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Challenges in prescribing medication for the elderly population

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Abstract

Prescribing medication for older adults is more challenging than for younger individuals due to a variety of reasons. These include physiological and psychological changes associated with ageing, physical and social limitations, cognitive decline, and multiple health conditions. Healthcare providers should stay informed and follow specific prescription protocols for older patients. A collaborative approach involving patients, nurses, pharmacists, and caregivers is crucial to ensure appropriate prescriptions. Health professionals should be aware of the risks associated with drug interactions and adverse reactions. Regular review of medications and discontinuation of inappropriate drugs are essential practices. This systematic approach improves patient care and helps alleviate the financial strain on patients and the healthcare system.

Keywords: Polypharmacy; Adherence; Geriatric medicine; Drug-related side effects and adverse reactions; Prescription writing

1. Introduction

The field of medicine has tremendously changed over the last decades. The inventions and application of new medical practices, new medications, and the wide application of evidence-based medicine approaches have greatly improved the field of medicine and have led to increased life expectancy and an increased proportion of older persons. The population aged 65 years or over increased to 9% in 2019 from 6% in 1992. Further, this proportion is projected to rise to 16% by 2050 (1). The increase in the elderly population has opened up new challenges to the medical community as the assessment and management of older adults requires a different approach than younger people because of the changes in the physiological and psychological processes occurring while ageing.

2. Material and methods

Systematic searches were conducted in international databases to review and extract relevant articles and reports published between 1992 and 2022. A narrative review using the Medical Subject Headings (MeSH) terms "geriatrics," "physiological changes in elderly," "elderly care," "prescription," "Polypharmacy or multiple medicines," "adverse drug events," "adherence," and similar keywords was done. Similar usage of MeSH keywords was observed in other datasets. Articles were considered if the abstracts were available in English and were published. A search of the reference lists from identified articles and recent reviews were done to find additional articles.

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3. Review

3.1. Physiological changes during ageing

Total body water is decreased due to diminished lean body mass in old age. The absorption of a drug is more readily achieved if it is lipid-soluble, whereas water-solubility facilitates excretion. So, the water-soluble drugs have smaller volumes of distribution, leading to higher serum levels in older people [2]. Ageing causes a decrease in first-pass drug metabolism, leading to potential changes in drug bioavailability [3]. There is a physiological reduction in the glomerular filtration rates in old age, reducing drug excretion. Ageing has been reported to diminish the clearance of drugs, particularly those undergoing metabolism through the oxidation pathway by the microsomal cytochrome P450-dependent mono-oxygenase systems in the liver. Diminished liver volume and blood flow also contribute to the reduced clearance of drugs that exhibit first pass kinetic profiles [4]. These changes are more marked in females. Old age is associated with multiple comorbidities and treatments, which sometimes lead to unnecessary drug use [5]. There is an integral association between old age and the rate of adverse drug reactions; an increased rate is caused by age related changes in pharmacodynamics and pharmacokinetics of the drug metabolism, at least for some medical conditions [6]. Inflammation, circadian rhythm, changes in gut microbe composition, and epigenetic aspects may alter drug metabolism with increasing age [7].

3.2. Polypharmacy

Polypharmacy often occurs when treating elderly individuals. It is defined as the use of multiple medications by a single patient. The exact minimum number of medications that constitute "polypharmacy" varies but typically falls within the range of 5 to 11 or more medications [8]. Studies indicate that as many as 91% of long-term care patients take at least five medications daily [9]. The management of older adults is likely to involve multiple subspecialist physicians, which can lead to polypharmacy, and those without a primary care physician and those living in long-term care facilities are particularly vulnerable to this. Polypharmacy can occur at the health care system level, too. For example, poor medical record keeping can lead to polypharmacy if discontinued medications are not removed from the record and are refilled automatically. Other factors that contribute to this include lack of enough time, performance pressure, fear of lawsuits, and the patient's response to the removal of medication. A longitudinal study of deprescribing in community dwelling patients has shown a reluctance of family practitioners to implement polydeprescribing (PDP) recommendations [10]. Polypharmacy in the elderly is a cause of increased incidence of drug-drug interactions and adverse drug events due to their decreased metabolism and reduced drug clearance. Duplication of medications with similar side effects could lead to cumulative impacts and increase the severity of adverse effects.

3.3. Prescription cascades

Caution should be made to avoid prescribing cascades, in which when a drug is administered to a patient, it causes signs and symptoms of an adverse event that are misinterpreted as a new condition, resulting in the prescription of new medications [11]. For example, some antipsychotics are prone to cause extrapyramidal symptoms. If this is not promptly recognised as an adverse event, antiparkinsonian drugs will be prescribed, which could cause delirium and orthostatic hypotension and will lead to more prescriptions. High-risk medications prone to serious adverse effects like anticholinergics, sedatives, anxiolytic medications, narcotics, anti-hypertensives, and anti-diabetic agents should be prescribed after carefully considering the patient's age, physical status, and potential drug interactions. Every new symptom in old age should be regarded as a side effect of the prescribed medications. The prompt identification and prevention of prescribing cascades will reduce polypharmacy and help to prescribe appropriately in older adults.

3.4. Medication complexity

A systematic approach is required to consolidate every medication regimen and to reduce its complexity. Reduction of daily doses through extended-release formulations or drugs with lower frequency has frequently shown improvements in adherence, quality of life, patient satisfaction, and reduced medication costs [12]. The medication regimen complexity index (MRCI) quantifies the complexity of prescribed medication regimens. It quantifies medication regimen complexity beyond the number of medications administered, including weighted scores for dosage forms, dosing frequency, and administration directions [13]. A significant association is found between an increased MRCI value and increased prevalence of hospitalisation, hospital readmission, and medication adherence [14]. A medication regimen complexity evaluation should be done, considering the patient's understanding and instructions received regarding the intake of their medications. A tailored, person-centered assessment of regimen complexity is required to simplify medication regimens [15].

3.5. Inappropriate medications

Potentially inappropriate medications (PIMs) are drugs that should be avoided in older adults due to the high risk of adverse reactions and/or insufficient evidence of their benefits when safer and equally or more effective alternatives are available [16]. Carefully reviewing medications and deprescribing when clinically appropriate has potential benefits on mortality, quality of life and cognition among older adults [17]. The regular medication review must consider over-the-counter drugs and herbal preparation intake. Underutilisation of appropriate medications is also a concern. Clinicians not recognising medication benefits in the older population, patients' affordability, and non-availability of specific medication doses are essential causes of underutilisation.

The Medication Appropriateness Index (MAI) is a clinimetricaly derived tool for measuring potentially inappropriate prescribing (PIP). MAI is a widely used implicit measure. It consists of a 10-item questionnaire with a score of each question ranging from 1 to 3 with a maximum score of 18. A score of 18 signifies maximum inappropriateness, while 0 signifies appropriateness [18]. This approach will help assess the patient's medication appropriateness, particularly in old age, by considering the remaining life expectancy. It helps tailor the existing medication or doses and will guide the medication appropriateness while starting a new drug. The MAI has acceptable inter- and intra-rater reliability. It frequently detects potentially inappropriate prescribing than a commonly used set of explicit criteria but is more complex to apply [19]. The American Geriatrics Society Beers Criteria (AGS Beers Criteria) for Potentially Inappropriate Medication (PIM) Use in Older Adults is an explicit list of PIMs, which should be best avoided in most circumstances or under specific situations in the geriatric population [20]. Medications are grouped into five groups: those potentially inappropriate in most older adults, drugs to be avoided in older adults with certain conditions, drugs to use with caution, drug-drug interactions, and those that require dose adjustment according to renal function. It is not always possible to adhere strictly to the criteria while prescribing. Considering many factors, including common sense and clinical judgment, is crucial while using this criterion. It serves as a warning guide to identify medications with an unfavourable balance of benefits and harms compared to other pharmacological and nonpharmacological alternatives [21].

The Drug Burden Index (DBI) is a tool that quantitatively evaluates an individual's exposure to medications with anticholinergic and sedative activity. DBI calculates the burdens from every anticholinergic or sedative medicine in a medication regimen. This calculation uses a mathematical equation to consider the drug's pharmacological effect and daily treatment dose [22]. Higher DBI scores have been associated with poorer physical and cognitive function in the community-dwelling geriatric population without intellectual disabilities [23]. This tool helps clinicians rapidly recognise and minimise the dose or number of drugs prone to cause the above side effects. This pharmacologic approach provides a practical, evidence-based tool for assessing the functional impact of medication exposure in this population [24]. Other criteria, such as the STOPP/START criteria (Screening Tool of Older Person's Prescriptions (STOPP)/ Screening Tool to Alert doctors to the Right Treatment (START)), have been shown to significantly increase medication appropriateness, which was maintained up to 6 months after the intervention [25]. Applying STOPP/START criteria significantly reduces the adverse drug reaction (ADR) incidence and medication costs in acutely ill older adults, but it has been shown to not affect the median length of hospital stay [26].

3.6. Adverse drug events

The incidence of adverse drug events (ADE) increases with age. Studies have shown that older people have four times increased risk of being hospitalised by adverse drug events-related problems than younger people [27]. 6% to 12% of all hospital admissions in old age are due to ADEs [28]. A thorough assessment of symptoms reported by the patient might be required to recognise adverse events in older people as they often present with nonspecific symptoms, most commonly with falls, orthostatic hypotension, delirium, renal failure, gastrointestinal and intracranial bleeding, all of which have several possible aetiologies [29].

Edwards and Arson classify adverse drug reactions into six types: dose-related (Augmented), non-dose related (Bizarre), dose-related and time-related (Chronic), time-related (Delayed), withdrawal (End of use), and failure of therapy (Failure) [30]. The severity of adverse drug events can be assessed by Hartwig and Siegel's severity assessment scale, which ranges from level 1 to level 7 [31]. WHO-UMC causality scale and the Naranjo algorithm are used to assess the causality of adverse drug reactions, but there is poor agreement between these scales [32].

Care must be taken while prescribing a new medication to an older person as they are particularly vulnerable to drug-drug interactions, and a review of the existing drugs is necessary to prevent this. A patient getting treatment should be educated about any potential side effects of the medicines, and the clinician must monitor the patient for any such events. Assessment of comorbidities is essential, as dose adjustments might be required in certain conditions, such as renal [33] and hepatic failure [34], which are prone to cause a dose related adverse event. The allergic reactions are not dose-related or could be due to an idiosyncratic reaction to the drug. The adverse drug events could be due to dose-

related adverse drug reactions, which exaggerate the drug's therapeutic effects. A careful history and examination are essential to differentiate between these. The ADEs caused by medication errors are called preventable ADEs. In contrast, non-preventable ADEs, which are also referred to as adverse drug reactions (ADRs), are drug induced harm occurring with the appropriate use of medication. Nearly half of the adverse drug events are preventable. Patients on antipsychotic agents, anticoagulants like warfarin, diuretics, and antiepileptic medications are at increased risk [35]. The GerontoNet ADR risk score helps identify patients at an increased risk of adverse drug reactions. The strongest predictors of adverse drug events (ADEs) are the number of drugs and a history of prior ADE. These are followed by heart failure, liver disease, having four or more conditions, and renal failure. These variables were used to calculate the ADR risk score, which can be a helpful tool in clinical practice for identifying patients at risk of drug-related illness [36].

3.7. Adherence

Clinicians should assess many complex factors affecting medication adherence in the elderly population to optimise therapeutic outcomes. Clinicians should be more skillful in discovering and optimising the medication adherence factors in geriatric patients [37]. Non-adherence to the medications may be due to patient factors like multiple comorbidities, decreased cognitive function, mental health illnesses like depression, or physical impairments like decreased or loss of vision, deafness, or immobility. The medication factors include a history of adverse drug events in the past, poor labelling of medications, complex dosing regimen, multiple prescribing physicians, problems with drug storage, high cost, or lack of insurance coverage. A high level of medication adherence was linked to lower disease-related medical costs and has been shown to have significantly lower hospitalisation rates in chronic conditions such as diabetes and hypercholesterolemia, even in younger populations [38]. The medication adherence of elderly patients is related to their education level, health-related problems, dosing frequency, satisfaction with patient counselling, and explanation of medication [39]. There is a need for personal education among this group of patients to better understand and adhere to the medication regimen. Frequent medication reviews and knowledge regarding the purpose of the medication are positively associated with adherence [40]. The interventions to improve adherence could focus on simplifying drug regimens and patient education. Memory aids, drug containers, and smartphone apps will help patients improve their adherence. Assessment of the patient's social support and involvement in support groups will be a definite help.

4. Discussion

Prescribing medication for elderly individuals is complex, and it requires a thorough understanding of medical history and a comprehensive patient assessment. Any new symptom exhibited by an elderly patient should be presumed to be an adverse drug reaction unless proven otherwise. When prescribing medication, it is essential to consider the patient's medical conditions, physical limitations, and social factors. Healthcare providers should utilise available tools to simplify medication regimens and ensure appropriate prescribing. Involving the patient in decision-making and providing comprehensive education about medication dosages and potential adverse effects is essential. Regularly reviewing the patient's medication regimen is recommended to discontinue unnecessary medications and adjust dosages as needed. Simplifying dosing schedules and utilising combination medications can improve medication adherence. Healthcare providers should follow a systematic approach when prescribing medications for the elderly to minimise the risk of adverse drug reactions.

5. Conclusion

Prescription in the old age population is challenging due to multiple factors. A systematic approach using appropriate prescribing tools, deprescribing and early recognition of adverse drug reactions should be considered to increase medication adherence and to optimise the prescriptions in the elderly.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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