhaler to EW, a 70-year old male patient. EW repeatedly asks CA to repeat what she is telling him. Which of the following is a likely cause of this?

a) EW may be experiencing difficulty hearing her voice because she is a female with a higher pitched voice
b) The pharmacy may be too noisy for EW to be able to hear her well and they should move to a quieter, more private area
c) EW likely has dementia
d) A & B only
e) A, B, & C

3. EN is a 65-year old female patient with osteoporosis and Type 2 diabetes. JH, a pharmacy technician in a community pharmacy, is helping EN measure her blood pressure. What is an ideal blood pressure target for EN.

a) < 130 mmHg/80 mmHg
b) < 130 mmHg/90 mmHg
c) < 140 mmHg/80 mmHg
d) < 140 mmHg/90 mmHg

4. PD is a 71-year old male patient with several chronic conditions. Which of the following is the most likely example of a prescribing cascade?

a) Hydrochlorothiazide + ramipril for hypertension, celecoxib for osteoarthritis, dextromethorphan for an unproductive, dry, hacking cough
b) Candesartan for hypertension, celecoxib for osteoarthritis, fluticasone + salmeterol for COPD
c) Alendronate for osteoporosis, metformin for diabetes, amlodipine for hypertension
d) All are examples of a prescribing cascade
e) None are examples of a prescribing cascade

5. TK is a 72-year old patient receiving corticosteroid injections for osteoarthritis. Which of the following is true?

a) Corticosteroid injections should be administered every 4-6 weeks
b) Corticosteroid injections should only be administered in a single joint 3-4 times per year
c) Corticosteroid injections should not be administered more than every 6 weeks
d) A & B
e) A & C
f) B & C

6. AP, a 65-year old post-menopausal female, tells pharmacy technician, EM, that she has been experiencing heart burn and stomach upset lately and is looking for OTC antacids. EM reviews the patient's medication profile and notes that AP is taking the following medications:
   - alendronate 70 mg PO Q Sunday
   - calcium carbonate 500 mg po daily
   - candesartan 16 mg po qam
   - metformin 500 mg PO TID
   - naproxen 500 mg po bid
   - Vitamin D 1000 IU po daily

   Which of the following is the best course of action for EM to take?

a) Immediately refer AP to the pharmacist to make a therapeutic recommendation
b) Recommend AP see her primary care practitioner for a prescription for a stomach medication as some of them are covered by her provincial plan
c) Show AP to the stomach aisle and point out the generic store brand which is on sale and will save AP some money
d) Use open-ended questions to gather information as to how AP is taking her medications and refer to the pharmacist

7. CW is a 77-year old patient who has been admitted to hospital after a fall. VS, the pharmacy technician conducting the best possible medication history, documents that CW is taking the following medications:
   - Calcium 500 mg twice daily
   - doxazosin 4 mg po daily
   - lorazepam 1 mg po daily
   - risedronate 35 mg poq Monday
   - tiotropium 18 mcg by inhalation qam

   VS should alert the pharmacist to which of the following medications on CW's medication profile as they are most likely to have contributed to their fall?

a) Risedronate
b) Doxazosin
c) Lorazepam
d) A & C only
e) B & C only
f) A, B & C

8. AN is a senior patient with deteriorating vision due to glaucoma and age-related macular degeneration who has been happily living at home independently and states that if he understands the directions he has no trouble taking his medications. AN is also taking medications to treat hypertension and osteoporosis. How can a pharmacy technician help AN manage his medications and conditions and continue to live independently for as long as possible?

a) Recommending AN remove loose rugs in his home
b) Recommending AN use nightlights in hallways and around stairways
c) Increase the font size on prescription labels for AN
d) Dispense AN's medications in snap caps
e) A & B only
f) A, B, and C only
g) B & C only
h) A, B, C & D

9. HW, a regular patient at the pharmacy, is managing several chronic conditions, including hypertension and gout and has recently lost his spouse. In an effort to get some physical activity, HW walks from his house to a coffee shop to meet friends and walks to the pharmacy to take his blood pressure. While in the pharmacy HW makes a point to stop and chat with every employee he sees. Every day HW expresses concern that his blood pressure readings taken in the mornings at the pharmacy are much higher than when he takes them after his mid-day nap at home. Why could HW's blood pressure readings be higher at the pharmacy?

a) HW likely had coffee with his friends at the coffee shop before measuring his blood pressure
b) HW's home blood pressure monitor likely needs new batteries as the blood pressure

machine at the pharmacy is working well
c) HW was active, walking around before measuring his blood pressure and may not have sat for 5 minutes before taking his reading
d) A & B only
e) A & C only

10. Which of the following statements is TRUE?
a) Seniors with osteoporosis should limit their physical activity in order to prevent the risk of falls
b) Seniors managing chronic conditions should aim for 150 minutes of physical activity each week, starting with 10-minute intervals of activity if needed
c) Seniors managing hypertension with medications should not make lifestyle changes to help lower blood pressure as there is an increased risk of hypotension and falls.
d) All of the above

11. EW returns to the community pharmacy for a refill on his metered dose inhaler. Pharmacy technician, CA, notices that EW is early for his refill. CA asks EW how he has been using his inhaler and how he has been feeling. He tells CA that he tries to use his inhaler as prescribed but still feels short of breath most of the time and so has been using more. What should CA do?
a) Alert the pharmacist immediately so they can review the dose and possibly make or recommend a change in dose or drug
b) Ask EW to demonstrate how he is using his inhaler and valved holding chamber
c) Refer EW back to his prescriber for a change in drug or dose
d) Refill EW's prescription, highlighting the early refill for the pharmacist to review

12. Hypoglycemia is a risk associated with diabetes and seniors are at an increased risk of experiencing hypoglycemia since they often have multiple chronic conditions and are taking multiple medications. To help manage type 2 diabetes, _____ is generally the first oral antidiabetic medication used in seniors, while _____ should be avoided in seniors due to a high risk of causing hypoglycemia.
a) glargine; litagliptin
b) gliclazide; canagliflozin
c) metformin; glyburide
d) sitagliptin; liraglutide

13. JJ is a 74-year old patient with hypertension and type 2 diabetes, who was also recently diagnosed with rheumatoid arthritis. JJ's rheumatologist is starting them on methotrexate, however, since it can take some time for JJ to experience relief from the methotrexate, the doctor administered triamcinolone to a joint that was particularly involved in the office. Which of the following is TRUE?
a) JJ should check their blood glucose levels more frequently after receiving the triamcinolone injection
b) JJ should start daily doses of methotrexate 1 month after the triamcinolone injection
c) Triamcinolone should only be used to treat osteoarthritis
d) None of the above are true

14. When helping patients select a blood glucose meter, pharmacy technicians should consider the following:
a) The size of the screen
b) Audio capabilities
c) Information storage and retrieval.
d) Patient lifestyle
e) A & C only
f) A, B, C, & D

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1. a b c d	**4.** a b c d e	**7.** a b c d e f	**9.** a b c d e	**12.** a b c d
2. a b c d e	**5.** a b c d e f	**8.** a b c d e	**10.** a b c d	**13.** a b c d
3. a b c d	**6.** a b c d	f g h	**11.** a b c d	**14.** a b c d e f

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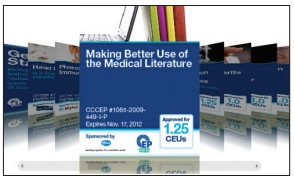

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All other inquiries about Tech Talk CE should be directed to Vicki Wood at 437-889-0615, ext. 1254 or vwood@ensembleiq.com.