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eISSN 2450-3118 · Open Access · Peer-reviewed

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Biernacka Z, Kacprzak U, Celmer M, Majchrzak M, Kossakowska J, Ruszkowski M, Piątkowski N. Deprescribing in Primary Care Patients Aged 65 Years and Older Exemplified by Hypertension, Type 2 Diabetes, and Insomnia: A Literature Review. *Quality in Sport*. 2026;67:74289. <https://doi.org/10.12775/QS.2026.67.74289>

ARTICLE TIMELINE

Received: 14.07.2026. Revised: 08.08.2026. Accepted: 08.08.2026. Published: 10.08.2026.

The journal has been awarded 20 points in the parametric evaluation by the Polish Ministry of Higher Education and Science (Annex to the announcement of 05.01.2024, No. 32553). Unique Journal Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).

Punkty Ministerialne z 2019 – aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398. Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych). © The Authors 2026.

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Deprescribing in Primary Care Patients Aged 65 Years and Older Exemplified by Hypertension, Type 2 Diabetes, and Insomnia: A Literature Review

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Abstract

Background. An aging population has become a fact around the world. It is estimated that by 2050, individuals over the age of 65 will constitute more than 56.7% of the European population. Aging involves a series of physiological changes and is a highly variable process among individuals. In elderly patients with hypertension, type 2 diabetes, or insomnia, treatment de-escalation is frequently required. This study identifies challenges physicians encounter in daily practice during the deprescribing process and highlights the magnitude of the problem.

Aim. The aim of this study was to review the available scientific literature regarding medication deprescribing in individuals over 65 years of age, focusing on hypertension, type 2 diabetes, and insomnia.

Material and methods. A comprehensive literature review was conducted using databases such as Medline and PubMed. The search included publications papers published between 2010 and 2026 concerning deprescribing methods and their application in elderly patients suffering from hypertension, type 2 diabetes, and insomnia.

Results. Pharmacokinetics and drug metabolism changes with age. Medications, especially those used in long term, can induce adverse effects that may be hazardous. Conversely,

patients must not be deprived of essential pharmacotherapy. To address this, deprescribing algorithms have been developed to assist clinicians in clinical decision-making.

Conclusions. The analysis of available data indicates that despite the extensive number of criteria and lists focusing on medication withdrawal and their continuous updates, further research is still required regarding the clinical outcomes of their implementation in individuals over 65 years of age suffering from hypertension, type 2 diabetes, or insomnia. Furthermore, it is essential to increase the awareness and dissemination of these criteria within the medical community to facilitate their more frequent application in clinical practice.

Keywords: deprescribing; elderly; **polypharmacy**; hypertension; type 2 diabetes; insomnia

1. Introduction

Population aging is becoming an established fact. According to the latest Eurostat data, the European Union is experiencing a steady increase in the population aged 65 and over. This group accounted for 22,2% of the total population in 2025 and is projected to reach 25.1% by 2035 [1,2].

Aging entails a series of changes in drug pharmacokinetics [3, 4]. The absorption of various substances decreases due to an increase in gastric juice pH, reduced gastrointestinal motility, and impaired active transport, which leads, among other things, to a delayed onset of action of the administered drug. The distribution of substances in the body is altered by a reduction in total body water, a decrease in muscle mass, an increase in adipose tissue, and elevated vascular resistance. These factors contribute to an increase in the free fraction of drugs. Drug metabolism also changes due to reduced liver mass and diminished hepatic blood flow. This results in decreased activity of liver enzymes and the oxidative system, as well as reduced hepatic clearance, which extends the half-life of active metabolites and increases the risk of drug-drug interactions. Furthermore, the body's elimination capacity declines, as kidneys lose approximately 10% of their filtration function for every decade after the age of 40 [5]. Both glomerular filtration rate (GFR) and renal perfusion decrease with age and factors such as renal parenchyma fibrosis, tubular secretion and excretion are reduced, leading to an increased risk of drug accumulation.

All these physiological changes lead to multimorbidity, which has a strong impact on polypharmacy. Polypharmacy is defined as the concurrent use of at least five medications [6]. Although it is essential for many patients, it carries numerous complications. For instance, the active substances may interact, either diminishing or potentiating their respective effects. This can lead to adverse drug reactions (ADRs), which frequently result in hospitalization and impose a significant financial burden for patients [3]. Among the most common conditions in the elderly, are cardiovascular diseases (hypertension, atherosclerosis, stroke), neurological disorders (dementia, Alzheimer's disease), and metabolic diseases (e.g., type 2 diabetes, osteoporosis) [7]. At the beginning of the 21st century, the high prevalence of multimorbidity and polypharmacy gave rise to a new phenomenon: deprescribing. Its objective is to reduce the side effects of over-treatment and to optimize therapy. Deprescribing involves the supervised withdrawal of one or more medications that are potentially harmful or from which the patient no longer derives any clinical benefit [6].

2. Material and methods

A comprehensive search of available literature was conducted using databases such as PubMed and Medline. Research papers published from 2010 to 2026 were selected to ensure the most up-to-date information regarding deprescribing. The following keywords were used to identify relevant data: deprescribing, elderly, polypharmacy, hypertension, type 2 diabetes and insomnia.

3. Results

3.1. Why physicians and patients fear deprescribing

Primary care physicians (PCPs) are most commonly responsible for deprescribing, as they tend to know the patient best, including their health history, the number of comorbidities, and the total medication load. They often have long-standing relationships with their patients. According to research, physicians are hesitant to discontinue medications that a patient has been taking for many years due to the potential emergence of withdrawal symptoms [6]. Furthermore, during a visit, physicians often lack sufficient time to thoroughly review and analyze a patient's medication list or to explain the necessity and benefits of discontinuing specific drugs [8, 9]. Medications are frequently prescribed by specialists from various fields, which leads to a reluctance among PCPs to question another specialist's clinical judgment

[10]. Physicians often fear initiating conversations about deprescribing due to the risk of patient misinterpretation [6]. There is also a common apprehension regarding discussions about life expectancy, practitioners fear that patients might perceive such actions negatively, feeling unwanted or marginalized. Additionally, in daily practice, physicians must adhere to clinical guidelines, which often lead to polypharmacy [10]. Crucially, clinicians frequently report a lack of knowledge on how to safely taper medications, where to find reliable information, or which clinical criteria to utilize [9,10].

Patients, on the other hand, fear the potential consequences of discontinuation and the possible relapse or exacerbation of their condition [3, 8]. Often, patient reluctance is driven by insufficient information regarding the tapering process, which is frequently a result of the limited time a physician can dedicate to a single visit [3, 6, 8]. Moreover, patients may not fully understand that the therapeutic goals for their condition, previously achieved through medication, should now be achieved with lower doses to counteract side effects that were previously absent.

3.2. Criteria supporting deprescribing decisions

At the beginning, it is important to note that these criteria do not address the full complexity of all problems a patient may face. Instead, they are intended to guide physicians in verifying the potential risks and benefits of pharmacotherapy, with the primary goal of enhancing patient safety.

3.2.1. The Beers criteria

The Beers Criteria were updated in 2023 by the American Geriatrics Society [9]. They are applied to adults aged 65 and older in most healthcare settings, with the exception of hospice and palliative care. Experts categorized the criteria into five groups: medications that should generally be avoided in older adults; medications that should be avoided in patients with specific conditions; and those that should be used with caution. The remaining two categories address drug-drug interactions that may cause adverse effects due to pharmacokinetic changes, and medications whose dosage must be adjusted based on creatinine clearance [9, 11]. These criteria encompass approximately 30 drugs or drug classes.

3.2.2. The FORTA criteria (Fit fOR The Aged)

Medications are assigned to one of four categories (A through D), which are presented in Table 1 [12].

Table 1. Categories and recommendation levels of the FORTA criteria.

Category	Recommendation level
A	Absolutely
B	Beneficial
C	Careful
D	Do not use

Categories A and B include drugs with proven benefits, while C and D should generally be avoided. However, if treatment options from groups A and B are exhausted, pharmacological intervention with group C agents may become necessary. In addition to deprescribing recommendations, FORTA also addresses the initiation of necessary therapy (positive recommendations). Originally developed in German, the FORTA list now has multiple versions adapted for different regions of the world [12].

Applying these criteria requires a four-step approach. The first steps is focus on the information gathered during the physical examination and medical history. This includes data on the patient's comorbidities, previous treatments, and current medications [12]. The patient's functional status is also assessed. At this stage, therapeutic goals are established, taking into account the patient's life expectancy. The second step is based on three fundamental questions, **which** are summarized in Table 2 [12].

Table 2. Based fundamental question.

Question ID	Core evaluation question
Q1	Are any of the patient's current medications unnecessary?
Q2	Does the patient have clinically significant health problems that remain untreated?
Q3	Are the patient's conditions being treated with the best possible pharmacological options?

The third stage involves the analysis of additional aspects. Since the FORTA list is not exhaustive, this stage involves gathering data on dosage, administration routes, known

allergies, and potential interactions with existing therapy. If a drug cannot be initiated due to secondary contraindications, an alternative must be selected.

The final stage focuses on observing the patient's health after implementing changes. This includes evaluating the efficacy of the pharmacotherapy and identifying potential side effects. A follow-up schedule is established, with more frequent contact required at the beginning of the new regimen [12].

Finally, it should be noted that if therapeutic goals are not met, side effects occur, or there is a lack of patient adherence, a change in medication should be considered.

According to current literature, the FORTA list is fully patient-centered (PILL – Patient-In-focus Listing approach), in contrast to other criteria which tend to be drug-oriented [9].

3.2.3. STOPP/START criteria version 3

These criteria address the prescription of medications associated with potentially inappropriate medications (STOPP – Screening Tool of Older People's Prescriptions) and medications from which the patient would benefit but which were omitted during prescribing (START – Screening Tool to Alert to Right Treatment). They encompass 145 STOPP criteria and 59 START criteria. These tools are particularly applicable to patients at the end of life or in palliative care, prioritizing deprescribing by considering both life expectancy and quality of life. Conversely, by following the START criteria, a clinician may incorporate medications into the therapy that were previously overlooked. The updated criteria include approximately 190 clinical scenarios, which may slightly complicate their application in daily clinical practice [13].

Additionally, two specialized tools have been identified: **STOPPFrail**, which comprises 27 criteria and evaluates pharmacotherapy in patients with frailty syndrome and limited life expectancy, and **STOPPFall**, which is aimed at individuals experiencing falls and focuses on identifying medications responsible for such adverse effects [13].

3.2.4. PRISCUS 2.0

This list includes 18 medication categories and 177 substances. Furthermore, the list provides safer alternatives for the medications being discontinued. The application of the PRISCUS list does not require specific clinical patient data, as it focuses exclusively on the medications used and their dosages. The detailed version of the PRISCUS 2.0 list takes into account the median, mean, 95% confidence interval, possible alternatives, and expert commentary—including information on drug monitoring, comorbidities in which the drug should be avoided, and the rationale for its classification as a Potentially Inappropriate Medication (PIM) [14]. Recent data indicate the necessity of verifying the new PRISCUS list

in epidemiological and prospective studies to fully determine its utility in everyday clinical practice [15].

3.2.5. The EU(7)-PIM list (for European countries)

Developed by experts from seven European Union countries, this serves as a screening tool to assess the necessity of deprescribing in European patients. It covers 282 active substances. For each medication, an explanation for its inclusion is provided, along with dosing guidelines and therapeutic alternatives [9, 16]. The EU(7)-PIM list was compiled using information from several international lists for example including the German PRISCUS list, the American Beers Criteria, Canadian and French lists [16].

4. Discussion

4.1. Clinical case study: hypertension

Over two-thirds of individuals aged 60 and older suffer from hypertension. It carries a range of cardiovascular complications, such as heart failure and myocardial infarction, and significantly impacts the nervous system, potentially causing hemorrhagic or ischemic stroke and cognitive impairment [17]. Furthermore, it can lead to premature death. For these and many other reasons, treating hypertension is essential. However, the use of antihypertensive drugs entails various adverse effects that can be hazardous for patients. Typically, hypertension treatment begins around age 40. As patients age, the number of comorbidities increases, consequently expanding their medication lists. It may occur that an antihypertensive drug, previously taken by a patient without side effects, becomes a candidate for withdrawal.

Therapeutic goals change with age. According to the 2024 ESC guidelines, for the management of elevated blood pressure and hypertension, antihypertensive treatment should be considered at blood pressure values $>140/90$ mmHg in specific patient populations [18]. This clinical threshold applies to individuals presenting with at least moderate frailty, a documented history of hypotension prior to treatment initiation, those aged over 85 years, or individuals with an estimated life expectancy of less than 3 years. In these cohorts, lower pressure may lead to central nervous system hypoxia and cognitive impairment, or potentially increase the overall risk of cardiovascular disease (CVD) [17]. Antihypertensive drugs are also frequently used for other conditions, such as diabetic kidney disease, heart failure with reduced ejection fraction (HFrEF), and atrial fibrillation. Antihypertensive therapy is associated with an increased risk of hypotension, acute kidney injury, syncope, falls, fractures,

hypokalemia, or hyperkalemia. Elderly patients, particularly those affected by polypharmacy where drug effects may overlap, and patients with frailty syndrome are especially vulnerable to these adverse effects [17].

4.1.1. Withdrawal or modification of antihypertensive medications

The first step consists of blood pressure monitoring. Before attempting to modify treatment, it is crucial to ensure that the patient's blood pressure is well-controlled and within target ranges. Evidence suggests that patients with lower baseline systolic blood pressure have a higher chance of successful therapy modification [19].

The second step involves a medication list review. Tools such as the Beers, STOPP/START, STOPPFall, and STOPPFrail criteria can be helpful. Indications for antihypertensive drugs must always be verified, as many are used for other conditions, for instance, ACE inhibitors and beta-blockers are used in HFrEF, beta-blockers in atrial fibrillation, and diuretics are common in heart failure management [19]. According to various criteria, medications recommended for withdrawal in the elderly include centrally acting drugs, vasodilators, alpha-blockers, loop and thiazide diuretics, and aldosterone antagonists [19].

4.1.2. Adverse effects of antihypertensive drugs

The use of beta-blockers in old age carries risks such as third-degree atrioventricular block and fainting. Loop diuretics can exacerbate urinary incontinence, while thiazide diuretics may cause hypercalcemia and gout. Aldosterone antagonists and ACE inhibitors can lead to electrolyte imbalances, specifically hyperkalemia. Centrally acting drugs, such as alpha-1 receptor inhibitors and agonists, may cause hypotension, sedation, and dizziness.

4.1.3. Withdrawal process

Antihypertensive medications should be withdrawn gradually. Particular attention must be paid to beta-blockers, which require dose tapering to avoid the rebound effect, and diuretics, to prevent excessive cardiovascular strain [19].

4.1.4. Monitoring

Studies suggest that medications should be discontinued one at a time. Regular blood pressure measurements are necessary to evaluate the efficacy of the modified therapy and ensure patients maintain their therapeutic goals: <140 mmHg for those under 80, and <150 mmHg for those over 80 with frailty syndrome. If blood pressure deviates from these norms, the clinician should consider restarting the medication at a reduced dose or exploring non-pharmacological interventions, though the latter can be challenging in elderly patients [19].

4.1.5. Scientific evidence

Currently, there is a limited number of studies regarding the necessity and impact of antihypertensive deprescribing in older patients [19]. Despite limited evidence, the final decision to discontinue or initiate a drug rests with the physician, who should approach each patient individually, based on medical history, clinical assessment, and specific deprescribing criteria. It is vital to remember that these criteria are systematically updated as new evidence emerges. Due to the complexity of the process, further research is needed to identify patient groups that may derive the most benefit from antihypertensive deprescribing.

4.2. Clinical case study: type 2 diabetes

Globally, over 800 million people suffer from diabetes, 90% of whom have type 2 diabetes. In recent years, the management of type 2 diabetes has undergone significant changes [20]. The emergence of numerous new pharmacological agents has increased the complexity of treatment, with medications often being prescribed by specialists across various fields. This poses a real risk of inappropriate prescribing of antidiabetic drugs, therefore tools such as the STOPP/START and Beers criteria are essential as screening instruments for verifying prescribed therapies.

The management of type 2 diabetes requires the use of multiple hypoglycemic agents. In elderly patients, whose pharmacokinetics and pharmacodynamics are altered, this can lead to complications, the most common being hypoglycemia [21]. Based on its course, hypoglycemia is categorized as mild or severe. Severe hypoglycemia, which usually requires third-party assistance, can lead to loss of consciousness, syncope, falls, fractures, coma, and notably, hospitalization. This underscores the necessity of rationalizing diabetes therapy in elderly patients, especially given the steadily growing population of individuals over 65. Therapeutic goals for the elderly are less stringent. For instance, the target for glycated hemoglobin (HbA1c) should be <7%, as hypoglycemia significantly diminishes quality of life. In elderly patients with microvascular complications and long-term diabetes, the HbA1c target should be relaxed to a range of 8.0%–8.5% [22, 23].

The STOPP/START criteria highlight several antidiabetic drugs [13]. Sulfonylureas pose the greatest risk of hypoglycemia in elderly patients. Thiazolidinediones (TZDs) may exacerbate heart failure, particularly due to fluid retention and its impact on cardiac function. With age, the renal filtration rate declines, which should alert clinicians to the use of metformin in patients with a GFR < 30, as its use in such cases is associated with a risk of lactic acidosis.

The Beers criteria specifically address sulfonylureas, stating they should not be the first-line treatment for older adults unless no alternatives exist [11]. Furthermore, long-acting sulfonylureas are more frequently associated with hypoglycemia; therefore, short-acting derivatives are preferred in this population.

Antidiabetic drugs, such as metformin, sulfonylureas, SGLT2 inhibitors, and GLP-1 agonists, may contribute to the exacerbation of frailty and its complications through various mechanisms [21]. The adverse effects of these selected antidiabetic agents are summarized in Table 3.

Table 3. Clinical risks of selected antidiabetic drug classes in geriatric patients

Drug class	Adverse effects
Sulfonylureas	Risk of hypoglycemia in patients with frailty syndrome, increasing the risk of falls, injuries, and hospitalization.
Metformin	Dehydration, malnutrition, and increased weight loss due to gastrointestinal side effects (vomiting, diarrhea); vitamin B12 deficiency due to impaired absorption; risk of lactic acidosis, potentially worsening frailty, especially in individuals with reduced physiological reserves.
GLP-1 Agonists	Weight loss and sarcopenia, further impairing mobility, posture, and balance, thus increasing the risk of falls.
SGLT2 Inhibitors	Dehydration, hypotension, cardiovascular strain, falls, syncope, fractures, and cognitive decline.

Therapy for type 2 diabetes in the elderly should primarily focus on avoiding hypoglycemia and maintaining or improving the patient's quality of life. Systematic assessment of glycemic control and treatment regimens is crucial in managing frailty and its complications in older adults.

4.3. Clinical case study: insomnia

Insomnia, defined as difficulty falling asleep, maintaining sleep, or waking up too early, affects approximately 12–20% of elderly patients. It often has a multifactorial etiology, as it may occur as a primary disorder or be secondary to other comorbidities. Various conditions can exacerbate insomnia, including chronic pain, obstructive sleep apnea (OSA), and other respiratory diseases. Insomnia may also be related to the consumption of substances (especially before bedtime) such as caffeine, alcohol, or energy drinks, or to the

pharmacological treatment of other conditions, particularly psychiatric disorders. Anxiety and depressive disorders should be specifically addressed before initiating treatment for sleep disturbances.

The most commonly prescribed medications for insomnia are benzodiazepines and Z-drugs. These agents carry a wide range of adverse effects, including cognitive decline, daytime somnolence, memory impairment, and reduced physical performance [24]. They also impair balance, which contributes to falls, fractures, and the need for hospitalization. Furthermore, they cause physical dependence [3,24]. When prescribing these drugs to patients over 65, the fundamental principles are: never prescribing the maximum dose, limiting the duration of therapy to no more than four weeks, and preferring short-acting formulations [25].

4.3.1. Tapering and discontinuation plan

Deprescribing criteria for this drug class are consistent. Based on these, the following conclusions can be drawn [25]. First, the physician must clearly explain the necessity of discontinuation, the action plan, and the evidence supporting the efficacy of these measures to the patient. Second, the reduction and eventual elimination of medication-related adverse effects leads to benefits such as improved cognitive function and memory. Third, the therapeutic efficacy of these drugs may diminish after four weeks. However, the negative effects on memory persist. Finally, it is crucial to note, that during gradual tapering, withdrawal symptoms may occur, lasting from several days to several weeks [3, 25].

Monitoring the severity and frequency of withdrawal symptoms, such as rebound insomnia, gastrointestinal disturbances, excessive sweating, and anxiety, is crucial [25]. This can be achieved through validated clinical scales or direct examination. If the patient finds the withdrawal symptoms intolerable, the physician may decide to maintain the current dose for 1–2 weeks before attempting a slower reduction. Research indicates that no sedative medications are entirely safe for the elderly. Guidelines from the American College of Physicians suggest that Cognitive Behavioral Therapy for Insomnia (CBT-I) is the most effective treatment for chronic insomnia [26].

Meta-analyses and systematic reviews have shown that strategies involving medication reviews and the discontinuation of these drugs reduce the incidence of falls. However, further research is still needed regarding tapering strategies for benzodiazepines and Z-drugs and their impact on patient quality of life to develop the most effective discontinuation methods.

5. Conclusions

In summary, the tools designed to support medication deprescribing differ in terms of the amount of patient health information required from the clinician. Some tools focus exclusively on specific drugs and drug classes (such as the PRISCUS and EU(7)-PIM lists), making them highly versatile instruments when clinical history is unavailable. While these tools are easier to implement, they may overlook critical medical nuances.

In contrast, other criteria are more comprehensive and necessitate detailed clinical data. These often provide a more holistic assessment of the justification for deprescribing, however, the information required for their application may be difficult to obtain, which increases the time needed for implementation.

It is also important to emphasize that the inclusion of a drug on a PIM (Potentially Inappropriate Medication) list does not automatically mandate its discontinuation. In certain clinical scenarios, continued use may still be necessary. Therefore, PIM lists should be regarded as a supportive resource and a guide for clinical judgment rather than an absolute or final determination of treatment appropriateness. Deprescribing must always be a personalized process.

Disclosure

Author Contributions

Conceptualization, Z.B. U.K. M.M.; methodology, Z.B., U.K., M.M. and M.C; software, M.C., J.K. and M.R; check, M.M. and M.C.; formal analysis, J.K, and Z.B; investigation, M.M. and N.P.; resources, N.P; data curation, M.R. and M.C; writing - rough preparation, Z.B, and U.K;; writing - review and editing, Z.B., U.K. and M.C.; visualization, Z.B., U.K. and M.C.; supervision, Z.B; project administration, Z.B., U.K., J.K. and M.R.

All authors have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

No new primary data were generated in this study. Data sharing is not applicable to this article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Declaration of the Use of Generative AI and AI-Assisted Technologies

During the preparation of this work, the authors used ChatGPT to enhance the medical language and stylistic clarity of the text. In addition, ChatGPT was utilized to format the reference list according to the Vancouver style. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the substantive content of the publication.

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