

## **Polypharmacy and Deprescribing**

**A Research Paper by the All4Smiles Research Team**

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## **Abstract**

Polypharmacy, or the concurrent use of multiple medications, has become a growing concern among older adults due to its association with adverse drug reactions, increased hospitalization rates, and declining cognitive and physical function. As aging populations often have multiple chronic conditions requiring pharmacological management, the risk of inappropriate medication use rises. Deprescribing, which is defined as the systematic approach to reducing or discontinuing unnecessary medications, has emerged as a crucial strategy to improve health outcomes and enhance the quality of life in elderly patients. In this paper, our research team explores the challenges of polypharmacy, the benefits and risks of deprescribing, and evidence-based strategies for optimizing medication regimens in older adults.

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## **Adverse Drug Reactions and Drug Interactions**

**By: Ifra Iyooob**

Polypharmacy, which is defined as the use of five or more medications simultaneously, is common among elderly populations. This overuse is mostly due to the need for a convenient and routine way of managing various chronic conditions, including prevalent ones like hypertension, diabetes, and arthritis. However, this increased medication elevates the risk of adverse drug reactions (ADRs), leading to hospitalizations, reduced quality of life, and higher mortality rates (Maher, Hanlon, & Hajjar, 2014).

As mentioned, ADRs are harmful and often unintended responses to medications that occur at normal doses. Often, higher doses of drugs are associated with increasingly devastating effects; with ADRs, those symptoms can occur without upped dosage. Among elderly patients, two main age-related changes are associated with ADRs: 1) pharmacokinetics: drug absorption, distribution, metabolism, and excretion, and 2) pharmacodynamics (how drugs affect the body).

Some of the most frequent ADRs amongst the elderly include cognitive impairment, dizziness, falls, gastrointestinal disturbances, and bleeding complications. One example is benzodiazepines. This medication is often prescribed for anxiety and insomnia, but it can cause excessive sedation and increase fall risks, leading to fractures and hospitalizations (American Geriatrics Society Beers Criteria Update Expert Panel, 2019). Similarly, NSAIDs (a.k.a. nonsteroidal anti-inflammatory drugs), can cause gastrointestinal bleeding and kidney dysfunction among seniors—this is even despite their original use under pain management.

While polypharmacy focuses on the interplay of numerous drugs, there are consequences to even taking a couple of prescriptions. Defined as the process of two or more drugs modifying

each other's effects (which can potentially lead to reduced efficacy or increased toxicity), drug interactions are not all that infrequent.

As mentioned previously, pharmacokinetic interactions impact drug metabolism, which often involves the cytochrome P450 enzyme system within the liver. One example of this kind of interaction is the response of warfarin, an anticoagulant, to antibiotics and antiepileptics. Studies have found that the risk of excessive bleeding has risen with the combined use of these drugs (Holbrook et al., 2012). Pharmacodynamic interactions are a little different in that they involve drugs with additive or opposing effects. A common example is the simultaneous use of antihypertensives and diuretics, which can lead to severe hypotension and electrolyte imbalances.

While polypharmacy and its risks may seem like an inevitable gamble, there are ways to minimize the associated risks. By taking a proactive approach to one's medicinal health (e.g. looking at medication reviews, participating in deprescribing, seeking out education, and talking to pharmacists, elderly people can ensure that they are engaging in safe and effective medication use.

## **Deprescribing Strategies and Guidelines**

**By: Mumtahina Hemi**

As people age, they often develop multiple different health conditions that require medical prescriptions. Taking several medications simultaneously is known as polypharmacy. While necessary in some cases, polypharmacy can lead to unwanted side effects and interactions between drugs. To address this, healthcare professionals use a process called deprescribing, which involves carefully reducing or stopping medications that may no longer be beneficial or could be harmful.

Deprescribing is the planned and supervised process of reducing or stopping medications that might not be needed anymore. The goal is to manage medication intake to improve the patient's overall well-being. This process is especially important for older adults who are more susceptible to the negative effects of taking multiple medications. Taking multiple medical prescriptions increases the risk of side effects, drug interactions, and challenges with following complex medication schedules. By deprescribing unnecessary medications, patients can experience fewer side effects, better adherence to their medication regimen, and an improved quality of life.

### **Strategies For Deprescribing:**

1. **Review All Medications:** Create a list of all the medicines you take, including over-the-counter and supplements.
2. **Asses Each Mediciation's Importance:** Determine whether each medication is necessary for the patient, considering the patient's current health status.

3. **Prioritize Medications to Discontinue:** Identify which medications can cause the most harm to least and how to consider which ones to discontinue.
4. **Develop a Plan:** Create a step-by-step plan to slowly get off the medication rather than abruptly stop taking it.

Deprescribing is a vital process in which patients may need to implement into their lives, especially if they are taking multiple medications. By systematically evaluating and reducing unnecessary medications, healthcare providers can help patients achieve better health outcomes and enhance their quality of life. Effective deprescribing requires careful planning, patient involvement, and ongoing monitoring to ensure safety and effectiveness.

## **Impact of Polypharmacy on Cognitive and Physical Function**

**By: Evelyn Yao**

As people grow older, their bodies tend to grow weary with accumulated stress from all of the years they endured. The debilitating effects of this weariness cause bones to ache and illnesses to take root. As such, doctors prescribe numerous medications to ward off the ill effects of such conditions. However, when a person takes too many medications simultaneously, harmful side effects can occur. It is necessary to be aware of this risk and to raise any concerns or questions to a health professional.

Polypharmacy is the concurrent use of medications, typically when a patient takes five or more medications daily. According to the National Library of Medicine, polypharmacy leads to increased cognitive impairment and a risk of dementia. The research paper emphasizes the severity of polypharmacy and the urgency to restrict such behavior. Even mild cognitive impairment can foster dementia or Alzheimer's dementia, and people with this condition are three to four times more likely to develop dementia than those with normal cognitive function. Along with impaired cognitive function, seniors who engage in polypharmacy are at a higher risk for adverse drug reactions, depression, disability, falls, frailty, increased healthcare use, postoperative complications, mortality, and caregiver burden. Continued use of polypharmacy will only lead to more complications which can cause serious consequences of their own. Thus, polypharmacy perpetuates an endless cycle of harmful side effects, decreased strength, increased burden on caregivers, and increased chance of mortality. Observation studies prove that chronic inflammation, changes in energy metabolism, oxidative stress, and mitochondrial dysfunction in stress response all contribute to cognitive decline in the elderly, putting them at a higher chance



of death. Because of the negative effects of polypharmacy on health, the elderly are highly discouraged from taking so many medications at the same time.

Moreover, polypharmacy is also associated with a decrease in physical strength and an increase in falls. Fractures and falls are a major concern for older adults because of the severity of the injuries they can sustain as a result. Polypharmacy significantly increases their chances of falling because it weakens their bodies. It is also linked to a decrease in the ability to complete normal tasks and physical function, limiting mobility and freedom. As a result of polypharmacy, the seniors' energy levels can seriously decline, leaving them too tired to engage in physical activity, which brings its own host of health problems. In addition to increased frailty, polypharmacy is also associated with an increased risk of sarcopenia (loss of muscle mass), which weakens the seniors significantly. The multiple medications taking effect in the person's body can counter each other and lead to adverse drug reactions, which sickens the person.

Overall, polypharmacy is a serious threat to the health of the elderly which is often overlooked. Though seniors can feel that taking as many medications as possible will help them more, it in fact has the opposite effect. Seniors who engage with polypharmacy must talk to their healthcare provider to safely deprescribe them from some of their medications in order to remain healthy. Not only does polypharmacy have severe harmful effects on cognitive function, it also contributes steadily to the physical weakening of the body. Raising awareness about polypharmacy is essential to protecting the health of seniors.

## **Role of Healthcare Providers in Medication**

**By: Joyce Sato**

### **What is it?**

Polypharmacy is the use of multiple medications; this has become a growing concern for seniors with chronic conditions. Healthcare providers are able to assist patients in finding which medications work best for them in a safer, healthier way.

### **The Problem With Polypharmacy**

The main concern regarding the mixing of different drugs is their potentially harmful effects on the body when interacting. This could lead to an increased need for healthcare professionals ' intervention and unpleasant or damaging side effects.

### **The Role of Healthcare Providers**

Healthcare providers play an important role in the planning for each individual's prescription plan. They are responsible for monitoring cognitive function in order to ensure that the patient is able to remember when to take their medication and remember if they have already taken it. They are also responsible for deprescribing medications that are no longer needed, are ineffective, or harmful to the body. Balancing the amount of risk with the amount of benefit to each prescription is crucial for the improvement of overall health. Making sure the patients are aware and have a full understanding of the impact and purpose of their medication, as well as becoming acquainted with new and developing technology in order to most benefit the patients' care, is of the utmost importance as well.

### **Methods of Awareness**

It is important that as patients, we do the best we can to keep ourselves in good condition and keep our doctors informed. Making use of the healthcare professionals around us is crucial to

getting accurate and beneficial prescriptions, meaning we have to go in for regular follow ups.

Following prescriptions and orders from your doctor will give you the best results.

## **Non-Harmful Applications of Polypharmacy**

**By: Kyle Vu**

Studies show that polypharmacy is used in 40% of patients, of which are all over the age of 65 (Hosseini, 2018). It is not just two or three medications that are being applied at once however, over five are typically used simultaneously. While polypharmacy is evidently a pharmaceutical method that raises significant medical concerns, there can be some uses that exhibit its helpful abilities. It is important to note that these situations are considered special conditions and the use of multiple medicines still poses large safety risks to patients.

It has been clinically indicated that polypharmacy can be used in the cases of patient populations that suffer from diabetes mellitus and hypertension. In diabetes management, for those with the conditions of high blood pressure or heart disease, medications are meticulously selected to ensure complementary, not harmful, reactions when paired together. For instance, metformin, a drug treatment for diabetes, is commonly used with SGLT2 inhibitors or GLP-1 receptor agonists, treatments that work by preventing kidneys from reabsorbing glucose and slowing digestion, to aid in the regulation of blood sugar. This pair of medications is used in moderation and certain drugs are avoided that increase the risk of low blood sugar. Knowing, the concerns of polypharmacy, regular medication reviews are conducted to reassess the necessity of medication, and patient education is standardized so patients understand how and when to use their medication correctly.

Polypharmacy is often necessary for managing hypertension, or high blood pressure that can damage the heart, brain, and other vital organs. Doctors examine medications that can work well together as well as ones that can cause harmful interactions. Commonly used antihypertensive drugs include ACE inhibitors, which protect the heart and kidneys, calcium

channel blockers, which relax blood vessels, diuretics, which help remove excess fluids, and beta-blockers, which reduce heart rate and workload. This can be very helpful as some patients have resistant hypertension, which causes their blood pressure to be unaffected by one medication alone. With the use of combination therapy, over time the effects of blood vessel constriction, reduced blood flow, and high excess fluid can be significantly decreased.

Polypharmacy, when used effectively, can be a powerful tool in managing complex conditions through combination therapy. By carefully selecting medications that work together, doctors can improve treatment outcomes and save lives. However, polypharmacy also comes with risks, including drug interactions, side effects, and increased challenges in medication adherence, especially concerning conditions for the elderly. The application of polypharmacy requires close monitoring, regular medication reviews, and a personalized approach to ensure both safety and effectiveness.

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