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Original Study

Education to Reduce Potentially Harmful Medication Use Among Residents of Assisted Living Facilities: A Randomized Controlled Trial

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A B S T R A C T

Objectives: The objectives of this study were (1) to investigate the effect of nurse training on the use of potentially harmful medications; and (2) to explore the effect of nurse training on residents' health-related quality of life (HRQoL), health service utilization, and mortality.
Design: A randomized controlled trial.
Setting and participants: In total, 227 residents in 20 wards of assisted living facilities in Helsinki were recruited. The 20 wards were randomized into those in which (1) staff received two 4-hour training sessions on appropriate medication treatment (intervention group), and (2) staff received no additional training and continued to provide routine care (control group).
Intervention: Two 4-hour interactive training sessions for nursing staff based on constructive learning theory to recognize potentially harmful medications and corresponding adverse drug events.
Measurements: Use of potentially harmful medications, HRQoL assessed using the 15 dimensional instrument of health-related quality of life, health service utilization, and mortality assessed at baseline, and 6 and 12 months.
Results: During the 12-month follow-up, the mean number of potentially harmful medications decreased in the intervention wards [−0.43, 95% confidence interval (CI) −0.71 to −0.15] but remained constant in the control wards (+0.11, 95% CI −0.09 to +0.31) ($P = .004$, adjusted for age, sex, and comorbidities). HRQoL declined more slowly in the intervention wards (−0.038 (95% CI −0.054 to −0.022) than in the control wards (−0.072 (95% CI −0.089 to −0.055) ($P = .005$, adjusted for age, sex, and comorbidities). Residents of the intervention wards had significantly less hospital days (1.4 days/person/year, 95% CI 1.2 −1.6) than in the control wards (2.3 days/person/year; 95% CI 2.1−2.7) (relative risk 0.60, 95% CI 0.49 −0.75, $P < .001$, adjusted for age, sex, and comorbidities).
Conclusions: Activating learning methods directed at nurses in charge of comprehensive care can reduce the use of harmful medications, maintain HRQoL, and reduce hospitalization in residents of assisted living facilities.

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Multimorbidity and polypharmacy are highly prevalent in institutional settings. Residents are prone to polypharmacy and use of potentially inappropriate medications (PIMs).[1–3] Frailty and age-related changes in pharmacokinetics and pharmacodynamics mean that residents are susceptible to adverse drug events (ADEs).

Medication use is considered inappropriate when the risks outweigh the benefits, particularly when safer alternatives exist. There are a range of implicit and explicit approaches for defining PIMs.[4–8] Internationally, the most widely used explicit criteria are Beers' Criteria.[4,6,9] Between 36% and 50% of older institutionalized residents use Beers' Criteria medications.[1,10–12] Use of PIMs has been associated with ADEs and preventable hospitalizations.[13]

The Omnibus Budget Reconciliation Act of 1987 succeeded in reducing the use of psychotropic medications in older people in the United States.[14] More recently, meta-analyses and safety warnings have alerted clinicians to the increased risk of stroke and mortality associated with antipsychotic use in people with dementia.[15,16] Psychotropic drugs are associated with an increased risk of falls.[17] Notwithstanding these concerns, psychotropic medication use remains highly prevalent in Finland. Up to 80% of residents in institutional care are administered 1 or more psychotropic medications.[18]

There is an increasing body of evidence in relation to ADEs associated with anticholinergic medications. Anticholinergic medications have peripheral and central anticholinergic side-effects including dry mouth, constipation, and cognitive impairment.[19,20] Anticholinergic medications may increase the risk of hospital admissions.[21] Institutionalized older people with dementia and cognitive impairment may be particularly susceptible to anticholinergic ADEs. Notwithstanding differences in lists of medications considered to have anticholinergic properties, scores obtained from several ranked lists of anticholinergic medications predict clinically significant anticholinergic ADEs in older people.[22]

The Swedish Criteria list nonsteroidal anti-inflammatory drugs (NSAIDs) as potentially inappropriate for older people when used for periods of longer than 2 weeks.[8] Although proton-pump inhibitors (PPIs) may be useful for gastroprotection in general older populations, there is evidence that long-term PPI use may be associated with infections, hip fractures, and even higher mortality when prescribed to frail older people in institutional settings.[23]

Several randomized controlled trials (RCTs) have been conducted to reduce PIM use in nursing homes. However, many previous studies have been of low quality and, therefore, have a risk of bias.[24,25] According to a recent systematic review, educational outreach, on-site education, and pharmacist-led medication review may be useful strategies to reduce PIM use in institutional settings.[24] Educational interventions have succeeded in decreasing the use of psychotropic medications in institutionalized older people,[26–30] and in improving the overall quality of medication prescribing.[31,32] However, relatively few studies have explored the effect of these interventions on older peoples' use of health services.[24,25,31] To our knowledge, no previous RCT has demonstrated that reducing harmful medication use improves older peoples' health-related quality of life (HRQoL).

The objectives of this study were (1) to investigate the effect of nurse training on the use of potentially harmful medications; and (2) to explore the effect of nurse training on residents' HRQoL, health service utilization and mortality.

Methods

Design and Context

This was a RCT in which 20 wards in assisted living facilities in Helsinki, Finland, were randomized to intervention and control arms.[33] The intervention was staff training on harmful medication use using the principles of constructive learning theory. Assisted living facilities provide medical and nursing care to people who are unable to live independently in the community. The level of care is similar to that provided in traditional nursing homes or long-term hospital wards, but the environment is designed to be more home-like. Physicians act as visiting consultants to whom nurses can refer challenging management issues. Unless prompted by nurses to do so, physicians may not see an individual resident more than once a year. This means that nurses have a key role in identifying and assisting to resolve medication-related problems.

The study was approved by the Ethics Committee of the Helsinki University Central Hospital. Written informed consent was obtained from each resident and/or their closest proxy. All study procedures were consistent with good clinical practice and the World Medical Association Declaration of Helsinki. The control wards were offered the staff training on harmful medication use at the conclusion of the study.

Participants

Eligible residents of assisted living facilities in Helsinki were invited to participate at the baseline study nurse visit. The study nurses who recruited the residents were not aware which wards had been randomized to the intervention or control groups. The resident inclusion criteria were age 65 years or older; living permanently in an assisted living facility; Finnish speaking; using at least 1 medication; having an estimated life expectancy >6 months; and being able to provide written informed consent (or have a proxy who is able to provide written informed consent in the case of cognitive impairment).

Data Collection

At the baseline study nurse visit, the nurses retrieved participating residents' demographic data, diagnoses, and medication data. These nurses were independent of the study intervention and unaware of the randomization procedures.

Medication data were extracted directly from each resident's medication administration chart and assessed as the point prevalence on the day of assessment. Medication use was categorized as regular if there was a documented regular sequence of administration. If a resident had 1 or more medications that nurses were permitted to administer on a pro re nata ('as-needed') basis this was also recorded. All medications administered to residents were classified using the Anatomical Therapeutic Chemical (ATC) classification system recommended by the World Health Organization.[34]

Cognition was assessed using the Mini-Mental State Examination,[35] nutritional status was assessed using the Mini-Nutritional Assessment,[36] and HRQoL was assessed using the 15 dimensional instrument of health-related quality of life (15D).[37] Repeated assessments were performed a 6 and 12 months using the same procedures described above. Hospitalizations, use of other health and social services and death dates were retrieved from the medical records and central registers from baseline measurements until December 31, 2012.

Harmful Medication Use

Harmful medication use was operationally defined as use of Beers' Criteria medications, anticholinergic medications, use of multiple psychotropic medications, NSAIDs, and PPIs. The study commenced prior to the publication of the 2012 update to the Beers' Criteria and, therefore, the 2003 version was used.[6,9] The Anticholinergic Risk Scale[38] was used in combination with Beers' Criteria anticholinergic