საქართველოს მეცნიერებათა ეროვნული აკადემიის მოამბე, ტ. 20(194), №2, 2026
BULLETIN OF THE NATIONAL ACADEMY OF SCIENCES OF GEORGIA, vol. 20(194), no. 2, 2026

*Pharmacology*

# Challenges of Polypharmacy in Georgia

**Luiza Gabunia[*], Nana Gorgaslidze[**]**

[*] *Department of Clinical Pharmacology, Tbilisi State Medical University, Georgia*
[**] *Department of Clinical and Social Pharmacy, Tbilisi State Medical University, Georgia*

(Presented by Academy Member Ramaz Shengelia)

**Abstract.** Polypharmacy represents a growing clinical and public health challenge associated with reduced treatment effectiveness, an increased risk of adverse drug reactions, drug-drug interactions, and rising healthcare costs. In Georgia, as in many countries worldwide, evidence regarding irrational pharmacotherapy based on electronic prescription data remains limited. The aim of this study was to investigate the characteristics and prevalence of irrational pharmacotherapy in Georgia through the analysis of polypharmacy cases using data derived from the national electronic prescription system over a three-month period. This study represents one of the first retrospective assessments of polypharmacy and irrational prescribing practices in Georgia based on electronic prescription system data and internationally validated clinical criteria. A retrospective analysis of prescriptions issued between July 1 and September 30, 2018 identified 7,665 cases in which five or more medications were prescribed. Among these, 612 cases (8%) were classified as irrational pharmacotherapy. The most frequently identified problems included the concurrent prescription of medications belonging to the same and/or similar pharmacological groups (72%), therapeutic duplication involving the prescription of the same active substance under different brand names (15.6%), drug incompatibility (9.4%), and the prescription of more than two antibiotics administered via the same route (3%). Polypharmacy is highly prevalent in Georgia, particularly among elderly patients with multiple comorbidities, and is associated with increased morbidity and mortality. These findings highlight the need for systematic review of pharmacotherapy, implementation of rational prescribing strategies, and integration of clinical prescribing criteria aimed at optimizing medication use. 

**Keywords:** polypharmacy, irrational pharmacotherapy, multimorbidity, drug safety, drug-drug interactions

## Introduction

According to pharmacoepidemiological studies conducted by the World Health Organization, drug-related complications rank fourth to fifth among the leading causes of mortality in developed countries, following cardiovascular diseases, cancer, and respiratory system disorders (O'Mahony et al., 2023; Nobili et al., 2011). The advancement of pharmacology and pharmaceutical sciences has led to the development of numerous modern and effective therapeutic agents for clinical medicine. Research on individual medicinal products, evidence-based scientific literature of high methodo-logical quality, and accumulated clinical experience continue to expand physicians' and pharmacists' knowledge regarding the principal aspects of drug action and the rational use of medications for preventive and therapeutic purposes. Issues related to polypragmasy have become particularly relevant for the broad medical and pharmaceutical community. This is due

to the continuously increasing number of registered medications in Georgia, the emergence of new pharmacological groups characterized by fundamentally different mechanisms of action, the implementation of evidence-based medicine methodologies in clinical practice, and the active promotion of pharmaceutical products by pharmaceutical companies. The growing availability of generic and over-the-counter medications on the pharmaceutical market, together with challenges associated with the rational and personalized selection of medicines, as well as medical errors caused by medication-related polypragmasy and polytherapy, represent a major challenge for healthcare systems worldwide. Polypragmasy and irrational pharmacotherapy reduce treatment effectiveness, increase the risk of serious adverse effects and drug toxicity, and consequently contribute to a substantial rise in medication-related healthcare expenditures. Efforts aimed at reducing polypragmasy may prevent health-related risks and medication-induced iatrogenic complications, improve quality of life, and increase life expectancy (O'Mahony et al., 2018; Alić et al., 2011; Gallagher et al., 2008). One of the principal causes of unjustified and irrational use of multiple medications is polymorbidity, which in turn leads to polytherapy. Polytherapy is frequently associated with polypragmasy, or polypharmacy, which in most cases represents a major cause of drug-induced iatrogenesis. The problem is especially prevalent among elderly individuals, 80% of whom have two or more chronic diseases. Polymorbidity, which predisposes to polypharmacy, is also frequently encountered in pediatrics, particularly in children with hereditary disorders. In an attempt to enhance therapeutic efficacy and accelerate recovery, some physicians choose combined pharmacotherapy involving several medications simultaneously. When patients are diagnosed with more than one chronic disease, the number of medications used daily often exceeds five, thereby constituting polypharmacy, which negatively affects both population health and, ultimately, patient well-being.

Problems within healthcare systems, including lack of continuity of care and absence of systemic approaches to treatment, contribute to the unjustified expansion of prescribed medication regimens and the development of polypharmacy. As a rule, polymorbid patients are simultaneously managed by several specialists of different profiles who often fail to coordinate treatment plans and adequately consider issues related to drug-drug interactions. Due to the widespread practice of self-medication, the abundance of over-the-counter medications, and easy access to medical information, many individuals avoid consulting healthcare professionals and independently administer medications. Self-medication frequently involves both officially approved medicinal products and questionable dietary supplements whose efficacy has not been confirmed by scientific evidence. Furthermore, patients often discontinue prescribed treatment because of financial or other reasons and replace it with essentially ineffective medications recommended by friends, relatives, neighbors, or other healthcare workers. Some patients are also influenced by aggressive pharmaceutical advertising and tend to add newly promoted medications to their treatment regimens without informing or consulting the appropriate medical specialist.

The phenomenon of unjustified simultaneous prescription of multiple medications and therapeutic procedures is widespread in medicine and is known as medication-related polypragmasy. Currently, polypragmasy is regarded as a manifestation of undisciplined and irresponsible medical decision-making when physicians prescribe five or more medications concurrently (O'Mahony et al., 2023; O'Mahony et al., 2018; Alić et al., 2011; Gallagher et al., 2008; Gallagher et al., 2011). According to pharmacoepidemiological studies conducted by the World Health Organization, the incidence of adverse drug reactions does not exceed 5% when fewer than five medications are used simultaneously; however, this rate increases dramatically to approximately 25% when five or more medications are administered concurrently. Potentially dangerous adverse effects

and toxicities develop in 17-23% of cases involving combinations of five or more prescribed medications, while approximately one-third of these cases may result in fatal outcomes. According to WHO data, one of the major healthcare trends of the 21st century is population aging, which also encompasses rational pharmacotherapy and the prevention of druginduced iatrogenesis in elderly patients. Clinical and epidemiological studies demonstrate a high proportion of polymorbid patients among the elderly population, many of whom simultaneously suffer from 5-8 chronic diseases, thereby constituting one of the major foundations of polypharmacy.

The development of dangerous drug-drug interactions in polypharmacy is facilitated by several factors, including advanced age, comorbidities, narrow therapeutic index, and limited therapeutic window of prescribed medications. Adverse drug interactions occur more frequently with cardiac glycosides, oral hypoglycemic agents, theophylline/euphylline, antibiotics, antiepileptic drugs, cytostatic agents, antithrombotic agents, and antidepressants (Goodman's and Gilman's., 2011; Hoigné et al., 1990; Hanlon et al., 2013; Larock et al., 2014). Adverse effects associated with polypharmacy may present either as latent symptoms or as newly developed, previously unrecognized, and clinically pronounced conditions. The most commonly observed manifestations include fatigue, reduced work capacity, constipation or diarrhea, decreased appetite, depression, tremor, restlessness, irritability, dizziness, decreased libido, cognitive impairment, skin rash, and various neurological disorders (Lund et al., 2010; Jost et al., 2011; Nobili et al., 2011). As in many countries worldwide, challenges associated with excessive prescribing and polypharmacy remain highly relevant and significant in Georgia.

## Materials and Methods

In 2018, a clinical pharmacologists' working group for the prevention and management of polypharmasy was established under the Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health and Social Affairs of Georgia. Within the framework of this initiative, cases of polypharmacy and irrational pharmacotherapy were retrospectively evaluated during the period from July 1 to September 30, 2018, using the national electronic prescription system and analysis of prescriptions uploaded to the electronic portal.

During the study period, a total of 7,665 cases of polypharmacy were identified, defined as prescriptions containing five or more medications. Clinical pharmacologists additionally evaluated the extent to which the fundamental principles of rational pharmacotherapy were adhered to in the uploaded prescriptions.

Cases of irrational pharmacotherapy were identified, analyzed, and assessed according to the following internationally validated clinical criteria (O'Mahony et al., 2015; Rankin et al., 2018): (1) Prescription of two or more pharmaceutical products containing the same active substance(s) under different trade names; (2) Simultaneous prescription of interchangeable medications and/or drugs belonging to the same pharmacological group; (3) Absolute incompatibility of prescribed medications; (4) Prescription of more than two antibiotics administered via the same route of administration; (5) Presence of more than two antibiotics prescribed using an identical route of administration; (6) Presence of comorbid conditions that could potentially be exacerbated by the prescribed.

## Results

The findings of the present study demonstrated that, among 7,665 cases involving prescriptions containing five or more medications, 612 cases (8%) were classified as irrational pharmacotherapy according to the Beers Criteria (American Geriatrics Association, 2015) and the STOP/START Criteria (National Health Service recommendations, United Kingdom, 2014) (O'Mahony et al., 2023; Katzung, 2018; Nobili et al., 2011; Rankin et al., 2018).

Among the 612 identified cases, 95 cases (15.6%) involved irrational prescribing characte-

rized by the prescription of two or more medications containing the same active substance under different trade names, accounting for 1.2% of the total number of prescriptions.

Simultaneous prescription of interchangeable medications and/or drugs belonging to the same or similar pharmacological groups was identified in 440 cases (72% of irrational prescriptions), representing 5.9% of all evaluated cases.

Drug incompatibility was identified in 57 cases (9.4%), accounting for 0.8% of the total number of cases. In 20 out of 612 cases (3%), corresponding to 0.3% of all evaluated cases, prescriptions included more than two antibiotics administered via the same route of administration.

## Discussion

Based on the findings of the present study, it can be concluded that irrational pharmacotherapy was identified in 15.6% of patients who had been prescribed five or more medications (612 patients).

Among the cases of irrational prescribing, the highest proportion was associated with the second clinical criterion (72%), namely the simultaneous prescription of interchangeable medications and/or drugs belonging to the same pharmacological group. The second most common category of irrational prescribing was related to drug incompatibility (the third clinical criterion), which accounted for 9.4% of cases. The least frequently identified cases corresponded to the fifth clinical criterion, namely the prescription of more than two antibiotics administered via the same route of administration.

The underlying causes of the above-mentioned findings are multifactorial and are most commonly associated with insufficient knowledge of the fundamental principles of clinical pharmacology and rational pharmacotherapy, commercially driven relationships with pharmaceutical companies, and the lack of personalized approaches when prescribing therapeutic regimens. These factors further contribute to increased morbidity and mortality, particularly among elderly polymorbid patients.

The obtained results may contribute to improving treatment effectiveness, enhancing population health outcomes, and reducing healthcare expenditures associated with irrational medication use.

## Conclusion

The selection of a medicinal product or a combination of medications is a complex process that requires clear justification of the appropriateness of prescribing for each individual patient.

One of the principal objectives of best clinical practice is the optimization of medication use, improvement of quality of life, and reduction of medication-related healthcare expenditures.

In addition to the implementation of clinical guidelines and treatment protocols, the development of effective therapeutic strategies requires the integration of personalized approaches to pharmacotherapy. Such approaches involve the selection of individualized medications and drug combinations based on the following criteria:

- Efficacy: indications, dosage, route of administration, pharmacodynamics, and pharmacokinetics;
- Safety: adverse effects and toxicity profile;
- Appropriateness: contraindications, drug–drug interactions, and incompatibilities;
- Cost-effectiveness.

Accordingly, physicians should adhere to a diagnostic and therapeutic model in which treatment is individualized, comprehensive, and pathogenetically oriented, targeting the principal pathogenic mechanisms of disease. At the same time, diagnostic evaluation should be as comprehensive as necessary while avoiding excessive interventions (Somers et al., 2012; WHO, 2014; WHO, 1996).

The primary objectives and criteria of best clinical practice in developed healthcare systems worldwide include optimization of medication use, reduction of pharmaceutical expenditures, improvement of quality of life, and extension of life expectancy.

*ფარმაკოლოგია*

# პოლიფარმაციის გამოწვევები საქართველოში

ლ. გაბუნია*, ნ. გორგასლიძე**

** თბილისის სახელმწიფო სამედიცინო უნივერსიტეტი, კლინიკური ფარმაკოლოგიის დეპარტამენტი, საქართველო*
*** თბილისის სახელმწიფო სამედიცინო უნივერსიტეტი, კლინიკური და სოციალური ფარმაციის დეპარტამენტი, საქართველო*

(წარმოდგენილია აკადემიის წევრის რ. შენგელიას მიერ)

პოლიფარმაცია წარმოადგენს მზარდ კლინიკურ და საზოგადოებრივი ჯანმრთელობის გამოწვევას, რომელიც დაკავშირებულია მკურნალობის ეფექტიანობის შემცირებასთან, არასასურველი მედიკამენტური გვერდითი ეფექტების, წამლებს შორის ურთიერთქმედებებისა და ჯანდაცვის ხარჯების ზრდასთან. საქართველოში, როგორც მთელს მსოფლიოში, ელექტრონული რეცეპტების მონაცემებზე დაფუძნებული არარაციონალური ფარმაკოთერაპიის შესახებ მტკიცებულებები მწირია. კვლევის მიზანია, საქართველოში არარაციონალური ფარმაკოთერაპიის თავისებურებების და გავრცელების შესწავლა პოლიფარმაციის შემთხვევების განხილვის საფუძველზე ეროვნული ელექტრონული რეცეპტების მონაცემების ანალიზის შედეგად 3 თვის მანძილზე. კვლევა წარმოადგენს პოლიფარმაციისა და არარაციონალური დანიშნულების ერთ-ერთ პირველ რეტროსპექტიულ შეფასებას საქართველოში, რომელიც ეფუძნება ელექტრონული რეცეპტების სისტემის მონაცემებს და საერთაშორისოდ ვალიდირებულ კლინიკურ კრიტერიუმებს. 2018 წლის 1 ივლისიდან 30 სექტემბრამდე გაცემული რეცეპტების რეტროსპექტულმა ანალიზმა გამოავლინა 7,665 შემთხვევა, სადაც დანიშნული იყო ხუთი ან მეტი მედიკამენტი. მათგან 612 შემთხვევა (8%) კლასიფიცირდა როგორც არარაციონალური ფარმაკოთერაპია. ყველაზე ხშირ პრობლემებს წარმოადგენდა ერთი და იმავე ან მსგავსი ფარმაკოლოგიური ჯგუფის მედიკამენტების ერთდროული დანიშვნა (72%), თერაპიული დუპლიკაცია – ერთი და იმავე მოქმედი ნივთიერების სხვადასხვა სავაჭრო სახელით დანიშვნა (15.6%), მედიკამენტების შეუთავსებლობა (9.4%) და ორზე მეტი ანტიბიოტიკის დანიშვნა ერთსა და იმავე გზით (3%). პოლიფარმაცია საქართველოში ფართოდ არის გავრცელებული, განსაკუთრებით სხვადასხვა თანმხლები დაავადებების მქონე ხანდაზმულ პაციენტებში, და უკავშირდება ავადობისა და სიკვდილიანობის მაჩვენებლების ზრდას. მიღებული შედეგები მიუთითებს ფარმაკოთერაპიის სისტემური გადახედვის, რაციონალური დანიშვნის სტრატეგიებისა და კლინიკური კრიტერიუმების დანერგვის აუცილებლობაზე მედიკამენტების გამოყენების ოპტიმიზაციის მიზნით.

## REFERENCES


Alić, A., Pranjić, N., Ramić, E. (2011). Polypharmacy and decreased cognitive abilities in elderly patients. *Medicinski Arhiv, 65*(2), 102-105.

Gallagher, P., Ryan, C., Byrne, S., Kennedy, J. (2008). STOPP (Screening tool of older persons' prescriptions) and START (Screening tool to alert doctors to right treatment): Consensus validation. *Clinical Pharmacology & Therapeutics, 46*(2), 72-83.

Gallagher, P.F., O'Connor, M.N., O'Mahony, D. (2011). Prevention of potentially inappropriate prescribing for elderly patients: A randomized controlled trial using STOPP/START criteria. *Clinical Pharmacology & Therapeutics, 89*(2), 72-83.

Goodman & Gilman's. (2011). *The pharmacological basis of therapeutics* (12th ed.). Edited by Laurence L. Brunton. e-Book edition.

Hanlon, J.T., Schmader, K.E. (2013). The Medication Appropriateness Index at 20: Where it started, where it has been, and where it may be going. *Drugs & Aging*, 30, 893-900. https://doi.org/10.1007/s40266-013-0118-4

Hoigné, R., Lawson, D.H., Weber, E. (1990). Risk factors for adverse drug reactions: Epidemiological approaches. *European Journal of Clinical Pharmacology*, 39, 321-325. https://doi.org/10.1007/BF00315403

Jost, L., Roila, F. (2011). Management of cancer pain: ESMO clinical practice guidelines. *Annals of Oncology*, 22(Suppl. 6), i69–i77.

Katzung, B.G. (2018). *Basic and Clinical Pharmacology* (14th ed.). LANGE Medical Books.

Larock, A.S., Mullier, F., Sennesael, A.L., Douxfils, J., Devalet, B., Chatelain, C. (2014). Appropriateness of prescribing dabigatran etexilate and rivaroxaban in patients with non-valvular atrial fibrillation: A prospective study. *Annals of Pharmacotherapy, 48*(10), 1258-1268. https://doi.org/10.1177/1060028014540868

Lund, B.C., Carnahan, R.M., Egge, J.A., Chrischilles, E.A., Kaboli, P.J. (2010). Inappropriate prescribing predicts adverse drug events in older adults. *The Annals of Pharmacotherapy*, 44, 957-963. https://doi.org/10.1345/aph.1M657

Nobili, A., Licata, G., Salerno, F., Pasina, L. (2011). Polypharmacy, length of hospital stay, and in-hospital mortality among elderly patients in internal medicine wards. *European Journal of Clinical Pharmacology, 67*(5), 507-519.

O'Mahony, D., Cherubini, A., Guiteras, A.R. (2023). STOPP/START criteria for potentially inappropriate prescribing in older people: Version 3. *European Geriatric Medicine*, *14*(4), 625-632. https://doi.org/10.1007/s41999-023-00777-y

O'Mahony, D., O'Sullivan, D., Byrne, S., O'Connor, M.N., Ryan, C., Gallagher, P. (2015). STOPP/START criteria for potentially inappropriate prescribing in older people: Version 2. *Age and Ageing, 44*(2), 213-218.

O'Mahony, D., O'Sullivan, D., Byrne, S., O'Connor, M.N., Cristin, R., Gallagher, P. (2018). Corrigendum: STOPP/START criteria for potentially inappropriate prescribing in older people: Version 2. *Age and Ageing*, *47*(3), 489. https://doi.org/10.1093/ageing/afx178

Rankin, A., Cadogan, C.A., Patterson, S.M., Kerse, N., Cardwell, C.R., Bradley, M.C., Ryan, C., Hughes, C. (2018). Interventions to improve the appropriate use of polypharmacy for older people. *Cochrane Database of Systematic Reviews*, 9. https://doi.org/10.1002/14651858

Somers, A., Mallet, L., Vander Stichele, R., Robays, H., Petrovic, M. (2012). Applicability of an adapted Medication Appropriateness Index for detection of drug-related problems in geriatric inpatients. *American Journal of Geriatric Pharmacotherapy, 10*(2), 101-109. https://doi.org/10.1016/j.amjopharm.2012.01.003

Tadele, M.Y., Freddy, E.K., Serawit, D., Patrick, E.O., Tamukong, R., Alele, P.E. (2021). Prevalence, characteristics and predicting risk factors of adverse drug reactions among hospitalized older adults: A systematic review and meta-analysis. *SAGE Open Medicine*, 9. https://doi.org/10.1177/20503121211039099

World Health Organization (WHO). (1996). *Cancer Pain Relief: Guide to Opioid Availability* (2nd ed.). Geneva: World Health Organization. https://www.gettextbooks.com/isbn/9789241544825/

World Health Organization (WHO). (2014). *Global burden of neurological disorders: Estimates and projections*. Retrieved from http://www.who.int/mental_health/neurology/chapter_2_neuro_disorders_public_h_challenges.pdf


*Received March, 2026*