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Original Study

Prevalence and Correlates of Cardiovascular Medication Use Among Nursing Home Residents With Ischemic Heart Disease: Results From the SHELTER Study

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A B S T R A C T

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Objectives: Despite being the highest group of users of many medications, older individuals remain underrepresented in clinical trials. This leaves a gap in evidence to guide management of many conditions, such as ischemic heart disease (IHD), in this population. This study aimed to describe factors associated with IHD medication use among nursing home residents in 7 European countries and Israel to depict challenges facing disease management in this population.

Design: This study was a retrospective cohort analysis.

Setting and Participants: The sample included 4156 nursing home residents in the SHELTER study.

Measurement: All residents were assessed using the interRAI Long Term Care Facility (LTCF) instrument. Use of angiotensin-converting enzyme inhibitor (ACEi) and/or angiotensin receptor blocker (ARB), beta-blocker (BB), antiaggregants (including acetylsalicylic acid [ASA]) and statins was analyzed. Based on the use of these medications, residents were classified into groups by medication use (as nonusers, 1–2 medications, or 3–4 medications). Generalized Estimation Equation modeling was used to explore predictors of medication use from items on the LTCF instrument as well as facility questionnaire.

Results: Of the 1050 residents with IHD, medication use was 77.7% overall, but only 16.9% were receiving 3 to 4 medications. Use of antiaggregants was highest at 51.7% and variations in medication use were observed by country (highest in France and lowest in Italy). Functional disability was the strongest predictor of medication use, reducing the likelihood of any or optimal management. Severe cognitive impairment also reduced the likelihood of optimal management, and comorbidity generally increased the likelihood of medication use. Polypharmacy reduced the likelihood of use of 3 to 4 medications for IHD.

Conclusion: Optimal management of IHD in nursing home residents was low and varied by country. Individual characteristics seemed to predict IHD medication use, suggesting prescribing bias and an effect of population differences from clinical trial cohorts.

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Population aging around the globe has meant that people are now living longer than before. Often, this demographic transition has been accompanied by an increase in prevalence of chronic diseases, such as

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ischemic heart disease (IHD), and subsequently higher rates of medication use. Despite being the largest group of users of medications,^{1–4} older individuals are often not adequately represented in clinical drug trials.^{5–8} This is problematic because such trials often form the basis for clinical practice guidelines for many chronic diseases. For these reasons, results from trials may not be replicable in older individuals and clinicians may not have good evidence on which to base treatment decisions. In nursing homes (NHs), patient populations are particularly complex, differing greatly from those in trials by higher rates of frailty, comorbidity, functional disability, and cognitive impairment.⁹ Following guidelines for drug therapies may be particularly difficult in this population.

IHD is a common disease among older populations and clinical guidelines recommend long-term multidrug regimens of angiotensin-converting enzyme inhibitor (ACEi) and/or angiotensin receptor blocker (ARB), beta-blocker (BB), antiaggregants (including acetylsalicylic acid [ASA]) and statin drug therapies, regardless of age.¹⁰ Nonetheless, evidence indicates that many individuals do not receive optimal therapy for this condition,^{11,12} perhaps due in part to this multidrug regimen, IHD is associated with increased risk of polypharmacy and excessive polypharmacy.⁹

Whether NH residents receive optimal treatment for IHD is not known; however, physicians may be influenced by cognitive or functional impairments, limited life expectancy at older ages, or presence of comorbid conditions and polypharmacy when deciding to prescribe IHD drugs.⁷ The aim of this study was to assess the prevalence of IHD medication use in older individuals in European NHs and examine factors associated with such use. This study is relevant because it depicts patterns of medication use in 8 countries and helps describe some of the challenges faced by physicians in managing this condition in older, complex NH residents.

Methods

Sample

The individuals selected for the current study were drawn from those included in the Services and Health for Elderly in Long Term care (SHELTER) project, funded by the Seventh Framework Programme of the European Union.¹³ The SHELTER project included 4156 residents from 57 NHs in 7 European countries (Czech Republic, England, Finland, France, Germany, Italy, and the Netherlands) and Israel, and has been described in detail elsewhere.¹³ The project was designed to validate, among a European sample, the interRAI instrument for long term care facilities (interRAI LTCF), a standardized assessment instrument developed by interRAI (www.interrai.org) to assess care needs and preferences of NH residents and assist with care planning. According to local regulations regarding ethics, approval for this study was obtained in all participating countries.

Data Source

The interRAI LTCF assessment contains more than 350 items to comprehensively capture client characteristics, including socio-demographic variables, clinical characteristics including both physical and cognitive status, clinical diagnoses, current services, and medication use.^{14,15} This instrument has been shown to be reliable in capturing resident information, allowing databases to be created to facilitate comparisons of resident characteristics across countries, languages, and cultures.¹³

Measures

Medication information is collected routinely during the interRAI LTCF assessment, and includes all medications that residents were using in the 3 days before assessment. Drug data are collected and verified from multiple sources, including physician order sheets and medication administration records. Information about proprietary names, Anatomical Therapeutic and Chemical (ATC) codes of the World Health Organization Collaborating Centre for Drug Statistics Methodology (www.whocc.no), formulation, dosage, frequency, and route of administration were recorded for each medication. Information was also collected regarding medications taken on an “as-needed” basis. For the purposes of this study, 4 classes of cardiovascular medications were of interest: (1) ASA and antiaggregants; (2) ACEi and ARB; (3) BB; and (4) statins. Residents were classified

according to the type of medication they were taking and by the number of cardiovascular medications they were taking (none, 1–2, or 3 or more). The independent variables of interest included demographic characteristics (age and gender), geriatric conditions (functional disability, cognitive impairment, depression, health instability, and weight loss), number of comorbid conditions (presence of cancer, chronic obstructive pulmonary disease, diabetes, heart failure, stroke), clinical symptoms (chest pain and dyspnea), number of medications, acute service use (including hospitalizations and emergency department [ED] visit) and facility characteristics (presence of a geriatrician and pharmacist). Functional disability was measured using the Activities of Daily Living (ADL) Hierarchy scale, embedded within the interRAI LTCF.¹⁶ This 7-point scale ranges from 0 (indicating no impairment) to 6 (indicating total dependence). For the purposes of this study, ADL disability was classified as assistance required (ADL hierarchy scale score of 2–4) and dependent (ADL hierarchy scale score ≥ 5). Cognitive impairment is captured in the interRAI LTCF using the Cognitive Performance Scale (CPS), which incorporates memory impairment, level of consciousness, and executive function into a score ranging from 0 (cognition intact) to 6 (very severe cognitive impairment).¹⁷ Similar to previous work, residents with CPS scores between 2 and 4 were considered to have mild cognitive impairment and those with CPS scores of 5 or higher were considered to be severely cognitively impaired. The Depression Rating Scale (DRS) is contained within the interRAI LTCF to assess the presence of depressive symptoms.¹⁸ A score of 3 or more was considered to represent depression among residents in this study. Health instability was captured during assessment using the Changes in Health, End-stage disease and Signs and Symptoms (CHESS) score (range 0–5).¹⁹ Residents were classified as having no health instability (CHESS score of 0), minimal instability (CHESS score of 1–2), or moderate to high instability (CHESS score of 3 or more). These outcome measures have been developed and validated for use with the interRAI Minimum Data Set (MDS), the earlier version of the current interRAI LTCF instrument.²⁰ The weight loss item on the interRAI LTCF indicates whether residents have lost at least 5% of body weight in the previous 30 days, or 10% or more of body weight in the last 180 days. Disease diagnoses including IHD were recorded by the study assessors gathering information from the patient, the attending physicians, after careful review of charts, and based on previous medical history and clinical documentation. There are also check-box items for clinical symptoms on the interRAI LTCF, and chest pain and dyspnea were recorded in this way. The number of medications that residents were taking was calculated excluding the number of cardiovascular medications of interest and classified into the following categories: 0 to 4 medications, 5 to 9 medications, and 10 or more medications. Use of acute care services, including ED visits and hospitalizations in the last 90 days or since the last assessment (if less than 90 days) was obtained from the interRAI LTCF. Last, a supplementary questionnaire regarding facility characteristics supplied information about whether geriatricians and pharmacists were working in the facility.

Statistical Analysis

Of the 4156 residents included in the SHELTER study, 133 (3.2%) were excluded due to missing medication information, leaving 4023 residents in the final sample for this study. Individuals with a diagnosis of IHD were selected, leading to a final sample of 1050 residents. Differences in baseline characteristics of residents according to cardiovascular use were described using *t* test for continuous variables and chi-square tests for categorical variables. Generalized estimating equation (GEE) models were used to explore factors potentially associated with cardiovascular medication use. Two GEE

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