

# High Risk Medications: What Can Community Pharmacists Do to Make Patients Safer?

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**Upon successful completion of this article, the pharmacist should be able to:**

1. Recognize medications that are deemed "high risk."
2. Recommend alternative therapy to patients that are utilizing high risk medications inappropriately.
3. Identify and appropriately utilize tools when assessing patients for high risk medications.
4. Bill for services rendered during medication therapy management sessions (when applicable).

**Upon successful completion of this article, the pharmacy technician should be able to:**

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## INTRODUCTION

At the prescribing stage in patient care, the physician must evaluate the potential benefits and consequences of prescribing a medication. While there are always potential risks to their utilization, medications are used to treat or cure ailments. Some medications have more inherent risks than others, but when used correctly, can provide positive outcomes for the patient. When treating patients age 65 years or older in your community, it is crucial to consider the best medication for a particular indication. Based off of the 2009 U.S. Census, 39.6 million patients are 65 years or older, comprising 12.9 percent of the population. By 2030, it is projected that 72.1 million patients will be 65 years or older. This trend shows that patients are living longer, and with that, there is a greater risk of inappropriate prescribing because it is noted that as a patient gets older, the risk of becoming sick increases as well.

With 12.9 percent of the population being age 65 or older, the risk of potentially inappropriate medications (PIMs), so-called by the American Geriatrics Society, being utilized increases dramatically. Potentially inappropriate medications can be characterized as medications that may be deemed ineffective, medications that have inappropriate doses, frequencies or durations, medications in which the risks outweigh the benefits, medications that interact with other medications, or lastly, medications that interact with diseases. Physiologically, patients age 65 and older have a greater risk of experiencing adverse drug effects due to decreased metabolism, decreased elimination secondary to kidney disease, and potentially altered absorption due to a thinner body habitus. Polypharmacy also remains a problem in the elderly. Polypharmacy is defined as utilizing various pharmaceuticals to treat ailments in a patient. While at times the prescribing may be appropriate, there is also the risk of encountering the “cascade of prescribing.” This occurs when a new medication is used to treat the side effect of the first medication. For example, a patient may be prescribed lisinopril and develops a cough due to bradykinin production, and is then prescribed promethazine with codeine to alleviate the cough, to which it causes drowsiness, so the patient may be prescribed amphetamines as a stimulant to keep the patient awake during the day. This cascade of prescribing can be potentially dangerous, if not lethal. It is noted that 27 percent of adverse drug events in primary care and 42 percent of adverse drug events in long-term care were preventable, with most problems occurring in the ordering and the monitoring stages of therapy.

While PIMs may cause adverse effects and increase the risk of polypharmacy, other risks arise as well. Patients may experience functional decline, delirium, hospitalization, or experience a re-hospitalization. Medications may have a cognitive effect on a patient, and with each medication add-

ed to a patient's medication regimen, the risk of cognitive decline increases. This can result in the patient losing independence, as well as having a decreased quality of life. If the patient experiences delirium, the patient tends to not be lucid, putting them at risk for self-harm. This lack of lucidity can also lead to the patient not being vocal about their care. If a patient is experiencing delirium, they will not be able to vocalize and address if they are not feeling well or experiencing side effects from their medication. Hospitalizations and re-hospitalizations impose a risk to the patient. With a hospitalization, the patient is at risk for polypharmacy. Hospitalized patients are also at risk for developing a hospital-borne infection, which, in turn, can potentially exacerbate the patient's medical conditions. Fiscally, hospitalizations and re-hospitalizations are a burden to Medicare. Based on the 2012 fiscal year Medicare Inpatient Charge Data, a hospitalization can burden Medicare with a cost anywhere from \$10,000 to \$200,000 per hospitalization. Medicare has also instituted the Hospital Readmissions Reductions Program in which Medicare will not reimburse hospitals for the cost of care for an admission if that patient is readmitted to the hospital within 30 days with the same diagnosis for certain health conditions. The conditions in which a hospital will not be reimbursed if a patient is re-admitted within 30 days include acute myocardial infarction, heart failure, pneumonia, chronic obstructive pulmonary disease, total hip arthroplasty and total knee arthroplasty. It is important for community pharmacists to help prevent hospitalizations both for the patient and for the sustainability of the medical community. Community pharmacists are no longer tasked with filling prescriptions blindly based on doctor's orders, but are expected to evaluate the appropriateness of each prescription, to do no harm to the patient, and to prevent them from requiring acute, urgent care in a hospital.

## TOOLS TO EVALUATE THE APPROPRIATENESS OF HIGH RISK MEDICATIONS

The Beers Criteria was first introduced in 1991 by the American Geriatrics Society coupled with a panel of experts in the field of geriatrics to establish a list of medications that may be inappropriately utilized in older adults. The 2012 Beers Criteria established a list of drug classes and individual medications that may cause harm and provide recommendations for an alternate therapy.<sup>2</sup>

Listed in Table 1 are the most common medications that may be recognized in the outpatient setting:

### Anticholinergics

First-generation antihistamines can potentially be harmful to patients. Anticholinergics can make a patient, “hot as a hare (increased body temperature), blind as a bat (mydriasis—dilated pupils), dry as a bone (dry mouth, dry eyes,

**Table 1. Medications and Drug Classes on the Beers Criteria**

<b>Organ System or Therapeutic Category or Drug</b>	<b>Rationale</b>	<b>Recommendation</b>
<b>Anticholinergics (excluding TCAs)</b>		
First generation antihistamines: Chlorpheniramine, diphenhydramine, doxylamine, hydroxyzine, promethazine	Highly anticholinergic (dry mouth, constipation, confusion, irritability), clearance can be reduced with advanced age	Avoid if possible
Anti-Parkinson agents: Benzotropine, trihexyphenidyl	Risk of extrapyramidal symptoms coupled with antipsychotics	Avoid if possible
Antispasmodics: Hyoscyamine, scopolamine	Highly anticholinergic	Avoid except in short-term palliative care for decrease in oral secretion
<b>Antithrombotics and Anticoagulants</b>		
Dipyridamole (short acting)	May cause orthostatic hypotension	Avoid if possible
Warfarin, rivaroxaban, apixaban, dabigatran	Increased risk of bleeding	Monitor and counsel patient about possible risks and side effects to monitor for
<b>Anti-infectives</b>		
Nitrofurantoin	Ineffective in patients with a creatinine clearance <60 mL/min	Avoid if possible
<b>Cardiovascular</b>		
Alpha1 blockers: Doxazosin, prazosin, terazosin	High risk of orthostatic hypotension	Avoid use as an antihypertensive
Alpha2 agonists: Clonidine	High risk of CNS effects, bradycardia and orthostatic hypotension	Avoid clonidine as first-line antihypertensive
Antiarrhythmic drugs (Class Ia, Ic, III): Amiodarone, dofetilide, dronedarone, flecainide, sotalol	Data shows that rate control may reduce risk of harm compared to rhythm control. Amiodarone is associated with thyroid disease, pulmonary fibrosis and QT-prolongation	Avoid as first-line treatment of atrial fibrillation
Digoxin > 0.125 mg/day	In heart failure patient, there is no efficacy with increased doses, may increase risk of toxicities	Avoid if possible
Nifedipine, immediate release	Potential risk of hypotension and precipitating of myocardial ischemia	Avoid if possible
Spirolactone > 25 mg/day	Risk of hyperkalemia, especially if coupled with NSAID, ACE-inhibitor, ARB or potassium supplement	Avoid in patient with heart failure or with a creatinine clearance <30 mL/min
<b>Central Nervous System</b>		
Tertiary Tricyclic Antidepressants (TCAs): Amitriptyline, doxepin > 6 mg/day, imipramine	Highly anticholinergic, sedating, risk of orthostatic hypotension	Avoid if possible

**Table 1. Medications and Drug Classes on the Beers Criteria (Continued)**

<b>Organ System or Therapeutic Category or Drug</b>	<b>Rationale</b>	<b>Recommendation</b>
<b>Central Nervous System</b>		
Antipsychotics (first and second generation): Chlorpromazine, haloperidol, perphenazine, aripiprazole, clozapine, lurasidone, olanzapine, paliperidone, quetiapine, risperidone, ziprasidone	Increased risk of stroke, and mortality in dementia patients	Avoid use for behavioral problems of dementia unless nonpharmacological options have failed and patient is a threat to self or others
Barbituates: Phenobarbital	High rate of physical dependence, tolerance to sleep benefits, risk of overdose at low doses	Avoid if possible
Benzodiazepines: Alprazolam, lorazepam, oxazepam, temazepam, clonazepam, diazepam	Increased sensitivity to benzodiazepines and slower metabolism of long-acting agents. Increase risk of falls, delirium, and cognitive impairment	Avoid for treatment of insomnia, agitation or delirium
Non-benzodiazepine hypnotics: Eszopiclone, zolpidem, zalepon	Increases risk of delirium, falls, cognitive impairment	Avoid for chronic use (>90 days)
<b>Endocrine</b>		
Desiccated thyroid	Increased risk of cardiac effects	Avoid if possible
Estrogen with or without progesterone	Increased risk of breast and endometrial cancer, lack of cardioprotective effect and cognitive protection in older women	Avoid oral and topical patch. Topical vaginal creams may be used in low-doses for management of dyspareunia, lower urinary tract infections and other vaginal symptoms
Insulin, sliding scale	Higher risk of hypoglycemia without improvement of hyperglycemia	Avoid
Sulfonylureas, long duration: glyburide	Greater risk of severe prolonged hypoglycemia due to renal metabolite	Avoid
Megestrol	Minimal effect on weight, increases risk of thrombotic events and death	Avoid
<b>Gastrointestinal</b>		
Metoclopramide	Increases risk of extrapyramidal effects including tardive dyskinesia and falls	Avoid unless for gastroparesis
<b>Pain</b>		
Meperidine	Not an effective oral analgesic, may cause neurotoxicity	Avoid
Non-COX-selective NSAIDs: Aspirin >325 mg/day, diclofenac, etodolac, ibuprofen, meloxicam, nabumetone, indomethacin, ketorolac	Increases risk of GI bleed and peptic ulcer disease. Patient may take proton pump inhibitors or misoprostol, but it does not eliminate the risk. Indomethacin has greatest risk of adverse drug effects	Avoid chronic use unless other alternatives are not effective
Skeletal muscle relaxants: Carisprodol, cyclobenzaprine, metaxalone, methocarbamol	Poorly tolerated due to increased risk of anticholinergic side effects, sedation, falls	Avoid if possible

decreased sweat), red as a beet (flushed face), and mad as a hatter (delirium).” Ultimately, anticholinergics can cause side effects, which may initiate the cascade of prescribing, or be detrimental to their health in the form of delirium. These medications are to be avoided, with the exception of diphenhydramine which may be used in acute treatment of allergic reaction. Benztropine and trihexyphenidyl may cause extrapyramidal symptoms when used concomitantly with antipsychotics. Other agents for Parkinson’s disease, such as carbidopa-levodopa, may be utilized to treat the patient. Antispasmodics such as hyoscyamine and scopolamine are to be avoided in elderly patients with the exception of palliative care patients who are using it to decrease oral secretions.

### **Antithrombotics, Anticoagulants, and Cardiovascular Medications**

Antithrombotics and anticoagulants are often utilized to prevent thrombosis and emboli from forming. Typically, the benefits often outweigh the risks of utilizing these medications. However, it is crucial that a community pharmacist educate the patient and caregivers about the potential risks associated with their use. When a patient is initiated on an antithrombotic or anticoagulant, the pharmacist is to counsel them on the risks of bleeding. For patients that are on antithrombotics or anticoagulants, the pharmacist should advise the patient to evaluate if there is unusual bruising bleeding while brushing their teeth, along with evaluating their stool. If the patient’s stool is black and tarry, and they are not taking an iron supplement, or if the stool looks like coffee grounds they may be experiencing a gastrointestinal bleed. In patients that are taking warfarin, they need to be educated to try and keep their vitamin K consumption consistent in a week. Foods that contain vitamin K include kale, Brussels sprouts, spinach, collard greens, celery, lettuce, broccoli, asparagus, and cabbage. The patient does not need to avoid these foods, but maintain a consistent diet of them, so that the dose of warfarin can be adjusted to meet a therapeutic INR.

In patients diagnosed with atrial fibrillation, they may be treated by rate control or rhythm control. In patients that are being treated by the rate control method, they are typically prescribed a beta-blocker with an anticoagulant to prevent an embolism. The other method used to treat atrial fibrillation is rhythm control in which the goal is to rectify the arrhythmia. For patients that are older, it is accepted practice to keep the patient maintaining an arrhythmia, but being treated with a beta-blocker and anticoagulant as opposed to antiarrhythmic drugs due to the risk of causing complications associated with antiarrhythmic medications. While it is up to the physician to decide the course of treatment, it is important for the patient to be educated on the risk of each course of therapy.

Other cardiovascular medications that should be evaluated in the elderly according to the Beers Criteria include alpha1 blockers, alpha2 agonists, digoxin, nifedipine, and spironolactone. Alpha1 blockers increase the risk of orthostatic hypotension, which can lead to a fall. These medications are to be avoided. Clonidine, while effective, also carries risks of bradycardia and orthostatic hypotension. Clonidine should only be utilized in patients diagnosed with treatment-resistant hypertension. Nifedipine should only be utilized in the extended release formulation as it can cause hypotension in the patient. While spironolactone may be beneficial in heart failure patients, it is important to consider the risk of causing hyperkalemia. Medications that also increase serum potassium include ACE-inhibitors, ARBs, and potassium supplements, all medications that can also be utilized in heart failure patients. It is imperative that patients be monitored for hyperkalemia.

### **Central Nervous System**

Tricyclic antidepressants have been utilized less in medicine compared to the past due to new agents being developed with fewer side effects. Typically, TCAs are being utilized to treat peripheral neuropathy or postherpetic neuralgia as opposed to depression. In patients who are utilizing TCAs for the treatment of peripheral neuropathy, it is important to assess its efficacy compared to its safety profile. If a patient has been effectively maintained on a TCA with no side effects noted, the patient may continue to utilize the medication. However, if the patient is experiencing symptoms, or is being started on a TCA for the first time, a discussion with the prescriber may be prudent, as the patient may utilize a medication with less detrimental side effects such as gabapentin, pregabalin, or a lidocaine patch, among other choices.

Barbiturates, benzodiazepine, and non-benzodiazepine hypnotics should be avoided in the elderly. The risk of falls, delirium, cognitive impairment, and physical dependence are more harmful than their potential efficacy. Patients should be educated on non-pharmacological approaches to dealing with stress, including meditation and breathing exercises, as well as eliminating stressors. If patients have failed non-pharmacologic therapy and require the use of benzodiazepines, it is important to counsel the patient and caregiver on the risk of falls, delirium and cognitive impairment. It is also crucial to stress the “as needed” nature of the medication. It should be only utilized in cases in which non-pharmacologic therapy has failed, and the patient is unable to cope. In patients with insomnia, a community pharmacist can counsel about proper sleep hygiene including limiting caffeine consumption and using the bed only for sexual intimacy and sleep, as well as keeping the bedroom dark while sleeping and developing a consistent schedule. If non-pharmacologic treatment fails, they may utilize a non-benzodiazepine hypnotic as a PRN therapy for insomnia.

The use of antipsychotics is a controversial subject for all patients. Antipsychotics carry a litany of risks including extrapyramidal side effects such as tardive dyskinesia, hyperprolactinemia, metabolic disorders, and weight gain. Antipsychotics should be utilized in patients that have failed non-pharmacologic approaches, and should be utilized for a short-term basis. Antipsychotics have also been documented to increase the risk of stroke as well as mortality in patients with dementia. Physicians may utilize antipsychotics at the lowest effective dose, for a short duration to help with acute psychosis and delirium. The patient should try to be weaned off therapy to prevent prolonged exposure. Non-pharmacological approaches such as counseling, re-direction of the patient, and finding the root cause of delirium should be implemented first, prior to initiating antipsychotics. Antipsychotics also increase the risk of QT-prolongation, increasing the risk of torsades de pointes, potentially leading to death. When a patient presents with a new prescription for an antipsychotic, whether in the community or long-term care setting, the pharmacist should assess the appropriateness of therapy based on diagnosis, drug, dose, and duration of therapy.

### **Endocrine and Gastrointestinal Disorders**

In the treatment of diabetes, it is important to take stock of the patient as a whole in the patient's treatment plan. Sliding scale insulin, regardless of age, should not be utilized in the treatment of diabetes. In an ideal world, the amount of insulin needed per dose can be calculated based on weight, diagnosis, and carbohydrate count. Sliding scale insulin is dangerous in that it assumes that all patients react the same way to 1 unit of insulin. This ultimately can cause hypoglycemia in patients that are particularly sensitive to insulin. It is the pharmacist's duty to question a prescription for sliding scale insulin on the behalf of the patient. In patients with decreased renal function, a common issue in patients with diabetes, glyburide puts the patient at risk of developing hypoglycemia. Glyburide, when metabolized, has a metabolite, which, in patients with decreased renal function can experience profound hypoglycemia due to the renal metabolite not being cleared. Recommendations for patients requiring a sulfonylurea include immediate release glipizide dosed once to twice a day depending on patient response.

Hormone therapy is common in men and women greater than the age of 50. Often times, estrogen therapy is utilized in women experiencing menopause, and is used to reduce symptoms of hot flashes and to promote cardiovascular protection. However, in patients that are elderly, the cardioprotection benefits of estrogen diminish, while the risk of breast and endometrial cancer increases. In patients that experience symptoms associated with menopause, such as vaginal dryness, topical vaginal creams may still be used as opposed to transdermal and systemic therapy. In males that

experience symptoms with low to no testosterone, testosterone supplementation is typically recommended to treat patients. However, like estrogen with women, testosterone in men can increase the risk of adverse events such as cardiac events, as well as its use being contraindicated in men with prostate issues like benign prostatic hypertrophy or prostate cancer. Testosterone therapy may only be utilized in patients with moderate to severe hypogonadism that are symptomatic.

Lastly, desiccated thyroid and metoclopramide need to be evaluated. With desiccated thyroid, there is no standardization in the dose of T3 and T4 that a patient may be exposed to in a single tablet. Patients that are diagnosed with hypothyroidism should utilize levothyroxine therapy to determine a dose based on patient response. Excess T4 can lead to cardiac issues such as palpitations. Metoclopramide should be avoided in all patients that are elderly, with the exception of patients who suffer from gastroparesis. In patients that are elderly, the risk of extrapyramidal effects, including tardive dyskinesia, become most prevalent.

### **Pain Management**

Pain has been regarded as the "sixth vital sign" that should be addressed in all patient encounters. As age increases, the risk of developing pain secondary to arthritis, falls, and osteoporosis, among other medical diagnoses, becomes more prevalent. Pain is important to be managed correctly, as it can cause inherent dangers if mismanaged. Opioids increase the risk of tolerance, sedation, delirium, and possibly death if the patient is overdosed. One opioid that should be avoided is meperidine, as the risk of neurotoxicity and seizures may cause more harm than efficacy compared to other opioids. Non-COX-2-selective NSAIDs increase the risk of gastrointestinal bleeding and peptic ulcer disease, especially in patients that are concomitantly using antithrombotics and anticoagulants. When utilizing NSAIDs, it is important to treat the patient for a predetermined amount of time, counsel them on the risks of chronic NSAID use, and evaluate the risk of developing peptic ulcer disease. Proton pump inhibitors or misoprostol may be utilized to help prevent peptic ulcer disease, but it is not a guarantee. Lastly, skeletal muscle relaxants should be avoided due to their risk of adverse events such as falls, sedation, and risks of fractures. In most cases, these medications should not be utilized except in circumstances in which all therapies have been exhausted.

### **WHEN SHOULD WE STOPP MEDICATIONS?**

The Screening Tool of Older Persons potentially inappropriate Prescriptions (STOPP), was developed to be utilized in conjunction with Beers Criteria to assess medications that may be stopped due to the fact that the medication is inappropriate for patients. However, the STOPP tool does not provide recommendations for prescribers if a medication is deemed inappropriate.



The list of recommendations from STOPP in regards to drug therapy includes:

- Discontinuing proton pump inhibitors for uncomplicated peptic ulcer disease at full therapeutic dosage after eight weeks of therapy.
- Discontinuing aspirin in patients with no history of coronary, cerebral, or peripheral vascular symptoms or occlusive arterial events.
- Discontinuing benzodiazepines in patients who have had one or more falls in the past three months.
- Eliminating duplicate drug class prescriptions.
- Avoiding long-term (>one month), long-acting benzodiazepines or benzodiazepines with long-acting metabolites.
- Avoiding loop diuretic as first-line monotherapy for hypertension.
- Avoiding long-term use of NSAIDS (>three months) for relief of mild joint pain in osteoarthritis.
- Avoiding long-term opiates in those with recurrent falls (one or more falls in past three months).
- Avoiding neuroleptic drugs in those with recurrent falls (one or more falls in past three months).

While STOPP does not provide recommendations on next steps for physicians, nurses, and pharmacists, it does provide more explicit recommendations on when to discontinue therapy for patients that are at risk.

### **WHAT HIGH-RISK MEDICATIONS ARE BEING UTILIZED IN THE NON-ELDERLY PATIENT POPULATION?**

The Institute of Safe Medication Practices (ISMP) has comprised a list of medications that “bear a heightened risk of causing significant patient harm when they are used in error.” Of the drugs listed by ISMP, most are intended for inpatient use and will not generally be dispensed in a community pharmacy. The medications that are commonly seen in community pharmacy practice include oral anticoagulants and antithrombotics, oral hypoglycemic agents, oral chemotherapeutic agents, insulin (including the U-500 and U-300 formulations), opioids, and methotrexate. These medications bear an inherent risk to patients that utilize them. It is important for the pharmacist to counsel the patient on the inherent risks of using these medications. Newly diagnosed patients with diabetes should not be prescribed the U-300 or U-500 insulin formulation. The U-300 and U-500 formulations are used in special circumstances of long-standing patients with diabetes who are grossly insulin resistant who require insulin. Overdose with the U-500 formulation is significant, and the patient should be counseled and asked to show how to draw up their particular dose. Patients taking methotrexate need to be counseled, as patients taking methotrexate for rheumatic purposes do not take the medication daily. It is important

that the patient understands that the medication is to be used once a week, whereas methotrexate for oncologic purposes is used once daily. There are many anecdotal instances in which patients taking methotrexate were not counseled, took the rheumatic dose once daily, and have been hospitalized, or expired.

### **ESSENTIALS OF MEDICATION THERAPY MANAGEMENT**

Since the incorporation of the term medication therapy management (MTM) into the Medicare Part D prescription drug benefit, pharmacists can provide a series of services to patients in an effort to provide maximal therapeutic benefit to a patient. Utilizing the skills adopted in training for MTM, the community pharmacist is instrumental in evaluating a patient's comprehensive medication list. In an ideal world, a patient would utilize one pharmacy, allowing the pharmacist the ability to make informed decisions and recommendations for a patient. The community pharmacist is instrumental in evaluating a patient's regimen, providing them the opportunity to counsel when appropriate, or make recommendations to the physician, when a patient's safety is at risk. Since the role of the pharmacist has shifted from strictly dispensing to one where the pharmacist is a member of a health care team, pharmacists have been granted the ability to bill for services through MTM platforms.

Community pharmacies that participate in medication therapy management services contract with medication therapy management platforms that allow for ease of service and ease of billing. The two platforms that are commonly utilized are OutcomesMTM<sup>®</sup> and Mirixa<sup>®</sup>. These platforms help to identify patients who are eligible for medication therapy management services and address whether they are eligible for targeted interventions or a comprehensive medication review. A targeted intervention is defined as a process in which a single recommendation is presented to the pharmacist about a patient in which greater efficacy or safety can be established for that patient. A comprehensive medication review is when the pharmacist evaluates the patient as a whole, verifying that there is an appropriate medication, dose, and duration for any and all given diagnoses and a proper diagnosis for all medications. During a comprehensive medication review session, a pharmacist may determine multiple interventions for a patient. This is the time in which high risk medications may be addressed, to which appropriate recommendations may be presented to the prescribing physician. Medication therapy management, while beneficial to the patient, is also a sustainable model for patient care. The platforms then allow for the pharmacist to bill for services rendered.

The Centers for Medicare & Medicaid Services (CMS) created the Star Ratings program to incentivize health plans to provide

better care to patients. Health plans are utilizing community pharmacists to provide MTM services in hopes of increasing metrics associated with the Star Ratings program. The metrics that pertain to pharmacy include adherence, correct drug utilization, drug-drug interactions, and high risk medication use. When a pharmacist conducts MTM services, the pharmacist evaluates all the metrics outlined in the CMS Star Rating program. If a pharmacist can decrease drug-drug interactions, and appropriately switch patients from potentially high risk medications to one that is deemed safer without sacrificing efficacy, the plan increases the chance of becoming a 5 Star plan. When a plan is a 5 Star, it has a chance of obtaining a greater pool of patients, and in reward, the pharmacy has the potential to receive better reimbursement rates in terms of dispensing, creating a new revenue stream.

MTM creates the ability to improve a patient's medication therapy and provide a revenue stream in terms of direct reimbursement, as well as reducing costs for CMS, leading to potential indirect reimbursement.

## CONCLUSION

Clinical pharmacy has historically been believed to be pharmacists conducting services within the confines of a hospital or nursing facility. Pharmacists in the inpatient setting are granted the ability to have direct patient contact, as well as direct contact with providers, allowing for a greater number of recommendations to be accepted by the provider. However, patient care extends beyond the confines of the hospital, to which the goal ultimately remains to keep the patient safe, healthy, and out of the hospital. This provides community pharmacists a unique opportunity to be the point of care as all prescriptions are funneled through the pharmacy. The pharmacist is then able to determine if the patient is receiving the most safe and efficacious therapy. The pharmacist can then form a relationship with the patient, so when they are appropriately prescribed a high-risk medication, the pharmacist can counsel on monitoring points for the prescribed medication. This in turn leads to patient trust in the pharmacist, so that when the patient experiences an adverse event, it is reported immediately, ultimately potentially preventing a hospitalization. ■

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**Editor's Note:** For the list of references used in this article, please contact *America's Pharmacist* Managing Editor Chris Linville at 703-838-2680, or at [chris.linville@ncpanet.org](mailto:chris.linville@ncpanet.org).

## Continuing Education Quiz

Select the correct answer.

1. What term is used when a physician prescribes a medication to counteract the side effect of another medication?
  - a. Medication therapy management
  - b. Cascade of prescribing
  - c. Drug utilization review
  - d. STOPP method
2. Which side effect is NOT associated with anticholinergic medications?
  - a. Dry eyes
  - b. Urinary incontinence
  - c. Diarrhea
  - d. Confusion
3. AF is a 71-year-old hospice patient in a skilled nursing facility. His medication regimen includes haloperidol 5 mg PO q6h PRN agitation, Sinemet 25-100 mg TID, and morphine ER 30 mg q12h around the clock. His Parkinson's disease symptoms have become troublesome for the patient. What is the best choice in therapy for this patient?
  - a. Physical therapy
  - b. Increase Sinemet to 25-100 mg QID
  - c. Add benztrapine
  - d. Add trihexyphenidyl
4. Under what condition SHOULD antispasmodics be used in the elderly?
  - a. Chronic idiopathic diarrhea
  - b. Sialorrhea
  - c. Motion sickness
  - d. Hyperhidrosis
5. KL is an 82-year-old male who has a past medical history of type 2 diabetes, hypertension, and stage III chronic kidney disease. His medications include metformin 1,000 mg PO BID, glipizide 10 mg PO daily, lisinopril 20 mg PO daily, and amlodipine 10 mg PO daily. Recently he has complained of pain shooting down his legs as well as chronic tingling and burning in his feet. Based upon his presentation, which medication would be the most safe AND efficacious?
  - a. Amitriptyline 100 mg PO daily
  - b. Capsaicin topically QID
  - c. Lidoderm patch applied for 12 hours
  - d. Pregablin 75 mg PO daily



- 6.** TM is a 55-year-old male who was recently diagnosed with a pulmonary embolism. He has no past medical history and takes one multivitamin daily. The patient is to be initiated on warfarin for six months. What counseling point(s) needs to be communicated to the patient?
- Maintain a consistent weekly diet.
  - Signs and symptoms of gastrointestinal bleed.
  - The patient needs to visit an anticoagulation clinic to monitor INR.
  - All of the above
- 7.** PP is a 68-year-old female diagnosed with refractory hypertension. Her medications include lisinopril 40 mg PO daily, isosorbide amlodipine 10 mg PO daily, hydralazine 25 mg PO TID, Imdur 30 mg PO daily, and salt restriction. She presents to her PCP with a blood pressure of 171/91 mm Hg. She has remained adherent to all medications. What is the safest next step for the patient?
- Initiate clonidine.
  - Initiate doxazosin.
  - Initiate immediate release nifedipine.
  - Discontinue hydralazine due to reflex tachycardia.
- 8.** HB is a 78-year-old female recently admitted to the hospital for a full cardiac evaluation due to her “feeling funny” with the complaint that her “heart was beating out of her chest.” After a full evaluation, it was determined that she was diagnosed with atrial fibrillation. Her past medical history includes depression and bipolar disorder. Her medications include sertraline 200 mg PO daily, aripiprazole 30 mg PO daily, and divalproex sodium ER 500 mg PO BID. Which medication regimen is most appropriate for the patient at this time?
- Sotalol 80 mg PO daily
  - Amiodarone 200 mg PO daily
  - Metoprolol succinate 100 mg PO daily
  - Metoprolol succinate 100 mg PO daily and warfarin dosed to INR 2-3
- 9.** JJ is a 65-year-old male who has been diagnosed with heart failure for 10 years. He presents to an MTM comprehensive medication review. Currently he is taking losartan 100 mg PO daily, carvedilol 12.5 mg PO BID, furosemide 40 mg PO daily prn edema, spironolactone 50 mg PO daily, digoxin 125 mcg PO every other day, and potassium chloride 10 mEq PO daily on days he takes furosemide. The patient states that recently he has not been feeling well, stating that he has experienced fatigue, nausea, and weakness. His blood pressure is reported at 143/81 mm Hg, with a pulse of 78 beats per minute. Based on the patient presentation, what is the best recommendation to be made to the patient's cardiologist?
- Decrease carvedilol to 6.25 mg PO BID.
  - Change losartan to Lisinopril 40 mg PO daily.
  - Monitor patient's serum potassium.
  - Change furosemide from PRN to once daily.
- 10.** What counseling point(s) need to be expressed to all patients, but especially the elderly, taking tricyclic antidepressants?
- Maintain fluid restricted diet.
  - Stand up slowly, holding on to the bed for stability.
  - Take diphenhydramine 25 mg PO HS prn insomnia.
  - All of the above.
- 11.** KR is a 94-year-old male hospice patient. Recently he has become agitated, leaving his room and becoming increasingly confused. He has not been deemed harmful to others or himself. Currently he is taking oxycodone ER 20 mg PO q12h around the clock, with oxycodone 5 mg PO q4h PRN pain, docusate 100 mg PO BID, senna 8.6 mg PO BID, and metoclopramide 10 mg PO QID for gastric motility. What is the best recommendation for the patient?
- Redirection by the nurse as needed
  - Aripiprazole 5 mg PO daily
  - Haloperidol 1 mg PO q8h prn
  - Diazepam 5 mg PO q8h prn
- 12.** BR is a 76-year-old male who presents to his PCP for insomnia. He states recently that he has experienced some trouble falling asleep. His sleep regimen includes him watching television in bed for three hours prior to attempting to fall asleep. He also has a coffee after dinner with dessert. What is the best recommendation for the patient at this time?
- Zolpidem 5 mg PO prn insomnia
  - Temazepam 30 mg PO prn insomnia
  - Diphenhydramine 25 mg PO prn insomnia
  - Lifestyle modifications

- 13.** MJ is a 67-year-old female who comes to her community pharmacy asking for advice. She states that she has been post-menopausal for 15 years. She states that she has been experiencing vaginal dryness, leading to frequent urinary tract infections. She asks for a recommendation before going to her PCP. What is the best therapy for the patient?
- Transdermal estradiol patch 0.0375 mg applied twice weekly
  - Conjugated estrogens 0.625 mg PO daily
  - Estradiol cream applied twice weekly
  - Sulfamethoxazole/ trimethoprim DS PO daily for prophylaxis
- 14.** ER is an 88-year-old male who was diagnosed with geriatric diabetes 10 years ago. His last A1c is 9.4 percent. He is currently taking metformin 1,000 mg PO BID. What is the most safe and efficacious recommendation for the patient?
- Insulin glargine 30 units subcutaneously HS
  - Increase metformin to 1,500 mg PO BID
  - Initiate glyburide 5 mg PO BID
  - Initiate glipizide 5 mg PO daily
- 15.** TO is a 90-year-old male who has a past medical history of hypertension, anxiety, transient ischemic strokes, and complicated peptic ulcer disease. He is currently taking furosemide 20 mg PO daily, omeprazole 20 mg PO daily, aspirin 81 mg PO daily, and alprazolam 0.25 mg PO daily PRN anxiety. Based on STOPP criteria, which medication should be re-evaluated?
- Alprazolam
  - Furosemide
  - Omeprazole
  - Aspirin
- 16.** What is a disadvantage of using STOPP as a lone source to evaluate appropriate medication use in the elderly?
- STOPP is less comprehensive compared to Beers.
  - STOPP does not provide specific criterion to discontinue an inappropriate medication.
  - STOPP does not provide alternative recommendations.
  - STOPP only focuses on anticholinergic medications.
- 17.** In a patient taking diazepam 10 mg PO q8h around the clock, oxycodone ER 60 mg PO q12h around the clock, and risperidone 1 mg PO daily, what is the patient most at risk for?
- Cerebrovascular events
  - Recurrent falls
  - Paradoxical neuronal excitation
  - Infections
- 18.** In what patient is U-500 insulin most appropriate?
- Newly diagnosed type 1 diabetes patient
  - A type 2 diabetes patient who is sensitive to insulin
  - A type 1 diabetes patient who frequently exhibits hypoglycemia
  - A type 2 diabetes patient requiring insulin who is insulin resistant
- 19.** What is the difference between a targeted intervention and a comprehensive medication review?
- A targeted intervention evaluates all medications, whereas a comprehensive medication review evaluates the appropriateness of one medication.
  - A targeted intervention provides a greater reimbursement opportunity compared to a comprehensive medication review.
  - A targeted intervention is patient initiated, whereas a comprehensive medication review is pharmacist initiated.
  - A targeted intervention is a single intervention, whereas a comprehensive medication review may consist of multiple interventions.
- 20.** Which of the following is NOT a reason in which it is important to evaluate the utilization of high risk medications in the elderly?
- Elderly patients have increased metabolism.
  - Elderly patients have decreased renal elimination of medications.
  - Elderly patients are at risk of polypharmacy.
  - Elderly patients have an increased risk of altered drug absorption.