Scientific and Social Research, 2025, Volume 7, Issue 8
https://ojs.bbwpublisher.com/index.php/SSR
Online ISSN: 2981-9946
Print ISSN: 2661-4332

Study on Medication Safety of Chronic Diseases in Middle-aged and Elderly People and Its Influencing Factors under the Background of Accelerated Aging

Ganhong Chen, Moli Ling, Xin Chen, Ben Zheng, Yong Liu*

Guangdong Meizhou Vocational and Technical College, Meizhou 514011, Guangdong, China

**Author to whom correspondence should be addressed.*

Abstract: With the accelerating global aging trend, the issue of medication safety for chronic diseases in middle-aged and elderly people has attracted widespread attention from all walks of life. Focusing on the context of accelerated population aging, this study explores and analyzes the medication safety of chronic diseases in middle-aged and elderly people and their influencing factors. The study first analyzes the relevant background and expounds on the global aging challenges, then discusses the core issues of medication safety, the biological-social-medical three-dimensional factors affecting medication safety, and innovative intervention strategies, hoping to provide some reference for relevant personnel.

Keywords: Accelerated aging; Chronic diseases in middle-aged and elderly people; Medication safety; Influencing factors

Online publication: September 17, 2025

1. Introduction

At present, the world has entered an aging era, and the accelerating process of population aging has led to a continuous increase in the number of middle-aged and elderly patients with chronic diseases [1]. In this context, the issue of medication safety for chronic diseases in middle-aged and elderly people has become a social topic. It can be seen that due to the characteristics of physical decline and complex medication use faced by the middle-aged and elderly groups, they often need to take medication in strict accordance with the standards of safe medication management during the treatment of chronic diseases [2]. However, in reality, their medication safety is affected by multiple factors. Therefore, it is imperative and timely to deeply explore the safety and influencing factors, and explore effective intervention strategies.

2. Research background and global aging challenges

Since the beginning of the new century, the process of population aging has been accelerating, which has also brought huge challenges to the medical and health systems of various countries [3]. For the middle-aged and elderly groups, due to factors such as declining physical functions, they have become a high-risk group for chronic diseases. In the process of their medication use, safety issues have also become a key topic of concern in the field of medicine and health care in various countries. Generally speaking, the treatment of chronic diseases requires the use of multiple drugs, which directly increases the risk of medication safety for the middle-aged and elderly groups. In China, the proportion of middle-aged and elderly people suffering from chronic diseases is relatively high. Common ones include coronary heart disease, diabetes, and hypertension. These patients not only need to take medicines for a long time but also take multiple kinds of medicines, which directly forms the safety dilemma of "polypharmacy" [4]. Secondly, in the context of polypharmacy, various drugs are prone to having some adverse mixed reactions. If this situation is not taken seriously, it will definitely bring direct health threats to middle-aged and elderly people [5]. In addition, middle-aged and elderly patients with chronic diseases often have the problem of "medication overload" during the medication process, which reflects an inherent contradiction between "disease treatment needs" and "physiological tolerance." How to balance this contradiction has become a paradoxical issue that needs in-depth thinking and scientific response in the medication process of middle-aged and elderly patients with chronic diseases [6].

3. Core issue of medication safety: Potentially inappropriate medication (PIM)

Potentially inappropriate medication (PIM) has a direct impact on the medication safety of middle-aged and elderly people with chronic diseases. Due to its strong harm and concealment, it has become a "key pain point" in medication safety and a key research content in the field of geriatric medicine and health in various countries.

3.1. Definition of PIM and innovation of assessment tools

For PIM, it mainly refers to the potential risk of drug use in middle-aged and elderly people during medication due to the influence of drug characteristics, physiological changes, and pathological conditions. It mainly includes excessively long treatment courses, improper dosage, unreasonable drug selection, etc., which will also lead to serious adverse reactions in patients. The Beers Criteria (2019 edition) issued by the American Geriatrics Society (AGS) is the main application tool for current PIM assessment. It clarifies more than 100 high-risk drugs, such as anticholinergic drugs, and has been applied in various fields of medical and health care, such as hospitals and communities. In 2017, based on this standard and the medication characteristics of Chinese residents, China issued the "Chinese Catalog of Potentially Inappropriate Medication for the Elderly", which supplemented and standardized relevant contents, adding standards related to the safety risks of medication for the elderly in China, such as insufficient dosage adjustment of vancomycin. This is also in line with the disease spectrum standards for the management of diseases in the elderly in China [7].

3.2. Epidemiological map of PIM

Looking at the global occurrence of PIM, there are obvious differences among various countries, which also reflect the differences in population structure, social economy, and medical systems in various regions. Generally speaking, the incidence of PIM in developing and developed countries shows a "polarized" characteristic [8]. At the same time, PIM "high-risk drugs" also have obvious regional common characteristics. For example, drugs such as

benzodiazepines (such as diazepam) appear in the PIM maps of various countries and are among the top. In China, due to the different medical culture, the PIM value caused by the combination of traditional Chinese medicine injections and western medicine is relatively high, which is also a regional characteristic [9]. For example, some elderly people often have the wrong idea that traditional Chinese medicine is non-toxic and take some traditional Chinese medicine by themselves, which leads to damage to their physical functions and organs.

4. Bio-social-medical three-dimensional factors affecting medication safety

4.1. Decline in physiological functions: The "Aging Trap" in pharmacokinetics

As middle-aged and elderly people grow older, their bodily functions will experience a certain degree of "decline", which will directly lead to disorders in the healthy operation of their bodily systems, thereby having a direct impact on issues such as drug metabolism and absorption. In terms of the absorption process, for example, the gastric acid secretion of the elderly over 60 years old is nearly 30% less than that of young people, and at the same time, the pH value of the stomach will increase. This will affect the absorption of some weakly acidic drugs such as digoxin, making them unable to exert their actual efficacy [10]. In addition, the increase in age will also lead to a decline in the gastric motility of middle-aged and elderly people, which will also affect their drug absorption. For instance, when taking fat-soluble drugs (such as vitamin D), insufficient gastric motility may cause drug residues, which can easily lead to drug poisoning and other problems. Secondly, in terms of metabolism and excretion. Take the elderly over 60 as an example: their liver blood flow is significantly less than that of young people, and the activity of liver drug-metabolizing enzymes also decreases significantly, which makes the effect of drug metabolism less than ideal. Meanwhile, the renal function of the elderly will decline to varying degrees, which will greatly reduce their drug excretion capacity. For example, when taking metformin, the half-life of renal drug excretion in people over 80 years old is 2 to 3 times longer than that in young people, which directly increases the risk of nephrotoxicity. Under such circumstances of "slow metabolism + delayed excretion", even if the dosage of drugs taken by middle-aged and elderly people is relatively reasonable, there will still be a certain degree of "hidden overdose" [11].

4.2. Patient behavior risk chain: from cognitive bias to operational errors

The medication risks for middle-aged and elderly patients with chronic diseases are directly related to deviations in their own cognition. The logical relationship can be summarized as the "cognition-attitude-behavior" risk chain, where inattention to any link can trigger corresponding risk issues. Firstly, at the cognitive level, many middle-aged and elderly patients with chronic diseases have "cognitive errors". For example, some people do not know the difference between prescription drugs and over-the-counter drugs, and some think that taking medicine before or after meals is the same. Such cognitive errors directly affect their medication safety [12]. Secondly, at the attitudinal level, some middle-aged and elderly patients with chronic diseases have a "fluke mentality." For instance, some believe that missing a dose or two or skipping medication occasionally is irrelevant, or some take the initiative to stop medication once their condition improves. Such incorrect attitudes towards medication have a huge negative impact on symptom relief and disease cure. Furthermore, there is "execution deviation" in behavior. For example, some middle-aged and elderly patients with chronic diseases fail to take medication as prescribed due to memory errors or misreading of dosages, which also affects their medication safety and disease treatment.

4.3. Defects in the healthcare system: "Superimposed loopholes" from prescription to supervision

The development of things is influenced by multiple factors. The medication safety issues of middle-aged and elderly patients with chronic diseases are not only affected by factors such as the decline of patients' own physiological functions and behavioral risk chains, but also related to the inadequate performance of duties by "gatekeepers" within the healthcare system. Firstly, in the prescription drug link, differences in the capabilities and professionalism of medical personnel may lead to variations in the prescription drugs they issue to patients. This directly results in problems such as "repeated medication" and "antagonistic medication", which in turn increase the incidence of potentially inappropriate medication (PIM). Secondly, there are inadequacies in the supervision link. For example, supervision in some areas of prescription drugs and health supplements is insufficient. In some remote regions, drugs that have not undergone suitability reviews or have expired are even prescribed to patients, which obviously poses a huge threat to patients' medication safety. Furthermore, there is a problem of "information asymmetry" in doctor-patient communication. Relevant medical personnel do not fully consider the limitations of elderly chronic disease patients in terms of memory, eyesight, etc., and fail to clarify their medication information. This makes it easy for patients to make mistakes and improper operations during medication, which in turn affects the specific efficacy of their disease treatment.

5. Innovative intervention strategies: From precision pharmacy to smart healthcare

5.1. Pharmacokinetic-oriented precision drug administration

For the issue of medication safety in elderly patients with chronic diseases, a reasonable "tailor-made" medication is the most direct approach. To this end, precision drug administration can be conducted based on pharmacokinetics to comprehensively improve the safety of patients' medication. Firstly, the development of genetic testing technology has also provided an effective opportunity for this [13]. For example, patients with the CYP2C9*3 genotype have a relatively low ability to metabolize warfarin. If medication is administered according to the conventional dose, it is easy to cause bleeding after medication. The application of the warfarin dose algorithm based on CYP450 genetic polymorphism can effectively reduce the incidence of bleeding after medication in patients. Based on this, relevant personnel have also developed corresponding drug administration models, such as the clopidogrel dose adjustment model. Through such adjustments, the resistance of medication to platelets is improved, thereby effectively reducing cardiovascular-related adverse reactions in elderly patients with chronic diseases after medication. Secondly, it is the effective monitoring of physiological indicators. For example, portable blood drug concentration detectors can be used to effectively monitor the physical conditions of elderly patients with chronic diseases, focusing on the concentrations of drugs such as digoxin. Then, the information can be sent to the medical terminal through digital transmission, and relevant personnel can carry out precise drug administration based on this, thereby greatly reducing the risk of drug poisoning.

5.2. Deprescribing campaign: A subtractive medication revolution

"Deprescribing" is not simply the cessation of drugs, but is based on the concept of optimizing the effect of drug use, reducing the dosage of some unnecessary drugs, so as to ensure the effect of medication while fully reducing the medication risk of elderly patients with chronic diseases. Medical personnel in Canada have made many attempts in this regard. For example, in accordance with relevant standards, they use methods such as STOPP (Screening Tool of Older People's Prescriptions) to effectively evaluate the medication lists of elderly patients

with chronic diseases, and reasonably set their drug intake, so as to reduce medication safety issues. For China, in this field, people should pay attention to the characteristics of local medication. For example, in view of the high market share of generic drugs, corresponding standards and plans should be formulated based on the differences in drug efficacy [14]. Meanwhile, for the psychological issues that some elderly people experience after reducing or stopping their medication doses, adjustments and optimizations can be made using the method of "low-dose administration + reasonable alternative schemes." This helps elderly patients with chronic diseases dispel their doubts and effectively ensures the safety of their medication.

5.3. Application of smart pillboxes: Technology empowering medication adherence

With the continuous development of artificial intelligence technology, the field of medical medication has also ushered in new reform opportunities. In this context, relying on smart pillboxes to reduce medication safety issues in elderly patients with chronic diseases has become an important development trend in the future. The Japanese Panasonic Group has made practical attempts in this regard. The "age-appropriate smart pillbox" developed by them can effectively identify the condition of patients with chronic diseases, and prompt the dosage and time of drug use in a timely manner. If the medication or drug collection is not in accordance with the set standards, it will directly send the information to the doctor's port. At the same time, it will also adjust the patient's medication in real-time based on the doctor's update of the patient's condition, so as to make the medication of elderly patients with chronic diseases safer and avoid medication errors caused by their memory decline and other reasons. However, it should be noted that the promotion of this method is mainly restricted by issues such as cost, technology, and privacy. Therefore, relevant units and researchers should accelerate the breakthrough of relevant cost and technical shackles and improve the privacy protection function of the system, so as to enable technology to empower medication adherence.

5.4. Blockchain + AI early warning system: building a full-chain safety network

The integration of blockchain technology and an AI early warning system can also further improve the medication safety chain and effectively reduce risks in various links. For example, the EU's "EU(7)-PIM List" system integrates PIM standards from multiple countries in the region, then incorporates them into electronic medical records, intelligently calculates medication lists based on patients' medication history and their own diseases, and timely issues warnings for operations with high medication risks, and prompts alternative plans. In this regard, people can learn from this and accelerate the construction of a "national PIM database + regional electronic medical record blockchain." Through this way, people can effectively improve the interception rate of PIM in communities, medical and other fields, make up for the differential shortcomings of medical personnel in professional capabilities, and further ensure the medication safety of elderly patients with chronic diseases [15].

6. Conclusion

In summary, with the accelerating aging process, the issue of medication safety for middle-aged and elderly patients with chronic diseases has become a hot topic of concern worldwide and among the general public. In response, it is necessary for people to, while grasping this general background, conduct in-depth analysis of the core issues of medication safety, clarify the biological-social-medical three-dimensional factors affecting medication safety, and on this basis, rely on effective countermeasures to further reduce the medication risks for middle-aged and elderly patients with chronic diseases, laying a solid foundation for their better medication use, rehabilitation, and life.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Zhong ZQ, Liu HQ, Yao ZQ, et al., 2024, Analysis of the Current Situation and Influencing Factors of Medication Safety in Patients with Chronic Diseases. Chinese Nursing Management, 24(3): 342–346.

[2] Zou Y, Feng GM, Wu SH, et al., 2022, Discussion on Medication Safety in Elderly Patients with Chronic Diseases. Chinese Research Hospitals, 9(3): 61–64.

[3] Xi XY, Shi H, 2022, Analysis of the Current Situation of Medication Safety Cognitive Level and its Related Influencing Factors in Elderly Patients with Chronic Diseases. Chinese Journal of Clinicians, 50(5): 589–591.

[4] Kong M, Wang H, Wang J, 2021, Analysis of Medication Safety and Risk Factors in Residents with Chronic Diseases in Yinchuan. Ningxia Medical Journal, 43(6): 562–565.

[5] Bai YL, 2021, Influence of Continuous Nursing on Medication Safety of Elderly Patients with Chronic Diseases after Discharge. Research of Trace Elements and Health, 38(2): 84–85.

[6] Wang M, Li YZ, 2020, Problems and Countermeasures of Medication Safety in Elderly Patients with Chronic Diseases in Communities. Journal of Jinzhou Medical University, 41(5): 109–112.

[7] Wang LL, 2020, Analysis of Current Situation and Influencing Factors of Medication Safety in Community Patients with Chronic Diseases. Electronic Journal of Clinical Medical Literature, 7(51): 159–160.

[8] Yang X, Zhang HC, 2020, Research Status of Medication Safety in Long-term Care of the Elderly. Chinese Nursing Research, 34(11): 1993–1996.

[9] Zhang YH, Wei GY, Wang YX, et al., 2019, Analysis of Current Situation and Influencing Factors of Medication Safety in Community Patients with Chronic Diseases. China Pharmacist, 22(10): 1881–1883 + 1917.

[10] Yao LP, Zhuang SL, Hu JL, et al., 2019, Influence of Collaborative Intervention between Community and Faculty-students of Medical Colleges on the "Knowledge, Attitude and Practice" of Medication Safety in Elderly Community Patients with Chronic Diseases. Health Vocational Education, 37(9): 131–133.

[11] Zhang LY, 2019, Study on the Effect of Medication Safety Intervention in Elderly People with Chronic Diseases Living at Home in Communities. World Latest Medicine Information, 19(19): 290–293.

[12] Huang WJ, Li P, 2018, Qualitative and Quantitative Research on Medication Safety in Elderly Patients with Chronic Diseases. Technology Wind, 2018(36): 278–283.

[13] Zhang YX, 2018, Research Progress on Home Medication Safety in Elderly Patients with Chronic Diseases. China Continuing Medical Education, 10(3): 111–113.

[14] Xia J, Jiang J, 2017, Medication Safety and Intervention Measures for Elderly People with Chronic Diseases in Communities. China Practical Medicine, 12(29): 159–160.

[15] Wang XL, Chen J, 2017, Analysis of Current Situation and Influencing Factors of Family Medication Safety for the Elderly. Science & Technology Vision, 2017(28): 188–189.