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Prescribing Drugs for the Elderly May be more Harmful than Useful

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ABSTRACT

The elderly are by far the largest consumers of prescribed drugs, taking more than half of all drugs supplied by the health services.

Patient compliance is notoriously poor, and it gets worse as the frequency of doses and the multiplicity of drugs increase. Elderly patients are more than usually prone to adverse drug reactions because of their generally more extensive previous drug exposure.

Drugs should be prescribed to the elderly with special care because of the complications they develop in the aging process, and only when needed. Physician should not give any drug blindly prior to diagnosis and to avoid polypharmacy. As well as understanding the pharmacodynamics and drug interaction of drugs by the physician prior to prescribing is of paramount importance.

Allah, the Lord said we should worship no one but him, and that we should be kind to our parents. If one or both of our parents reach old age with us, we should not say 'Fie' unto them not repulse them, but we should speak to them graciously.[1]

The Holy Quran tells us that we should not harm the elderly in any way, yet oftenly we unconsciously harming them by drugs we are prescribing.

The importance of considering drug therapy in the elderly specifically is illustrated by the fact that the elderly are by far the largest consumers of prescribed drugs, **taking more than half of all drugs supplied within the Health Services. About three quarters of the over 75s receive prescribed medications with two-thirds of the patients taking one to three drugs and the rest taking four or more.** This age group is increasing rapidly, so the absolute numbers of persons having prescribed drugs is also increasing.[2,3]

Important changes in drug responses occur with increasing age as a result of the increasing incidence of disease with age leads to the tendency to prescribe more drugs for elderly patient.[3,4]

It has already been emphasized that many old people have multiple illnesses and complaints. Many are the victims of social and financial stress which may give rise to somatic symptoms and frequently they have anxious and guilty relatives who insist that 'something must be done'.[2,5]

It is important to realise that many of the diseases from which the elderly suffer are doing the patient no immediate harm and do not require treatment. Curtainly, there is no need for each disease or symptom simply because of multiple pathology present in the elderly. It is surprising how often the elderly are better off without some drugs. However, do not withhold drugs on account of old age, particularly when appropriate drug treatment can improve the quality of life.[6]

It seems that many doctors believe that patients expect a prescription for every symptom. There is one study, however, that contradicts this notion. In another general practice study, half the 75+ group was receiving long-term therapy, mostly for heart disease, depression or anxiety.[2]

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— Principles of Prescribing Drugs
— Medical Treatment of Aged Patient
— Compliance
— Pharmacology of Drugs Prescribed
— Adverse Side Effects, and
— Recommendations

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PRINCIPLES OF PRESCRIBING:[3,6,7]

Prescribing drugs is an area which requires great skill from the general practitioner. Old people respond very satisfactory to treatment of the vast majority of diseases. **Accurate diagnosis and assessment** of their problem is essential, and frequently not easy.

Correct drug treatment in the elderly is absolutely critical for many reasons. The important factors are: weakness, the degree of illness, inability to look after themselves, poor appetite and nutrition, poor fluid intake, immobility, multiple illnesses, confusion, forgetfulness and lack of supervision. Some of these factors may lead to problems with compliance.[3,7]

Drug compliance is vital for therapeutic success. The minimum number of the drugs to be taken in a day should be prescribed in order to avoid confusion over pills. If possible, once a day drugs having a long action should be used.

Perhaps the biggest practical problem is multiple prescribing of drugs for the elderly, with long lists of medications that they may be taking. This not only enhances the risk of drug interaction, but also reduces the likelihood of drug compliance.[7]

The unwanted effects of individual drugs should be thoroughly understood as well as drug interaction, since many old people are taking several different agents at any one time.

Drug interactions and unwanted effects of individul drugs are a greater problem in the old than the young. Many analgesics and simple antacids have a constipating effect. The atropinic effects of many agents may precipitate glaucoma or severe prostatism. Diuretic agents may light up a diabetic state or severely execerbate existing diabetes as well as upsetting the potassium status of the old.[7]

The actual packaging of drugs is important, since those with arthritic hands may find great difficulty in opening bottles or measuring spoonfuls of liquid medicines.

Careful explanation should be given to the patient, and if possible, the relatives, about why the drug is being prescribed, how to take it, and what unwanted effects may occur.

A drug cooperation card is very useful and is already used by many general practitioners, but these cards are useless unless they are kept up-to-date and always used by both patient and doctor.[7]

Drug metabolism may be markedly affected by the aging process and this applies mostly to drugs excreted by the kidney. However, there are many groups of drugs that need to be given in the same doses as in younger adults, these include antibiotics, steroids and most analgesics, and anti-inflammatory agents as well as diuretics.[7]

The most important renally excreted drug that causes severe toxic problems is digoxin. Many of the beta-adrenergic block agents are excreted by the kidney and the doses should always be started at a low level and increased slowly if necessary.[7]

MEDICAL TREATMENT OF THE AGED PATIENT:[3-6,8]

The keystone of medical treatment is accurate diagnosis. Repeatedly the attention has been drawn to the difficulties in making accurate diagnosis. These include inadequate history, the presence of multiple pathology which has the consequence of polypharmacy and the altered reaction to disease, so often observed in the elderly. Also, the elicitation and interpretation of physical signs is difficult and time-consuming. These difficulties not withstanding, much of the problem is because of the doctor's attitudes, knowledge and skills. Universal application of good geriatric practice would produce an immense improvement in the care of the elderly.

— Accurate diagnosis
— Improve quality of life
— Minimum drug schedules

Having made the diagnosis, the doctor should aim to improve the quality of the patient's life using the minimum number of drugs in the simplest possible way. Not all medical problems are amenable to drug treatment.

COMPLIANCE

Patient compliance in this respect, is notoriously poor and it gets worse as the frequency of doses and the multiplicity of drugs increase.[5,9]

Compliance (including over-the counter medication, whether accidental or intentional) is an important factor

which may cause problems with drug usage in the elderly. Approximately 30 to 50% of patients of all ages fail to comply with their physicians prescription instructions, a problem that physicians largely underestimate.[5,9]

FACTORS THAT CAUSE POOR COMPLIANCES

However, the factors that lead to poor compliance in the geriatric population are unique. They include:[2,3]

1. aging,
2. living alone
3. impairment and loss of vision
4. not able to understand instructions,
5. multiple diagnosis
6. general debility
7. memory loss and dementia
8. limited knowledge of current medicines
9. packing unsuitable for the age and illness (eg wrong style covers like child proof covers.)
10. use of generic and propriety names of various drugs for medications, as well as, multiple generic and brand name preparation of drugs that may look alike may lead to confusion.

ERRORS IN COMPLIANCE WHICH HAVE BEEN IDENTIFIED INCLUDE:[2]

1. Failure to take the drugs due either misunderstanding of instructions or inability to obtain the drugs, eg. patient's house-bound and has no one to take the prescription to chemist.

2. Self medication with 'across the counter' drug, or drugs left over from a previous illness. The former occurrence may be more likely to happen now that there is a limited list of drugs prescribable under NHS regulations.

3. Sometimes a patient may be taking drugs prescribed for another person such as a spouse or a **'helpful' neighbor.**

4. **Inaccurate timing and spacing of doses**.

5. **Mistaking one drug for another**, eg taking digoxin thrice daily and potassium supplements only once.

IMPROVING COMPLIANCE:

To improve the compliance,[2,3,5]

— Make the regime and administration of drugs as simple as possible in order to ensure better compliance

— Give as few doses as possible - no more than three drugs should be prescribed, if possible.

— Prescribe the medications so they are taken at mealtimes, in the morning or before going to bed.

— Instruction should be clear and written in large type. Samples of pills could be stuck to the instruction card. Also, explain the medication instructions to a spouse or other relatives.

— Use clear glass containers whenever applicable.

— Assess if a patient is losing his memory. Third party can contribute in this field and reltives can be helpful in this area also.

— Small tablets go down more easily than large because some old people have poor salivary flow and difficulty in swallowing larger tablets.

— Adequate amounts of water or other beverage should be ordered with medications.

APPROACH TO DRUG PRESCRIBING

Modern drugs carefully administered and supervised offer great benefit to elderly patients, and the doctor who takes the trouble to understand the way in which a drug is handled in the body, and the effect of a drug on physiological or pathological processes, ie, the response to the drug, will derive great satisfaction from seeing the improvements resulting from his or her prescription.[2]

DRUGS AND THE AGING BRAIN

Modern medical practice now includes a vast array of potent pharmacological agents that are available to treat a large number of illnesses experienced by older individuals. The elderly often have multiple medical problems occurring simultaneously which may require numerous medications. Because of changes in handling and distribution of drugs, the older individual is more susceptible to untoward reactions, especially those affecting the central nervous system. Family physicians should be aware of potential deleterious effect of drugs on their older patients.[4,9]

AGE FACTORS IN PRESCRIBING PHARMACODYNAMIC CHANGES

The change in pharmacodynamics that occurs with

aging often causes drugs to have deleterious effects on the brain. The aging brain, particularly when there is hypoxia or fever, may be more sensitive to certain drug actions due to increased pharmacological effects, even though the actual tissue drug levels may not be excessive.[3,5,9,12]

PHARMACOKINETIC CHANGES WITH AGING

Pharmacokinetics include the absorption, distribution and elimination of drugs.

Certain physiologic changes associated with aging are clinically important: these include changes in:[3-6,12]

1. drug absorption
2. drug distribution
3. protein binding
4. drug elimination:
   a. hepatic metabolism, and
   b. renal excretion
5. changes in receptor sensitivity, and brain neurotransmitters with age are also being reported.

DRUG ABSORPTION

Drug absorption does not normally change significantly with age. **Age-related change** in gastrointestinal function, such **as decreased gastric acid secretion, motility and reduced active transport processes**, have little or no effect on drug absorption.[4-6,9]

Pathological changes in the gastrointestinal function may, however, have profound effects in the absorption of certain drugs:

— **Mucosal oedema of the gut** can significantly impair the absorption of furosemide and other cardioactive agents;

— **Malabsorption** disorders or surgery affecting sites of drugs absorption of certain medications; and

— **Loss of stomach acid** following ulcer surgery may impede the absorption of oral iron.

DRUG DISTRIBUTION

As people grow older, the elderly patients tend to have smaller body mass than young patients, and the standard drug dose might be expected to result in higher blood tissue level.

Factors Affecting Drug Distribution:[3-6,12]

1. total body water decreases,
2. lean body mass is reduced, and
3. body fat increases

From age 20 to 70, the proportion of total body fat may increase from 10 to 50%. This increases the volume of distribution of lipid-soluble drugs, such as desmethyldiazepam, a metabolite of diazepam, and contributes to greatly prolong the drug half-life. Drug half-life is increased by an elevation of the volume of distribution or by a decrease in creatinine clearance. As a consequence of changes in volume of distribution and clearance, the half-life of diazepam metabolites, for instance, is prolonged from an average of 20 hours at age 20 to 90 hours at age 80.[12]

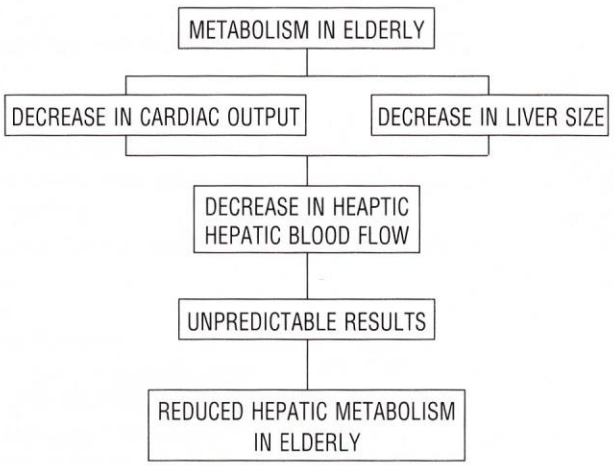
The distribution of drugs within the body does not change significantly due to age alone. The decrease in lean body mass and the increase in adipose tissue that occurs with aging can change the distribution of certain drugs. Fat-soluble psychoactive drugs, such as diazepam and phenothiazine, have an increased volume of distribution, whereas drugs that are more water soluble have a decreased volume of distribution.[9]

DRUG METABOLISM

Many drugs are metabolised (especially in the liver) prior to excretion by the kidney. If the enzyme systems in the liver are depressed by treatmet or disease, the effects of these drugs will be enhanced; eg alcohol and pethidine.[8]

Some drugs stimulate the liver enzymes and, thus, accelerate drug metabolism. This diminishes the pharmacological effects of the inducing drug and of other drugs given concurrently. The best example is the barbiturates which may cause an accelerated biotransformation of warfarin, phenytoin and the barbiturates themselves.[8]

HEPATIC METABOLISM IN ELDERLY[12]



DRUG ELIMINATION

The elimination of medications in older patients is an important issue. The elimination rates of some decline with age, but with others do not. Changes in renal and hepatic clearance of drugs can be both age-related and due to illnesses that occur more commonly in older persons.[5,6,9]

HEPATIC METABOLISM

The capacity of the liver to metabolise drugs does not appear to decline consistently with age for most of drugs. However some drugs are metabolised by the liver, and hepatic blood flow. In those over age 65 metabolism is decreased by 40%. This is the result of a decline in cardiac output and a decrease in liver size in relation to body mass. Despite these predictable changes, no consistent generalisation can be made about hepatic metabolism in the elderly.[5,6,12]

RENAL EXCRETION

In contrast to unpredictable changes in hepatic metabolism, renal excretion is well studied.[3,4,6]

The glomerular filtration rate falls approximately 1% per year over the age of 40, so do the tubular reabsorptive and secretary capacities. By age 70, the glomerular filtration rate (GFR) decreases by approximately 50%. Over the period from 20 to 80 years of age, there is a 20% decrease in kidney size and a 30% loss in the number of functional glomeruli.[5,12]

These changes exceed the decline in lean body mass, so that the serum urea and creatinine concentration rise,

Also, the creatinine clearance and renal plasma flow of healthy kidneys declines yearly, and kidney damage or disease reduces clearance even more. So renal toxicity due to drugs like aminoglycocides will lead to renal failure, and the response to antidiuretic hormone is reduced and water conservation thus less efficient.[5]

PROTEIN BINDING

Since many drugs, like psychotropic, bind to albumin, the fact that serum albumin levels are reduced by 15% to 25% in the elderly is of clinical importance. The less albumin available for drug binding, the more free drug is available to body tissues.[5,12]

Age-related changes in protein binding usually do not have a significant effect on drug efficacy. However, changes in distribution due to drug binding interactions (as may occur with digoxin and verapamil or quinidine) can have a deleterious therapeutic effect warranting special consideration in this age group.[9]

EFFECT OF FREE DRUG IN ELDERLY:

Increased free drug may make the elderly patient either:[12]

1. **more susceptible to adverse affects**, or
2. **more vulnerable to the effects of multiple drug** therapy on drug binding.

OTHER CHANGES

Decreased CNS dopamine and acetylcholine may make the elderly more sensitive to drug side effects. Also, as we age, most **neurotransmitters and enzyme levels seem to decrease**; therefore, they are more liable to unwanted effects.

ADVERSE DRUG REACTIONS

Advancing years carry an increased risk of unwanted and potentially dangerous reaction to drugs. Adverse drug reactions are 2 to 3 times more common in the elderly than in young and middle aged adults. Many studies have shown that about 1 in 6 elderly patients admitted to hospital are suffering from adverse reactions at that time. Many old people are admitted to hospitals or reviewed during long-term hospitalisation improve greatly when the regimen of drugs that have been taken is stopped.[2,3,6]

ADVERSE SIDE EFFECTS

The adverse side effects of drugs may be more burden some to the patient than the original disease. The doctor should know that the drug he prescribes will do good and that the likely adverse effects will not be worse than the disease to be treated. In the patient with multiple pathology, the urge to treat each and every 'treatable' complaint must be firmly resisted. There must be convincing reasons for evey single drug used. The liability of the elderly to mental confusion, giddy spells, falls, postural hypotension and incontinence has been mentioned repeatedly everywhere. These aspects are often due to drug treatment. Common offenders are the psychosedatives, anti-parkinson drugs, antidepressants and diuretics.[3,6,8,10,13-15]

Diuretics were the commonest cause of adverse reactions with psychotropics a close second. Diuretics are 'safe' while psychotropics tremors and rigidity controllers (antiparkinsonian drugs) and hypotensive carry the highest risk.

Adverse reactions increased significantly with

increasing numbers of drugs being taken; **in patients receiving only one drug the rate was 10.8%, while in those receiving 6 drugs the prevalence was 27%**, a highly significant difference.[8]

AVOIDING ADVERSE DRUG REACTIONS

The incidence of ADRs in hospitalised patients over 80 years of age was found to be twice that of patients under 60. The reason for these differences include the:[3,9]

1. existence of multiple pathology,
2. increased sensitivity to toxic effects of drugs, and
3. multiple medications use.

Because many diseases can have atypical presentations in the elderly, ADRs may be more difficult to identify in this age group. Drugs must always be considered in the aetiology of a change in cognitive function, affect, or behaviour.

ADRs which include any undesirable reaction caused by medications, results because of:

1. exaggeration of the intended therapeutic response
2. an unrelated toxic effect, or,
3. an interaction with a second therapeutic agent.

DISCONTINUATION NOT INEVITABLE

Identifying an ADR does not always necessitate discontinuing the agent. Risks must be weighed against benefits, eg mild dryness of the mouth may be tolerable in order to experience the beneficial effects of tricyclic antidepressant.[9]

GUIDELINES FOR PRESCRIBING[2,3,6,9,12-16]

A few general principles should be kept in mind when prescribing drugs in the elderly as practical recommendations to avoid side effects of drugs:

1. **Careful history** is necessary to know what concomitant illnesses the patient has and what medications have been taken.

2. **Make an accurate diagnosis**. This is imperative to avoid the inappropriate use of medication. eg, if severe insomnia is secondary to depression, benzodiazepines may worsen the overall clinical situation, while a sedating antidepressant will treat the underlying disorder.

3. **Avoid polypharmacy.** Resist the advice of some clinical pharmacologists, and stick to tried favorites.

4. **Give clear instructions**. It is worth while spending sometime to explain and make sure that the patient understands what the drug is for, its dosage and what untoward effects may occur.

5. **Check all drugs used (prescription and OTC) before prescribing new drug**. This is extremely important, especially when more than one physician may prescribing medication or when neuroleptics are being used. It is not uncommon for medications to be continued for many months after the indication has resolved.

6. **Evaluate potential for uncompliance**. Make the therapeutic regimen as simple as possible. Explain which medications are to be taken, the dosage, and timing to both the patient and the family. Write down the dosing schedule. Choose the most appropriate dosageform; liquids may be more suitable for a patient who has trouble of swallowing. In patients who are confused or demented, be sure that adequate supervision is present.

7. "**Start low and go slow**". For older persons, and for highly toxic drugs and those with variable pharmacokinetics and pharmacodynamic effects, start with low dosage and gradually increase the dose until the therapeutic effect is achieved, hopefully without causing side effects.

8. **Modify dosage of other drugs** if known interactions might occur with a newly prescribed drug.

9. **Decrease the usually recommended dosage and increase dosage interval** for most non-urgent and some urgent drugs.

10. **Review drug regimes regularly** and always when another drug is being added or when intercurrent illness occurs to make sure that drugs have not been duplicated or that drugs already discontinued are not being taken. Encourage patients to destroy or return discontinued medication and immediate disposal of unnecessary drugs can be accomplished at this time.

11. **Change or stop drugs rather than treat clinical or laboratory adverse effects of a drug**. Stop the drug altogether (unless absolutely life-saving) and reassess the patient when in doubt about CNS side effects.

12. **Monitor older patient for CNS side effects of drugs**, eg change in sleep pattern, mood, personality, memory, and mental function, etc.

13. **Consider possibility of CNS effectd to all drugs,** including those not specially known to be psychoactive.

14. **Do not avoid the use of psychotropic agents because of age.** These drugs can be used safely in the elderly, and older patients deserve relief of symptoms of depression, psychosis, and severe anxiety.

15. **Know the pharmacology of the drug prescribed.** It is best to be familiar with the use of a few drugs in each class. The clinician needs to be aware of altered dosing schedule in the elderly and changes in the half-life, elimination, and protein binding. Potential interaction with other drugs as well as toxicity and side effects must be kept in mind.

16. **Avoid the assumption that mental decline in the elderly is due to age.** Evaluate all drugs that patients is taking and stop all drugs that are not absolutely essential and the reassess mental function.

CONCLUSION

Total prevention of disease in elderly is rarely possible, but onset may be delayed and disability minimized if problems are picked up and simple preventive precautions are taken. We should treat causes rather than symptoms in our patients, and therefore, we should change ourselves and our own behaviour. It will be realized that drug treatment intended to be beneficial can be very hazardous.

Elderly patients are more than usually prone to adverse drug reactions because of their generally more extensive previous drug exposure and their bigger schedule of current drugs on account of multiple pathology. Additionally, they often have some degree of renal failure and rather small lean body mass.[8]

Adjusting drug dosages in elderly patients, who are often taking many medications simultaneously, necessitates an understanding of drug pharmacodynamics and drug interactions, if therapeutic goals in prescribing medications are to be achieved. Also, the aging brain is more sensitive to the potentially deleterious effects of drugs used to treat common geriatric disorders. The atypical presentation of medical conditions can lead to inaccurate diagnosis and inappropriate drug prescribing.[9]

Inorder to maximise beneficial therapeutic effects without compromising mental function, and to avoid untoward sife effects, three questions should be answered before prescribing any medications.[2]

1. **First 'Is treatment necessary?' Hence accurate diagnosis is essential, based upon history and examination with a careful check of current and recent drug consumption. This is time-consuming for a busy general practitioner, but time spent initially getting the facts right may mean more time saved later in trying to clear up the mess!**

2. **Is drug treatment really indicated? Simple explanation and reassurance may be all that are necessary.**

3. **The third question is: Do I know enough about the drug I am going to prescribe?**

The primary care physician has to do much more if he is going to be an advocate for the elderly patient.[11]

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