

*Full Length Research Paper*

# Elderly drug utilization in the community assessed through pharmacy dispensing data

**Alina Martinez Sanchez**UNIR - Universidad Internacional de La Rioja, Delegación Madrid P<sup>o</sup> de la Castellana,  
163. 8<sup>a</sup> Planta, 28046, Madrid, Spain.

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People of 65 years and above now comprise a greater share of the world's population than ever before, and this proportion will increase during the 21st century. In Spain, between 55 and 90% of the elderly consume a drug. This study characterizes the use of drugs by elderly through dispensing data at the community pharmacy. This study was conducted at a community pharmacy in Madrid, Spain in 2011. A retrospective and descriptive consumption study was conducted using computerized pharmacy dispensing records for all pensioner patients. Anatomical Therapeutic Chemical (ATC) Classification code of all drugs dispensed was recorded in this database accordingly and this classification was used. The 10 most widely used ATC subgroups (2nd level) were determined. These most widely used ATC subgroups were examined using ATC-codes of the 5th level, thus mostly consumed drugs were estimated. A total of 40, 177 drugs were dispensed to patients with prescriptions for pensioners. Anti-inflammatory and analgesic were by far the most widely used drugs: 37.2% of all elderly used drugs from this subgroup. The use of drugs from the remaining nine subgroups was considerably lower, ranging from 9.0% (drugs for obstructive airway diseases) to 4.5% (antineoplastic and beta blocking agents). Cardiac therapy and psycholeptic were used by 7.8%. Diuretic were used by 7.5% of elderly people, while antibacterial for systemic use and psychoanaleptic were used by 5.6%. Psychoanaleptics was consumed in 5.6%, mostly represented by venlafaxine and citalopram. According to the dispensing data, drug use in this sample is similar to that reported by other studies conducted in Spain and abroad. Majority of the elderly were exposed to anti-inflammatory, analgesic and drugs for obstructive airway diseases. Other ATC-subgroups for treatment of cardiovascular conditions were used. This study demonstrates the need for involvement of pharmacists to ensure efficacy and safety in the use of drugs by sensitive populations such as elderly at the community setting.

**Key words:** Community pharmacy, elderly, drug use, Spain.

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## INTRODUCTION

People of age 65 and above now comprise a greater share of the world's population than ever before, and this proportion will increase during the 21st century (Morchadze et al., 2009). It is projected that the elderly population of the world will cross the one billion mark by the year 2020. By that time, over 700 million old people will be living in developing countries (Hutton, 2008).

According to Abellán and Ayala (Abellán and Ayala, 2012), 17.4% of the Spanish population are 65 years or above with 98% of these persons living in their main family home, that is, ageing at home. The most prominent sociodemographic characteristics are the number of very elderly (43% are 75 or above), number of women (almost 6 out of every 10 are women), number of widows or widowers

(31%), low educational level (44% have no education), and the predominance of pensioners (76%). The high number of widows/widowers and single people explains the significant proportion of elderly people living alone (20%), an aspect which mainly affects women and the very oldest.

A study on drug consumption in Spain shows that between 55 and 90% of the elderly consume at least one drug (Ruíz, 2006). The average number of drugs in the non-institutionalized elders is between 2 and 4 drugs per person per day, with an average of 2.6, the proportion being larger in the pool of women. This consumption takes place over prolonged periods of time, with a high degree of dependence on others for taking medication and with high rates of self-medication. A study about drug prescribing and use among elderly people in Spain showed that drug use is highly prevalent among the elderly, that many medicines without any demonstrated benefit are being taken, and that potentially harmful drugs were being used by a high proportion of patients without medical follow-up (Mas and Laporte, 1983). Another study showed a high prevalence of multiple medications and a high percentage of elderly patients using inappropriate medications (35%). The same study showed that 77.7% of the inappropriate prescriptions originate from the family doctor, which is, therefore, a challenge for the primary care clinic (Moral et al., 2006). The results of the study could help to improve the medicine use among elderly, specifically at the community setting, from the knowledge of medicines more used by them.

Furthermore, Spain has many community pharmacies, but there is little pharmacy practice research (Gastelurrutia et al., 2005). "The existence of authors who publish very few studies and the high insularity index observed in the articles may be considered as negative indicators for community pharmacy-based research in Spain" (Iglesias et al., 2007). Therefore, this study was conducted to characterize the use of drugs by the elderly through examining dispensing data in one community pharmacy.

## METHODOLOGY

### Setting

A prospective and descriptive research study was conducted over an 11-month period (October 2010 August, 2011) in a community pharmacy in Madrid, Spain. The community pharmacy is a shift of 12 h, attached to Ambulatory Health Center, which dispenses about 4000 prescriptions each month. Like all community pharmacy in Spain, this is a private community pharmacy.

### Data source

The study was performed with pharmacy dispensing data from the Unycop Win database, which is an Office Pharmacy Management

program in Spain developed by Unycop Pharmacy Group (Unycop, 2012). More than 4,200 pharmacies in Spain are computerized with this software. Unycop Win has visual and intuitive applications integrated with the latest tools from Microsoft; a Menu Bar and "Toolbar Icons" that provide access to the entire application; and is adapted to the legal and administrative requirements of each region and fully integrated with *Bot Plus*, the most comprehensive database of pharmaceutical knowledge in Spain. This database comprises all prescriptions of all patients served at the community pharmacy, regardless of reimbursement status.

### Inclusion/exclusion criteria

All drugs registered in the database and dispensed during the study period under code number 3 (corresponding to pensioners) were included in the study. Non-drug agents and accessories which require a medical prescription were excluded.

### Data analysis procedures

The following elements from Unycop Win database were considered: drug name, therapeutic class, and units dispensed. The Anatomical Therapeutic Chemical Classification (ATC) code of all drugs dispensed was recorded in Unycop Win database, and accordingly, this classification was used in this study. In the ATC classification system given by World Health Organization (WHO), the drugs are divided into different groups according to the organ or system on which they act and their chemical, pharmacological and therapeutic properties (Rønning, 2001). Drugs are classified in groups at five different levels. The drugs are divided into fourteen main groups (1st level), with two therapeutic/pharmacological subgroups (2nd and 3rd levels). The 4th level is a therapeutic/pharmacological/chemical subgroup and the 5th level is the chemical substance.

For example, the code N02BE01: the first character (N) represents the main anatomical group. In this example, N = Nervous System. Characters two and three (02) represent the therapeutic subgroup. In this example, N02 = Analgesics. Character four (B) represents the pharmacological subgroup. In this example, N02B = Other analgesics and antipyretics. Character five (E) represents the chemical subgroup. In this example, N02BE = Anilides. Characters six and seven (01) represent the chemical substance. In this example, N02BE01 = Paracetamol (acetaminophen).

Collected data were recorded in a database that was processed in Microsoft Access. The 10 most widely used active substances were determined using ranking the percentage. These most widely used ATC subgroups were examined using ATC-codes of the 5th level, allowing estimation of the most commonly used drugs.

Approval from community pharmacy owner was obtained. Only data related to drugs sold was used. Patient data is not registered in the Unycop Win database, because this pharmacy does not have the licenses granted by the Spanish Data Protection Law for this registers. Therefore, the ethical approval was not considered.

## RESULTS

Table 1 shows the ATC subgroups that were most widely used by elderly according to dispensing data and the distribution of active substances used by elderly. During the study period, a total of 40 177 drugs were dispensed. Anti-inflammatory and analgesic drugs were by far the

**Table 1.** Distribution of active substances used by elderly, according to ATC Classification, ( $n = 40\ 177$ )

ATC classification <sup>a</sup>	n	Percentage within the subgroups	Percentage within the total
M01AE01 Ibuprofen	7 203	48.1	17.9
M01AC01 Piroxicam	3 525	23.5	8.7
R03CC02 Salbutamol	2033	49.8	5.0
R03AK06 Salmeterol	1856	45.5	4.6
C08CA01 Amlodipine	1348	37.1	3.3
C03AB03 Hydrochlorothiazide	1289	42.6	3.2
N05CF02 Zolpidem	1233	38.8	3.0
C01DA02 Glyceril trinitrate	1145	36.0	2.8
N02BA01 Acetylsalicylic acid <sup>b</sup>	1022	6.8	2.5
J01CR02 Amoxicillin	995	43.9	2.4
N02BE01 Paracetamol	906	6.0	2.2
C01AA05 Digoxin	856	26.9	2.1
N05BA01 Diazepam	846	26.6	2.1
C08DA51 Verapamil	820	22.6	2.0
J01FA10 Azithromycin	791	34.9	1.9
C03DA01 Spironolactone	698	23.0	1.7
N06AX16 Venlafaxine	714	31.5	1.7
C07BB03 Atenolol	587	32.3	1.4
L01BA01 Methotrexate	533	29.4	1.3
N06AB04 Citalopram	460	20.3	1.1
C07AG02 Carvedilol	361	19.9	0.8
L01AA01 Cyclophosphamide	358	19.7	0.8

<sup>a</sup>Active substances showing an example of the two most used drugs within each of the subgroups consumed. <sup>b</sup>Concentration of tablet was not considered in the classification.

most widely used: 37.2% of all elderly used drugs from this subgroup. Within this subgroup, paracetamol was by far the most widely used analgesic followed by acetylsalicylic acid, ibuprofen, and piroxicam.

The use of drugs from the remaining nine subgroups was considerably lower, ranging from 9.0% (drugs for obstructive airway diseases) to 4.5% (antineoplastic and beta blocking agents). Within the subgroup "drugs for obstructive airway diseases," salbutamol and salmeterol were the most commonly used while methotrexate and cyclophosphamide were the most frequently prescribed antineoplastic drugs. Atenolol and carvedilol were the most commonly used beta blocking agents.

Cardiac therapy (C01) and psycholeptics (N05) were used by 7.8%. Diuretics (C03) were used by 7.5% of the elderly, while antibacterials for systemic use and psychoanaleptics were used by 5.6%. The most common drugs dispensed within the subgroup of diuretics were hydrochlorothiazide and spironolactone. Digoxin and glyceril trinitrate were widely used within the cardiac therapy subgroup.

The ATC subgroup of calcium channel blockers was largely represented by the use of amlodipine and verapamil. The ATC subgroup of psycholeptics appeared to be a heterogeneous group represented by drugs like

zolpidem and diazepam. The subgroup of psychoanaleptics was taken by 5.6% of the elderly and the most common members were venlafaxine and citalopram. Finally, the antibacterials for systemic use subgroup was used by 5.6% with the most common representatives being azithromycin and amoxicillin.

## DISCUSSION

This study examined the pattern of medication use among the elderly in a community pharmacy in Madrid. The 10 most widely prescribed drugs were anti-inflammatory drugs, analgesic drugs, and drugs for obstructive airway diseases. Non-steroidal anti-inflammatory drugs (NSAIDs) were widely used within the analgesics+anti-inflammatory subgroup. Similar results were presented by Pilotto et al. (2003), who identified the prevalence of specific drug use in elderly outpatients and the relationship between NSAID use and gastrointestinal disturbances and therapies in elderly subjects treated by their general practitioner (GP). Other studies have also shown that NSAIDs are prescribed to a great extent in elderly patients (Visser et al., 2002; Hogan et al., 1994; Rahme, 2001).

These results could be associated with the high prevalence of chronic pain in the Spanish general population (Català et al., 2002). General chronic pain prevalence in Spain was estimated at 31.4% in women and 14.8% in men, the most frequent causes being osteoarthritis/arthritis and rheumatoid arthritis, results epidemiologically similar to those reported for other European countries such as the United Kingdom, Ireland, Italy, Norway and Belgium (Breivik et al., 2006).

The burdens of chronic obstructive airway diseases among the elderly in Europe and worldwide are increasing (Lundba and Gulsvik, 2003). Of the general Spanish population between 40 and 80 years of age, 10.2% suffer from obstructive airway diseases (Soriano et al., 2010). Obstructive airway diseases in Spain generate approximately 10 to 12% of family doctor visits. Similarly, these diseases cause 35 to 40% of visits to pulmonologists and cause 35% of permanent work disability (Echave-Sustaeta and Villena, 2002). This justifies the use of medications such as salbutamol and salmeterol reported in this study.

According to studies developed by Wolf-Maier and Cooper, (2003), Europe should be considered a high prevalence hypertension region. In Germany and Finland, roughly 44% of the adult population can be diagnosed with hypertension (HT) (Wolf-Maier and Cooper, 2003). Cardiovascular diseases constitute the first cause of death in the whole Spanish population. Both cerebrovascular disease and ischemic heart disease together account for 60% of global cardiovascular mortality (Redón et al., 2007). The prevalence of essential hypertension in the Spanish population more than 60 years of age is greater than 65% (Sierra et al., 2008). Beta blocking agents, for example, showed a low consumption when compared with other subgroups in this study. These data are consistent with those reported in other studies of beta blockers consumption which also reported decreasing consumption with age and other pathological factors in the elderly (Garcia-Molla et al., 2011). At the same time, this result could support the hypothesis that beta blockers do not offer much additional benefit to the control of other risk factors and prevent the progression of target organ damage, so that they are relegated to specific indications (Protocolo de HTA, 2011; Che et al., 2009).

Likewise, cardiac therapy (ATC- group C01) showed considerable consumption; this result is similar to that of Straand and Rokstad (1999), where nitrates and digitalis preparations were more representative drugs. Other studies showed the same tendencies (Loyola et al., 2011; Rozenfeld, 2008).

Our calcium channel blocker (ATC-group C08) consumption results are consistent with other studies developed at the primary care level (Mendes-Netto et al., 2011). This result, however, conflicts with the findings of the PROTECT project, where calcium channel blockers

were used in 97.8% of all the cases in the outpatient sector (Ballarín et al., 2012). Taken together, the results related to drugs active on the cardiovascular system are consistent with the European Society of Cardiology/ European Society of Hypertension (ESC/ESH) guidelines, which recommend that thiazide diuretics should be considered just as suitable as  $\beta$ -blockers, calcium antagonists, angiotensin-converting-enzyme (ACE) inhibitors, and angiotensin receptor blockers for the initiation and maintenance of antihypertensive treatment (Grossman and Verdecchia and Micheli, 2011). Similarly, psycholeptics were the drugs most used by the elderly according to some current studies (Tomàs, 1999; Ramage-Morin, 2009).

According to the Spanish Agency for Medicines and Health Products, Spain is the second leading European Union country in antibiotic consumption after France, even though the use of these drugs has been reduced from 22.8 doses per 1,000 inhabitants/day in 1995 to 19.8 in 2007 (Lázaro, 2008). The antibiotic consumption reported in this study is consistent with these findings.

The findings related to antineoplastic agents (ATC-subgroup L01) is consistent with cancer prevalence, because of the overall aging of the population and the fact that cancer incidence and mortality rises exponentially in the 50 to 85 year old age groups (Nathan et al., 2006). This pathology in the elderly represents an increasing load for the community, particularly in France, Italy and Spain due to the ageing population in these countries (Verdecchia, 2002). The epidemiological data could support the consumption reported in this study for antineoplastic agents. Similarly, cyclophosphamide and methotrexate are drugs sold in oral dosage form at the community pharmacy. These drugs have been widely used as therapy to treat breast and prostate cancer (Colleoni et al., 2006).

Interestingly, these results showed the use of drugs that, as recommended by Elliott (2006), should be avoided in elderly, namely, benzodiazepines and NSAID. According to these results, future researches will be necessary to address these issues, and a geriatric pharmaceutical care program could be viable to improve the coordination of pharmaceutical treatments, ensuring the safety of pharmacotherapy in elderly patients.

## STUDY LIMITATIONS

The limitation of this study is that the consumption of drugs was estimated using a dispensing register. When using a dispensing register for investigating the consumption of a drug, it must be taken into consideration that the register contains information on redeemed prescriptions and not on the actual consumption of drugs by the persons who redeem the prescriptions. The fact that there is no assurance that persons ingested the drugs that they collected at the pharmacy is a limitation.

This limitation has also been recognized in other studies using dispensing data for investigating use of a drug (Sundell et al., 2011; González et al., 2004).

Another limitation is that the database is used to record dispensing and manage cash control, but says nothing about the quality of prescribing. Patient records are not considered in this database; therefore, it was not possible to estimate consumer population. Diagnostic data are not considered in this database; therefore, statements about the appropriateness of drug use cannot be made. These limitations are consistent with the statements of González et al. (2004): the pharmacy databases are designed for administrative control ("PharmacyManagement") rather than for clinical use.

## Conclusion

According to the dispensing data, drug use in this sample is similar to that reported by other studies conducted in Spain and abroad. Majority of the elderly were exposed to anti-inflammatory and analgesic drugs and drugs for obstructive airway diseases. Other ATC subgroups for the treatment of cardiovascular conditions were used. This study shows that the Unycop Win database is a valuable source for information on drug utilization, permitting the registration and classification of drugs dispensed in accordance with the ATC Classification System. This study shows the need for involvement of pharmacists to ensure effectiveness and safety for the use of drugs in sensitive populations such as the elderly in community settings.

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