PHARMACOEPIDEMIOLOGY AND PRESCRIPTION

I. Barat · F. Andreasen · E. M. S. Damsgaard

The consumption of drugs by 75-year-old individuals living in their own homes

Received: 7 January 2000 / Accepted in revised form: 10 April 2000

Abstract Objective: To examine the drug consumption and the extent of polypharmacy (defined as daily intake of three or more drugs) among 75-year-old persons living in their own homes and to point out potential problems associated with it.

Methods: Information on the intake of all drugs was collected from 492 subjects randomly selected. The subjects were interviewed at home, and their drug storage was examined. Information was also collected from the general practitioners (GPs) and from prescription databases. Database information comprised prescribed drugs used by the study population and the background population.

Results: Eighty-seven percent of the study population received prescribed drugs and 72% used over-the-counter (OTC) drugs. Only 3% of the subjects did not take any drugs. Eighty percent of females and 60% of males used central nervous system (CNS) drugs, the most commonly used category. The subjects took on average 4.2 different prescribed drugs and 2.5 OTC drugs. Sixty percent used three or more prescribed drugs and 34% used five or more. Thirty percent used three or more OTC drugs. Seventeen percent had prescribed drugs not in use at the time of the examination in their drug storage. Twenty-five percent of the prescribed drugs were used without the GPs’ knowledge. Thirty-one percent of the study population received prescribed drugs from two or more physicians. Potential drug interactions with clinical significance were found among 15.3% of the participants and were positively correlated to polypharmacy.

Conclusion: Almost all 75-year-old persons receive drugs. The observed polypharmacy may increase drug-related risks. The discrepancies between the GPs’ knowledge of their patients’ medication and the actual intake may involve a potential risk. A better registration of the patients’ total medication and the implementation of a common medication database for the use of all involved physicians may improve medication and reduce risks.

Key words Drug interaction · Drug utilisation · Elderly

Introduction

The use of drugs in the general population and particularly in the elderly has increased dramatically over the last decades. In Canada, the use of patented drugs in 1995 increased by 14.8% compared with 1994, and the number of prescriptions increased by 3.7%. Whereas the elderly in Canada make up about 12% of the population, they account for almost 40% of prescriptions [1]. In the USA, drug expenditures in 1998 increased by 10.2% [2]. Drug consumption measured in daily doses in Denmark increases by about 3.5% yearly. People over 65 years of age consume about four times as many defined daily doses (DDDs) as the rest of the population [3]. A Danish database study confirms that multi-drug usage increases with age [4].

About 80% of persons older than 65 years suffer from chronic conditions that may require long-term medical treatment [5]. Moreover, complex medical conditions are frequent and often involve multiple drug therapy. Multiple drug therapies may present a problem in medication of the elderly. Increasing mental impairment makes the patient prone to make errors [6, 7], and physiological changes such as decreased renal function and hepatic elimination increase the likelihood of adverse drug reactions [8]. It has been demonstrated that

I. Barat (✉) · E. M. S. Damsgaard
Geriatric department C, Marselisborg Hospital, Aarhus University Hospital, P.P. Orumsgade 11, DK-8000 Aarhus C, Denmark
e-mail: i.b@dadmnet.dk
Tel.: +45-6-9491991; Fax: +45-6-9491990

F. Andreasen
Center of Clinical Pharmacology, Department of Pharmacology, University of Aarhus, The Bartholin Building, DK-8000 Aarhus C, Denmark
the probability of compliance errors increases in direct relation to the amount of drugs ingested [9] and that the risk of drug interactions increases for the same reason [10]. Often hospitals, specialists and the general practitioners (GPs) are all involved in the treatment of the elderly and lack of co-ordination may increase the likelihood of adverse drug events. The elderly seem to have an inclination to buy over-the-counter (OTC) drugs and diet supplements that may add an extra risk of drug interaction and lack of compliance [11].

Several studies describe the drug utilisation pattern in the elderly. The interpretation of the results may be difficult because they are influenced by the approaches chosen as the authors include only one of the sexes, or rely solely on databases or on interviews [4, 12, 13]. The main purpose of the present study was to elucidate and quantify major problems related to the medicine used by the elderly living in their own homes. The data were based on interviews with the subjects and their doctors and information from a prescription database. To our knowledge, no other studies have combined such data. Obtaining data from the participants through a home visit seems essential for determining the complexity of medication problems. Only in this way may one receive complete information on the subjects’ drug storage, including prescribed drugs and OTC medication.

Our study only dealt with 75-year-old persons, thus avoiding very small numbers of participants in each age group. We used a dynamic sampling method from the central population register to avoid selection of subgroups of survivors.

In our study, additional and therapy-related data were collected simultaneously from the subjects regarding medication, health, activity of daily living, cognitive and mental function, and also from the National Health Insurance System (NHIS), the county hospitals, and the local Home Care Services. The present paper focuses solely on a precise description of the actual medication of the 75-year-old population.

**Methods**

Design of the study

The study was carried out in the municipality of Aarhus, Denmark, which on 1 January 1998 comprised 282,137 inhabitants, of whom 1585 were 75 years old. The subjects were sample randomly every fortnight during the study period (August 1997 to February 1999) ensuring minimal lapse of time from sampling to contact with the subjects. Forty random samples were drawn, each consisting of 20 individuals. This sampling method was developed by Damsgaard et al. [14]. The average time between sampling and examination was 21.5 days (range 4–198 days) and 95% of the participants were examined within 1.5 months after sampling. Subjects were invited by mail and telephone to participate in the study. The examination took place in the subjects’ homes, each subject being visited for approximately 2 h by the same nurse or physician for interview and medical, cognitive and functional assessment. The participants were asked to present their drug storage (prescribed drugs, OTC drugs and alternative medication). Each drug name was noted. The subjects were asked about dose, frequency of use, purpose of the therapy and time of intake. It was noted whether the drug had been prescribed and by whom. Each participant’s GP was contacted by telephone and was either interviewed or asked to mail information on all substances prescribed to the patient within the last 6 months prior to the examination day. This information included the name of the drug, daily dose, purpose of treatment and changes in treatment during the last 6 months. In Denmark, the GP establishes contact between the patient and specialists or hospitals when needed, and thus the GPs are informed about all treatments.

The regional ethics committee and the Danish State Registry Board approved the study.

**The study population**

Selection of the study population is shown in Fig. 1. We examined 492 (31.4%) of the 75-year-old population in the municipality of Aarhus. Women in the study population comprised only 53%, while in the background population they comprised 61% (P < 0.005). Seventy-one percent of the males lived with spouses, while only 41% of the females did (in the background population 67% and 38%, respectively). The response rate was 66% for men and 60% for women. Reasons for non-responding are listed in Table 1.

**Databases**

From the NHIS, we received summarised data of subsidised drugs purchased by the study population and by non-responders during the 3-month period following the first contact. This information was used to validate our data. The NHIS registered all prescriptions of subsidised drugs. Non-subsidised drugs that are not registered include most hypnotics and sedatives, some non-narcotic analgesics and H-2 antagonists. The NHIS database includes a unique person identification corresponding to each prescription information. Table 2 summarises the relative number of persons prescribed a given number of subsidised drugs according to this source. We found no significant differences between the study population and non-participants. The use of prescribed drugs in the study was compared with the annual report of The Danish Medicines Agency (DMA) in 1997 [3]. This department registers all drug sales in Denmark. As data from this source are specified for ages in 10-year intervals, we used the data of ages 75–84 years (mean 78.9 years).

<table>
<thead>
<tr>
<th>Total population of 75-years old</th>
<th>Sample population</th>
<th>Not examined</th>
<th>Non-responders</th>
<th>Excluded</th>
<th>Study population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total 1585 (100%)</td>
<td>Total 793 (50%)</td>
<td>Total 246 (83%)</td>
<td>Total 166 (67%)</td>
<td>Total 49 (17%)</td>
<td>Total 492 (99%)</td>
</tr>
<tr>
<td>Females 973 (61%)</td>
<td>Females 460 (58%)</td>
<td>Females 166 (67%)</td>
<td>Females 266 (53%)</td>
<td>Females 28 (57%)</td>
<td>Females 263 (53%)</td>
</tr>
<tr>
<td>Males 612 (39%)</td>
<td>Males 333 (42%)</td>
<td>Males 80 (33%)</td>
<td>Males 232 (47%)</td>
<td>Males 21 (43%)</td>
<td>Males 229 (47%)</td>
</tr>
</tbody>
</table>

Fig. 1 Selection of study population