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Original Study

An Educational Intervention on Drug Use in Nursing Homes Improves Health Outcomes Resource Utilization and Reduces Inappropriate Drug Prescription

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A B S T R A C T

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Objective: Inappropriate drug prescription is a common problem in people living in nursing homes and is linked to adverse health outcomes. This study assessed the effect of an educational intervention directed to nursing home physicians in reducing inappropriate prescription and improving health outcomes and resource utilization.

Design: Prospective, randomized, multicenter study.

Setting: A private organization of nursing homes in Spain.

Participants: Sixty nursing home physicians caring for approximately 3900 nursing home residents in 37 centers were randomized to receive an educational intervention (30) or as a control group (30).

Intervention: 10 hours educational program, followed by on demand support by phone.

Outcome Measurements: Outcomes were assessed in 1018 randomly selected nursing home residents. Appropriateness of drug use [measured by the Screening Tool of Older Persons Prescriptions (STOPP) and Screening Tool to Alert Doctors to Right Treatment (START) criteria], incidence of selected geriatric syndromes (falls, delirium) and health resource utilization (visits to physicians and nursing homes, visits to the emergency room, days of hospitalization) were recorded for 3 months before the intervention started and 3 months after the intervention finished.

Results: A total of 716 residents finished the study (344 cared for by the intervention group physicians, 372 cared for by control physicians). Mean age was 84.4 ± 12.7 years; 73% were women. The mean number of inappropriate drugs (STOPP criteria) was higher at the end of the study in the control than in the intervention group (1.29 ± 1.56 vs 0.81 ± 1.13), as was the number of residents on 6 or more drugs (76.5% vs 67.0%), using antipsychotics (9.1% vs 3.2%) or duplicate medications (32.5% vs 9.2%). The number of fallers increased in the control group (from 19.3% to 28%) and did not significantly change in the intervention group (from 25.3% to 23.9%); the number of residents with delirium increased in the control group (from 3.8% to 9.1%) and decreased in the intervention group (from 6.1% to 3.2%). The number of visits to a physician did not change in the control group (-0.22 , $P = .3$) but were significantly reduced in the intervention group (-0.76 , $P = .01$), the same happened with the number of visits to a nurse (-0.38 , $P = .4$ in controls, -1.43 in the intervention group, $P < .001$). Visits to the emergency room and days in hospital significantly increased in the control group ($+0.12$ and $+0.38$) but were unchanged in the intervention group ($+0.03$ and $+0.01$).
Conclusions: An educational intervention on drug use is feasible in nursing home physicians and improves the use of inappropriate drugs, use of antipsychotics, and drug duplications in their residents. It may also improve the risk of delirium and falls, and reduce the use of health care resources.

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The authors declare no conflict of interest.

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Inappropriate drug prescription is a common problem in people living in nursing homes, both on admission and later.^{1,2} This is usually linked to polypharmacy,^{3,4} which is also related with adverse drug reactions^{5,6} and adverse outcomes (increased number of hospital

admissions or use of health services, higher morbidity, and impaired functionality).^{7,8}

Polypharmacy has been reported to reach 49.7% of the residents in European nursing homes, and excessive polypharmacy (10 or more drugs) in 24.3% residents.⁹ Compared with nonpolypharmacy, excessive polypharmacy was directly associated not only with presence of chronic diseases but also with depression, pain, dyspnea, and gastrointestinal symptoms. Psychotropic drugs (hypnotics, antidepressants, antipsychotics) are the most frequently prescribed medications in European nursing homes. Reported prevalence of use varies substantially among studies, with a range of 50% to 80% of residents with at least 1 prescription for a psychotropic medication.¹⁰

Interventions to improve the quality of drug prescription and reduce polypharmacy in nursing home residents would be expected to reduce the number of adverse drug reactions and to improve other outcomes that are closely related with inappropriate use of drugs, especially in the nursing home setting, where multimorbidity and highly dependent patients are treated with a high number of drugs.^{11–13} Review of prescriptions by physicians of pharmacists,^{14–16} multidisciplinary assessment,^{17,18} computer interventions,¹⁹ and other methods have been explored, with inconsistent results.^{20,21} Brief educational interventions on nursing home staff (physician, nurses) have found minor changes in prescription,^{22,23} and those linked with support on prescription practices may improve some aspects of prescription.²⁴ A case control study with regular assessment of prescription was able to reduce the number of drugs but did not change health outcomes or resource use.²⁵

Most intervention studies have only tried to show if drug prescription can be improved, but very few have measured the impact of improving the quality of drug prescription on clinically relevant outcomes or health care costs. The goal of this study has been to assess the effect of an educational intervention on drug utilization directed to nursing home physicians in improving the quality of prescription, improving some health outcomes, and reducing the use of health resources.

Methods

A prospective, randomized, multicenter trial was carried out in a group of 37 nursing homes owned by a private company in Spain, with around 3900 nursing home beds in nine different regions. A total of 60 physicians were working in these nursing homes, and they were randomized in clusters (all physicians of the same nursing home had the same assignment) to receive an educational intervention on drug use (30 physicians working in 19 nursing homes) or to a control group (30 physicians working in 18 nursing homes). Of the 37 participating facilities (distributed along Spain, all of them urban) 22 had a single physician, 11 had 2, and 4 had 4 physicians. Mean number of residents was 100. All the nursing homes had similar structure, staffing ratios for health care professionals (including physicians, around-the-clock registered nurses, physiotherapists, psychologists, occupational therapist), common protocols for geriatric assessment and intervention on common problems, and use a common database for medical records. Usually, patients admitted to these nursing homes will receive primary care by the nursing home physician at no extra cost. All the nursing homes staff—including physicians—is employed and paid by the company that manages the group and are used to follow direction and to receive feedback from quality control systems.

Randomization was done using random number tables and was not based on characteristics of nursing homes, as they were mostly homogeneous (except in size). Physicians in the control group did not receive any intervention or information about an educational intervention been delivered in other centers. Physicians in both groups

were informed that there was a company program aimed to improve drug prescription (to explain why data on prescription were collected in their centers) but were blinded to the fact that the educational intervention was being assessed.

A nursing home physician, expert in drug use in older people, delivered a structured educational intervention. The program included general aspects of prescription and drug use in geriatric patients, how to reduce the number of drugs, to perform a regular review of medications, to avoid inappropriate drug use, to discontinue drugs that do not show benefits, and to avoid undertreatment with drugs that have shown benefits. It also discussed in detail some drugs frequently related to adverse drug reactions in older people. Educational material and references were given to participants. Finally, two 1-hour workshops reviewed practical real life cases and promoted practice changes in participants. The educator offered further on-demand advice on prescription for the next 6 months. This intervention was reinforced by a single review by the researchers, using standard appropriateness criteria [Screening Tool of Older Persons Prescriptions (STOPP)— Screening Tool to Alert Doctors to Right Treatment (START)],²⁶ of a random sample of 10 residents cared by each physician in the intervention group, with written feedback on the problems found.

Outcomes were assessed in a random group of residents cared by the physicians involved in the study. Persons older than 65 years, who had been living in the nursing home for at least 3 months and expected to stay in it for the length of the study, were clinically stable (no changes in prescription in the last 2 months) and accepted that their clinical data were used for the study were included. Residents receiving palliative care or those usually cared by other primary care providers outside the nursing home were excluded. Up to 17 residents were randomly chosen from the list of residents cared by each participating physician, using random number tables.

Outcome measures were as follows:

- (1) Appropriateness and quality of drug use. The STOPP-START criteria were used to assess the drugs that were actively used by each resident at the beginning of the study and 9 months later (three months after the intervention was finished). The number of individuals with potentially inappropriate prescriptions, duplicate class of drugs, and antipsychotic use are reported here.
- (2) Incidence of selected geriatric syndromes. The number of falls and the number of episodes of delirium were recorded for the 3-month period before the intervention started, and the 3-month period immediately after the 6-month intervention finished. This allowed for comparing the control and the intervention group, and also for assessing time changes in both groups. Falls and delirium are systematically registered in the clinical records of all the participant nursing homes.
- (3) Health resource utilization. The number of visits to physicians and nurses, the number of visits to an emergency room, and the total number of days spent in hospital were also recorded for the 3-month period before the intervention started, and the 3-month period after the 6-month intervention finished. These are also regularly registered in the clinical records of all the participant nursing homes.

A sample size of 980 participants was calculated to find significant differences of at least 50% in health resource use, estimating a dropout rate of 30%. To assess appropriateness of drug use, which is time consuming, a sample size of 360 participants was calculated to find a 70% improvement with the intervention, so a random subgroup was chosen for this outcome. Nonparametric statistical tests were used because of the non-normal distribution of most outcome measures.

The study was approved by the Ethics Committee of the Hospital de la Plana, Castellón, Spain.

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