

Polypharmacy in Geriatrics

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ABSTRACT

Geriatrics is more prone to higher risks of chronic illness and are using multiple medications in order to lead healthy life. Polypharmacy increases the risk of adverse drug events, as a result changes takes place in physiological, social, physical and functional decline in the body. These rapid physiological changes make elderly patients unable to cope with body stresses. Drug toxicity, side effects and adverse drug reactions appear more frequently and are more life-threatening in elderly patients. Tetracyclins, streptomycin, reserpine, and all barbiturates are to be contraindicated in geriatrics in order to prevent further complications. Polypharmacy is the simultaneous taking of many medications, has been well documented and is a topic of much concern for those looking to improve the quality of care for the elderly. Elderly patients often develop complicated conditions and multi-factorial health states that require extensive pharmacotherapy, sometimes surgery leaving the population at risk for exposure to drug-drug interactions, drug-food interactions and other adverse events. Previously literature states that rate of adverse events are directly proportional to number of drugs taken by the patient. To manage all these complications and to avoid polypharmacy Dose regimen should be simple and drugs should be given in combinations to improve patient compliance.

Keywords: Polypharmacy, Geriatrics, multiple medications, prevalence of disease

INTRODUCTION

What is Polypharmacy:

“Polypharmacy is the concurrent use of multiple medications. It can be associated with the prescription and use of too many or unnecessary medicines at dosages or frequencies higher than therapeutically essential. However, multiple medications are often necessary and can constitute best care for patients.”^{[1][6]}

Types of polypharmacy^[4]:

Appropriate polypharmacy

Prescribing for an individual for complex conditions or for multiple conditions in

circumstances where medicines use has been optimized and the medicines are prescribed according to best evidence. The overall intent for the combination of medicines prescribed should be to maintain good quality of life, improve longevity and minimize harm from drugs.

Problematic polypharmacy

Where multiple medications are prescribed inappropriately, or where the intended benefit of the medication is not realized. The reasons why prescribing may be problematic may be that the treatments are not evidence-based, or the risk of harm from treatments is likely to

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outweigh benefit, or where one or more of the following apply:

- The drug combination may be hazardous because of interactions.
- The overall demands of medicine-taking, or 'pill burden', are unacceptable to the patient.
- These demands make it difficult to achieve clinically useful medication adherence (reducing the 'pill burden' to the most essential medicines is likely to be more beneficial).
- Medicines are being prescribed to treat the side effects of other medicines where alternative solutions are available to reduce the number of medicines prescribed.

Geriatrics: Is the branch of general medicine concerned with the clinical preventive remedial and social aspects of illness in the elderly. The term geriatrics refers to patient's age 65 years or over.^[3] However, the physiological changes that occur with ageing or progressive, occurring gradually over a lifetime rather than abruptly at any given chronological age, so the choice of '65 years' is a relatively arbitrary one, and the definition is sometimes extended to include people aged 60 years and over^[3]. The ageing population given below in table (T-1).

(T-1) The ageing population^{[3][4]}		
Country		Percentage
U S A	100 years ago	<2% of population over 65 years of age.
	1990	13% of population over 65 years of age.
	by 2050	Predicted to reach 20%.
India	1951-1995	5.5-7%
	Currentscenario	65 million people

Age related changes in geriatrics^{[5][6]}:

1. Advance age brings inevitable changes like slow muscular atrophy.
2. There is 20-30% decrease in lean body mass, especially from 30-80 years of age.
3. Fat-free mass diminishes from 60-80%.
4. Fat increases with age especially in men from 18-36%.
5. Cellular mass decreases from 30-65%.
6. Albumin pool is reduced by 20%.
7. After 20 years of age cerebral function starts declining, slowly upto 75 years of age, and slowly deteriorates.
8. Reduction in motor function, often leads to vehicular accidents.
9. Visual and auditory degeneration causes misunderstanding and confusion.
10. All the above changes together, contribute to interrelated complexes and to what is, known as, 'old age syndromes'.

REASONS FOR CAUTION WHEN USING MEDICATION IN THE ELDERLY^{[3][4]}

Increased prevalence of disease

The prevalence of many diseases increases with advancing age and as a result elderly people often suffers from multiple co existing medical conditions. Common diseases and health related programs in the elderly are tabulate in table given below (T-2).

(T-2) Common diseases and health problems affecting the elderly^{[3][4]}

Cancer
Cerebrovascular diseases
Cardiovascular diseases
Chronic bronchitis, chronic obstructive airway disease
Constipation
Dementia
Depression
Infectious diseases(UTI,RTI)
Impaired mobility and falls
Osteoporosis
Malnutrition and related problems
Visual and hearing impairment

Polypharmacy^{[3][4]}

As a result of increased disease prevalence, older people tend to use more medications compared to younger people. For example, in Australia people over the age of 65 comprise 12% of the population, yet 40% of all prescriptions dispensed are for this age group. The term polypharmacy has been used to describe the prescription or use of multiple medications. Increasing the number of medications prescribed has been shown to independently increase risk of ADR's and for this reason unnecessary polypharmacy must be avoided. Other reasons to avoid unnecessary polypharmacy are to minimize cost and enhance compliance.

Altered drug response^{[3][4]}

Older patients tend to be more sensitive to the effects of medication compared to younger patients. This is due to the result of physiological changes that occurs with advancing age resulting in altered pharmacokinetic and dynamic parameters for many drugs. In older patient were mostly observed with more ADR's and often require lower doses.

Inappropriate prescribing

Inappropriate prescribing for elderly patients is common, with studies throughout the world reporting that 14-16% of elderly patients are prescribed at least one inappropriate medication. For example angiotensin converting enzyme inhibitors decrease morbidity and mortality associated with cardiac failure.^[4]

Adverse drug reactions

The incidence of ADR is known to increase with age, although old age itself is one of the important risk factors mentioned above. Adverse drug reactions are most commonly seen in the community settings, and drug related problems contribute 10-24% of hospital admissions among older people.^[3]

Patient non-compliance

Poor compliance with prescribed drugs is very common elderly patients. Contributing factors include multiple drug prescribing confusion, forgetfulness, visual impairment, illiteracy and poverty.^[4]

PRINCIPLES OF GERIATRIC MEDICINE^[2]

Despite the biologic controversy, from a physiologic standpoint human aging is characterized by progressive constriction of the homeostatic reserve of every organ system. This decline, often referred to as

homeostenosis, is evident by the third decade and is gradual and progressive, although the rate and extent of decline vary. The decline of each organ system appears to occur independently of changes in other organ systems and is influenced by diet, environment, and personal habits as well as by genetic factors.

Several important principles follow from these facts^[2]:

- Individuals become more dissimilar as they age, belying any stereotype of aging;
- abrupt decline in any system or function is always due to disease and not to “normal aging”
- “Normal aging” can be attenuated by modification of risk factors (e.g., increased blood pressure, smoking, sedentary lifestyle);
- “Healthy old age” is not an oxymoron. In fact, in the absence of disease, the decline in homeostatic reserve causes no symptoms and imposes few restrictions on activities of daily living regardless of age.
- Appreciation of these facts may make it easier to understand the striking increases that have occurred in life expectancy. Average life expectancy is now 18 years at age 65, 11 years at age 75, 6 years at age 85, 4 years at age 90, and 2 years at age 100. Moreover, the bulk of these years is characterized by a lack of significant impairment. Even beyond age 85, only 30% of people are impaired in any activity required for daily living and only 20% reside in a nursing home.
- Yet, as individuals age they are more likely to suffer from disease, disability, and the side effects of drugs, all of which, when combined with the decrease in physiologic reserve, make the older person more vulnerable to environmental, pathologic, and pharmacologic challenges.

Adverse drug reactions in elderly^{[5][2]}:

Geriatrics is two or three times more likely to have adverse drug reactions. Due to a decrease in renal plasma flow and glomerular filtration rate and a reduced hepatic clearance drug clearance is often markedly reduced. The last is due to a decrease in activity of the drug metabolizing microsomal enzymes and an overall decline in blood flow to the liver with aging. The volume of distribution of drugs is also affected, since the elderly have a decrease in total-body water and a relative increase in body fat. Thus, water-soluble drugs become more concentrated, and fat-soluble drugs have longer half-lives. In addition, serum albumin levels decline, particularly in sick patients, so that there is a decrease in protein binding of some drugs (e.g., warfarin, phenytoin), leaving more free (active) drug available. Thus, a lower/total serum drug level, as assessed by routine assays, may be an appropriate level in older patients. In addition to impaired drug clearance, which alters pharmacokinetics, older patients have altered responses to similar serum drug levels, a phenomenon known as altered pharmacodynamics.

They are more sensitive to some drugs (e.g., opiates, anticoagulants) and less sensitive to others (e.g., adrenergic agents). Finally, the older patient with multiple chronic conditions is likely to be taking several drugs, including non-prescribed agents. Thus, adverse drug reactions and dosage errors are more likely to occur, especially if the patient has visual, hearing, or memory deficits. Nonetheless, because under treatment of older patients is as problematic as overtreatment, these caveats should not deter prescription of appropriate therapy.

By large, adverse drug reactions manifest more in people in above 60 years of age than in younger people. The reasons may be stated as:

1. Multiple chronic disorders among the elderly require administration of large number of medication.

2. Several physicians prescribe independently for different disease conditions and patients are on multiple drug therapy.
3. In appropriate identification of ADR, due to complexity of pathophysiological changes.
4. Patients not complying or self-medication improperly due to lack of understanding.
5. Inadequate patient education for prescription drugs and over the counter (OTC) drugs

The following tables (T-3.1)&(T-3.2) were given with the important drug disease interactions and list of drugs to be used with caution in geriatric patients.

(T-3.1) Common Drug-Disease Interactions in elderly ^[5]		
Underlying diseases	Drug	Adverse effects
Dementia	Psychotropic drugs, levodopa, antiepileptic agents.	Increased confusion, delirium.
Glaucoma	Drugs with anti-muscarinic side effects.	Acute glaucoma
Cardiac disorders	Tricyclic anti-depressants.	Heart block
Hypertension	NSAID's	Increases in blood pressure
Chronic obstructive pulmonary disease	β – blockers.	Bronchoconstriction
Chronic renal impairment	NSAID's aminoglycosides	Acute renal failure
Diabetes mellitus	Diuretics, prednisolone	Hyperglycemia
Prostatic hypertrophy	Drugs with anti-muscarinic side effects.	Urinary retention.
Depression	β – blockers, centrally acting antihypertensives, alcohol, benzodiazepines, steroids.	Mental depression and suicidal tendencies
Hypokalemia	Digoxin	Cardiac arrhythmias
Peptic ulcer	NSAID's, anticoagulants	Gastrointestinal hemorrhage.

(T-3.2) Drugs preferably to be Avoided in Elderly ^{[5][6]}	
Drugs	Reason
All barbiturates	Confusion.
Bethanidine	Severe postural hypotension.
Carbenoxolone	Fluid retention and congestive cardiac failure.
Chlorthalidone	Prolonged diuresis, incontinence.
Debrisoquine	Postural hypotension.
Guanethidine	Postural hypotension.
Pentazocine	Confusion, variable efficiency.
Reserpine	Depression.
Streptomycin	Ototoxicity.
Tetracycline	Rising blood urea in the presence of impaired renal function.

PHARMACIST ROLE IN GERIATRIC CARE^{[5][7]}

- Understand the benefit-to risk factor of the drugs for an elderly patient.
- Non-drug alternative treatment should be possible as far as possible.
- Dose regimen should be simple.
- The selected drug should cure more than one ailment, if possible.
- Dosage of drugs should be calculated based upon age and body weight and preferably total amount of drug administered is reduced to compensate for impaired renal and hepatic function.

Strategies for Rational Drug Therapy^{[5][3]}:

The patient compliance also depends on the dosage form. Compliance is to which a patient behavior withstands the drug regimen. Intellectual impairment, visual impairment and inability to open drug containers have been identified as major problems in the elderly.

The pharmacist should make special efforts to make geriatric patients understand adverse drug reactions, administration of drug formulations and hazards of non-compliance, both verbally and in written form. In trying to prevent misuse of medications by the elderly, some Do's and Don'ts to be observed by patients are suggested here.

- Avoid sudden withdrawal of sedating medications on admission

- Recommend low dose heparin of 5000 units subcutaneous twice daily for deep vein thrombosis prophylaxis if patient is unable to mobilize.
- Recommend short term use of laxatives in immobilized patients especially if receiving opioid analgesics.

Do's^[6]:

- Tell your doctor all the medicines you are taking and the allergies you are bearing.
- Understand all instructions for using drugs.
- Call doctor on noticing any new symptoms or side effects.
- Keep drugs in air tight containers, and store them properly.
- Keep record of all drugs and vaccines you are sensitive or allergic to.

Don'ts^[6]:

- Do not take more or less than the amount of drug prescribed.
- Do not skip taking the drugs suddenly without the doctor's suggestion.
- Do not mix alcohol and drug without the doctor's permission.
- Do not take someone else's drug or give yours to others.
- Do not transfer a drug from its original bottle to other container.
- Do not keep old or expired medicines in your cabinet.

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