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Medication use in a cohort of newly admitted nursing home residents (Ageing@NH) in relation to evolving physical and mental health

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ABSTRACT

Background: Medication use is high among nursing home (NH) residents, but there is a lack of longitudinal studies, determining medication use at admission and its evolution over time.
Aim: Describing the evolution of the medication use two years after entering a NH, compared to the baseline observations and exploring the relation to the physical and mental health.
Methods: Data from the observational prospective Ageing@NH study, based on an inception cohort of newly admitted residents at NHs (65+) was used, selecting those consenting and with medication chart available. Information about socio-demographic, functional and mental characteristics, as well as medication use, was collected at baseline, year 1 and year 2.
Results: Medication chart was available for n = 741 at baseline (mean age 83.8, 66% female), and for n = 342 residents in year 2. The mean number of total medications increased from 8.9 to 10.1 (p-value < 0.001). Polypharmacy was high, with an increase in extreme polypharmacy from 23% to 32%. The biggest increase was noted in the respiratory (from 17% to 27%) and alimentary medications (from 80% to 87%). Cardiovascular medication use in year 2, was lower in those with stable high dependency (77%) and those evolving from low to high dependency (79%), than those with stable low dependency (89%) ($p < 0.025$). For residents with or evolving to dementia symptoms, decline in most medication groups was observed, especially in pain and sleeping medications, while antipsychotics use increased.
Conclusion: Although medication use was high, signs of deprescribing were noted when the physical and mental health of the residents declined.

1. Introduction

According to the World Health Organization (WHO), the number of older adults (≥65 years) worldwide is expected to grow, and prolonged life expectancy has become a demographic trend shared by most of the industrialized countries (Kacevska, Ivanov, & Ingelman-Sundberg, 2011). In Belgium, in 2014, about 17.9% of the population age was 65 and older ("Federal Planning Bureau. Demographic prospects 2013–2060 [Internet]. Brussels," 2013; OECD, 2016a) and 8.8% of them lived in a rest or a nursing home (NH). This percentage raised from 6.7% in 2010, illustrating an increased need for long term care (LTC) services (OECD, 2016b). The majority of people who are entering a NH, are moving mainly due to physical or mental decline, increased need of care, or the loss of personal independence or caregiver (Scocco, Rapattoni, & Fantoni, 2006). Most of them present with multimorbidity and polypharmacy, which is often associated with drug-related problems (Fulton & Riley Allen, 2005). This increases the clinical and economic burden to the patients and the society (Agostini, 2007; Cahir et al., 2010; Cahir et al., 2010; Cooper et al., 2015).

However, polypharmacy in itself cannot be equated to inappropriate prescribing. Pharmacotherapy forms an essential part of the care of older populations and represents a challenging and complex process. It needs to be appraised in the context of several characteristics of ageing, such as disability, frailty, multimorbidity, as well as changing care goals

Abbreviations: WHO, World Health Organization; LTC, long term care; NH, nursing home; PIMM, potentially inappropriate medication management; ADL, activities of daily living scale; MMSE, mini mental state examination; GDS-8, geriatric depression scale; NHP, Nottingham health profile; NPI, neuropsychiatric inventory; ATC, anatomical therapeutic chemical; DDD, defined daily dose; SD, standard deviations; PPI, proton pump inhibitors; CV, cardiovascular medications; ACE, inhibitors angiotensin converting enzyme inhibitors

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(Azermai, Vander Stichele, & Elseviers, 2016).

There is a lack of long term inception cohort studies on newly admitted nursing home residents, focusing on polypharmacy and the chronic medication use in general (Elseviers, Vander Stichele, & Van Bortel, 2010).

The aim of this longitudinal study is to describe the medication use between baseline observations and the second year after entering the NH, and to explore the relation with the evolution of the physical and the mental health, in a cohort of newly admitted residents.

2. Methods

2.1. Ageing@NH cohort

Ageing@NH is an observational prospective study based on an inception cohort of newly admitted residents at nursing homes (NHs) from the northern, Dutch-speaking part of Belgium (Flanders), with data collected at baseline, one year after entering, and two years after entering the NH. For this study, all newly admitted residents with available medication charts at baseline were included. The study design was described in a previous study (Paque, Goossens, Elseviers, Van Bogaert, & Dilles, 2017).

2.2. Sampling

A representative sample of NHs in the Flemish region of Belgium was invited to participate in the Ageing@NH study. Inclusion criteria were nursing homes with at least 60 beds and serving a mixed population (accepting all care profiles). Study information was provided by telephone and study protocol was distributed by e-mail to all participating NHs. One week later, the NHs received an additional phone call to confirm the participation consent and to schedule a first appointment with the researcher. Residents were eligible for inclusion and recruited if they were aged 65 and older, Dutch speaking and entering the NH for permanent stay between September 2013 and December 2013. All participating residents were consecutively recruited during the period of 4 months. Residents in short-stay beds were excluded.

2.3. Data collection

Baseline data was collected two months after entering the NHs to allow a period of adaptation of the residents to the new environment. Administrative data was collected for every participant, followed by a structured questionnaire and standard tests for activities of daily living (Katz, Downs, Cash, & Grotz, 1970), mental health (MMSE) (Folstein, Folstein, & McHugh, 1975), and behavioral problems (NPI) (Cummings et al., 1994) (Box 1). The data of the structured questionnaire and validated measuring tools were completed with data from nursing charts and information from staff nurses. The first and the second follow up were performed one year and two years later through the collection of administrative data, a follow-up questionnaire and the same standard tests, completed with nursing care data. In case of mortality, only administrative data were collected (hospitalizations, date of death). In case of dementia or palliative care, only the responsible nurse was questioned.

2.4. Data handling

Medications were recorded using the brand or generic name in a data-entry program based on the official register of medications on the market from the Belgian Centre for Pharmaceutical Information. The medication was translated into the Anatomical Therapeutic Chemical (ATC) classification (WHO ATC/DDD index, the current version of each year of data entering). Focus was on anatomical main groups (first ATC level) and therapeutic subgroups (second ATC level).

Chronic medication use was defined as a medication use for more than three months, and a medication was defined as 'acute medication use' if the end date was entered in the medical chart. Polypharmacy was defined as concurrent daily use of five or more different chronic medications. Excessive polypharmacy was defined as concurrent daily use of 10 or more chronic medications (Viktil, Blix, Moger, & Reikvam, 2007).

To identify the residents with high functional dependency, the ADL score was used (cut off ≥ 17, set on the bases of the frequency distribution at baseline). Dementia symptoms were defined based on patients combined score of MMSE, ability to respond to the questionnaire, and the combination of the KATZ scores for disorientation in time and place (≥ 6 on 8 points) (see Box 1).

For the analysis of the medication use in relation to the evolving physical health we used the functional dependency categorized in 3 categories of dependency trajectories: stable low dependency (residents with ADL ≤ 17 at baseline and still after 2 years), low to high dependency (residents that went from ADL ≤ 17 at baseline to ADL > 17 after 2 years), and stable high dependency (residents with ADL > 17 already at baseline).

The medication use in relation to evolving mental health was assessed through the variable dementia, categorized in 3 categories of dementia trajectories: stable no dementia (residents without dementia at baseline and still after 2 years), from no to dementia (residents that went from not dement at baseline to dementia after 2 years), and stable dementia (residents with dementia already at baseline).

2.5. Statistical analysis

The data was analyzed using the Statistical Package for Social Sciences 23.0 (SPSS, Inc., Chicago, IL, USA).

The descriptive analysis was performed on the baseline population, defined as the population for which medication chart was available at baseline. Continuous variables at baseline were expressed using means, ranges and standard deviations (SD). Categorical data was expressed using numbers and percentages.

The evolution of the medication use in relation to the physical and mental health was analyzed on the basis of the comparative population, defined as the population with available medication charts at baseline and in year 2. The relation was analyzed by categorizing the evolution of the physical and mental health in 3 categories, and comparing the differences in percentages using $\chi 2$ tests, and means using paired *t*-test and one-way ANOVA.

The level of significance was set at $p < 0.05$.

2.6. Ethical approval

The study protocol was approved by the ethics committee of the Antwerp University Hospital Belgium (EC-number 13/43/420).

The board of directors and the supervising general practitioner of the nursing home signed informed consent to give permission to collect the administrative data of included residents. Residents or their legal representative signed an informed consent.

3. Results

During recruitment, 1066 residents entered in the 67 participating nursing homes (NHs). Fifty residents died before baseline assessment, and in 275 no informed consent could be obtained. Hence, 741 residents represent the total baseline population, all with medication charts available. After 2 years of follow up, a total of n = 342 residents were still alive, resided in a NH that did not stop the cooperation, confirmed informed consent, and still resided in the NH (see Fig. 1). These residents represented the comparative population.

In Table 1 are shown the socio-demographic characteristics of the residents in the total baseline population of the Ageing@NH cohort. The median age was 83.8 years (range 65–105), and 65.5% were