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## Brief Report

# Advanced Age and Medication Prescription: More Years, Less Medications? A Nationwide Report From the Italian Medicines Agency



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## A B S T R A C T

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**Background:** In older adults co-occurrence of multiple diseases often leads to use of multiple medications (polypharmacy). The aim of the present study is to describe how prescription of medications varies across age groups, with specific focus on the oldest old.

**Methods:** We performed a cross-sectional study using 2013 data from the OsMed Health-DB database (mean number of medicines and defined daily doses prescribed in 15,931,642 individuals). There were 3,378,725 individuals age 65 years or older (21.2% of the study sample).

**Results:** The mean number of prescribed medications progressively rose from 1.9 in the age group <65 years to 7.4 in the age group 80–84 years and then declined, with a more marked reduction in the age group 95 years or older with a mean number of 2.8 medications. A similar pattern was observed for the mean number of defined daily doses. Among participants age ≥65 years, proton pump inhibitors were the most commonly prescribed medication (40.9% of individuals ≥65 years), followed by platelet aggregation inhibitors (32.8%) and hydroxy-methylglutaryl-coenzyme A reductase inhibitors (26.1%). A decline in prescription was observed among individuals age 90 years or older, but this reduction was less consistent for medications used to treat acute conditions (ie, antibiotics and glucocorticoids) rather than preventive medicines commonly used to treat chronic diseases (ie, antihypertensive medications and hydroxy-methylglutaryl-coenzyme A reductase inhibitors).

**Conclusions:** The burden of medication treatment progressively increases till age 85 and substantially declines after age of 90 years. Patterns of medication prescription widely vary across age groups.

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† The members of the OsMed Health-DB Network are listed in [Appendix 1](#).

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Older adults often show the co-occurrence of multiple chronic and acute diseases, whose prevalence progressively and steadily increases with aging.<sup>1,2</sup> The treatment of these diseases requires multiple medications (polypharmacy), and it has been estimated that more than 10% of the population age 65 years or older receives 10 or more medications concomitantly.<sup>3,4</sup>

Polypharmacy in the older population might raise several concerns related to an increased risk of drug-drug and drug-disease interactions, poor adherence to treatment, and increased risk of adverse drug reactions (ADR).<sup>4,5</sup> In addition, medications often used to treat chronic and acute diseases are rarely tested in the older population.<sup>6</sup> In the oldest old population, this is further complicated by the high prevalence of geriatric conditions (ie, cognitive impairment, functional deficits, and geriatric syndromes) that can impact treatment adherence and limit life expectancy, which can further reduce the beneficial effect of prescribed medications.<sup>7,8</sup>

Several surveys have assessed attitudes of prescribing physicians toward their older patients, showing a high level of uncertainty related to difficulties in balancing the benefits and harms of pharmacologic treatments.<sup>9</sup> However, a detailed scenario of medication prescription at a population level in old and very old adults living in the community has rarely been provided. The aim of the present study is to describe prescription of medication across age groups in a large, national representative sample of the Italian population, with specific focus on the oldest old (90 years or older).

## Methods

### Study Sample—OsMed Health-DB Database

We used data from the Medicines Utilization Monitoring Center Health-Database (OsMed Health DB Database), which includes data collected in 35 Italian Local Health Units (LHU) on about 18 million of people (about 30% of the Italian population). The sample mean age is 43.5 years vs 43.3 years of about 30% of the Italian population; the percentage of males is 48.5%, which is in line with the national data. Using this database, the OsMed report on drug use in Italy is published yearly by the Italian Medicines Agency (Agenzia Italiana del Farmaco, AIFA), the national competent authority responsible for the regulation of medicine use, which has the following objectives: (1) to describe drug consumption at a national level; (2) to examine changes in drug use over time; (3) to benchmark drug consumption across different Italian regions; and (4) to evaluate appropriate use of drugs and adherence with treatment. For each LHU, the following current administrative databases have been captured: demographic database (including deaths) and outpatient and in-patient pharmaceutical prescription database.<sup>10,11</sup> In order to comply with privacy legislation, data were anonymized by LHUs.

### Italian Pharmaceutical Reimbursement System

The Italian healthcare system covers costs of pharmacologic treatment for most diseases, providing universal pharmaceutical coverage to the whole population.<sup>12</sup> Reimbursed medications include medications proven to be effective for the treatment of acute or chronic diseases (ie, antihypertensive drugs, antibiotics, hypoglycemic agents, antibiotics, antidepressants, antiaggregants, anticoagulants, etc). Nonreimbursed medications include medications whose use is discouraged, those with no clear proven beneficial effect, and those not requiring a medical prescription (ie, benzodiazepines, antispasmodics, topical treatments, etc). The present analysis is focused only on reimbursed medications.

### Medication Assessment

Information on each drug package, identified by the Anatomical Therapeutic Chemical classification and identification package unique

identifier codes, were tracked at the individual level. The number of medicines (Anatomical Therapeutic Chemical classification-fourth level) and defined daily doses (DDD) prescribed and dispensed within 2013 were calculated at the individual level.<sup>13</sup> Only the prescribed medications that were dispensed by local pharmacies are considered in the present analysis.

### Data Analysis

Mean number of medications and DDD were calculated by dividing the number of medications and DDD prescribed and dispensed at the individual level during 2013 by the overall number of individuals living in the geographic areas where data were collected. A similar approach was adopted to estimate the prevalence of use of individual medications. Individuals who died during 2013 were excluded from data analysis ( $n = 160,909$ ), in order to avoid underestimation in the calculation of number of medications and DDD consumed over a 1-year period. Age was categorized into the following groups: <65, 65–69, 70–74, 75–79, 80–84, 85–89, 90–94, and  $\geq 90$  years.

## Results

During 2013, the OsMed Health-DB Database collected data on 15,931,642 individuals, representing 26.8% of the overall Italian population ( $n = 59,394,207$ ). There were 3,378,725 individuals age 65 years or older (21.2% of the study sample) and 160,053 age 90 years or older (1% of study sample). The age and gender distribution of individuals included in the database reflects those of the Italian population (see [Appendix 1, Table 1](#)).

[Figure 1](#) shows an inverse U-shaped association between age and medication prescription in men and women. In the overall sample, the mean number of medications progressively rose from 1.9 in the age group <65 years to 7.4 in the age group 80–84 years and then declined, with a more marked reduction in the age group 95 years or older, who received a mean number of 2.8 medications. A similar pattern was observed for the mean number of DDD, with participants in the age group 80–84 years receiving a mean number of 3116 DDD and those in the age group 95 years or older, a mean number of 980 DDD. The number of medications prescribed did not differ substantially between men and women up to age 94 years, but in the age group 95 years or older, women were prescribed more medications than men. Men were prescribed a higher number of DDD compared with women in the age groups between 65 and 94 years, but this association was reversed in the age group 95 years or older.

[Table 1](#) presents 20 most commonly prescribed medications among individuals age 65 or older, according to age group. Proton pump inhibitors were the most commonly prescribed medications (40.9% of individuals 65 or older), followed by platelet aggregation inhibitors (32.8%) and hydroxy-methylglutaryl-coenzyme A (HMG CoA) reductase inhibitors (26.1%). For most of the medications examined, a decline in prescription was observed among individuals age 90 years or older, but this reduction was less consistent for medications used to treat acute conditions (ie, antibiotics and glucocorticoids) rather than preventive medicines commonly used to treat chronic diseases (ie, antihypertensive medications and HMG CoA reductase inhibitors).

## Discussion

This is one of the first studies to assess patterns of medication prescription in a large population of old and very old adults. Results of the study show that the burden of medication treatment progressively increases till age 85 and substantially declines after 90 years of age. This finding is in contrast with the concept that the number of diseases, which may require pharmacologic treatment, progressively and constantly increases with age.<sup>1,2</sup>

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