



A REVIEW ON POLYPHARMACY IN GERIATRIC PATIENT

M. S. Manuelita Sharon Christina B.¹, Dr. M. K. Sundar Sri², M. Immanuel Jebastine^{3*}

¹Pharm D- Doctor of Pharmacy, Department of Pharmacy Practice, School of Pharmaceutical Sciences, Vels Institute of Science, Technology And Advance Studies, Chennai, India. Chrystina2721@gmail.com

²Assistant Professor, Department of Pharmacy Practice, School of Pharmaceutical Sciences, Vels Institute of Science, Technology and Advanced Studies, Pallavaram, Chennai - 600117, India. sundarsri.sps@vistas.ac.in

³Assistant Professor, Department of Pharmacy Practice, School of Pharmaceutical Sciences, Vels Institute of Science, Technology and Advance Studies, Chennai, India. immanueljebastin.sps@vistas.ac.in



*Corresponding Author: M. Immanuel Jebastine

Assistant Professor, Department of Pharmacy Practice, School of Pharmaceutical Sciences, Vels Institute of Science, Technology and Advance Studies, Chennai, India.

DOI: <https://doi.org/10.5281/zenodo.21290152>

How to cite this Article: M. S. Manuelita Sharon Christina B.¹, Dr. M. K. Sundar Sri², M. Immanuel Jebastine^{3*} (2026). A Review On Polypharmacy In Geriatric Patient. European Journal of Biomedical and Pharmaceutical Sciences, 13(7), 304-314.

This work is licensed under Creative Commons Attribution 4.0 International license.



Article Received on 12/06/2026

Article Revised on 03/07/2026

Article Published on 10/07/2026

ABSTRACT

The problem of polypharmacy in the health sector has become significant especially among the older population due to the development of chronic diseases, multimorbidity, and physiological changes associated with aging. The need for polypharmacy as part of the disease management may cause several clinical problems including drug-drug interactions, adverse drug reactions, non-adherence to medications, cognitive decline, fall, hospitalization, and increased cost of healthcare delivery. The physiologic changes related to aging make older patients prone to experiencing adverse drug reactions. There are a number of causes of polypharmacy burden including prescription from several clinicians, self-prescription, guidelines-based prescription, and fragmentation in healthcare system. It is important to conduct assessment using tools such as Beers Criteria, STOPP/START Criteria, and drug reviews for optimal use of drugs. Management methods including deprescription, interprofessional team work, and inclusion of clinical pharmacists in the process will ensure medication safety and positive clinical outcomes and reduce healthcare costs and improve the quality of life of older people.

KEYWORDS: Polypharmacy; Geriatric Patients; Older Adults; Multimorbidity; Medication Adherence; Adverse Drug Reactions; Potentially Inappropriate Medications; Deprescribing; Clinical Pharmacist; Quality of Life.

INTRODUCTION

Today's population has been getting older at a much faster pace because of the advancement in medical treatment facilities, better living standards, adequate nutrition and improved healthcare services. With increasing lifespan, there is an ever-increasing trend in the prevalence of multiple chronic diseases among older persons. The common chronic diseases include high blood pressure, diabetes, heart diseases, chronic obstructive pulmonary disease, arthritis and neurologic disorders. Treatment of such diseases requires the administration of various drugs at the same time. As a result, the practice of polypharmacy, which refers to the concurrent use of five or more medications, is becoming common among elderly patients. Although medications are important for the management of diseases and for

better quality of life, use of multiple medications poses various difficulties in healthcare management.^[1]

Use of several drugs in elderly people may be inevitable due to the nature of chronic diseases that requires long-term management using pharmacological means. At the same time, use of multiple medicines makes the therapy process complicated and raises the danger of medication issues. There are several physiological changes that occur during aging of the body and which include changes in renal function, changes in the ability of liver to metabolize drugs, changes in the body composition and in sensitivity of drug receptors. This means that the aging of the patient can affect pharmacokinetic and pharmacodynamic processes and can make the elderly more prone to adverse effects of the drugs, interactions

between drugs and interactions of drugs with disease state.^[2]

However, the effects of polypharmacy go beyond the adverse effects of taking several medications simultaneously and can affect the physical health of older adults greatly. Studies have shown a link between polypharmacy and higher risks of being hospitalized, falls, bone fractures, cognitive dysfunction, frailty, disability, and death. Moreover, dealing with complicated prescription can be difficult for an elderly patient, especially when he/she suffers from poor memory, vision problems, or health illiteracy. Understanding prescription instructions becomes impossible, which leads to improper use of medication, missing doses, and taking unnecessary drugs. Such difficulties can decrease efficiency of treatment and influence the quality of people's lives adversely. Besides, the cost of several medications becomes a serious financial burden.

With the recognition of the increasing burden of polypharmacy, there is an increased focus on optimizing the use of medication among older adults. Several tools to evaluate potential medication misuse, including the Beers criteria, STOPP/START criteria, and the Medication Appropriateness Index, have been developed. Regular medication review, deprescribing, patient education, and multidisciplinary collaboration by healthcare providers, including physicians, pharmacists, nurses, and caregivers, are all important ways of reducing the risk of drug-related injuries. Innovative technologies, including electronic prescription systems, decision-making support, pharmacogenomics, and artificial intelligence, can play an important role in achieving this objective.^[3]

GERIATRIC POPULATION

The term geriatric population is typically associated with individuals who are 65 years old and above. This age group is currently among the rapidly growing sections of the world's population, thanks to developments in healthcare, nutritional programs, better hygiene practices, and disease management. Aging can be described as a natural biological process that involves gradual physiological changes that have an impact on the structure and functioning of different organs and systems. In the course of aging, people develop susceptibility to different diseases, impairments, and disabilities. Growing numbers of elderly people have presented serious challenges to healthcare facilities, especially in terms of chronic conditions and pharmacotherapy.^[4]

Old age people suffer from various chronic illnesses such as hypertension, diabetes mellitus, heart-related ailments, osteoarthritis, chronic renal failure, COPD, osteoporosis, and degenerative neurological diseases. When two or more chronic illnesses exist concurrently in an individual, it is called multimorbidity. Such a condition

is very common in the elderly patients. These chronic illnesses demand treatment and monitoring, hence increased utilization of healthcare services. Apart from chronic physical illnesses, cognitive impairment, depression, anxiety, and loneliness are some of the common health concerns among the elderly. The existence of multiple health issues requires consultation from various physicians and taking multiple medications.

Aging is characterized by various physiological changes which impact on the health status and treatment outcomes. There is a progressive loss of function of organs, like the loss of kidney function, lower metabolic rate in the liver, lowered cardiac reserve, and changes in body composition, where body fat increases while muscles shrink. The aforementioned changes can impact the pharmacokinetics process, rendering older patients susceptible to drug toxicity due to the effect of the drugs on their physiology. In addition, the sensory deficits, impaired physical mobility, and brain function due to aging may impact the patient's capacity to self-administer medication.^[5]

There are many implications on public health and delivery of healthcare due to the growing geriatric population. This group takes up a significant share of healthcare spending, hospitalizations, outpatient visits, and prescription drug utilization. The maintenance of functional independence, enhancement of quality of life, and protection from any potential medication complications constitute important aspects of geriatrics. Comprehensive assessment of geriatrics, multidisciplinary approach to healthcare provision, and proper strategies of medication management are critical for the accomplishment of these purposes. The aging of population throughout the globe raises the need for dealing with specific medical, psychological, and social issues in relation to the geriatric patients. It becomes obvious that the knowledge about the geriatric population is essential to deal with problems, such as polypharmacy.

POLYPHARMACY

The theory of polypharmacy has gone through tremendous changes over the years due to progress in medical sciences and pharmacotherapy. In the early centuries, there was a dearth of options for treatment; thus, patients used to take very few medications for alleviating their symptoms. However, in the twentieth century, with the invention of modern drugs, the options for medicines have significantly risen. Due to the introduction of medicines for treating chronic ailments, including hypertension, diabetes, heart diseases, mental problems, etc., physicians started using multiple medicines for controlling complex illnesses. It was observed more commonly in older people, who used to suffer from various diseases simultaneously, and thus needed to be treated with multiple drugs.^[6]

Polypharmacy was initially perceived negatively due to its association with irrational prescriptions and unnecessary medication usage. The health professionals acknowledged that the excessive use of drugs would result in negative consequences such as adverse drug reactions, drug interactions, and higher healthcare expenses. With the development of geriatrics and research related to it, the data indicated that polypharmacy did not have to be necessarily negative. Quite many older patients gained positive benefits from the co-prescription of multiple medications based on evidence for treating chronic conditions. This helped to form a new point of view regarding the two types of polypharmacy.

The increasing incidences of chronic diseases, the increase in life expectancy, and the improvements in medical therapy witnessed in the last few decades have further added to the growth of polypharmacy. Clinically, combined therapies are suggested for better management of diseases. Though such techniques have yielded positive results for patients, they have also resulted in an increase in the medication burden of older people. In this regard, much attention has been drawn towards the development of ways to reduce the risks related to medication without reducing its efficacy. The ideas like medication review, deprescribing, and comprehensive geriatric assessment have emerged significantly in this context.^[7]

Polypharmacy has emerged as an important health problem at present in all parts of the world, especially among elderly people. As against the previous practice that considered polypharmacy as a bad practice in itself, today healthcare professionals assess whether each drug in the regimen is necessary, effective, and safe. The current approach is patient-centric, whereby medications are tailored to the patient's medical condition, level of functioning, lifespan, and therapeutic objectives.

CLASSIFICATION

Minor Polypharmacy

Minor polypharmacy is the use of two to four drugs by the patient at the same time. It is commonly observed in old people who have one or two diseases. It is generally acceptable, but it also requires constant monitoring for preventing medication issues, ensuring efficacy of treatment and patient safety.

Major Polypharmacy

Major polypharmacy is the use of five or more drugs at the same time. It is commonly observed in geriatric patients who suffer from several diseases. Such type of medication increases the probability of drug side effects, drug interactions, medication errors and non-compliance.

Appropriate Polypharmacy

Appropriate polypharmacy is the prescription of several drugs based on the clinical evidence and patient's needs. Each drug has specific therapeutic purpose, and its

advantages surpass the possible risks. It is often required in case of multimorbidity of elderly patients.

Inappropriate Polypharmacy

Inappropriate polypharmacy includes use of inappropriate drugs that can be either ineffective, harmful, or even unnecessary. This happens due to reasons such as duplicating therapy, lack of drug assessment, and prescribing drugs with no appropriate indication. Inappropriate polypharmacy causes many complications including hospital admissions, side effects, falls, and decreased quality of life among elderly people.^[8]

AGE-RELATED PHYSIOLOGICAL CHANGES AFFECTING DRUG THERAPY

Ageing is characterized by certain physiological modifications which have a profound effect on how drugs are processed by the body. Changes in the physiology of ageing individuals may affect pharmacokinetics and pharmacodynamics. Pharmacokinetics refers to the processes involved in drug absorption, distribution, metabolism, and elimination from the body while pharmacodynamics is the effect of the drug on the body. Due to the gradual decline in organ functions with advancing age, the elderly are prone to drug toxicity and inefficacy.

Pharmacokinetic Changes

Drug Absorption

There might be some decrease in the secretion of gastric acid, gastric emptying time, and gastrointestinal motility due to aging. However, this will not greatly affect the absorption of drugs; rather, there is a possibility that the onset of the drug effect is slowed by this process.

Drug Distribution

Due to changes in the body such as an increase in the amount of body fat and a reduction in total body water and lean body mass, there could be changes in the distribution of drugs. Fat soluble drugs will stay in the body for a long time whereas water soluble drugs might be accumulated in large amounts in the blood stream.

Drug Metabolism

The size of the liver, liver blood flow, and metabolic enzymes activity will decrease as people age. This will slow the metabolism of many drugs causing the drug effect to last longer.

Drug Excretion

The renal function declines as a result of aging due to decreased kidney size, renal blood flow, and GFR. Poor drug elimination results in increased levels of the drug and its metabolites within the body and poses a danger of drug toxicity. Therefore, an evaluation of the patient's renal function becomes necessary before administering drugs to elderly patients.^[9]

Pharmacodynamic Changes

Pharmacodynamic alterations refer to any changes that occur in the patient's reaction to drugs. Age-related changes may affect the amount of receptors, their function, and other homeostatic processes, causing increased sensitivity of elderly patients to particular drugs such as tranquilizers, opioids, blood thinners, and antihypertensive drugs.

CAUSES AND RISK FACTORS FOR POLYPHARMACY IN GERIATRIC PATIENTS

Multiple Chronic Diseases

It is common for the elderly to suffer from different chronic diseases like hypertension, diabetes, cardiovascular disease, chronic kidney disease, osteoarthritis, and chronic obstructive pulmonary disease. Having two or more than two chronic diseases is referred to as multimorbidity. In order to have good control of the diseases and avoid complications, different medicines need to be taken by older adults. Given that there may be specific treatment plans for each of the diseases, the number of medications increases significantly. This is one of the reasons why polypharmacy occurs among the elderly.

Multiple Prescribers

Most geriatric patients seek health care from multiple doctors and specialists who include cardiologists, endocrinologists, nephrologists, neurologists, and general practitioners. Every medical expert could prescribe medications to the patient for particular diseases, not knowing everything about the patient's medication schedule. As a result of this, there is a chance that patients would have duplicate prescriptions and unwanted drugs. Multiple prescribers complicate the treatment process and are important factors in contributing to the phenomenon of polypharmacy. Proper communication between health care providers and medication reconciliation are important measures to address polypharmacy.^[10]

Self-Medication and OTC Drug Use

Self-medication is a prevalent phenomenon among elderly persons since they resort to over-the-counter drugs, herbals, dietary supplements, and alternative treatments to address mild illnesses and symptoms. Elderly people often fail to report other products they consume to health care practitioners, which leads to inaccurate medical history records. Co-administration of prescription and non-prescription products elevates the chances of having interactions between the two groups of products, developing side effects, and receiving duplicate therapies. In addition, myths about the safety of non-prescription products may lead to the overuse of those products.

Hospitalization and Care Transitions

Admissions to the hospital usually lead to changes in the treatment regime, such as starting new medications or changing the current medications. Discrepancies in

medications can happen during the transition from one health facility to another due to lack of coordination between healthcare professionals. The medicines that have been prescribed for the treatment of an acute disease might continue to be administered even though they are not required anymore. This process might result in drug duplications and overprescribing. It is important to reconcile medications properly to avoid polypharmacy in elderly patients.

Clinical Practice Guidelines

Evidence-based practice guidelines give recommendations on treating certain illnesses. Nonetheless, elderly people usually suffer from various diseases, which means that they need to follow various disease-related guidelines. Therefore, if a person follows various guidelines, he or she may be prescribed many drugs, each of which treats a certain illness. Although these drugs may be necessary, their combination may increase the number of drugs and, therefore, their side effects. Therefore, healthcare providers should weigh the benefits and risks of following various guidelines depending on individual characteristics such as fragility and life expectancy.

Fragmented Healthcare Systems

The fragmented nature of healthcare delivery system could be a major cause of polypharmacy through lack of adequate communication and coordination amongst the healthcare professionals. Older adults will attend several clinics and hospitals for medical attention and will have their medical history and medication records not well communicated from one healthcare professional to another hence increasing the risk of duplicated prescriptions, medication errors, and improper use of drugs. In addition, the lack of adequate follow up and medication review could lead to unnecessary prescription of drugs.^[11]

Increasing Life Expectancy

The progress in medical sciences, public health interventions, and healthcare has greatly contributed to the increase in average life expectancy around the world. As people age, they tend to acquire chronic conditions necessitating long-term use of pharmaceutical products. The increased survival rate also leads to the acquisition of other medications as more health problems arise with time. The increasing tendency toward the use of medicines plays a direct role in the occurrence of polypharmacy in old age. While the increased life expectancy is a product of improved healthcare, it still comes with its own difficulties regarding medications.

COMMONLY PRESCRIBED MEDICATIONS IN ELDERLY PATIENTS

Cardiovascular Drugs

Cardiovascular drugs are one of the commonly prescribed drugs in the elderly because of the high prevalence of hypertension, heart failure, coronary artery disease, and arrhythmia among the elderly population.

The drugs commonly prescribed include beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), calcium channel blockers, and diuretics. These drugs aid in the regulation of blood pressure, heart function, and prevent complications. Nevertheless, there is increased risk of adverse effects such as hypotension, electrolyte disturbances, and dizziness among the elderly.

Antidiabetic Agents

Diabetes mellitus is very common among the geriatric population, and hence antidiabetics are an integral part of their treatment regimen. Commonly used medicines include metformin, sulfonylurea, DPP-4 inhibitors, sodium-glucose co-transporter 2 inhibitors, and insulins. These medicines help control blood sugar levels to reduce the incidence of complications associated with diabetes. But elderly patients can have hypoglycemia, renal failure, and adverse drug reactions. It is important to consider individual goals of therapy and monitor patients before administering antidiabetics to elderly people.^[12]

Antihypertensive Drugs

Hypertension is one of the most prevalent chronic diseases among the elderly population. Antihypertensive drugs like ACE inhibitors, ARBs, calcium antagonists, beta-blockers, and thiazide diuretics are commonly prescribed to control hypertension and to minimize the risk of heart complications. Proper blood pressure control helps to decrease the risks of stroke, heart attack, and heart failure. But too much reduction in blood pressure can lead to orthostatic hypotension, falls, dizziness, and decreased kidney functioning. Thus, it is important to tailor the treatment depending on the patient's individual features.

Anticoagulants and Antiplatelets

Thromboembolisms can be prevented through the administration of anticoagulant and antiplatelet drugs to elderly patients who have diseases like atrial fibrillation, deep vein thrombosis, pulmonary embolism, and cardiovascular disease. The most common drugs administered to this category of patients are warfarin, direct oral anticoagulants, aspirin, and clopidogrel. The administration of these drugs greatly reduces the risk of stroke and other types of vascular complications. Older patients are at high risk of developing complications related to bleeding because of age-related factors.

Psychotropic Medications

Psychotropic agents are commonly used in elderly people to manage mental illnesses and neurologic disorders. Examples of drug categories that are commonly prescribed for this population include antidepressants, antipsychotic drugs, anxiolytics, hypnotics, and mood stabilizers. They are mainly prescribed to treat psychiatric disorders such as depression, anxiety, insomnia, behavioral problems, and other illnesses. While these drugs are known to alleviate

signs and symptoms, they may also cause complications including sedation, confusion, falls, cognitive dysfunction, and dependence.

Analgesics and NSAIDs

Management of pain is one of the major components in the elderly population, especially those suffering from osteoarthritis, musculoskeletal problems, and chronic pain. Some of the commonly used analgesics are paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDs), and opioids. The use of such drugs is necessary for reducing pain and improving physical mobility. However, long-term use of NSAIDs may lead to such complications as bleeding problems, renal damage, and cardiovascular problems. Opioids can cause sedation and constipation as well as addiction.^[13]

Gastrointestinal Medications

GI medications are widely used in older individuals for diseases like GERD, PUD, constipation, and dyspepsia. The common medications used in this regard include proton pump inhibitors, H2 receptor blockers, antacids, laxatives, and antiemetics. These medications assist in improving GI functioning and treating the condition. But prolonged use of some of these medications has been linked with negative outcomes including nutritional deficiencies, infections, and bone fractures. This makes it imperative to evaluate the need and duration of their use on a regular basis.

Vitamins and Nutritional Supplements

The use of vitamins and nutritional supplements is common among elderly people as a way to ensure their nutrition and overall well-being. Typical nutritional supplements for seniors include vitamin D, calcium, vitamin B12, iron, folic acid, and multivitamins. Nutritional supplements may be useful in improving the state of bones, enhancing immunity, and ensuring proper nutrition. The misuse of supplements and taking excess amounts may cause problems of polypharmacy and drug-supplement interaction. Physicians should determine the necessity of nutritional supplements depending on the patient's clinical picture and laboratory results.^[14]

CLINICAL CONSEQUENCES OF POLYPHARMACY

Adverse Drug Reactions (ADRs)

Drug side effects are one of the most frequent outcomes of polypharmacy among elderly patients. The likelihood of ADRs becomes much higher according to the number of prescribed drugs due to aging of drug metabolism and drug elimination processes. Typical symptoms are dizziness, nausea, disorientation, hypotension, and digestive disorders. Critical ADRs can lead to hospitalization, disability, and even mortality. Elderly patients are especially sensitive to the effect of ADRs due to malfunctioning of some physiological systems and comorbidity.

Drug-Drug Interactions

Taking several drugs simultaneously increases the chances of having a drug-drug interaction that affects the safety and effectiveness of the drugs. The effects of drug-drug interaction might be increased toxicity of drugs, decreased effectiveness of drugs, or side effects that may not have been expected. The elderly are particularly at risk because they may be receiving multiple drugs from different doctors. There is an increased risk of hospitalization, treatment failure, and increased cost of care in cases of drug-drug interactions.

Drug-Disease Interactions

A drug-disease interaction is said to take place when a drug used for treating a particular disease makes another pre-existing medical condition worse. This type of interaction is common in elderly patients who have multiple disorders at the same time. Nonsteroidal anti-inflammatory drugs could be harmful for patients suffering from kidney diseases and high blood pressure whereas psychotropics could further complicate cognitive disorders. Drug-disease interactions could result in deterioration of the medical condition of the patient, decreased efficacy of treatment, and an increase in morbidity rate. The patient's entire medical history needs to be reviewed before starting the treatment process.^[15]

Medication Non-Adherence

Medication regimens that are complex because of polypharmacy may pose challenges for adhering to the recommended medication treatment in elderly patients. Issues related to cognitive impairment, visual impairment, memory loss, and complex medication dosages may lead to non-adherence to the medication regimen. The non-adherence to medication treatment may lead to failure of disease management, symptom aggravation, frequent hospitalizations, and high cost of health care. Patients not taking medication properly may suffer from decreased effectiveness of therapy and increased risks of developing complications.

Increased Hospitalization

Polypharmacy is a significant factor in higher hospitalization in elderly people. Medication side effects, adverse drug reactions, errors with medications, and non-adherence to prescribed treatment can be factors which lead to admission to an emergency room and then further to hospitalization. Elderly patients who are using many medications are more prone to develop certain complications, which will result in the need for medical care. Frequent hospitalization increases health care expenses as well as puts the patients at additional risks, including infections, disabilities, and emotional stress.^[16]

Falls and Fractures

Falls and bone fractures represent serious outcomes of polypharmacy in elderly patients. Some drugs like sedatives, antihypertensive agents, antidepressants, and antipsychotics may induce vertigo, poor balance,

postural hypotension, and drowsiness. Polypharmacy contributes to even higher incidence of falls because of their joint impact on the body functions. Falls frequently lead to fractures, admission to hospital, loss of autonomy, and deterioration of the patient's quality of life. Hip fractures are especially dangerous for old people and may be fatal for them.

Cognitive Impairment and Delirium

Cognitive disorders such as cognitive dysfunction, memory impairment, confusion, and delirium have been attributed to polypharmacy in the elderly population. Some drugs, which include anti-cholinergics and those that have an effect on the central nervous system, have been shown to be hazardous to cognitive functioning. In cases where a combination of several drugs is taken, cognitive impairment can become more pronounced. Delirium has proved to be dangerous due to its connection with hospital stay, mortality, and functional decline.

Functional Decline

Taking more than one medication may be a reason why older people experience functional impairment and become dependent. The negative consequences of taking medications such as weakness, fatigue, dizziness, and difficulty in moving may be barriers to performing daily activities. Functional impairment may hinder patients from engaging in self-care activities, maintaining communication with other people, and living independently. The need for care and medical help may become more frequent because of these restrictions. Avoiding inappropriate taking of medications is important for ensuring functional ability of older patients.^[17]

Increased Mortality Risk

Many studies have shown that there is a relationship between polypharmacy and increased mortality in elderly patients. Increased mortality may be due to drug side effects, medication error, drug-drug interaction, falls, and exacerbation of underlying conditions. Overutilization of drugs may also lead to frailty, admission to the hospital, and poor health status. Even if polypharmacy alone cannot always be considered as the cause of mortality, it still plays a significant role as a marker of clinical complexity and vulnerability.

POTENTIALLY INAPPROPRIATE MEDICATIONS IN GERIATRIC PATIENTS

Inappropriately Prescribed Medications (IPMs), or Potentially Inappropriate Medications (PIMs), are medicines where the risk of usage outweighs the potential clinical benefit, especially when there are better alternatives in terms of efficacy and safety available. Elderly patients are prone to harm from medication since their physiology has changed, and they often suffer from various illnesses as well as take several medications at the same time. The use of IPMs is linked with side effects of taking medicines, falls, cognitive dysfunction,

hospitalization, loss of function and high healthcare expenditures. Detection and reduction of IPM use is one of the key components of geriatric pharmacotherapy. There are several screening tools, like the Beers Criteria and the STOPP Criteria, designed to help detect potentially harmful medications.^[18]

Sedative-Hypnotics and Benzodiazepines

Sedatives such as benzodiazepines are used to treat conditions like anxiety, insomnia, and agitation. The older adults are, however, much more prone to the effects of these drugs owing to physiological changes related to age that affect the metabolism of the drugs and functioning of the central nervous system. Side effects of the drug include extreme drowsiness, dizziness, confusion, poor coordination, and mental impairment. Dependency on and withdrawal from these drugs is another side effect. In addition, the elderly are at high risk of falls and road accidents because of these drugs.

Anticholinergic Medications

Anticholinergics have been commonly regarded as possibly inappropriate medications among geriatric patients. Anticholinergics can be prescribed for different diseases such as allergies, urinary incontinence, gastrointestinal disorders, and depression. The elderly population is especially vulnerable to anticholinergic side effects due to higher susceptibility and low physiological reserves. The most frequent complications include dry mouth, constipation, urinary retention, blurred vision, confusion, and cognitive impairment. It has been also found that long-term anticholinergic use is linked to cognitive impairment and dementia.

Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)

NSAIDs are extensively utilized for the treatment of pain, inflammation, and musculoskeletal conditions in elderly patients. However, due to the potential adverse consequences of long-term NSAID utilization such as gastric bleeding, peptic ulcers, impaired kidney functioning, edema, and cardiovascular events, elderly patients are at high risk because of age-associated decline in renal and gastrointestinal functions. In addition, the co-administration of anticoagulants and antiplatelet drugs together with NSAIDs raises the probability of bleeding. Hence, the prescription of NSAIDs is associated with the need for caution and administration of minimum doses.^[19]

Antipsychotic Medications

Antipsychotic medication can be prescribed for behavioral and psychological symptoms that occur as part of dementia, delirium, and other mental illnesses. Nevertheless, the risks associated with these agents in elderly individuals include such effects as sedation, orthostasis, extrapyramidal side effects, stroke, and mortality. It is known that dementia patients are especially sensitive to these side effects. Even though the prescription of antipsychotics might be inevitable in

some situations, it needs to be used only if all non-medicinal treatment methods were not effective.

Sulfonylureas

Specific sulfonylureas, specifically the extended-release ones like glyburide, are regarded as potentially inappropriate for elderly people due to their increased potential for causing prolonged hypoglycemia. Changes that happen in the body of aging individuals affect the renal clearance of drugs, hence making it likely for severe and prolonged hypoglycemia to occur. Hypoglycemia among older individuals leads to falling, confusion, admission to the hospital, and even cardiovascular problems. There are other drugs that have less chance of causing hypoglycemia and thus are usually recommended.

Proton Pump Inhibitors (PPIs)

Proton pump inhibitors (PPIs) are the drugs that are frequently used to treat GERD, peptic ulcer disease, and gastric protection. Even though PPIs are generally considered safe when used on a short term basis, their long-term use may lead to an increased risk of bone fracture due to osteoporosis, vitamin B12 deficiency, hypomagnesemia, *C. difficile* infections, and chronic kidney disease. The use of PPIs in an absence of clear indication in elderly patients may be referred to as potentially inappropriate.

Skeletal Muscle Relaxants

Though skeletal muscle relaxants may be recommended to deal with pain and muscle spasm, their prescription for older people is not regarded as proper. These drugs have several side effects that can lead to such symptoms as sedation, dizziness, weakness, and even confusion, thereby increasing the likelihood of falling and having bone fractures. It may be difficult to obtain a good effect with their use by older people, whereas the possibility of developing side effects is rather high. Thus, safer drug therapy may be used.

First-Generation Antihistamines

Antihistamines of the first generation like diphenhydramine and chlorpheniramine have potent anticholinergic action and can become an issue in older patients. Antihistamines of the first generation may result in sedation, confusion, urine retention, constipation, visual disturbances, and impaired cognitive functioning. The risks of falling and developing delirium are also elevated, especially in vulnerable older patients. Taking into account the fact that there are modern antihistamines providing equivalent efficacy with fewer adverse effects, antihistamines of the first generation can be regarded as potentially inappropriate.^[20]

IMPACT OF POLYPHARMACY ON QUALITY OF LIFE IN GERIATRIC PATIENTS

Polypharmacy has a considerable effect on the quality of life of elderly patients. While it is often needed to control chronic illnesses and achieve better health outcomes, too

many medications may have a negative effect on physical, psychological, social, and economical spheres of elderly patients' life. Older patients are especially at risk of having side effects from drugs owing to their physiology that has been changed with age, multimorbidity, and lack of function. As a result, polypharmacy may have an enormous effect on an older patient's ability to perform his or her activities of daily living, build and keep social ties and be well-off.

Physical Health and Functional Status

Polypharmacy could have adverse effects on physical wellbeing since it increases the risk of drug-related adverse events, drug interactions, dizziness, tiredness, weakness, and lack of mobility. The above-mentioned conditions could make it difficult for a geriatric patient to complete basic activities of daily living including bathing, dressing, moving, and feeding oneself. Taking several drugs is associated with the likelihood of falls and fractures which require a hospital stay and disability in the long term. The decreased ability to move physically would result in dependence on caregiver assistance. Thus, polypharmacy can have negative effects on physical wellbeing and functionality.

Psychological Well-Being

Managing a number of medications can make an immense contribution to the mental well-being of older people. Complicated regimes of drug intake can generate stress, anxiety, confusion, and dissatisfaction, especially in those patients who suffer from cognitive impairments. There are also certain drugs that are capable of provoking depression and other mental conditions, including cognitive deterioration. Psychological burden generated by polypharmacy can be aggravated by such factors as fear of adverse effects, costs of the medications, and their chronic dependence on them. Effective medication management is capable of resolving these issues.^[21]

Medication Adherence and Treatment Burden

As the number of medicines becomes higher, the treatment regimen becomes complex, making it harder for people to adhere to it. Older people may have problems with remembering the schedule of taking medicines, the way the medicines should be taken and the time of taking them. Such non-adherence can cause poor disease management, development of worse symptoms and increased usage of health services. Also, the regular obligation of taking different medicines can lead to high burden of treatment, thus lowering the motivation and confidence in performing self-care.

Social Functioning and Independence

Polypharmacy can have an adverse effect on social functioning in that it restricts mobility, decreases social activity involvement, and increases dependence on families or care givers. Adverse effects of medication that include fatigue, confusion, and weakness make elderly patients less likely to participate in social

activities and maintain their social connections. This can result in loneliness, social isolation, and poor emotional state. Additionally, dependence on caregiver in terms of taking medications and visiting medical institutions undermines feeling of independence. It is vital to keep a proper use of medication.

Economic Burden

The economic effects of polypharmacy can have a significant effect on elderly patients, especially where patients do not have enough money or adequate insurance cover. This is because the expenses that come with buying several drugs, visiting the doctor regularly, and handling side effects of the drugs can create economic hardships for the patient and the family. Increased use of healthcare services due to bad drug effects will contribute even more to the economic burden. Economic difficulties might even result in medication nonadherence among patients who cannot afford their prescribed medications.

Cognitive Function and Quality of Life

Polypharmacy has been linked to cognitive dysfunction, impaired memory, confusion, and decreased mental capacity in older patients. Some drugs, especially those that are anticholinergic or have sedating effects, can negatively impact cognitive ability and predispose patients to delirium and signs of dementia. Cognitive deterioration may impair the ability to take medication, make decisions, and live independently. The more cognitive function deteriorates, the worse the quality of life becomes due to lack of autonomy and increasing dependency on caregivers. It is crucial to choose appropriate medication to avoid adverse cognitive effects.^[22]

ECONOMIC BURDEN OF POLYPHARMACY

The concept of polypharmacy is a source of high economic cost to geriatric patients, their carers, health care systems, and even to society as a whole. The more medications that have been prescribed by doctors, the greater the costs connected with treatment are. Elderly people need long-term use of medicines due to chronic diseases, and therefore spend much money on prescriptions, over-the-counter drugs, as well as dietary supplements. In some cases, the payment for the maintenance of complicated medical treatment plans becomes a burden for elderly people who live on small budgets.

Aside from the cost of medications, polypharmacy also leads to the higher utilization of healthcare and increased cost in relation to that. Some of the factors responsible for such complications include the incidence of drug side effects, drug interactions, medical errors related to medications, and poor adherence. Such complications require hospitalization and cause costs for both patients and health care systems. Research shows that medication-related admissions make up for one of the

main sources of spending in health care sector when talking about older population.^[23]

There is also the indirect cost of polypharmacy. Medication-related complications often lead to disability, decrease in functioning, productivity of caregivers, and need for more healthcare services. Caregivers have to take much time and effort to assist their relatives in managing their medications, transport to hospitals, and to monitor the effect of medications on the patients' health. Moreover, older people lose their ability to be self-sufficient that leads to the need of hiring a helper at home, admission to assisted living facility, or even a nursing home.

Some ways to lessen the economic impact of polypharmacy are conducting routine medication evaluations, deprescribing, improving compliance with medications, and adopting rational prescribing practices. The contribution of clinical pharmacists, conducting medication reconciliation programs, and the utilization of rational prescribing measures will assist in identifying any inappropriate medication prescribed and optimizing the medication regimen for the patient. Through minimizing the complications associated with medication use, health care providers will be able to achieve better patient outcomes at lower costs of healthcare delivery.

ROLE OF CLINICAL PHARMACISTS IN MANAGING POLYPHARMACY

The practice of clinical pharmacy helps in dealing with polypharmacy cases among geriatric patients. Geriatric individuals tend to use many different drugs due to their different chronic illnesses. Thus, there can be adverse reactions, drug interactions, and other problems related to the medications used by such patients. The clinical pharmacists evaluate every medication used by the individual to determine if it is needed and useful. They detect any duplication of therapies and the medications which should not be used, as well as possible interactions which can lead to negative consequences. Moreover, they give advice on the right usage of the medications.

Moreover, clinical pharmacists collaborate with physicians, nurses, and caregivers to enhance the effectiveness of medication treatments for patients. They are involved in conducting medication reconciliation on admission and discharge to avoid prescription mistakes and ensure continuity in their care. In addition, pharmacists promote deprescribing by suggesting discontinuing unnecessary drugs that might be hazardous to patients. Through evaluating the effectiveness of treatment and the safety of patients, they manage to minimize any complications associated with medication, admissions in hospitals, and healthcare costs. The participation of pharmacists in the care of elderly patients is essential for their health.^[24]

CHALLENGES AND LIMITATIONS IN POLYPHARMACY MANAGEMENT

Polypharmacy in older patients poses some difficulties owing to the prevalence of several co-morbidities, complex regimen, and physiologic changes. Elderly individuals are often under the care of multiple healthcare practitioners, which may lead to fragmented care, duplicate prescriptions, and poor coordination between practitioners. Moreover, cognitive decline, visual problems, and low health literacy among older people may complicate the proper comprehension of the instructions for medications. These factors increase the likelihood of medical mistakes, drug interactions, and non-adherence, complicating the polypharmacy management problem.

One more limitation of current practice in this area is that there are no routine medication review opportunities and inadequate resource availability in order to implement comprehensive medication management. Practitioners may face time limitations, lack of access to complete medication records, and inability to coordinate the care provided by multidisciplinary team members. The resistance of patients and/or their caregivers to the process of deprescribing the medications prescribed for the lifetime is also an issue. Additionally, clinical guidelines are often tailored to specific diseases and do not address the needs of patients with multiple chronic conditions.^[25]

FUTURE PERSPECTIVES

Polypharmacy management of geriatric patients in the future is expected to adopt more patient-centered approaches that will aim at optimizing the use of medication while reducing risk factors associated with it. The development of health care technology such as EHRs, CDSS, and AI will help the healthcare practitioners identify the potentially inappropriate medication, predict drug-drug interactions, and improve prescribing decisions. Pharmacogenomics is another innovation that will play an important role in individualizing the drug therapy using the patient's genetic profile in order to enhance the effectiveness of the medication therapy and minimize adverse drug reactions.

Moreover, future approaches to polypharmacy management will involve more multidisciplinary cooperation, regular medication review, and deprescribing approach to ensure safe medication practices. In this context, clinical pharmacists, physicians, nurses, and other caregivers will be responsible for the rational use of drugs and reduction of unnecessary medication. Research in the future should aim at developing prescribing guidelines for geriatric patients, intervention strategies aimed at enhancing the medication adherence, and outcomes of deprescribing programs. Enhancing health policy, raising awareness among the healthcare provider community and the

patients, and applying technology in clinical practice will be vital in dealing with the problem of polypharmacy.^[26]

REFERENCES

- Gianfredi V, Nucci D, Pennisi F, Maggi S, Veronese N, Soysal P. Aging, longevity, and healthy aging: the public health approach. *Aging Clin Exp Res*, 2025 Apr 17; 37(1): 125.
- Nobili A, Garattini S, Mannucci PM. Multiple diseases and polypharmacy in the elderly: challenges for the internist of the third millennium. *J Comorb*, 2011 Dec 27; 1: 28-44.
- Alhumaidi RM, Bamagous GA, Alsanosi SM, Alqashqari HS, Qadhi RS, Alhindi YZ, Ayoub N, Falemban AH. Risk of Polypharmacy and Its Outcome in Terms of Drug Interaction in an Elderly Population: A Retrospective Cross-Sectional Study. *J Clin Med*, 2023 Jun 10; 12(12): 3960.
- Ellis G, Gardner M, Tsiachristas A, Langhorne P, Burke O, Harwood RH, Conroy SP, Kircher T, Somme D, Saltvedt I, Wald H, O'Neill D, Robinson D, Shepperd S. Comprehensive geriatric assessment for older adults admitted to hospital. *Cochrane Database Syst Rev*, 2017 Sep 12; 9(9): CD006211.
- Fang Y, Gong AY, Haller ST, Dworkin LD, Liu Z, Gong R. The ageing kidney: Molecular mechanisms and clinical implications. *Ageing Res Rev*, 2020 Nov; 63: 101151.
- Kaur G. Polypharmacy: The past, present and the future. *J Adv Pharm Technol Res*, 2013 Oct; 4(4): 224-5.
- Fried TR, O'Leary J, Towle V, Goldstein MK, Trentalange M, Martin DK. Health outcomes associated with polypharmacy in community-dwelling older adults: a systematic review. *J am Geriatr soc*, 2014; 62: 2261–2272.
- Sidamo T, Deboch A, Abdi M, Debebe F, Dayib K, Balcha Balla T. Assessment of Polypharmacy, Drug Use Patterns, and Associated Factors at the Edna Adan University Hospital, Hargeisa, Somaliland. *J Trop Med*, 2022 Aug 29; 2022: 2858987.
- Mangoni AA, Jackson SH. Age-related changes in pharmacokinetics and pharmacodynamics: basic principles and practical applications. *Br J Clin Pharmacol*, 2004 Jan; 57(1): 6-14.
- Delara M, Murray L, Jafari B, Bahji A, Goodarzi Z, Kirkham J, Chowdhury M, Seitz DP. Prevalence and factors associated with polypharmacy: a systematic review and Meta-analysis. *BMC Geriatr*, 2022 Jul 19; 22(1): 601.
- Monégat M, Sermet C, Perronnin M, Rococo E. Polypharmacy: definitions, measurement and stakes involved - review of the literature and measurement tests. *Quest d'économie la Santé*, 2014; 204: 1–8.
- Moriarty F, Hardy C, Bennett K, Smith SM, Fahey T. Trends and interaction of polypharmacy and potentially inappropriate prescribing in primary care over 15 years in Ireland: a repeated cross-sectional study. *BMJ Open*, 2015; 5(9): 1–7.
- Obermann KR, Morris JC, Roe CM. Exploration of 100 commonly used drugs and supplements on cognition in older adults. *Alzheimers Dement*, 2013 Nov; 9(6): 724-32.
- Keche Y, Gaikwad NR, Wasnik PN, Nagpure K, Siddiqui MS, Joshi A, Dhaneria S, Dewangan G, Meher J, Das P. Analysis of Drugs Prescribed to Elderly Patients in a Tertiary Health Care Center in Raipur, Central India: An Observational Study. *Cureus*, 2024 Jan 23; 16(1): e52770.
- Ahmed B, Nanji K, Mujeeb R, Patel MJ. Effects of polypharmacy on adverse drug reactions among geriatric outpatients at a tertiary care hospital in Karachi: a prospective cohort study. *PLoS One*, 2014 Nov 17; 9(11): e112133.
- Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. *Expert Opin Drug Saf*, 2014 Jan; 13(1): 57-65.
- Wastesson JW, Morin L, Tan ECK, Johnell K. An update on the clinical consequences of polypharmacy in older adults: a narrative review. *Expert Opin Drug Saf*, 2018 Dec; 17(12): 1185-1196.
- Karki S, Thapa RB, Shrestha R. Exploring Potentially Inappropriate Medication Use on Elderly Patients in a General Medicine Ward Using 2023 AGS Beers Criteria. *Aging Med (Milton)*, 2025 Jun 15; 8(3): 238-248.
- Bhatt AN, Paul SS, Krishnamoorthy S, Baby BT, Mathew A, Nair BR. Potentially inappropriate medications prescribed for older persons: A study from two teaching hospitals in Southern India. *J Family Community Med*, 2019 Sep-Dec; 26(3): 187-192.
- Choo A. Potentially inappropriate medicines for older people: consensus-based lists. *Aust Prescr*, 2025 Aug; 48(4): 128-132.
- Boateng I, Pascual CR, Grassby P, Asghar Z, Ibrahim K. The impact of polypharmacy on health outcomes in the aged: A retrospective cohort study. *PLoS One*, 2025 Feb 3; 20(2): e0317907.
- Zarinfar Y, Panahi N, Shojaei R, Hosseinpour M, Nabipour I, Larijani B, Fahimfar N, Ostovar A. The association between polypharmacy and quality of life in elderly population in Southern Iran: Bushehr Elderly Health (BEH) Program. *BMC Public Health*, 2025 Nov 25; 25(1): 4146.
- Lakra K, Pandey M, Meher S, Panda BK, Meher RK, Panigrahi D, Kumar Chowdury R, Panda S, Mahapatra SK. Economic Burden of Multimorbidity and Polypharmacy Among Geriatric Patients: A Single-Center Experience From Odisha, India. *Cureus*, 2024 Nov 29; 16(11): e74752.
- Ouraou R, Cossette B, Perron ME, Hudon C. Pharmacists' role in interventions addressing excessive polypharmacy: a scoping review. *Int J Clin Pharm*, 2026 Feb; 48(1): 17-26.
- Sinha A, Mukherjee S, Tripathi S, Dutta S. Issues and challenges of polypharmacy in the elderly: A

- review of contemporary Indian literature. J Family Med Prim Care, 2021 Oct; 10(10): 3544-3547.
26. Molokhia M, Majeed A. Current and future perspectives on the management of polypharmacy. BMC Fam Pract, 2017 Jun 6; 18(1): 70.