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Medications and Falls

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Case Study: Medications and Falls

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Educational Objectives:

1. To describe potential causes of falls and ways to prevent them.
2. To illustrate how medications can contribute to an increased risk of falls and recommend strategies for reducing this risk.

Case Study

Jane Brown is an 83 year old woman who lives with her husband in her own home. She is active in her church and enjoys visiting with her grandchildren and great grandchildren. She suffers from several health problems including heart failure, arthritis, osteoporosis, occasional anxiety, insomnia, and cataracts. More recently she has begun to experience mild confusion, dizziness and depression. Jane Brown sees two doctors: a primary care doctor and a cardiologist. She takes the following medications:
Digoxin (Lanoxin®) for heart failure
Furosemide (Lasix®) for heart failure
Flurazepam (Dalmane®) as needed for insomnia
Lorazepam (Ativan®) as needed for anxiety
Amitriptyline (Elavil®) for depression
Meclizine (Antivert®) for dizziness.

She also takes acetaminophen or ibuprofen for aches and pains and calcium for her osteoporosis. She obtains her medications from two different pharmacies, depending on which is more convenient. She is enrolled in Medicare and a Medicare Supplemental Insurance program that pays for her prescription medications.

Last month, she fell against the bathroom sink, bruising her back and chest wall, but she did not feel that it was serious enough to consult her doctor. She has not attended church or been out of the house much since the fall.

Are falls a significant problem?

Falls in the elderly result in significant medical, social, and financial consequences. About 30% of people age 65 and older living at home will fall each year (Tinetti, 1990). The number increases to 50% for those over age 80. More than half of ambulatory residents in long term care facilities fall each year. The majority of those who fall experience multiple episodes. Not only does the rate of falls increase with age, but the rate of injury from those falls increases as well. About 5% of people who fall fracture a bone, and 1% fracture a hip, resulting in 250,000 hip fractures each year in the U.S. Accidents, most of which are falls, are the sixth leading cause of death in persons over age 65. It has been estimated that the financial cost of caring for those who fall is $12.4 billion per year (Tibbitts, 1996). Falls are cited as the reason for 40% of nursing home admissions. Falls often result in self-imposed activity restriction because of fear of falling, and may lead to withdrawal from normal activities and depression.

What are the risk factors for falls?

Falls usually result from a combination of factors related to the individual, the environment, and/or medications. Characteristics of the individual that may contribute to an increased risk of falling include disabilities (e.g. muscle weakness or balance impairment), current diseases (e.g. cerebrovascular disease, cardiac arrhythmias, dementia, altered mental status, Parkinson's disease, seizure disorders, diabetic neuropathy, osteoporosis, cataracts, or a previous fracture), acute illnesses (e.g. infection, fever), or age-related changes in vision, hearing or reaction time. Environmental causes are believed to be responsible for about 22% of falls (Tibbitts, 1996). These factors include poor lighting, obstacles on the floor, unstable furniture, low beds or toilets, or inadequate railings on stairs. Environmental factors are particularly significant in unfamiliar surroundings. Medications are also an important contributor to falls. The total number of medications is a significant factor, with increased risk associated with taking four or more drugs (Tibbitts, 1996). Specific drugs or drug classes which can increase risk of falls include (Tibbitts, 1996; Kay and Tideiksaar, 1990; Cooper, 1997):

Drugs which act on the central nervous system:
* tricyclic antidepressants
* trazadone
* monoamine oxidase inhibitor antidepressants
* antipsychotics
* barbiturates
* benzodiazepines
* drugs which can cause abnormal movements
* sedating antihistamines.

Drugs which act on the cardiovascular system:
* beta blockers
* calcium channel blockers
* reserpine
* methyldopa
* vasodilators
* digoxin.

Drugs which lower blood sugar:
* oral hypoglycemics
* insulin.

The risk of a fall is increased when medications have been changed within the past two weeks (Tibbits, 1996). Adverse drug effects, particularly sedation and dizziness, are usually greater at the initiation of treatment before the body begins to become tolerant to the side effects.

A clinical pharmacist, using a clinical rules system, designed an intervention to reduce the risk of falls in the elderly by identifying patients over age 75 who are at higher risk for falls. Claims data for patients enrolled in a Medicare Supplement plan (approximately 70,000 patients) were examined. Information from both insurance and drug claims was used to calculate a risk index. Each patient's risk factors were evaluated and combined into a risk index:

Risk index =
total number of high risk diagnoses +
total number of high risk medications +
1 point for taking 4 or more medications +
1 point for taking 8 or more medications +
1 point for taking 12 or more medications +
1 point if being treated by more than one physician.

Patients with a risk index of 10 or greater were defined as "high risk" for a fall. Claims for 27,052 patients over age 75 (average age = 82.3 years) were reviewed. The average number of drugs per patient was 7.3, and the average number of high risk drugs per patient was 2.1. Patients were seen by an average of 2.3 physicians. A total of 2,211 patients (8%) were determined to be potentially at high risk for a fall.

Jane Brown was one of these patients, with a risk index of 10. She has osteoporosis (1), cataracts (1) and confusion (1); uses 6 prescription medications (1); uses five high risk drugs [digoxin, imipramine, lorazepam, flurazepam and meclizine](5); and sees two physicians (1). The insurance company sent a letter to each of Jane Brown's physicians requesting that they review her drug regimen and consider any drug changes that would be appropriate to reduce her fall risk.

What can be done to reduce the risk of medication-related falls?

Prescribers can reduce fall risk due to medications by:
1. Determining through regular review the indication and ongoing need for each prescribed drug.
2. Discontinuing drugs of questionable benefit with appropriate clinical follow up.
3. Substituting a lower risk drug whenever possible.
4. Identifying patients who are at higher risk for drug adverse events (e.g. advanced age or presumed or documented renal impairment) because of an inability to effectively eliminate a drug effectively or compensate for the drug's effects, and adjusting dosages as needed.
5. Advising patients to be careful when ambulating whenever new drugs are begun.
6. Refraining from using a drug to treat an adverse event of another drug.
7. Adequately treating conditions such as osteoporosis to reduce the risk of injury after a fall.

Patients and their families can reduce fall risk due to medications by:
1. Informing each prescriber and pharmacist of all of the medications being taken, including nonprescription products.
2. Consulting the prescriber whenever an adverse drug reaction may be occurring, especially when confusion or loss of balance is noted. Problems attributed to normal aging may actually be medication side effects.
3. Consulting a doctor or pharmacist when choosing nonprescription products.
4. Exercising caution in the activities of daily living when starting a new medication, especially those that cause sedation, loss of balance, or low blood pressure.
5. Working with the prescriber to reduce the total number of prescription and nonprescription medications.

Another approach to reducing fall risk is a population-based one as described in this case. Using information technology, medical and pharmacy insurance claims data can be evaluated to identify patients at potential risk, and interventions can be designed to reduce that risk.

Jane Brown visited her primary care doctor to discuss her medications and other health issues. Over the next 6 months, they worked together to reduce her fall risk.

* The digoxin dose was decreased. She had been taking digoxin for more than 10 years. Digoxin is eliminated from the body by the kidneys. Her kidney function had been gradually declining over time. Her dose had become too high, resulting in confusion, dizziness, and drowsiness.

* The prescription for flurazepam was discontinued. Flurazepam is a long-acting benzodiazepine that can accumulate in the elderly. Use should be discontinued gradually because dependence develops with chronic use. Flurazepam can also cause dizziness, confusion, and daytime drowsiness and has been associated with falls in the elderly. Non-medication strategies to alleviate insomnia were implemented.

* Lorazepam was gradually discontinued. Lorazepam is also a benzodiazepine, and the use of two benzodiazepines simultaneously can result in additive toxicity. Lorazepam and flurazepam were prescribed by different doctors, who were unaware that Jane Brown was taking two

benzodiazepines. Withdrawal of benzodiazepines can take months and requires a great deal of motivation from the patient and the prescriber.

* Amitriptyline was switched to paroxetine (Paxil®). Amitriptyline has anticholinergic activity which can be associated with sedation, confusion, and impaired cognition in older persons. It may also lower blood pressure. Paroxetine and other SSRI antidepressants have a more favorable side effect profile in the elderly. An antidepressant may no longer be needed after benzodiazepines and anticholinergic drugs are discontinued.

* Meclizine was discontinued. Meclizine was prescribed for dizziness that was probably a medication side effect. Meclizine is also an anticholinergic drug and often causes central nervous system side effects in the elderly.

* Jane Brown was referred to a specialist to evaluate her osteoporosis and obtain appropriate treatment, including weight bearing exercise and strength training.

* Strategies to reduce the risk of fall due to the environment were also discussed.

Summary

By working together, patients and their health care providers can reduce the risk of falls. Many factors associated with the individual, the environment, and medications contribute to fall risk. Drug therapy is a modifiable risk factor. A comprehensive review of a patient's drug history often reveals medications that were intended to be discontinued earlier, or were continued because of lack of coordination of care. Patients who appear to be "well controlled" on their current medication regimen may actually be placed at unnecessarily high risk for adverse drug reactions and falls. Response to medication can change with age-associated changes in physiology. Ongoing monitoring of drug therapy may minimize fall risk.

Study Questions

1. What risk factors contribute to falls?
2. What types of medications are particularly problematic when it comes to falls?
3. What strategies can be implemented to reduce medication-related fall risk?

References

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