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Literature search results

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Search details

Adverse effects of polypharmacy in the elderly.

Resources searched

NICE Evidence; TRIP Database; Cochrane Library; AMED; BNI; CINAHL; EMBASE; HMIC; MEDLINE; PsychINFO; Google Scholar; Google Advanced Search

Database search terms:
(elder* OR geriatric* OR "older people" OR aged), (polypharmacy OR “poly pharmacy” OR “multiple medication”)

Evidence / Google Scholar search string(s):
(elderly OR geriatric OR “older people” OR aged) polypharmacy

Guidelines and Policy

NHS Scotland
Polypharmacy guide, 2015

The King’s Fund
Polypharmacy and medicines optimisation, 2013
Evidence Reviews

Cochrane Database of Systematic Reviews

Interventions to improve the appropriate use of polypharmacy for older people, 2014

Published Research – Databases

**Title:** Polypharmacy in the Elderly: A Marker of Increased Risk of Mortality in a Population-Based Prospective Study (NEDICES)
**Citation:** Gerontology, July 2015, vol./is. 61/4(301-309), 0304-324X;1423-0003 (22 Jul 2015)
**Author(s):** Gomez C., Vega-Quiroga S., Bermejo-Pareja F., Medrano M.J., Louis E.D., Benito-Leon J.
**Language:** English
**Abstract:** Background: Little information is available on the potential association between polypharmacy and risk of mortality. Objective: To determine in a population-based study whether polypharmacy is associated with increased risk of mortality in elderly persons. Methods: In this population-based, prospective study of 5,052 people aged 65 years and older (Neurological Disorders in Central Spain), current medications were recorded. Cox proportional hazards models, adjusted for sociodemographics and comorbidity factors, were used to assess the risk of death up to 13.3 years later, comparing the polypharmacy group (>6 drugs) to those who were taking 1-5 drugs and those in a nonmedicated group (0 drugs). Results: Out of 5,052 participants, 2,550 (50.5%) died over a median follow-up of 6.5 years, including 361 (28.8%) deaths among 931 nonmedicated participants, 1,946 (51.4%) deaths among 3,787 participants taking 1-5 drugs daily, and 243 (72.8%) among 334 participants on polypharmacy. In an unadjusted Cox model, risk of mortality was increased in participants on polypharmacy [hazard ratio (HR) = 2.78, 95% confidence interval [CI]: 2.36-3.27, p < 0.001) and in those taking between 1 and 5 drugs (HR = 1.47, 95% CI: 1.31-1.64, p < 0.001) versus those who were nonmedicated (reference group). In a Cox model that adjusted for a variety of demographic factors and comorbidities, HR remained increased in participants on polypharmacy (HR = 1.83, 95% CI: 1.51-2.21, p < 0.001). Conclusion: This study provides evidence that polypharmacy is associated with increased risk of mortality in elderly people. The extent to which polypharmacy is the proximate cause rather than a marker of this increase risk remains to be determined.
**Publication Type:** Journal: Article
**Source:** EMBASE

**Title:** Ageing is not for the faint-hearted: are we making it worse? Polypharmacy-related harm in the elderly.
**Citation:** Journal of primary health care, Jun 2015, vol. 7, no. 2, p. 167-169 (June 2015)
**Author(s):** Wallis, Katharine A
**Source:** Medline
**Full Text:** Available from Directory of Open Access Journals in Journal of Primary Health Care

**Title:** Polypharmacy in the elderly.
**Citation:** Journal of research in pharmacy practice, Apr 2015, vol. 4, no. 2, p. 85-88, 2319-9644 (2015 Apr-Jun)
**Author(s):** Golchin, Negar, Frank, Scott H, Vince, April, Isham, Lisa, Meropol, Sharon B
Abstract: The objective was to assess the frequency of polypharmacy and potential complications among local seniors. A cross-sectional convenience sample of 59 adults aged above 65 years was interviewed at Cuyahoga county (U.S. state of Ohio) senior programs. Polypharmacy was defined as more than five prescribed medications. Primary outcomes were frequent missed doses, one or more duplicate drug/s, and equal or more than one contraindicated drug combinations. Among seniors with the mean age of 76.9 years (25.4% male), 40.6% used multiple pharmacies and 35.6% had polypharmacy. Of all seniors with polypharmacy, about 57% had contraindicated drug combinations. Polypharmacy was associated with duplication (P = 0.02), but not frequent missed doses (P = 0.20). As shown by this study, polypharmacy was associated with duplicated therapy and contraindicated drug combinations. Improved communications among seniors, physicians, and pharmacists is necessary to minimize adverse consequences of polypharmacy.

Source: Medline

Full Text: Available from National Library of Medicine in Journal of Research in Pharmacy Practice

Title: Polypharmacy and falls in older people: Balancing evidence-based medicine against falls risk.

Citation: Postgraduate medicine, Apr 2015, vol. 127, no. 3, p. 330-337 (April 2015)

Author(s): Zia, Anam, Kamaruzzaman, Shahrul Bahyah, Tan, Maw Pin

Abstract: The term polypharmacy has negative connotations due to its association with adverse drug reactions and falls. This spectrum of adverse events widens when polypharmacy occurs among the already vulnerable geriatric population. To date, there is no consensus definition of polypharmacy, and diverse definitions have been used by various researchers, the most common being the consumption of multiple number of medications. Taking multiple medications is considered a risk factor for falls through the adverse effects of drug-drug or drug-disease interactions. Falls studies have determined that taking ≥ 4 drugs is associated with an increased incidence of falls, recurrent falls, and injurious falls. In light of existing evidence, careful and regular medication reviews are advised to reduce the effect of polypharmacy on falls. However, intervention studies on medication reviews and their effectiveness on falls reduction have been scarce. This article reviews and discusses the evidence behind polypharmacy and its association with falls among older individuals, and highlights important areas for future research.

Source: Medline

Title: Polypharmacy is associated with an increased risk of bleeding in elderly patients with venous thromboembolism.

Citation: Journal of general internal medicine, Jan 2015, vol. 30, no. 1, p. 17-24 (January 2015)


Abstract: Polypharmacy, defined as the concomitant use of multiple medications, is very common in the elderly and may trigger drug-drug interactions and increase the risk of falls in patients receiving vitamin K antagonists. To examine whether polypharmacy increases the risk of bleeding in elderly patients who receive vitamin K antagonists for acute venous thromboembolism (VTE). We used a prospective cohort study. In a multicenter Swiss cohort, we studied 830 patients aged ≥ 65 years with VTE. We defined polypharmacy as the prescription of more than four different drugs. We assessed the association between polypharmacy and the time to a first major and clinically relevant non-major bleeding, accounting for the
competing risk of death. We adjusted for known bleeding risk factors (age, gender, pulmonary embolism, active cancer, arterial hypertension, cardiac disease, cerebrovascular disease, chronic liver and renal disease, diabetes mellitus, history of major bleeding, recent surgery, anemia, thrombocytopenia) and periods of vitamin K antagonist treatment as a time-varying covariate. Overall, 413 (49.8%) patients had polypharmacy. The mean follow-up duration was 17.8 months. Patients with polypharmacy had a significantly higher incidence of major (9.0 vs. 4.1 events/100 patient-years; incidence rate ratio [IRR] 2.18, 95% confidence interval [CI] 1.32-3.68) and clinically relevant non-major bleeding (14.8 vs. 8.0 events/100 patient-years; IRR 1.85, 95% CI 1.27-2.71) than patients without polypharmacy. After adjustment, polypharmacy was significantly associated with major (sub-hazard ratio [SHR] 1.83, 95% CI 1.03-3.25) and clinically relevant non-major bleeding (SHR 1.60, 95% CI 1.06-2.42). Polypharmacy is associated with an increased risk of both major and clinically relevant non-major bleeding in elderly patients receiving vitamin K antagonists for VTE.

Source: Medline

Title: The impact of drug interactions and polypharmacy on antimicrobial therapy in the elderly
Citation: Clinical Microbiology and Infection, 2015, vol./is. 21/1(20-26), 1198-743X;1469-0691 (2015)
Author(s): Corsonello A., Abbatecola A.M., Fusco S., Luciani F., Marino A., Catalano S., Maggio M.G., Lattanzio F.
Language: English
Abstract: Infectious diseases are more prevalent in older people than in younger adults, and represent a major healthcare issue in older populations. Indeed, infections in the elderly are often associated with higher morbidity and mortality, and may present atypically. Additionally, older patients are generally treated with polypharmacy regimens, which increase the likelihood of drug-drug interactions when the prescription of an antimicrobial agent is needed. A progressive impairment in the functional reserve of multiple organs may affect either pharmacokinetics or pharmacodynamics during aging. Changes in body composition occurring with advancing age, reduced liver mass and perfusion, and reduced renal excretion may affect either pharmacokinetics or pharmacodynamics. These issues need to be taken into account when prescribing antimicrobial agents to older complex patients taking multiple drugs. Interventions aimed at improving the appropriateness and safety of antimicrobial prescriptions have been proposed. Educational interventions targeting physicians may improve antimicrobial prescriptions. Antimicrobial stewardship programmes have been found to reduce the length of hospital stay and improve safety in hospitalized patients, and their use in long-term care facilities is worth testing. Computerized prescription and decision support systems, as well as interventions aimed at improving antimicrobial agents dosage in relation to kidney function, may also help to reduce the burden of interactions and inherent costs.
Publication Type: Journal: Review
Source: EMBASE

Title: Polypharmacy including falls risk-increasing medications and subsequent falls in community-dwelling middle-aged and older adults
Citation: Age and ageing, January 2015, vol./is. 44/1(90-96), 1468-2834 (01 Jan 2015)
Author(s): Richardson K., Bennett K., Kenny R.A.
Language: English
Abstract: BACKGROUND: polypharmacy is an important risk factor for falls, but recent studies suggest only when including medications associated with increasing the risk of falls. DESIGN: a prospective, population-based cohort study. SUBJECTS: 6,666 adults aged >50 years from The Irish Longitudinal study on
Ageing.METHODS: participants reported regular medication use at baseline. Any subsequent falls, any injurious falls and the number of falls were reported 2 years later. The association between polypharmacy (>4 medications) or fall risk-increasing medications and subsequent falls or injurious falls was assessed using modified Poisson regression. The association with the number of falls was assessed using negative binomial regression.RESULTS: during follow-up, 231 falls per 1,000 person-years were reported. Polypharmacy including antidepressants was associated with a greater risk of any fall (adjusted relative risk (aRR) 1.28, 95% CI 1.06-1.54), of injurious falls (aRR 1.51, 95% CI 1.10-2.07) and a greater number of falls (adjusted incident rate ratio (aIRR) 1.60, 95% CI 1.19-2.15), but antidepressant use without polypharmacy and polypharmacy without antidepressants were not. The use of benzodiazepines was associated with injurious falls when coupled with polypharmacy (aRR 1.40, 95% CI 1.04-1.87), but was associated with a greater number of falls (aIRR 1.32, 95% CI 1.05-1.65), independent of polypharmacy. Other medications assessed, including antihypertensives, diuretics and antipsychotics, were not associated with outcomes.CONCLUSION: in middle-aged and older adults, polypharmacy, including antidepressant or benzodiazepine use, was associated with injurious falls and a greater number of falls.

Publication Type: Journal: Article
Source: EMBASE
Full Text: Available from Free Access Content in Age and Ageing

Title: Impact of Polypharmacy on Occurrence of Delirium in Elderly Emergency Patients
Citation: Journal of the American Medical Directors Association, November 2014, vol./is. 15/11(850e11-850e15), 1525-8610;1538-9375 (01 Nov 2014)
Author(s): Hein C., Forgues A., Piau A., Sommet A., Nourhashemi F., Vellas B.
Language: English
Abstract: Objective: To examine associations between polypharmacy and delirium diagnosed in elderly patients hospitalized in geriatric acute care unit after emergency hospital admission. Methods: Study design was an observational cohort study in the acute geriatric care unit of a university hospital. We included 410 consecutive patients admitted to the acute geriatric ward during 9 months. Within 72 hours of each patient's hospitalization, a clinically trained geriatrician collected the following data: sociodemographic details (age, sex, type of residence), predisposing factors for delirium, main cause of hospitalization, and current medications. Polypharmacy was defined as 6 or more drugs a day. Delirium was assessed by a geriatrician using the Confusion Assessment Method and was diagnosed on the basis of clinical history with an acute change in usual functional status, behavioral observation, and clinical and cognitive assessment. Results: Nearly 25% of hospitalized patients had delirium. The Confusion Assessment Method was positive in 69% of patients receiving polypharmacy and in 30% of those not receiving polypharmacy, a relative risk of 2.33. The proportion of elderly patients receiving polypharmacy was 58.53%. Conclusions: In our study, polypharmacy is an independent risk factor for delirium in a population of elderly patients after emergency admission. In the geriatric population, delirium is an underestimated scourge and because of its medicosocial and economic consequences and its impact on morbidity and mortality, we need to give increased attention to the prevention and control of polypharmacy, which is a predisposing factor for delirium.

Publication Type: Journal: Article
Source: EMBASE

Title: Oral implications of polypharmacy in the elderly
Citation: Dental clinics of North America, October 2014, vol./is. 58/4(783-796),
**Title:** Polypharmacy related to increased risk of hip fracture in elderly patients  
**Citation:** Atencion Farmaceutica, March 2014, vol./is. 16/2(117-123), 1139-7357 (March-April 2014)  
**Author(s):** Garcia Molina O., Olmos Jimenez R., Castellote De Varona F.J., Mendoza Otero F., Arocas Casano V., De La Rubia Nieto M.A.  
**Language:** English  
**Abstract:** Objective: Assess the association between polypharmacy and the use of drugs, and falls in elderly patients leading to hip fractures. Method: This is a population-based retrospective case-control study. The case group consists of patients aged >75 years old admitted to a tertiary hospital with hip fractures after accidental falls and the control group were randomized patients who were admitted to the Internal Medicine ward in the same period to obtain a relationship 1:1. The data were analyzed using SPPS v15.0. The data collection period was one year. Results: 61 patients were admitted with hip fractures obtaining a total of 122 patients. Mean age was 83.3 +/- 4.8 years (60.7% women) for the case group versus 81.97 +/- 4.04 (59% women) for the control group, p = 0.12. The number of drugs consumed was 7.2 +/- 3.3 in older patients with hip fractures respect 4.9 +/- 2.1 in patients without hip fractures, p <0.05. The most consumed drugs were proton-pump inhibitors (63.9%), followed by antihypertensive drugs (60.7%) and diuretics (55.7%). Statistically significant differences were found (p <0.05) in the consumption of benzodiazepines (OR 3.87, CI 1.77-8.46); antidepressants (OR 3.26, CI 1.18-9.02) and diuretics (OR 2.58, CI 1.24-5.39). Conclusions: The risk of hip fracture in elderly patients increases with the number of drugs taken and the use of benzodiazepines, antidepressants and diuretics.  
**Publication Type:** Journal: Article  
**Source:** EMBASE

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**Title:** Impact of polypharmacy on occurrence of delirium in elderly emergency patients  
**Citation:** Journal of the American Medical Directors Association, 2014, vol./is. 15/11(850.e11-5), 1538-9375 (2014)  
**Author(s):** Hein C., Forgues A., Piau A., Sommet A., Vellas B., Nourhashemi F.  
**Language:** English  
**Abstract:** OBJECTIVE: To examine associations between polypharmacy and delirium diagnosed in elderly patients hospitalized in geriatric acute care unit after emergency hospital admission.METHODS: Study design was an observational cohort study in the acute geriatric care unit of a university hospital. We included 410 consecutive patients admitted to the acute geriatric ward during 9 months. Within 72 hours of each patient's hospitalization, a clinically trained geriatrician collected the following data: sociodemographic details (age, sex, type of residence), predisposing factors for delirium, main cause of hospitalization, and
current medications. Polypharmacy was defined as 6 or more drugs a day.
Delirium was assessed by a geriatrician using the Confusion Assessment Method
and was diagnosed on the basis of clinical history with an acute change in usual
functional status, behavioral observation, and clinical and cognitive
assessment.RESULTS: Nearly 25% of hospitalized patients had delirium. The
Confusion Assessment Method was positive in 69% of patients receiving
polypharmacy and in 30% of those not receiving polypharmacy, a relative risk of
2.33. The proportion of elderly patients receiving polypharmacy was 58.53%.CONCLUSIONS: In our study, polypharmacy is an independent risk factor
for delirium in a population of elderly patients after emergency admission. In the
geriatric population, delirium is an underestimated scourge and because of its
medicosocial and economic consequences and its impact on morbidity and
mortality, we need to give increased attention to the prevention and control of
polypharmacy, which is a predisposing factor for delirium.

Publication Type: Journal: Article
Source: EMBASE

Title: Comorbidities and polypharmacy impact on complete cytogenetic response
in chronic myeloid leukaemia elderly patients.
Citation: European journal of internal medicine, Jan 2014, vol. 25, no. 1, p. 63-66
(January 2014)
Author(s): Iurlo, Alessandra, Ubertis, Anna, Artuso, Silvia, Bucelli, Cristina,
Radice, Tommaso, Zappa, Manuela, Cattaneo, Daniele, Mari, Daniela, Cortelezzi,
Agostino
Abstract: In older patients comorbidity and polypharmacy can significantly
influence the success of the treatment, as well as the cognitive and psycho-social
aspects. A significant proportion of chronic myeloid leukaemia (CML) patients are
"elderly": in the past the aim of therapy in this subset of patients was only to
contain the leukaemic mass, but nowadays, with the advent of the protein-tyrosine
kinase inhibitors, also elderly patients can access these treatments. We want to
assess if even old CML patients, with a correct geriatric evaluation, can be
successfully treated with protein-tyrosine kinase inhibitors. A complete geriatric
evaluation in 16 old CML patients aged >65 years treated with TKI was performed
in order to assess the comorbidity, the polypharmacy and the cognitive, physical
and psychological states. The Charlson comorbidity index (CCI) and the
polypharmacy were correlated to the obtained cytogenetic response. Seven scales
of geriatric evaluation were used to assess the autonomy of patients before they
were included into the study. In our cohort of elderly patients treated with imatinib,
comorbidities and polypharmaco-therapy demonstrated an influence on TKI
therapeutic success. In fact, the majority of complete cytogenetic response was
obtained by patients who presented a low score of CCI and did not take any other
drugs other than TKI. Also old chronic myeloid leukaemia patients can benefit from
TKI treatment if a good cooperation between the haematologist and the geriatrician
is established. Copyright © 2013 European Federation of Internal Medicine.
Published by Elsevier B.V. All rights reserved.
Source: Medline

Title: Clinical consequences of polypharmacy in elderly.
Citation: Expert opinion on drug safety, Jan 2014, vol. 13, no. 1, p. 57-65 (January
2014)
Author(s): Maher, Robert L, Hanlon, Joseph, Hajjar, Emily R
Abstract: Polypharmacy, defined as the use of multiple drugs or more than are
medically necessary, is a growing concern for older adults. MEDLINE and
EMBASE databases were searched from January 1, 1986 to June 30, 2013) to
identify relevant articles in people aged > 65 years. We present information about:
i) prevalence of polypharmacy and unnecessary medication use; ii) negative
consequences of polypharmacy; and iii) interventions to improve polypharmacy.
International research shows that polypharmacy is common in older adults with the highest number of drugs taken by those residing in nursing homes. Nearly 50% of older adults take one or more medications that are not medically necessary. Research has clearly established a strong relationship between polypharmacy and negative clinical consequences. Moreover, well-designed interprofessional (often including clinical pharmacist) intervention studies that focus on enrolling high-risk older patients with polypharmacy have shown that they can be effective in reducing aspects of unnecessary prescribing with mixed results on distal health outcomes.

**Source:** Medline

Health outcomes associated with polypharmacy in community-dwelling older adults: a systematic review.

**Author(s)**: Fried, Terri R, O’Leary, John, Towle, Virginia, Goldstein, Mary K, Trentalange, Mark, Martin, Deanna K

**Citation:** Journal of the American Geriatrics Society, Dec 2014, vol. 62, no. 12, p. 2261-2272 (December 2014)

**Publication Date:** December 2014

**Abstract:** To summarize evidence regarding the health outcomes associated with polypharmacy, defined as number of prescribed medications, in older community-dwelling persons. Systematic review of MEDLINE (OvidSP 1946 to May, Week 3, 2014). Community. Observational studies examining health outcomes according to number of prescription medications taken. Association between number of medications and health outcomes. Because of the importance of comorbidity as a potential confounder of the relationship between polypharmacy and health outcomes, articles were assessed regarding the quality of their adjustment for confounding. Of the 50 studies identified, the majority that were rated good in terms of their adjustment for comorbidity demonstrated relationships between polypharmacy and a range of outcomes, including falls, fall outcomes, fall risk factors, adverse drug events, hospitalization, mortality, and measures of function and cognition. However, a number of these studies failed to demonstrate associations, as did a substantial proportion of studies rated fair or poor. Data are mixed regarding the relationship between polypharmacy, considered in terms of number of medications, and adverse outcomes in community-dwelling older persons. Because of the challenge of confounding, randomized controlled trials of medication discontinuation may provide more definitive evidence regarding this relationship than observational studies can provide. © 2014, Copyright the Authors

**Source:** Medline

Title: Polypharmacy concerns in the geriatric population

**Citation:** Osteopathic Family Physician, July 2013, vol./is. 5/4(147-152), 1877-573X (July 2013)

**Author(s):** Compton R.D.

**Language:** English

**Abstract:** With the geriatric population steadily increasing and receiving primary care, it is important for the osteopathic family physician to have knowledge about safely prescribing to the geriatric patient. Polypharmacy, the use of 5 or more medications or the use of any medication that is not clinically warranted, presents many risks to the elderly patient and increases morbidity and mortality. Irrespective of a patient’s medical problems, polypharmacy has proven to be associated with an increased risk of falls as well as fracture. Drug-related cognitive changes as well as worsening of underlying dementia may be attributable to polypharmacy. Certain types of medications are more likely to cause cognitive changes, but any medication may cause a status change in the geriatric patient. Safe prescribing to the geriatric patient involves understanding the physiological changes of aging and adjusting the dosages accordingly, to avoid adverse events such as acute renal failure. Many resources (including the Beers Criteria, screening tool to alert doctors
to right treatments [START] tool, and screening tool of older persons’ potentially inappropriate prescriptions [STOPP] tool) exist to assist the osteopathic family physician in safely prescribing to the geriatric patient. Utilizing these resources for a thorough medication review for each geriatric patient would enable the osteopathic family physician to implement safe prescribing practices thus decreasing risks to the patient. © 2013 Elsevier Inc.

**Publication Type:** Journal: Review  
**Source:** EMBASE

**Title:** Polypharmacy and falls in the elderly: a literature review.  
**Citation:** Nursing and midwifery studies, Jun 2013, vol. 2, no. 2, p. 171-175, 2322-1488 (June 2013)  
**Author(s):** Hammond, Tania, Wilson, Anne  
**Abstract:** Medications are taken to ease, control or cure ailments. They are effective and safe if used correctly. In the elderly, disorders that occur as a result of ageing, frequently require treatment, resulting in increased use of medications. Polypharmacy is common among the elderly and although it can be therapeutic in nature, is linked to adverse events such as falls. A review of the literature was conducted. English articles in Cinahl, Medline and Healthsource (2000-2012) were searched for links between polypharmacy and falls in older adults aged 65 years old and over. Articles not meeting the age criterion were excluded. Search terms included falls, polypharmacy, medications, multiple medications, medicines, elderly, aged. A total of 120 articles were retrieved from the Literature search. Sixteen articles were included in the literature review. Four literature reviews, three observational prospective cohort, three cross-sectional, three case-control, one longitudinal study and two retrospective cohort studies were examined. Many studies were able to demonstrate a link between the number of medications taken and risk of falls however the potential for bias resulting from confounding by indication was high due to study design in many cases. Polypharmacy as an independent variable has been linked to falls in older people, however there appears to be a stronger link between falls and the type of medications taken (e.g. medications known to increase risk of falls), rather than polypharmacy on its own. Polypharmacy can sometimes be therapeutic and it may be more beneficial to consider terms such as 'inappropriate prescribing' or potentially inappropriate medications' when considering the effects of medication on falls in older adults. Polypharmacy in older people is often viewed in a negative light due to the increased risk of adverse events, including falls. This article examined current knowledge on the characteristics that define polypharmacy, its effect on falls in elderly people and provided recommendations for future research. Further research utilizing prospective and intervention studies are needed to clarify the causal relationship between polypharmacy, comorbidities and fall risk.  
**Source:** Medline  
**Full Text:** Available from [National Library of Medicine](https://www.ncbi.nlm.nih.gov/pubmed) in [Nursing and Midwifery Studies](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3793734/)

**Title:** Polypharmacy and adverse drug reactions in Japanese elderly taking antihypertensives: a retrospective database study.  
**Citation:** Drug, healthcare and patient safety, Jan 2013, vol. 5, p. 143-150 (2013)  
**Author(s):** Sato, Izumi, Akazawa, Manabu  
**Abstract:** The concomitant use of multiple medications by elderly patients with hypertension is a relatively common and growing phenomenon in Japan. This has been attributed to several factors, including treatment guidelines recommending prescription of multiple medications and a continuing increase in the elderly population with multiple comorbidities. This study was aimed at investigating the association between polypharmacy, defined as the concomitant use of five or more medications, and risk of adverse drug reaction (ADR) in elderly Japanese hypertensive patients to examine the hypothesis that risk of ADR increases with
the administration of an increasing number of co-medications. Using a retrospective cohort design, the data regarding all hypertensive patients aged 65 years or older were extracted from the Risk/Benefit Assessment of Drugs - Analysis and Response Council antihypertensive medication database. The data were reviewed for classification of patients into one of three groups according to drug use at the initiation of therapy - a monotherapy group composed of patients who had taken the investigated drug only, a co-medication group composed of patients who had taken the investigated drug and a maximum of three other medications, and a polypharmacy group composed of patients who had taken the investigated drug and four or more other medications - and determination of the number of ADR events experienced. Estimated rate ratios (RRs) and 95% confidence intervals (CIs) were calculated using a Poisson regression model adjusted for drug category and patient age and sex. Various sensitivity analyses were performed to confirm the robustness of the study findings. Of 61,661 elderly Japanese patients (men, 41.8%; 75 years or older, 35.1%) registered in the database, 2491 patients (4.0%) experienced a total of 3144 ADR events during the study period. The rate of ADR per 10,000 person-days was 2.0 for the monotherapy group, 5.1 for the co-medication group, and 8.6 for the polypharmacy group. After adjusting for age, sex, and initial antihypertensive therapy, the RR was estimated at 2.4 (95% CI, 2.2-2.6) for the co-medication group and 4.3 (95% CI, 3.8-4.8) for the polypharmacy group, when compared with the monotherapy group. The use of polypharmacy increases the risk of ADR among elderly Japanese patients with hypertension, calling for regular medication review to eliminate the administration of unnecessary co-medications.

Source: Medline


Available from Free Access Content in Drug, Healthcare and Patient Safety

Title: Polypharmacy as a risk for fall occurrence in geriatric outpatients.

Citation: Geriatrics & gerontology international, Jul 2012, vol. 12, no. 3, p. 425-430 (July 2012)

Author(s): Kojima, Taro, Akishita, Masahiro, Nakamura, Tetsuro, Nomura, Kazushi, Ogawa, Sumito, Iijima, Katsuya, Eto, Masato, Ouchi, Yasuyoshi

Abstract: To investigate the predictors of falls, such as comorbidity and medication, in geriatric outpatients in a longitudinal observational study. A total of 172 outpatients (45 men and 126 women, mean age 76.9 ± 7.0 years) were evaluated. Physical examination, clinical history and medication profile were obtained from each patient at baseline. These patients were followed for up to 2 years and falls were self-reported to their physicians. The factors associated with falls were analyzed statistically. A total of 32 patients experienced falls within 2 years. On univariate analysis, older age, osteoporosis, number of comorbid conditions and number of drugs were significantly associated with falls within 2 years. On multiple logistic regression analysis, the number of drugs was associated with falls, independent of age, sex, number of comorbid conditions and other factors that were significantly associated in univariate analysis. A receiver-operator curve evaluating the optimal cut-off value for the number of drugs showed that taking five or more drugs was a significant risk. In geriatric outpatients, polypharmacy is associated with falls. Intervention studies are needed to clarify the causal relationship between polypharmacy, comorbidity and falls. © 2011 Japan Geriatrics Society.

Source: Medline

Full Text: Available from EBSCOhost in Geriatrics & Gerontology International

Title: Polypharmacy leading to adverse drug reactions in elderly in a tertiary care hospital
Polypharmacy is a common occurrence in elderly patients due to reasons like multiple co-morbidities and multiple prescribing physicians. The present study was designed to identify the adverse drug reactions occurring in the elderly as a result of polypharmacy and also to assess the rationality of prescription based on World Health Organization (WHO) criteria and Beer's criteria. This study was conducted at Victoria hospital attached to Bangalore Medical College and Research Institute. Hundred patients aged >60 years and prescribed more than 5 drugs were included in the study. The analysis of data revealed, the number of drugs per prescription was 8.42+/2.4. Of the total 842 drugs prescribed, number of drugs prescribed by generic name was 36 (4.27%) and number of drugs prescribed from WHO model list of essential medicine was 444 (52.7%). Adverse drug reactions were mainly seen in 15% of patients. 20 patients were prescribed potentially harmful drugs according to Beer's list. To conclude, polypharmacy was seen in majority of elderly patients but the use of injections and antibiotics were limited. Prescribing by generic name and from essential drug list needs to be improved. Many ADRs were noted for commonly prescribed drugs and also for inappropriate drugs as given in Beer's list.
hypertension, 5.2 (3.9 [51%]); hyperlipidemia, 5.6 (3.8 [58%]); gastric ulcer, 5.4 (3.8 [53%]); previous stroke, 5.8 (3.2 [61%]); reflux esophagitis, 5.6 (3.8 [40%]), diabetes mellitus, 5.6 (3.1 [54%]); malignancy, 4.1 (3.1 [37%]); osteoporosis, 5.4 (3.4 [45%]); angina pectoris, 5.7 (3.6 [42%]); congestive heart failure, 6.1 (4.0 [60%]); chronic obstructive pulmonary disease, 5.0 (3.5 [53%]); dementia, 5.1 (3.2 [52%]); and depression, 7.0 (4.2 [73%]). Conclusions: When assessing the risk of polypharmacy, physicians should carefully consider the type of any chronic disease. Elderly patients with multiple diseases may be subjected to further polypharmacy.

**Publication Type:** Journal: Article

**Source:** EMBASE

**Title:** Polypharmacy and nutritional status in elderly people

**Citation:** Current Opinion in Clinical Nutrition and Metabolic Care, January 2012, vol./is. 15/1(1-6), 1363-1950;1473-6519 (January 2012)

**Author(s):** Jyrkka J., Mursu J., Enlund H., Lonnroos E.

**Language:** English

**Abstract:** Purpose of review Increasing use of drugs among elderly people has raised concerns about possible negative health outcomes, including malnutrition, associated with polypharmacy. Evidence about the association of polypharmacy with nutritional status is scarce. This review summarizes the relevant evidence regarding polypharmacy and nutritional status in elderly people. Recent findings The probability of nutritional problems as a consequence of drugs is highest in elderly people suffering from several diseases. Drug treatment may contribute to poor nutritional status by causing loss of appetite, gastrointestinal problems, and other alterations in body function. Some recently published studies add evidence on possible association between increasing number of drugs and malnutrition. Studies indicate also an association between polypharmacy and weight changes. In addition, there are available studies that have shown deficits in the intake of specific macronutrients and micronutrients (e.g. fiber, glucose, and specific vitamins) for those with a high number of drugs in use. On the basis of available evidence, the role of polypharmacy on nutritional status among elderly people is unclear. Some diseases promote malnutrition; thus, the independent role of drugs for nutritional status is challenging to determine. Longitudinal studies with careful adjustment for underlying diseases are needed to explore association between polypharmacy and malnutrition. Nutritional evaluation should be a routine part of comprehensive geriatric assessment that is conducted ideally in multiprofessional teams, including physician, pharmacist, and dietitian. © 2011 Wolters Kluwer Health.

**Publication Type:** Journal: Review

**Source:** EMBASE

**Title:** Polypharmacy in elderly patients with cancer: Clinical implications and management

**Citation:** The Lancet Oncology, December 2011, vol./is. 12/13(1249-1257), 1470-2045;1474-5488 (December 2011)

**Author(s):** Lees J., Chan A.

**Language:** English

**Abstract:** More and more elderly people with cancer are treated in oncology clinics worldwide every year, many of whom have comorbid disorders treated with one or more drugs. Moreover, these patients might also take self-prescribed over-the-counter drugs or complementary and alternative medicines, which they might not tell their doctor about. Initiation of chemotherapy with one or more cytotoxic or targeted agents and drugs for treatment of cancer symptoms or toxic effects related to treatment can result in polypharmacy. We examine the clinical implications of polypharmacy. Challenges for the medical teams who treat elderly patients with cancer include identification of what drugs are actually being taken by
the patient, avoidance or management of any adverse effects or drug interactions, and reassessing the patient's overall treatment. We address these issues and propose practical recommendations for management of treatment for elderly patients with cancer.

**Publication Type:** Journal: Review

**Source:** EMBASE

**Full Text:** Available from *ProQuest* in *Lancet Oncology*

**Title:** Association of polypharmacy with fall risk among geriatric outpatients

**Citation:** Geriatrics and Gerontology International, October 2011, vol./is. 11/4(438-444), 1444-1586;1447-0594 (October 2011)

**Author(s):** Kojima T., Akishita M., Nakamura T., Nomura K., Ogawa S., Iijima K., Eto M., Ouchi Y.

**Language:** English

**Abstract:** Aim: To investigate the association of fall risk with comorbidities and medications in geriatric outpatients in a cross-sectional design. Methods: A total of 262 outpatients (84 men and 178 women, mean age 76.2±6.8years) were evaluated. Physical examination, clinical histories and medication profile were obtained from each patient. History of falls in the past year, 22-item fall risk index, 13-point simple screening test for fall, and time interval of one-leg standing test were examined as markers of fall risk. Results: On univariate analysis, older age, female sex, hypertension, osteoporosis, history of stroke, number of comorbidities, use of antihypertensives, aspirin, bisphosphonates, hypnotics and number of prescribed drugs were significantly associated with either of four indices. On multiple regression analysis, the number of drugs was associated with all of the four indices, independent of other factors associated in the univariate analysis. The association of number of drugs with fall risk indices was stepwise. Conclusion: In geriatric outpatients, polypharmacy rather than number of comorbidities was associated with fall risk. Prospective and intervention studies are needed to clarify the causal relationship between polypharmacy, comorbidities and fall risk. © 2011 Japan Geriatrics Society.

**Publication Type:** Journal: Article

**Source:** EMBASE

**Full Text:** Available from *EBSCOhost* in *Geriatrics & Gerontology International*

**Title:** Association of polypharmacy with fall risk among geriatric outpatients.

**Citation:** Geriatrics & gerontology international, Oct 2011, vol. 11, no. 4, p. 438-444 (October 2011)

**Author(s):** Kojima, Taro, Akishita, Masahiro, Nakamura, Tetsuro, Nomura, Kazushi, Ogawa, Sumito, Iijima, Katsuya, Eto, Masato, Ouchi, Yasuyoshi

**Abstract:** To investigate the association of fall risk with comorbidities and medications in geriatric outpatients in a cross-sectional design. A total of 262 outpatients (84 men and 178 women, mean age 76.2±6.8years) were evaluated. Physical examination, clinical histories and medication profile were obtained from each patient. History of falls in the past year, 22-item fall risk index, 13-point simple screening test for fall, and time interval of one-leg standing test were examined as markers of fall risk. On univariate analysis, older age, female sex, hypertension, osteoporosis, history of stroke, number of comorbidities, use of antihypertensives, aspirin, bisphosphonates, hypnotics and number of prescribed drugs were significantly associated with either of four indices. On multiple regression analysis, the number of drugs was associated with all of the four indices, independent of other factors associated in the univariate analysis. The association of number of drugs with fall risk indices was stepwise. In geriatric outpatients, polypharmacy rather than number of comorbidities was associated with fall risk. Prospective and intervention studies are needed to clarify the causal relationship between
Title: Association of polypharmacy with nutritional status, functional ability and cognitive capacity over a three-year period in an elderly population.

Citation: Pharmacoepidemiology and drug safety, May 2011, vol. 20, no. 5, p. 514-522 (May 2011)

Author(s): Jyrkkä, Johanna, Enlund, Hannes, Lavikainen, Piia, Sulkava, Raimo, Hartikainen, Sirpa

Abstract: To determine the association of polypharmacy with nutritional status, functional ability and cognitive capacity among elderly persons. This was a prospective cohort study of 294 survivors from the population-based Geriatric Multidisciplinary Strategy for the Good Care of the Elderly (GeMS) Study, with yearly follow-ups during 2004 to 2007. Participants were the citizens of Kuopio, Finland, aged 75 years and older at baseline. Polypharmacy status was categorized as non-polypharmacy (0-5 drugs), polypharmacy (6-9 drugs) and excessive polypharmacy (10+ drugs). A linear mixed model approach was used for analysis the impact of polypharmacy on short form of mini nutritional assessment (MNA-SF), instrumental activities of daily living (IADL) and mini-mental status examination (MMSE) scores. Excessive polypharmacy was associated with declined nutritional status (p = 0.001), functional ability (p < 0.001) and cognitive capacity (p < 0.001) when compared to non-polypharmacy group. Age, institutional living, poor self-reported health and time of measuring were also associated with the three outcome measures. In the excessive polypharmacy group, the proportion of malnourished or at risk of it increased from 31% to 50%, having difficulties in daily tasks from 48% to 74% and impaired cognition from 36% to 54% during the follow-up. The mixed model analysis revealed that polypharmacy status was not able to predict the progress of MNA-SF, IADL and MMSE scores over a three-year time. Excessive polypharmacy is associated with decline in nutritional status, functional ability and cognitive capacity in elderly persons. However, the changes in nutrition, physical functionality and cognition over a three-year period cannot be predicted by polypharmacy status. Copyright © 2011 John Wiley & Sons, Ltd.

Title: Metformin-associated lactic acidosis precipitated by zoledronic acid-induced acute kidney injury: A case of polypharmacy in an elderly patient

Citation: Clinical Geriatrics, February 2011, vol./is. 19/2(50-52), 1095-1598 (February 2011)

Author(s): Leung S., LeFrancois D., Eisen L.A.

Language: English

Publication Type: Journal: Article

Source: EMBASE

Full Text: Available from Free Access Content in Clinical Geriatrics

Title: Polypharmacy correlates with increased risk for hip fracture in the elderly: A population-based study

Citation: Medicine, September 2010, vol./is. 89/5(295-299), 0025-7974 (September 2010)

Author(s): Lai S.-W., Liao K.-F., Liao C.-C., Muo C.-H., Liu C.-S., Sung F.-C.

Language: English

Abstract: Few studies have addressed the association between polypharmacy and hip fracture using population data. We conducted a population-based case-control study to investigate whether polypharmacy increases the risk for hip fracture in the elderly. We used insurance claims data from the Taiwan Bureau of
National Health Insurance, a universal insurance program with a coverage rate of more than 98% of the population in Taiwan. We identified 2328 elderly patients with newly diagnosed hip fracture during the period 2005-2007. We randomly selected 9312 individuals without hip fracture to serve as the control group. Patient characteristics, drugs prescribed by physicians, and all types of hip fracture were ascertained. The odds ratio (OR) of hip fracture in association with the number of medications used per day in previous years was assessed. We found that patients were older than controls, predominantly female, and more likely to use 5 or more drugs (22.2% vs. 9.3%, p < 0.0001). The OR of hip fracture increased with the number of medications used per day and with age. Multivariate logistic regression analysis revealed that the overall OR for patients using 10 or more drugs was 8.42 (95% confidence interval [CI], 4.73-15.0) compared with patients who used 0-1 drug per day. However, age-specific analysis revealed that the risk for hip fracture was 23 times greater for patients aged ≥85 years who used 10 or more drugs than for those aged 65-74 years who used 0-1 drug after controlling for covariates (OR, 23.0; 95% CI, 3.77-140). We conclude that the risk of hip fracture in older people increases with the number of medications used, especially in women. Age interacts with the daily medications for the risk of hip fracture. © 2010 by Lippincott Williams & Wilkins.

**Publication Type:** Journal: Article  
**Source:** EMBASE

**Title:** Polypharmacy status as an indicator of mortality in an elderly population.  
**Citation:** Drugs & aging, Jan 2009, vol. 26, no. 12, p. 1039-1048 (2009)  
**Author(s):** Jyrkkä, Johanna, Enlund, Hannes, Korhonen, Maarit J, Sulkava, Raimo, Hartikainen, Sirpa

**Abstract:** Increased use of drugs has raised concern about the risks of polypharmacy in elderly populations. Adverse outcomes, such as hospitalizations and falls, have been shown to be associated with polypharmacy. So far, little information is available on the association between polypharmacy status and mortality. To assess whether polypharmacy (six to nine drugs) or excessive polypharmacy (ten or more drugs) could be indicators of mortality in elderly persons. This was a population-based cohort study conducted between 1998 and 2003 with mortality follow-up through to 2007. The data in this study were derived from the population-based Kuopio 75+ Study, which involved elderly persons aged ≥75 years living in the city of Kuopio, Finland. The initial sample (sample frame n=4518, random sample n=700) was drawn from the population register. For the purpose of this study, two separate analyses were carried out. In the first phase, participants (aged ≥75 years, n=601) were followed from 1998 (baseline) to 2002. In the second phase, survivors (aged ≥80 years, n=339) were followed from 2003 to 2007. Current medications were determined from drug containers and prescriptions during interviews conducted by a trained nurse. The Kaplan-Meier method and Cox proportional hazards regression were used to examine the association between polypharmacy status and mortality. In the first phase, 28% (n=167) belonged to the excessive polypharmacy group, 33% (n=200) to the polypharmacy group, and the remaining 39% (n=234) to the non-polypharmacy (0-5 drugs) group. The corresponding figures in the second phase were 28% (n=95), 39% (n=132) and 33% (n=112), respectively. The mortality rate was 37% in the first phase and 40% in the second phase. In both phases, the survival curves showed a significant difference in all-cause mortality between the three polypharmacy groups. In the first phase, the univariate model showed an association between excessive polypharmacy and mortality (hazard ratio [HR] 2.53, 95% CI 1.83, 3.48); however, after adjustment for demographics and other variables measuring functional and cognitive status, this association did not remain statistically significant (HR 1.28, 95% CI 0.86, 1.91). In the second phase, the association between excessive polypharmacy and mortality (HR 2.23, 95% CI 1.21, 4.12) remained significant after adjustments. Age, male sex and dependency
according to the Instrumental Activities of Daily Living screening instrument were associated with mortality in both phases. This study points to the importance of excessive polypharmacy as an indicator for mortality in elderly persons. This association needs to be confirmed following adjustment for co-morbidities.

**Source:** Medline

**Full Text:**
Available from EBSCOhost in Drugs & Aging

**Title:** Clinical consequences of polypharmacy in elderly: expect the unexpected, think the unthinkable.

**Citation:** Expert opinion on drug safety, Nov 2007, vol. 6, no. 6, p. 695-704 (November 2007)

**Author(s):** Salazar, Joel A, Poon, Ivy, Nair, Mridula

**Abstract:** Multiple medication use has been coined ‘polypharmacy’. Polypharmacy is highly prevalent in older patients secondary to the increased number of co-morbid disease states with ageing. Existing practice guidelines recommend multiple drug use for certain chronic diseases (i.e., HIV, tuberculosis, hypertension, etc.). A polypharmacologic approach for certain diseases has been shown to improve therapeutic response, decrease morbidity and mortality. On the contrary, polypharmacy may induce iatrogenic complications that are often unseen prior to the initiation of medicinal regimens. This paper will review the potential clinical consequences of polypharmacy in the elderly and common medication administration errors that may occur. Consequences of polypharmacy include adverse drug effects, drug-drug interactions, disease-drug interactions, food-drug interactions, nutraceutical-drug interactions and medication cascade effect. Medication administration errors, such as phonetic confusion, flip-flopping dosing errors and pill visual-cue errors, are also reviewed. Prescribing for the elderly, whose medications are vast in number, is often uncharted physiologic territory. The clinician must expect the unexpected and think of the unthinkable in the geriatric patient, when dealing with polypharmacy and the potential consequences.

**Source:** Medline

**Title:** Polypharmacy as a risk factor for adverse drug reactions in geriatric nursing home residents.

**Citation:** The American journal of geriatric pharmacotherapy, Mar 2006, vol. 4, no. 1, p. 36-41, 1543-5946 (March 2006)

**Author(s):** Nguyen, Julia K, Fouts, Michelle M, Kotabe, Sharon E, Lo, Eunice

**Abstract:** Polypharmacy is a well-known risk factor for adverse drug reactions (ADRs). The objective of this study was to determine the relationship between the use of > or = 9 different scheduled medications and the occurrence of ADRs in geriatric nursing home residents. This was a retrospective cohort study conducted in a 1200-bed, county-owned and -operated, longterm care skilled nursing facility. Participants were 335 subjects aged > or = 65 years who were present at the facility during the index month of October 1998. Hospice, respite care, and rehabilitation patients were excluded. Use of > or = 9 different scheduled medications was defined a priori as routinely administered medications, excluding as-needed agents, topical agents, 1-time administration, and vaccinations. ADRs were identified by voluntary reporting and by chart review during a 12-month period. ADRs were assessed individually by 2 clinical pharmacists applying the Naranjo ADR probability scale. A total of 207 ADRs were identified. The cohort receiving > or = 9 scheduled medications (n = 43) experienced 53 ADRs, compared with 154 ADRs in the control group receiving <9 medications (n = 292). The demographic distribution was similar in both cohorts, with white as the dominant ethnicity; 45% were white in the control group and 51% were white in the cohort group receiving > or = 9 scheduled medications. The sex distribution was also similar, with women outnumbering men in both cohorts: 60% and 81% were women in the control and cohort groups, respectively. The mean age was 72 years
After the data were adjusted for the number of days each subject was at risk for experiencing an ADR, subjects using > or = 9 different scheduled medications were 2.33 times more likely than controls to experience an ADR (95% CI, 1.54-3.52; P < 0.001). A positive correlation between the use of > = 9 different scheduled medications and ADRs was found among these geriatric nursing home residents.

Source: Medline
Full Text: Available from Free Access Content in American Journal of Geriatric Pharmacotherapy

Title: Polypharmacy and falls in the middle age and elderly population.
Citation: British journal of clinical pharmacology, Feb 2006, vol. 61, no. 2, p. 218-223, 0306-5251 (February 2006)
Author(s): Ziere, G, Dieleman, J P, Hofman, A, Pols, H A P, van der Cammen, T J M, Stricker, B H Ch
Abstract: Falls in the elderly are common and often serious. We studied the association between multiple drug use (polypharmacy) and falls in the elderly. This was a population-based cross-sectional study, part of the Rotterdam Study. The participants were 6928 individuals aged > or = 55 years. The prevalence of falls in the previous year was assessed. Medication use was determined with an interviewer-administered questionnaire with verification of use. Polypharmacy was defined as the use of four or more drugs per day. The prevalence of falls strongly increased with age. Falls were more common in women than in men. Fall risk increased with increasing disability, presence of joint complaints, use of a walking aid and fracture history. The risk of falling increased significantly with the number of drugs used per day (P for trend < 0.0001). After adjustment for a large number of comorbid conditions and disability, polypharmacy remained a significant risk factor for falling. Stratification for polypharmacy with or without at least one drug which is known to increase fall risk (notably CNS drugs and diuretics) disclosed that only polypharmacy with at least one risk drug was associated with an increased risk of falling. Fall risk is associated with the use of polypharmacy, but only when at least one established fall risk-increasing drug was part of the daily regimen.
Source: Medline
Full Text: Available from National Library of Medicine in British Journal of Clinical Pharmacology
Available from Wiley in British Journal of Clinical Pharmacology
Available from EBSCOhost in British Journal of Clinical Pharmacology

Title: Health outcomes and polypharmacy in elderly individuals: an integrated literature review.
Citation: Journal of gerontological nursing, Sep 2005, vol. 31, no. 9, p. 4-11, 0098-9134 (September 2005)
Author(s): Frazier, Susan C
Abstract: The purpose of this integrated literature review was to determine the extent of research available related to polypharmacy and its effect on the health outcomes of the elderly population. A search of the Cumulative Index of Nursing and Allied Health Literature and Medline was conducted for studies published between 1995 and 2003 that linked polypharmacy and outcomes in the elderly population. The 16 studies in this integrative literature review were conducted in the United States, Canada, Australia, and Europe. Polypharmacy was shown to be a statistically significant predictor of hospitalization, nursing home placement, death, hypoglycemia, fractures, impaired mobility, pneumonia, and malnutrition. The effect of polypharmacy on elderly individuals is significant as demonstrated by this literature review. Nurses are in a unique position to monitor and potentially
eliminate adverse effects of a complex medication regimen. Nursing research on polypharmacy and its effects on nursing-sensitive outcomes will help define guidelines for prevention and intervention.

**Source:** Medline

**Full Text:**
Available from *ProQuest* in *Journal of Gerontological Nursing*
Available from *EBSCOhost* in *Journal of Gerontological Nursing*