

Preface

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This From Research to Practice section focuses on polypharmacy, a term we do not often hear or read about in publications dealing with diabetes. Nonetheless, many of us routinely encounter the phenomenon of polypharmacy, or multiple medications, when dealing with patients.

In general, the term “polypharmacy” carries negative connotations, including increased costs, poorer compliance, and increased risk of side effects and drug interactions. Certainly all of these factors require careful consideration. Still, polypharmacy may be a necessity to effectively manage diabetes and its associated complications and comorbidities.

For example, a patient may require three oral medications to manage blood glucose, three medications for blood pressure control, and an additional two to three medications for lipid control. This would be a total of nine chronic medications not including aspirin or drugs for other diseases the patient may have. Some would argue that the goal should be to decrease the number of medications this patient requires. But while that course of action may be appropriate, I would counter that the primary goal should be to determine whether the medications are indicated for the disease state and whether they are safe and effective for the patient. It could be that this patient truly needs nine medications.

With continued advances in pharmacological therapies, it is likely that the number of medications prescribed for our patients will continue to increase rather than decrease. The four articles included in this section provide us with a better understanding of polypharmacy as well as practical information about common drug-

drug, over-the-counter (OTC) drug, and complementary therapy interactions seen in patients with diabetes.

What is Polypharmacy?

We begin with an excellent article on polypharmacy in the elderly by Chester B. Good, MD, MPH (p. 240). He writes that there is no consistent definition of polypharmacy in the literature and that many authors define it simply as the use of five or six medications. However, polypharmacy is much more complex than just the number of medications a patient uses.

Dr. Good discusses the factors that influence polypharmacy, as well as its incidence in the elderly. Elderly patients are particularly at risk for adverse effects. They frequently take multiple drugs that are prescribed by different providers for different diseases, often in unrelated health care settings. They may also have sensory deficits resulting in nonadherence to their medication regimen because of confusion or other problems.

Wilcox et al.¹ reported that inappropriate polypharmacy is a problem in elderly patients, up to 24% of whom receive inappropriate medications. This is especially worrisome given Census Bureau projections that there may be 6.7 million Americans over the age of 85 by 2020.² This article contains practical suggestions for strategies to evaluate polypharmacy and assist in appropriate prescribing medications for elderly patients with diabetes.

Interactions Between Prescription Medications

Drug interactions and side effects are the negative but real consequences of pharmacological therapy. The more medications patients take, the greater

the potential for drug-drug interactions.

Although thousands of drug-drug interactions have been described in the literature, only a relatively small number of these are clinically important. Understanding mechanisms of drug interactions and interpreting the literature on them can be a challenge for health care professionals, including pharmacists. Specific knowledge of each drug's absorption, distribution, metabolism, excretion, and pharmacodynamic effects is necessary.

The most significant kind of drug-drug interaction involves the cytochrome P450 microsomal enzyme system. In her article on p. 249, Beverly A. Kroner, PharmD, BCPS, reviews the mechanisms of drug interactions focusing on the cytochrome P450 system. She describes common drug interactions found in patients with diabetes, dyslipidemia, and hypertension and offers suggestions for reducing the risk of adverse events when drugs are coadministered.

When obtaining information about drug-drug interactions, it is important to use an updated source of information. It is particularly appropriate to use caution when a patient is taking a newer medication. Before being approved by the Food and Drug Administration (FDA), drugs are studied in selected populations for limited periods. Drugs are sometimes on the market for years before the full range of adverse reactions and interactions associated with them is known.³ A recent example is the drug cisapride (Propulsid). It gained FDA approval in 1993, but potentially fatal drug interactions associated with it were not identified until 1996.³ Another 3 years passed before it was removed from the market for general use.

Interactions Between OTC and Prescription Medications

Most people take some OTCs, often on their own initiative but sometimes on the advice of a health care professional. At the very least, most patients with diabetes should be taking daily aspirin if they do not have a contraindication to it.

Often, health care providers can overlook OTCs when assessing a patient's medication regimen. However, providers need to be aware of some important interactions. In our third article (p. 256), Kimberly Rhoades, RPh, CDE, describes some drug-drug interactions between pre-

scription and OTC medications that are common in people with diabetes. The tables she provides may be especially useful as a reference guide in clinical practice.

Interactions Between Complementary Therapies/Nutritional Supplements and Conventional Medications

The use of complementary and alternative medications is increasing throughout the United States and among people with diabetes.^{4,5} In our final article (p. 262), Laura Shane-McWhorter, PharmD, BCPS, FASCP,

CDE, BC-ADM, and Patti Geil, MS, RD, FADA, CDE, offer two case studies reviewing some of the interactions and other issues to consider when patients combine prescription medications with OTCs, nutritional supplements, herbal products, and other complementary therapies.

Addressing Polypharmacy in Patients With Diabetes

Obtaining a complete medication profile, including use of supplements, OTCs, and herbal products is an important first step in screening our

Case Study

A 54-year-old woman with a history significant for type 2 diabetes, hypertension, dyslipidemia, and hypothyroidism reports taking the following medications. The patient states that she does not use any herbal products. What potential problems can you identify with her profile?

- Aspirin, 81 mg daily
- Atenolol, 25 mg daily
- Atorvastatin, 20 mg daily
- Calcium carbonate, 600 mg twice daily
- Conjugated estrogens, 1.25 mg daily
- Folic acid, 1 mg daily
- Gemfibrozil, 600 mg twice daily
- Glyburide, 5 mg twice daily
- Metformin, 1,000 mg twice daily
- Hydrochlorothiazide, 25 mg daily
- Levothyroxine, 0.50 mg daily
- Lisinopril, 10 mg daily
- Micronase, 5 mg daily
- Multivitamin daily
- Potassium chloride, 8 mEq daily
- Rosiglitazone, 4 mg twice daily
- Synthroid, 0.025 mg daily
- Vitamin E, 400 IU daily

Following are a few of the potential problems with this patient's medication regimen.

- Confusion between the trade and generic names of drugs has resulted in two instances of duplicate medications. The patient reports that she is taking both glyburide and Micronase, which is the trade name for glyburide. Similarly, she says she is taking levothyroxine and Synthroid, which is the trade name for levothyroxine. This duplication came about when the patient was recently discharged from the hospital and received new prescriptions with dosage changes for levothyroxine and glyburide. Of note, admission to the hospital is a known risk factor for increasing the number of appropriate and inappropriate medications as well as for errors in patients' medication regimens.⁶ The duplicate medications should be discontinued.
- There is a potential interaction between the levothyroxine and calcium carbonate (Caltrate). Thyroid hormones should be administered 1 hour before or 4 hours after calcium supplements because concurrent administration may decrease the absorption and thus the efficacy of the levothyroxine. The provider should confirm with the patient that she is separating the two medications appropriately to avoid this interaction.
- The combined use of lisinopril (Prinivil, Zestril) and potassium chloride can put the patient at risk for hyperkalemia. A potassium level should be obtained if one has not been done recently.

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patients for inappropriate polypharmacy. Many health care professionals ask patients to bring either their medications or a list of their medications with them to their health care visits.

At our diabetes center, we recently started sending letters to remind our patients about their initial appointment. We include in the letter a specific request that patients bring their medications, vitamins, and herbal products with them. This has been helpful in getting a more complete list of medications from our patients, and it assists in evaluating patients' medication regimen.

To ensure appropriate drug therapy for our patients with diabetes:

- Encourage patients to keep an up-to-date list of all of their medications, including vitamins, OTCs, and herbal products. Pharmacies will usually provide patients with a list of their prescription medications, which is a good place to start.
- Be aware of both the brand and generic names of medications. It is

not that uncommon for patients to be taking the same medication twice, with one prescription vial dispensed and labeled as the brand name and the other vial dispensed and labeled as the generic name. Usually, this problem is avoided if patients have all of their prescriptions filled at the same pharmacy.

- Help patients simplify their medication regimens by suggesting that they use pill boxes, calendars, watch alarms, or some other system that will help them remember when to take their medications. Remember, for a medication to work, it first has to be absorbed.

Polypharmacy can be beneficial, giving us more therapeutic options to help patients achieve better outcomes. However, patients' use of multiple medications requires their health care professionals to have a better understanding of prescription and OTC medications as well as nutritional supplements, herbal products, and other

complementary therapies. I hope the following articles offer useful information you can use to improve the care you give your patients.

References

¹Wilcox SM, Himmelstein DU, Woolhandler S: Inappropriate drug prescribing for the community dwelling elderly. *JAMA* 272:292–296, 1994

²Schneider GL, Guralnik JM: The aging of America: impact on health care costs. *JAMA* 263:2335–2340, 1990

³Lasser KE, Allen PD, Woolhandler SJ: Timing of new black box warnings and withdrawals for prescription medications. *JAMA* 287:2215–2220, 2002

⁴Payne C, O'Connell BS (Eds.): From Research to Practice: Complementary and integrative medicine: emerging therapies for diabetes, Part 1. *Diabetes Spectrum* 14:129–160, 2001

⁵Payne C, O'Connell BS (Eds.): From Research to Practice: Complementary and integrative medicine: emerging therapies for diabetes, Part 2. *Diabetes Spectrum* 14:196–225, 2001

⁶Murray MD, Kroenke K: Polypharmacy and medication adherence: small steps on a long road. *J Gen Intern Med* 16:137–139, 2001