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Potential Drug-Disease Interactions and Drug-Related Problems in Older Adults with Chronic Hypertension and/or Diabetes

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Abstract: Older adults with chronic hypertension and/or diabetes are particularly prone to drug-disease interactions (DDIs) and drug-related problems (DRPs) due to multimorbidity, polypharmacy, and age-related physiological changes. This article reviews the prevalence, types, and impact of DDIs and DRPs in this population, identifies high-risk scenarios, and outlines evidence-based strategies for safer medication management. Comparative data and graphical representations illustrate the magnitude of these challenges and support recommendations for clinical practice.

Keywords: Drug-related problems (DRPs), Drug-disease interactions (DDIs), Older adults, Polypharmacy, Chronic conditions.

INTRODUCTION

The global aging population faces a high prevalence of chronic non-communicable diseases, notably hypertension and diabetes mellitus. Consequently, older adults often require multiple medications, increasing the risk for adverse drug effects, drug-disease interactions, and prescription cascades. Drug-related problems constitute a major threat to the health, autonomy, and quality of life in this group, necessitating ongoing vigilance and proactive medication reviews by healthcare teams[1][2].

DRUG-RELATED PROBLEMS IN OLDER ADULTS

Definitions and Scope

- **Drug-related problem (DRP):** Any event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes, including inefficacy, overdosage, underdosage, adverse effects, inappropriate therapy, or interactions[1][3].
- **Polypharmacy:** The use of five or more different medications, common in elderly patients with multimorbidity, significantly increases the likelihood of DRPs and DDIs[2][4].

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Prevalence and Major Risk Factors

- **High prevalence:** Up to 80% of older adults with chronic hypertension and/or diabetes experience at least one DRP[4].
- **Contributors:** Age-related decline in renal and hepatic function, comorbidities, altered pharmacodynamics, and poor adherence due to cognitive or financial barriers[1][5].
- **High-risk drugs:** Antihypertensives, antidiabetics, NSAIDs, psychotropics, anticoagulants, and diuretics[6][7][8].

Drug-Disease and Drug-Drug Interactions: Patterns and Pitfalls

Potential Drug-Drug Interactions (DDIs)

-**Prevalence:** More than 70% of older adults with chronic vascular and metabolic diseases are exposed to at least one potential DDI. Severe interactions, while less common, remain clinically significant and require careful management[9][8][2][7].

- **Types of DDIs:**
  - Combination of antithrombotics (e.g., aspirin + clopidogrel): Increased bleeding.
  - NSAIDs with antihypertensives: Reduced efficacy of blood pressure control and elevated kidney risk.
  - Diuretics or ACE inhibitors with certain antidiabetics: Risk of electrolyte disturbances or hypoglycemia[10][7][8].

Drug-Disease Interactions (DDIs)

- **NSAIDs in Hypertension:** NSAIDs are repeatedly implicated; up to 8% of all observed DDIs in primary care older populations occur when NSAIDs worsen hypertension control or contribute to kidney injury[11].
- **Corticosteroids and Antidiabetics:** Chronic corticosteroid use exacerbates hyperglycemia, undermining glycemic control in diabetic patients and prompting insulin or oral agent escalation[12][10].
- **Other Examples:**
  - Yohimbine aggravates hypertension.
  - Danazol exacerbates hypertension via fluid retention.
  - Calcium channel blockers may potentiate the effect (and side effects) of some antidiabetics.

Polypharmacy and Cumulative Burden

- Polypharmacy is nearly universal in this group, often exceeding six medications per patient, amplifying the risk of unpredictable interactions and adverse outcomes[8][4][13][6].
- Concurrent use of multiple drugs affecting the central nervous system (e.g., sedatives, antidepressants) can heighten the risk of confusion, falls, and hospitalizations[1][2].

Key Metrics: Drug-Related Problems in the Older Population

Key statistics highlight the scope of the problem:

- Polypharmacy prevalence: 80%
- Potential drug–drug interactions: 72.9%
- Drug-disease interactions: 50.4%
- Adverse drug events: 38.6%

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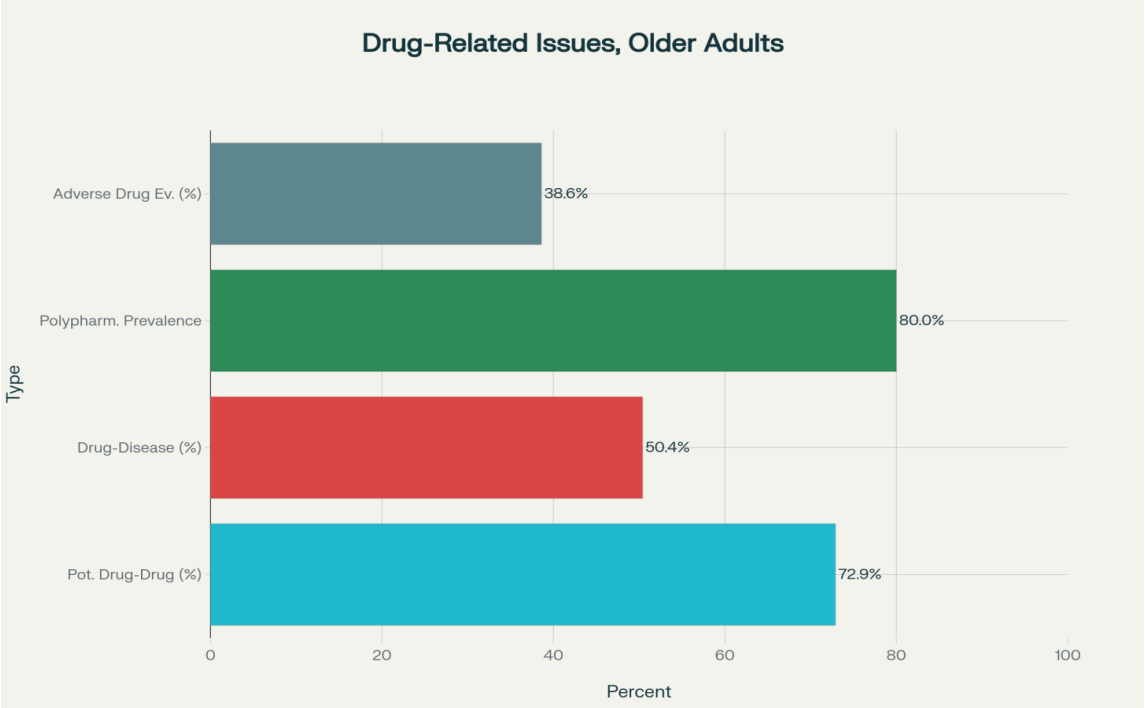

Key Drug-Related Problem Metrics in Older Adults with Chronic Hypertension and/or Diabetes

Clinical Consequences and Patient Safety

- **Adverse drug events (ADEs):** Account for 4–7 times greater hospitalizations in older adults vs. younger populations[1].
- **Major clinical complications:** Hypoglycemia, hyperglycemia, hypertensive crisis, acute kidney injury, falls, gastrointestinal bleeding, and cognitive impairment are prominent[10][2].
- **Potentially inappropriate medication use:** Over 40% of older diabetic patients are prescribed at least one potentially inappropriate medication, further increasing risk[6][3].

Table 1: Common Drug-Disease and Drug-Drug Interactions

Interaction	Risk/Impact	Clinical Considerations
NSAIDs + Hypertension	BP elevation, renal injury	Use alternatives, monitor BP/renal function
Corticosteroids + Diabetes	Hyperglycemia	Adjust diabetes therapy, monitor glucose
Diuretics + Antidiabetics (sulfonylureas)	Hypoglycemia, electrolyte loss	Monitor glucose and electrolytes
ACE Inhibitors + Potassium-sparing Diuretics	Hyperkalemia	Monitor K+, consider alternatives
Multiple CNS drugs (e.g., sedatives, psychotropics)	Falls, confusion	Minimize CNS agents, review indications
Antithrombotics (aspirin, clopidogrel, warfarin)	Bleeding or reduced efficacy	Avoid unnecessary duplication, review INR
Statins + Amiodarone, azole antifungals	Myopathy, increased statin levels	Lower statin dose, monitor for toxicity

Special Considerations in Diabetes and Hypertension

- **Drug-nutrient interactions:** Some antilipemics and cephalosporins may induce vitamin K deficiency[10].
- **Sulfonylureas:** Use is discouraged due to high hypoglycemia risk in frail elders[6].

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- **Renal function:** Adjust dosing for antihypertensives and antidiabetics as kidney function commonly deteriorates with age.

Predictors and Risk Factors

Predictor	Impact
Number of chronic diseases	↑ DRP/DDI risk
Higher medication count	↑ DRP/DDI risk
Cognitive impairment	↑ Nonadherence and adverse events
Hospitalization history	↑ DRP risk

Identification and Management Strategies

- **Medication review:** Regular, comprehensive review by prescribers and clinical pharmacists is essential[9][2].
- **Use of screening tools:** Employ explicit criteria (e.g., Beers Criteria, STOPP/START) and digital DDI checkers[6][14].
- **Deprescribing:** Actively discontinue unnecessary or inappropriate medications, particularly when safer alternatives exist.
- **Transition management:** Review medications at transitions of care (e.g., hospital admission/discharge) when changes are most frequent.
- **Patient/caregiver education:** Educate on self-management, symptoms of adverse events, and importance of adherence.

Recommendations and Future Directions

- Individualized care plans suited to the patient's comorbidity burden and functional status are paramount.
- Adoption of multidisciplinary medication management—including pharmacists—leads to better safety and outcomes[9][2].
- Integration of electronic health records and alert systems can help flag high-risk interactions and guide safer prescribing.

CONCLUSION

Older adults with chronic hypertension and/or diabetes are at exceptional risk for drug-related problems and drug-disease interactions, mainly due to polypharmacy and multimorbidity. Of critical importance are NSAIDs, corticosteroids, and multi-antithrombotic combinations, as well as excessive use of sulfonylureas and sedatives. Systematic medication reviews, avoidance of potentially inappropriate medications, and collaborative care models are essential in mitigating these risks and improving quality of life for older patients.

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