Polypharmacy in the Older Patient With Cancer

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The plethora of medications taken by older patients with cancer increases the risk of harmful drug interactions.

Background: Elderly patients -- those aged 65 years and over -- use more medications than their younger counterparts and experience higher risks for polypharmacy, drug interactions, adverse drug reactions, and noncompliance for this age-group.

Methods: The data on polypharmacy in the aged is reviewed, supplemented with preliminary information from studies performed on elderly patients with cancer at our institution.

Results: Polypharmacy occurs in ambulatory, extended care, and institutional settings. Over-the-counter medications are underreported. The number of potential drug-related problems is related to the total number of prescriptions. Methods for evaluating the extent of polypharmacy include the "brown-bag" technique and careful medication histories.

Conclusions: The risks of polypharmacy may be reduced with patient and physician education, intervention, and drug monitoring. Further pharmacokinetic investigations of anticancer medications are needed to recognize the potential for harmful drug interactions, to understand their toxicity profiles, and to avoid the clinical implications of drug interactions.

Introduction

The definition of polypharmacy has changed over the past decade. The earlier interpretation -- the mixing of several drugs into one prescription -- has evolved to refer to the concurrent use of several different medications, which can include more than one medication from the same drug classification. The Healthy People 2000 Conference identified polypharmacy by older people with chronic health problems as the principal safety issue in the coming years.

The elderly population -- those 65 years of age and older -- comprises approximately 12% of the total population. Four out of five elderly people experience at least one chronic illness and a vast array of symptoms. The likelihood that an older individual will experience a chronic illness increases rapidly with age. Twice as many medications are prescribed to patients over 65 years of age compared with younger patients. The trend for multiple medications continues through 80 years of age. The older population uses approximately 30% of all prescription medications, along with an unknown percentage of nonprescription medications. Approximately three quarters of ambulatory seniors take at least one prescription medication. The number of over-the-counter medications is not well documented. As the elderly population increases and as researchers discover and test new medications to prevent and treat medical problems such as cancer, polypharmacy will continue to flourish.

The complex treatment of cancer, coupled with the increased comorbidity in the older patient, increases the potential for polypharmacy. According to the 1994 Surveillance, Epidemiology, and End Results Program of the National Cancer Institute, over 50% of all cancers occur in patients who are older than 65 years of age, and complex treatments may involve multiple cytotoxic medications at near-toxic dosages. The simultaneous use of several different medications is increasingly resulting in harmful drug interactions in the older patient with cancer. The usefulness of a drug, its side effects, and any potential interactions that could alter its toxicity or efficacy profile must be carefully considered before being added to a medication regimen.

All medications used by an older patient should be reviewed before the addition of systemic therapy to the cancer treatment.

In 1984, Simonson suggested seven features that identify medication misuse and abuse: (1) medications that have no apparent indication, (2) duplicate medications, (3) concurrent use of interacting medications, (4) contraindicated medications, (5) inappropriate dosages, (6) drug therapy to treat adverse reactions, and (7) improvement when the medication is discontinued. Polypharmacy may also be attributed to the fact that medical advice is sought more often by older adults than by young adults. The elderly rely on medications more than their younger counterparts to alleviate symptoms and/or disease states. Nolan and O'Malley noted that 35% of office visits by those more than 85 years of age resulted in prescriptions for three or more medications. The senior adult is often targeted by the mass media in the promotion of new medications and medications that are given over-the-counter status.
Until age 60 years, the incidence of invasive cancer is greater in women than in men. This trend reverses for those age 60 and older, when the incidence becomes higher in men. On average, drugs are used more often by older women than older men. At our center, a retrospective study is being conducted to evaluate sex specificity and medication use in older patients. As an example, an analysis of 147 patients with cancer shows that nonprescription medications are used more often by women with breast cancer than by men with prostate cancer (Fig 1).

Arenas for Polypharmacy

The rate of prescribing medications is lower in the ambulatory community setting than in the extended care facility or in the institutional setting. Two studies on the use of prescription and nonprescription drugs show that regardless of study parameters, the categories of medications most frequently used in the elderly population are similar (Table 1). Prescription medications for 218 older patients with cancer at our center were ranked in order of frequency of medication prescribed (Table 2). Similarities are apparent among the groups cited in these tables.

Shimp et al studied potential prescription and nonprescription medication-related problems in noninstitutionalized elderly patients and concluded that the number of potential drug-related problems was most strongly affected by the number of prescription medications used. Frequent changes in medication regimens may confuse the older patient about which medications to continue or discontinue. A change from a brand-name drug to a generic drug may result in an elderly patient using both medications concurrently, and alterations in the color, appearance, or size of capsules or tablets may also confuse a patient who identifies medications by these traits.

A 1988 study by Carbonin et al analyzed drug use and adverse reactions in 41 medical and geriatric wards. Each patient used an average of 5.1 medications, and this number increased with advancing age. The most common medications given during hospitalization were cardiac glycosides, loop diuretics, cardiac medications, and antiulcer medications. These medications are also reported on the top 10 medications in the ambulatory setting (Table 1) and at our center (Table 2).

The primary reason for hospitalization of cancer patients is neutropenic fever. An older cancer patient may require hospitalization due to additional side effects of chemotherapy that would not be apparent in a younger cancer patient. Compared with their younger counterparts, older patients with cancer generally have more comorbid conditions that may be exacerbated by the chemotherapeutic regimen. For example, elderly cancer patients with heart conditions may be receiving chemotherapy agents (or dosages of those agents) that affect function of the heart. In general, these patients are taking medications to control their comorbid condition, and the additional volume of administered fluid or medication may unbalance the homeostasis. These situations are usually rectified prior to admission of chemotherapeutic medications, but complications can arise following treatment. Another example is the high frequency of use of laxative or antidiarrheal medication in the elder population. Laxatives coupled with chemotherapeutic agents that have a laxative effect can cause dehydration and subsequent hospitalization in the older person with cancer. These side effects may not be apparent immediately after chemotherapy treatment but may be latent.

The phenomenon of treating with "natural" products advocated and sold by health food stores may unintentionally harm the older person. The term "natural" may imply "safe" to the elderly when in fact the product may not be safe, due to its intrinsic nature, to the physical health of the older individual, or to other medications being used for treatment. These "natural" products may interact with prescribed medications and thus exacerbate existing health conditions. For example, iron products inhibit the absorption of tetracyclines, quinolones, and antihypertensive agents. When iron is given with thyroxine replacement therapy, the serum concentration of thyrotropin (thyroid-stimulating hormone) increases and thus the signs and symptoms of hypothyroidism are increased. As another example, calcium products inactivate tetracycline and should not be given with antibiotics. Calcium should be used cautiously in older patients using cardiac glycosides due to the interaction between these two drug classifications. Arrhythmias may occur if these agents are taken concurrently.

"Alternative" therapies (eg, herbal products, food supplements, vitamins, crystals, and religious beliefs) are widely publicized for the treatment and prevention of cancer.
A medication is defined as "any substance, other than food, that is used in the prevention, diagnosis, alleviation, treatment, or cure of a disease." Based on this definition, most alternative therapies should be considered as medications.

The Food and Drug Administration does not regulate food supplements in the manner of traditional medications. Ingredients do not need to be included on the label, and the quality control required of traditional medication manufacturing is not mandatory in food supplements. Therefore, "what you see" may not always be "what you get." Nutritional claims can be stated on labels of food supplements without the support of factual studies or proof. The effects of food supplements in conjunction with chemotherapy regimens have not been adequately studied.

Antioxidants for the prevention of cancer are heavily promoted. They may control damage to cells by holding cellular integrity and preventing the formation of free radicals. Significant side effects may result from indiscriminate use of these agents by cancer patients. For example, megadoses of vitamin C can cause the formation of kidney stones and can acidify the urine. Methotrexate is an example of a chemotherapeutic agent that needs an alkaline urine pH in order to be properly excreted. By acidifying the urine, methotrexate may be retained and thus cause excess toxicity or damage to the renal tubules. Several anticancer medications exert their cytotoxicity via the formation of free radicals. For example, doxorubicin, an anthracycline, is used alone or in combination with other chemotherapeutic agents in a variety of antitumor regimens. In theory, preventing the formation of free radicals may inhibit the full potential of an important piece of the treatment regimen, which could decrease the efficacy of the chemotherapeutic regimen. Further studies are needed to evaluate the use of antioxidants in combination with chemotherapeutic regimens.

**Evaluation and Potentiation of Polypharmacy**

Older patients with cancer are especially vulnerable to the risks associated with polypharmacy. Their heightened use of drugs to treat cancers and increasing chronic illnesses, the availability of nonprescription medications, the tendency to self-treat, the prohibitive costs of some anticancer medications are among the various reasons that can promote polypharmacy (Table 3).

<table>
<thead>
<tr>
<th>Table 3. Factors That Influence the Development of Polypharmacy in the Older Population.</th>
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<tr>
<td>Increasing number of chronic illnesses</td>
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<tr>
<td>Use of home remedies</td>
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<tr>
<td>Cost of medications</td>
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<td>Insufficient knowledge of medications</td>
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The potential for adverse effects from the use of "natural" products by the elderly population is enhanced when the patient fails to disclose all medication use to the health professional. When medical histories are recorded, drug side effects, interactions, and exacerbations of already apparent disease processes may be attributed to other causes. The older patient may not perceive nonprescription products to be medications and thus may use these products without the knowledge of possible drug interactions. Of 218 older patients with cancer who were interviewed at our institute, 47% were taking nonprescription items but did not report these products as medications. With each additional physician seen by the senior adult, the probability of duplicating medications and other polypharmacy issues increases exponentially. The lack of a primary care physician to orchestrate all physicians seen by one patient record, therapy may be initiated without the full scope of a patient's medication regimen. Consequently, physicians may prescribe different medications to achieve the same therapeutic endpoint. If the physicians do not have access to the primary medical record, therapy may be initiated without the full scope of a patient’s medication history. With each additional physician seen by the senior adult, the probability of duplicate medications and other polypharmacy issues increases exponentially. The lack of a primary care physician to orchestrate all physicians seen by one patient increases the possibility of polypharmacy. Multiple prescribers for the senior adult are not limited to physicians, however. Health food store personnel, pharmacists, dietitians, nurses, friends, and family members may also influence the medication practices of the elder adult and may make recommendations without full knowledge of the disease process, symptoms, or concomitant illness experienced by the elder person.

Hoarding medications poses a potential risk for polypharmacy. "Saving medication for later use" is a common explanation for not taking medications as prescribed. The fixed income of many elderly people may prompt the need to hoard medications. In addition, the policy of some health care coverage plans to limit the number of chemotherapy regimens has not been adequately studied.

The increase in the number of chronic illnesses reported with advancing age may increase the number of different physicians seen by the elderly population. Consequently, physicians may prescribe different medications to achieve the same therapeutic endpoint. If the physicians do not have access to the primary medical record, therapy may be initiated without the full scope of a patient’s medication history. With each additional physician seen by the senior adult, the probability of duplicate medications and other polypharmacy issues increases exponentially. The lack of a primary care physician to orchestrate all physicians seen by one patient increases the possibility of polypharmacy. Multiple prescribers for the senior adult are not limited to physicians, however. Health food store personnel, pharmacists, dietitians, nurses, friends, and family members may also influence the medication practices of the elder adult and may make recommendations without full knowledge of the disease process, symptoms, or concomitant illness experienced by the elder person.
Using multiple pharmacies to fill prescription medications also can add to the risk of polypharmacy. Rather than using one pharmacy for all medications and thus developing a convenient record of drug use, the older adult may patronize various pharmacies to find the lowest cost for a medication. Several large drug store chains are linking pharmacies via a common computer data base, thus providing access to a record of all prescriptions filled by that chain. However, the record becomes unreliable and incomplete when the patient uses different chains or sources.

The patient’s lack of knowledge concerning medications, as well as poor understanding of the medical conditions for which the medications are prescribed, may also lead to polypharmacy. Psychosocial aspects of the ability of the older adult to learn about medications has been documented.21 The education of patients is vital to the successful treatment of their medical condition. Lack of knowledge may or may not be attributed to the information resources available to the elderly. Presentation of information must correspond to the physical limitations of patients and their individual education levels. Beyond 65 years of age, one in four people is affected by vision or hearing loss or by significant tinnitus.22,23 Medication information is often presented in small print, making it difficult to read by some older individuals. The cognitive process may slow with advancing age and thus may correspond to a decline in memory and learning procedures.24 In addition, the patient may not understand the therapeutic endpoint of the therapy or why the medication is being given.

Consequences of Polypharmacy

Adverse Drug Reactions

Differences in study design and samples hinder the ability to draw conclusions from reports of adverse drug reactions (ADRs) in the elderly hospitalized population. Drug interactions are thought to be a leading cause of ADRs.25 The multitude of medications prescribed to the elderly patient upon hospitalization potentiates the risk of drug interactions. This may explain the assumption that ADRs are related to the age of the individual, when in reality ADRs may be due to the severity of the presenting medical problem (eg, congestive heart failure, an infectious process, or respiratory difficulties). An exponential rather than linear increase in the incidence of ADRs is observed with the addition of each drug to an existing regimen.25-26 Lipton et al27 reported that 48% of 236 ambulatory patients experienced a drug interaction, and only 2% of those reactions were clinically significant.

Common medications used by the elderly have been previously listed (Tables 1 and 2). It is important to note that those medications most commonly cause ADRs in the senior population with cancer (Table 4).15,26-30 Another factor that heightens ADR risk in the elderly is inappropriate prescribing of medications. ADRs also may be the result of changes in drug pharmacodynamics and pharmacokinetics in the senior adult, such as decreased absorption,31 declining renal function,32 reduced liver mass, and metabolic clearance of medications.33 The adverse effects may be heightened by alterations in diet, exercise, sleeping patterns, and daily activities.

Intentional and unintentional change in drug doses may be made by the elderly patient. If information on noncompliance is not reported by the patient to the prescriber, increases or decreases in dosages of medications may result, with multiple possible outcomes. The patient may be hospitalized with an ADR secondary to the improper dosage of the medication rather than to the medication itself, which may result from both subtherapeutic or supertherapeutic drug levels.

Cough and cold remedies may cause adverse effects in the older person with hypertension, diabetes, and/or coronary artery disease. For example, cimetidine, recently approved as a nonprescription agent, reduces the hepatic metabolism of some prescription items such as warfarin, phenytoin, propranolol, theophylline, terfenadine, some tricyclic antidepressants, and some benzodiazepines. By reducing hepatic metabolism, cimetidine decreases elimination and increases blood concentrations of these medications, and clinically important adverse effects can occur. The concomitant administration of cimetidine with phenytoin and theophylline, for example, increases the side effects from these medications.16(p2267) Discontinuation or irregular use of cimetidine may result in subtherapeutic levels.

Drug Interactions

Table 5 summarizes some drugs that, either in vitro or in vivo, may interact with commonly prescribed antitumor chemotherapeutic agents. The risk for deleterious drug interactions increases with the addition of each anticancer medication to the drug regimen. Research on anticancer drugs historically has reported the efficacy and safety of single drugs but has not determined the effects on combined medications.34 Published drug interactions usually reference only one other drug, while several medications may have the ability to potentiate one medication. Thus, determining which medication is the cause of the interaction can be difficult, and the potential for polypharmacy may continue if the cause of the interaction is not identified. Another medication may be added to the regimen if the drug interaction causes a decrease in response for the patient. An increase in response may also occur and cause the patient to describe exacerbated side effects to medication that may result in hospitalization or an addition of medication to the therapy. Additional medications may include not only prescription medications, but also self-treatment by the older patient with nonprescription products.

<table>
<thead>
<tr>
<th>Interacting Drug</th>
<th>Chemotherapeutic Agent</th>
<th>Effect on Chemotherapeutic Agent</th>
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<tr>
<td>Adriamycin</td>
<td>Streptozotocin</td>
<td>↑ toxicity</td>
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<tr>
<td>Paclitaxel</td>
<td>Streptozotocin</td>
<td>↑ toxicity</td>
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<td>Methotrexate</td>
<td>Streptozotocin</td>
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<td>Endoxan</td>
<td>Streptozotocin</td>
<td>↑ toxicity</td>
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<tr>
<td>Vincristine</td>
<td>Streptozotocin</td>
<td>↑ toxicity</td>
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<tr>
<td>Mesna</td>
<td>Streptozotocin</td>
<td>↑ toxicity</td>
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Table 4. — Medications That Cause Adverse Drug Reactions in the Elderly Population: Similairities of Different Settings

<table>
<thead>
<tr>
<th>Graham et al. (nursing home)</th>
<th>Chrisman et al. (ambulatory)</th>
<th>Gorin et al. (frail elderly)</th>
<th>Berlin et al. (US population)</th>
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<td>aspirin</td>
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<td>carboxyldiethyl</td>
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<td>reserpine</td>
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<td>benzodiazepines</td>
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<td>gastrointestinal drugs</td>
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<tr>
<td>Cough and cold remedies</td>
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**Medication Side Effects**

Many of the side effects experienced by older patients can be uncomfortable but usually do not warrant that the medication be stopped. However, treating these side effects escalates the risk of polypharmacy. Using several medications simultaneously can become cumbersome not only to the patient taking the medication, but also to the clinician attempting to discover the reasons for prescribing those medications. Also, identifying which medication is causing which problem may be difficult, since some medications have the same indications and side effects. For example, narcotics and tricyclic antidepressants are used in pain control, and both can cause constipation. An overlapping of effects may occur with the concomitant administration of medication.

**Cost**

The costs associated with medications and with hospitalization due to medication use may prohibit the older patient on a fixed income from purchasing essential medications. The cost of oral chemotherapeutic agents such as cyclophosphamide and etoposide is relatively high. Elderly patients on a fixed income may be able to afford medications that are part of a chemotherapeutic regimen only by discontinuing other medications, and higher medication costs have been linked to an increase in noncompliance. Medications that are not essential may take priority over essential medications because the cost:benefit ratio of each drug has not been clarified with the elderly patient. Also, elderly patients may avoid the cost of consulting a physician by accepting recommendations from individuals not actively involved in treatment.

Insurance companies and the health care system’s resources are also responsible for covering the mounting costs of additional drug therapies. Medication assistance programs are available to the cancer patient to offset the financial burden of purchasing chemotherapeutic agents. Information regarding these programs must be provided to the patient and to the physician when discussing treatment in order to expedite a financial benefit to the patient.

**Noncompliance**

The main reason for most outpatient treatment failure of drug treatment is noncompliance, which can cause serious medical complications. Rates of noncompliance have been estimated at 25% to 59% in the elderly. The average rate of noncompliance in individuals with chronic diseases has been reported to be 50%.[35-37] While noncompliance with medications correlates more strongly with the number of medications given than with the age of the patient, the difficulty experienced by an elderly person in interpreting the importance of a medication or the directions for use may lead to noncompliance.

The knowledge base, cognition, hearing acuity, vision, memory, and physical condition of the older patient may also affect compliance, and these may be single or additive in nature. The elderly person who cannot open the bottle of medication or cannot travel to purchase the medication may be regarded as noncompliant. Compliance also decreases when the older patient does not understand the directions regarding the medication due to hearing or vision loss or educational level. A patient who cannot take a medication as prescribed (eg, due to swallowing difficulties) is also often regarded as noncompliant. If the patient does not relate these difficulties to the physician, more medications may be prescribed.

Medication scheduling may be an exacerbating factor in the development of noncompliance. Following the directions of several different medications dispersed throughout the day may be confusing to the older patient, and the amount of time spent taking medications may affect the patient’s quality of life. For example, the frequency of urination that soon follows the ingestion of diuretics may prevent the senior adult from enjoying outdoor activities or traveling.

Dosages that are missed and taken at a later date or time can generate future medical problems. Seniors may also try to “catch up” by taking two doses of a medication to make up for one that was missed. This noncompliance can cause serious problems that may lead to hospitalization. Also, chemotherapeutic medications used incorrectly may result in hospitalization. Side effects such as nausea and vomiting, which would not be apparent at lower doses, could be exacerbated if the patient tries to “catch up” missed medications. Uncontrolled nausea and vomiting, dehydration, and hospitalization may result. Gebhardt et al[52] reported that 60% of older adults interviewed would discontinue a prescription drug without consulting a physician if the medication did not appear to be working.

**Prevention of Polypharmacy**

Recognizing polypharmacy is the first step toward its prevention. A comprehensive baseline assessment of the older patient helps in recognizing situations where polypharmacy may occur. A review of all aspects of the patient’s daily life provides insight into physical, emotional, or educational situations and helps to determine if polypharmacy has occurred.

A medication history is a valuable tool in determining the extent of polypharmacy. An effective evaluation incorporating questions about medication use that will allow the older patient to expound on his or her experiences. Answers to open-ended questions provide more insight into the medication habits of the senior adult than “yes” or “no” answers. The medication history should include any adverse reactions or allergies to medication.

The “brown bag” approach employed by Colt and Shapiro[6] is also useful in identifying and preventing polypharmacy. This approach is dependant on the instructions given to the elderly person about the definition of a medication. The patient brings all medication products — prescription and nonprescription — to the office visit. The amount of medications remaining in a vial compared with the amount that should remain can help to determine the extent of compliance. Multiple physician and pharmacy use can be determined by the labels on the vials. Nonprescription medication use can be evaluated. This approach provides information about possible drug interactions, actual prescribed dosages of medications, and duplications of medications.

At our center, a three-day medication history provided by the older patient with cancer is an additional tool to prevent polypharmacy. This record of the older patient’s daily medication use (dosage and scheduling), coupled with a check of the medications brought to the visit, provides another measure of medication compliance in the older cancer patient. Actual use of posttreatment antiemetics, antidiarrheals, or laxatives can be captured on the three-day medication history. Any deviation on the use of medication from that prescribed on the label is apparent. Preliminary assessment of the effectiveness of these two tools to judge medication use has been promising.

Twenty percent of patients who completed the medication history and brought medications to the clinic visit were not using medications in accordance with the instruction on the label. The importance of recording actual medication use has been shared with the elderly patient in order to treat symptoms of posttreatment nausea and/or vomiting associated with chemotherapy. Changes in posttreatment antiemetics have been avoided when instruction on the importance of taking medications has been provided.

Education regarding medication use is important in preventing polypharmacy in the older patient. This medication information is provided at a level that is appropriate and relevant to the individual senior is imperative. Patient involvement in treatment options not only allows some control to the patients in the treatment plans but also may help to prevent possible polypharmacy occurrences by their understanding the possible ramifications of noncompliance. As an active partner, the patient can aid
Simplification of drug regimens is another means by which the health care provider can prevent polypharmacy. Single-day dosing schedules are possible for many medications and may reduce the number of medications taken on a given day. One medication may have many therapeutic indications and can therefore be used for a number of disease states. Also, continued quality of life is an important consideration in scheduling oral chemotherapeutic agents. For example, agents that cause nausea may be taken prior to bedtime to prevent nausea during waking hours and may also reduce the use of antiemetic agents during the day. The patient would avoid the side effects of antiemetic agents that may affect current lifestyle, and the cost of use of these agents would be reduced.

A pharmacotherapy consultant is a good resource in preventing polypharmacy. Clinical pharmacists can improve geriatric prescribing by physicians in the outpatient setting. Utilizing a clinical pharmacist in our institution has provided the opportunity to minimize drug prescriptions and has improved medication scheduling, information on cost-containment and medication use, and notification of medication use to the patient’s primary physician (Fig 3).

Polypharmacy can best be prevented by changing prescription habits. Prescribing medications without a found diagnosis intensifies the risk of polypharmacy. The benefit of an additional medication to a therapeutic regimen must be weighed against the possible problems that may result from the addition. The patient should be aware of the benefit: risk ratio of each additional medication.

Communication among medication prescribers reduces the number of medications used. A responsible party is designated to review all medications (both prescription and nonprescription) taken by the senior patient to determine necessary and unnecessary medications. A record of all medication use should be available to all practitioners. The use of “as needed” medications should be kept to a minimum since antagonism or synergism of daily medications can occur.

The outcomes of drug therapy are reviewed, and medications that have reached their therapeutic endpoint or are not accomplishing the therapeutic endpoint are discontinued. This information is shared with the patient to prevent the continued use of medications past their usefulness.

The use of nondrug strategies may be effective in treating many symptoms experienced by older patients. Health promotion for older patients is an important asset to their quality of life. Exercise, nutrition, and a healthy lifestyle all decrease the need for medications to treat symptoms.

Conclusions and Recommendations

Polypharmacy is defined as the concurrent use of several different medications, including more than one medication from the same drug classification. Unnecessary and excessive medications are used by the elderly population. The development of polypharmacy is enhanced by factors such as lack of education concerning medications, a tendency toward self-treatment, and multiple disease states, medications, prescribers, and sources for medication. The consequences of polypharmacy involve ADRs, drug interactions, higher medication costs, and noncompliance. Polypharmacy is often recognized after it has occurred.

The key to the prevention of polypharmacy is to incorporate prevention methods prior to its occurrence. Education of the medical community as well as the elderly population is an effective prevention method. The use of the “essential medication only” premise to medication treatment in the elderly population will also aid in the prevention of polypharmacy. Cost factors, therapeutic endpoints, nondrug therapy through health promotion, and communication among the older patient and all prescribers involved in medical care are vital components to the main goal of decreased medication use in the senior population with cancer.

References
