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Content of Home Pharmacies and Self-Medication Practices in Households of Pharmacy and Medical Students in Zagreb, Croatia: Findings in 2001 with a Reference to 1977

Vedrana Aljinović-Vučić, Vladimir Trkulja, Zdravko Lacković

Laboratory for Neuropharmacology, Department of Pharmacology, Zagreb University School of Medicine, Zagreb, Croatia

Aim To evaluate the content of household drug supplies and self-medication practice among medical and pharmacy students at Zagreb University in 2001, and to relate the findings to a previous survey in 1977.

Methods A cross-sectional anonymous questionnaire-based survey included 287 students who inventoried drug supplies in their family households and interviewed the household members on drug keeping and self-medication practice. An identical methodology was used in 1977 (n = 225).

Results In 2001, healthcare professionals were present in 37% of the surveyed households (33% in 1977). At least one drug was found in every household. Drugs were kept at a designated place ("home pharmacy") in 68% of the households (65% in 1977). Drugs past expiry dates and/or with purpose unknown to the household members were reported in 27% of the households (32% in 1977). The most frequently found drugs were non-steroidal anti-inflammatory drugs (NSAIDs) that were present in 97% of the households (93% in 1977), and were followed by antibiotics found in 46% of the households (40% in 1977). Self-medication of NSAIDs was practiced in 88% of the households in which they were found (95% in 1977), whereas self-medication of antibiotics was practiced in 37% of the households in which they were found (41% in 1977).

Conclusion Accumulation of drugs was common in the surveyed households. Self-medication of over-the-counter drugs was a routine practice, and self-medication of prescription drugs was practiced in many households. No major difference in this respect was found between the 2001 and 1977 surveys.

Responsible self medication "can help prevent and treat ailments that do not require medical consultation" and "…reduce the pressure on medical services for the relief of minor ailments" (1). These potential benefits seem to be of a particular interest in financially less privileged countries with limited healthcare resources. However, the practice of self-medication can rather frequently have adverse effects – it can generate an additional burden on the system and increase counterproductive out-of-the-pocket expenditure in already impoverished population (2). Namely, "responsible" signifies that only appropriate drugs, e.g., over the counter (OTC) medicaments should be self medicated and only when really needed (1). Therefore, "responsible self medication" requires a certain level of knowledge from those who practice it. But even when "responsible", self medication is not without risks because even common OTC drugs have been associated with fatalities (3-5). Moreover, self medication can easily slip towards "irresponsible" or "inadequate" practice such as self medication of prescription drugs and/or inappropriate drug use (misdiagnosis, excessive or inadequately low doses, and/or duration of treatment), and this can result in drug abuse, delayed seeking for professional medical care and the increased incidence and severity of side-effects and drug interactions (6).

Self medication is a well-recognized topic of interest and is often discussed in the medical literature. Our search of the PubMed database, using the terms *self-medication* or *auto-medication,* retrieved more than 980 articles in March 2004. Although only a small number of these were empirical studies, the phenomenon has been investigated in many countries in different parts of the world. Despite the differences regarding the applied methodology and addressed populations, the surveys indicated certain common patterns of behavior in respect to drug keeping and self-medication: where this was evaluated, the examinees tended to "accumulate" medicaments in the home supplies (7,8); OTC drugs tended to be inadequately used, ie, for inadequate purposes and/or with inadequate dosing; prescription drugs (primarily antibiotics/chemotherapeutics and anxiolytics) were rather frequently self medicated, and typically this self medication was imprudent (9-11). The surveys thus indicated that, in most cases, "responsible self medication" was actually an ideal rather than the reality (3-5,9-11).

The primary aim of the current survey was to evaluate the household drug supplies and self medication practice in a sample of medical and pharmacy students in Zagreb, Croatia. The secondary objective was to estimate whether any major difference existed between the current survey and the outcomes of a survey that we conducted in an identically defined sample and using the identical methodology in 1977 (12). This comparison was particularly interesting because between the two surveys Croatia underwent major changes of the political and socioeconomic system, population changes due to great waves of migration, economical recession largely influenced by the 1991-1995 war, and reorganization of the health-care system (13).

Subjects and Methods

All 3rd year medical and pharmacy students at the Zagreb University in the 2000/2001 academic year (n = 421) were asked to participate in this study during the pharmacology or pharmacognosy courses, respectively. A total of 287 students (68%), 164 medical and 123 pharmacy students, agreed to participate. They were asked to inspect the drug supplies in their own family households and to conduct a structured interview with the household members. On the basis of the inspection and interviews, they were supposed to make an inventory of the found drugs and complete an anonymous questionnaire with multiple-choice questions about 1) healthcare professionals with knowledge about drug use, e.g., medical doctors, pharmacists, doctors of dental medicine, or doctors of veterinary medicine among the household or family members; 2) characteristics of drug keeping; 3) drugs past their expiry dates or drugs with purpose unknown to the household members; 4) potential toxicity of the found drugs; 5) the main sources of information about drug use; and 6) the practice of self-medication. All 287 students returned generally valuable questionnaires, but a detailed inventory of the found drugs was missing in 41 cases. Therefore, certain outcomes were evaluated on the basis of all 287 questionnaires, and 246 questionnaires were used to evaluate the content of the household drug supplies. Self-medication was defined as the use of a drug without prior consultations with a physician regarding the indication, dosage, and duration of treatment and it included two modalities: a) patient completely independently decides about the use of a drug – its indication, dosage, and duration; or b) the initial recommendation is given by a physician, but the patient changes the dosage and/or duration of treatment. Self-medication was evaluated only for drugs that were found in the households, and separately for each of the found drugs. The "extent" of self-medication of a particular drug was graded as "never self-medicated," "sometimes self-medicated," and "regularly self-medicated." In the analysis, data on individual drugs were pooled according to the pharmacodynamic or pharmacotherapeutic group. For example, if one out of 3 different non-steroid anti-inflammatory drugs (NSAIDs) found in a household had been regularly self-medicated, the household was counted as one in which self-medication of NSAIDs was a regular practice.

Identical methodology was used in the survey conducted among Zagreb University medical and pharmacy students in 1977 (12).

The survey was descriptive in nature. Data were summarized as counts and percentages. The only two groups of drugs found in a larger number of households (ie > 100) were NSAIDs for systemic use and antibiotics-chemotherapeutics for systemic use. Simple cross-tabulation of data re-coded to a binary form – self-medication "Yes" (regularly or sometimes) or "No" (never) – indicated an association between self-medication of antibiotics and the presence of healthcare professionals in the households, and also between self-medication of antibiotics and self-medication of NSAIDs. No apparent association was observed between self-medication of NSAIDs and the presence of healthcare professionals. Since systemic antibiotics are prescription drugs, data on their self-medication were considered as an outcome of interest. In order to additionally explore the observed associations, binary logistic regression was performed on self-medication of antibiotics with the presence of a healthcare professional in the family or household (Yes/No) and self-medication of NSAIDs (Yes/No) as independent variables (maximum likelihood estimation using Newton-Raphson method).

Data from the survey conducted in 1977 were taken from the original publication (12). No significance testing between the 2001 and 1977 surveys was intended, but the differences in proportions are reported. NCSS 2004 software (NCSS, Kaysville, Utah, USA) was used.

Results

Households and Household Drug Supplies

In 37% of households or families, at least one member was a healthcare professional with the knowledge about rational drug use. As judged by the answers related to drug keeping, at least one drug was found in every of the surveyed households, but a detailed list of the found drugs was supplied in 246 questionnaires. The most frequently found drugs by far were NSAIDs for systemic use (typically 2 or more different, in 97% of the households), followed by antibiotics and chemotherapeutics for systemic use (46% households), vitamins and nutrients, and cold-relief products (Table 1). Both NSAIDs and antibiotics were equally frequently found in households with a healthcare professional and those without healthcare professionals: 94% and 98%, respectively for NSAIDs, and about 46% for both subgroups for antibiotics. Drugs were mostly kept at a specific place within the household – the existence of a "home pharmacy" was reported in 68% of the households. There were no children under 14 years of age in most of the households, but in 36% of those with children drugs were kept within their reach (Table 2). In 27% of the households drugs that were either past the expiry date or with their purpose unknown to the household members, or both were reported (Table 2). Interestingly, this was comparably frequently reported for the households with healthcare professionals among the members (30%) and those without healthcare professionals (25%). In 127/287 (44%) households, the surveyors estimated that the found drugs (either only one drug or all together) had the potential of causing severe or lethal poisoning (Table 2).

Self-medication and Other Characteristics of Drug Use

Independent medical doctors and/or pharmacists or household members who were

Table 1. Drugs found in the surveyed households of medical and pharmacy students in Zagreb, Croatia*

Drugs (pharmacodynamic/pharmacotherapeutic group)	Prevalence (households in which found; No., %)
NSAIDs† (systemic)	238 (96.7)
Antibiotics-chemotherapeutics (systemic) (overall)	114 (46.3)
Beta lactams	75 (30.5)
Other (including systemic antiviral and anti-fungal agents)	75 (30.5)
Vitamins and nutrients	95 (38.6)
Cold-relief products (non-opioid antitussives, rhinologics, combinations with NSAID)	95 (38.6)
Topical non-steroid products (ointments, drops, crémes, lotions)	86 (35.0)
Benzodiazepines	68 (27.6)
Drugs for treatment of peptic ulcer	65 (26.4)
Anti-allergic drugs (systemic)	62 (25.2)
Topical steroid products	53 (21.5)
Antihypertensive drugs (including diuretics)	49 (29.9)
Spasmolytics	38 (15.4)
Opioid antitussives/analgesics/antidiarrheals (pholcodine, tramadol, loperamide)	24 (9.8)
Hormones, systemic (except oral contraceptives)	19 (7.7)
Drugs used to treat asthma	13 (5.3)
Oral contraceptives	12 (4.9)
Other (cumulative)	24 (9.8)

*Detailed lists of drug supplies were available for 246 households. Drugs found in ≥5.0% of the households are listed
†NSAIDs – non-steroid anti-inflammatory drugs.

Table 2. Characteristics of drug supplies in the surveyed households (n=287)

Characteristic	Prevalence (households for which reported; No., %)
Drugs are kept:	
at a specific place – "home pharmacy"	196 (68.3)
at several places around the house	89 (31.0)
there are no drugs in the household	1 (0.3)
not specified	1 (0.3)
Availability of drugs to children (<14 years of age):	
no children in the household	228 (79.4)
children in household – drugs out of reach	37 (12.9 or 63.8*)
children in household – drugs within reach	21 (7.3 or 36*)
Drugs' shelf-life and purpose:	
there are drugs past expiry dates	31 (10.8)
there are drugs whose purpose is unknown	10 (3.5)
there are drugs past expiry dates AND drugs with unknown purpose	35 (12.2)
none of the listed	209 (72.8)
not specified	2 (0.6)
Potential toxicity of found drugs:	
there are individual drugs (type/amount) that could cause lethal poisoning	19 (6.6)
there are individual drugs that could cause severe poisoning	31 (10.8)
total content of the drugs (type/amount) could cause lethal poisoning	26 (9.1)
total content of the drugs could cause severe poisoning	60 (20.9)
individual drugs as well the total content (type/amount) are such that could cause only mild poisoning	153 (88.1)
not specified	7 (2.4)

*If only households with children are counted (n=58).

Table 3. Main sources of information about the drug use*

Main source of information about drug use	Prevalence (households for which reported; No., %)
Independent† medical doctor and/or a pharmacist only	183 (63.8)
Household member who is a healthcare professional only	58 (20.2)
Product information leaflet only	25 (8.7)
Friends, relatives (not healthcare professionals) only	17 (5.9)
Not specified	4 (1.4)

*Members of the surveyed households (n=287) were interviewed in respect to the main source of information about (rational) drug use. A consensus statement for each household was recorded.
†Independent – not a household or family member.

healthcare professionals were listed as the "main source of information about drug use" in majority of the households (84%). In additional 9% of the households, the members mostly relied upon their own interpretation of the product inserts (Table 3).

Systemic NSAIDs were self-medicated (regularly or occasionally) in 88% and systemic antibiotics and chemotherapeutics in 37% of the households in which they were found (Table 4). For most of the other drugs, either prescription or over-the-counter, prevalence of households in which they were self-medicated was far beyond 50% (Table 4).

Considering the households in which self-medication of antibiotics was evaluated (n = 114), this practice appeared more likely to be reported when there was a healthcare professional among the members vs no healthcare professionals (OR 2.3, 95% CI 0.9-6.6), and also in households in which self-medication of NSAIDs was reported (vs NSAIDs not self-medicated) (OR 2.0, 95% CI 0.6-16.4). Hence, binary logistic regression was performed on the outcome "antibiotics self-medicated (Yes/No)" taking into account 111 households that were evaluated for self-medication of both antibiotics and NSAIDs. Self-medication of antibiotics appeared to be significantly associated with both the presence of a healthcare professional among the household members ($P = 0.009$) and self-medication of NSAIDs ($P = 0.012$; analysis of deviance) (Table 5). Self-medication of antibiotics was around 3 times more likely to be reported in households with a healthcare professional among the members (OR 3.1, 95% CI 1.3-7.4), whereas the odds ratio for the factor self-medication of NSAIDs could not be determined due to cells with zero frequency (Table 5).

2001 Survey and 1977 Survey

The major findings of the 2001 survey on the household drug supplies and self-medication were fully comparable to those from 1977 (Table 6).

Table 4. Prevalence of households in respect to the "extent" of self-medication *per* pharmacodynamic and pharmacotherapeutic group of drugs*

Pharmacodynamic/ pharmacotherapeutic group	No.	Prevalence (No. %) never self-medicated	sometimes self-medicated	regularly self-medicated	not specified
NSAIDs, systemic	238	10 (4)	142 (60)	67 (28)	19 (8)
Antibiotics, systemic	114	70 (61)	31 (27)	12 (10)	1 (1)
Vitamins and nutrients	95	17 (18)	33 (35)	33 (35)	12 (12)
Cold relief products	95	17 (18)	49 (52)	14 (15)	14 (15)
Topical non-steroid products	86	15 (17)	56 (65)	11 (13)	3 (4)
Benzodiazepines	68	18 (27)	32 (48)	6 (9)	11 (16)
Anti-ulcer drugs	65	13 (20)	36 (56)	11 (17)	5 (7)
Anti-allergic drugs-systemic	62	27 (44)	28 (45)	3 (5)	4 (6)
Topical steroid products	53	21 (39)	21 (39)	8 (15)	3 (6)
Antihypertensive drugs	49	26 (53)	10 (20)	7 (15)	4 (6)

*Self-medication was evaluated only for households in which drugs belonging to respective groups were found. Data are shown for drug groups found in ≥20% of the surveyed households. Abbreviations: NSAIDs – non-steroidal anti-inflammatory drugs.

Table 5. Binary logistic regression on the outcome "antibiotics self-medicated" (Yes/No)*

Term	df	Analysis of deviance: Increase from model deviance (χ^2)	*P*	Coefficient and odds ratio†: B	*P*	OR (95%CI)
All†	3	13.5	0.004			
Healthcare professionals	1	6.80	0.009	1.14	0.010	3.12 (1.31 to 7.43)
NSAIDs	1	6.28	0.012	12.54	0.955	NA
Healthcare professionals NSAIDs	1	0.00	0.998			NA

*For analysis of deviance; NA – not available, odds ratio not determined due to cells with zero frequency; NSAIDs – non-steroid anti-inflammatory drugs.
†Model performance: -2LL= -62.9, R^2= 0.99, d.f.=4, correctly classified cases 67.4%. 95% CI – 95% confidence interval.

Table 6. Major outcomes in 2001 and in the 1977 survey (225 surveyed households)*

Outcome	Prevalence (% households for which reported) 2001	1977	Difference 2001-1977 (95% CI)
Healthcare professional in household	36.9	32.9	4.0 (-4.0 to 12.3)
Drugs kept at a designated place	68.3	64.9	3.4 (-4.8 to 11.6)
Drugs past expiry dates or with unknown purpose or both	26.5	32.0	-5.5 (-13.5 to 2.4)
Drugs (type/amount) that cause severe/lethal poisoning	44.3	43.1	1.1 (-7.5 to 9.8)
In households with children, drugs within reach	36.2	26.6	9.7 (-5.9 to 25.3)
NSAIDs† found in home supplies	96.7	93.3	3.4 (-0.6 to 7.8)
Where found, NSAIDs self-medicated (regularly, sometimes)	87.8	95.1	-7.3 (-12.3 to -2.3)
Antibiotics found in home supplies	46.3	40.4	5.9 (-3.1 to 14.7)
Where found, antibiotics self-medicated (regularly, sometimes)	34.2	41.3	-7.1 (-18.0 to 3.7)
Drug use is "informed" (information from healthcare professionals or product inserts)	92.3	95.6	-2.9 (-6.9 to 1.2)

*Data for the 1977 survey were taken from the original publication (12). Differences are given with 95% confidence interval (CI).
†NSAIDs – non-steroid anti-inflammatory drugs.

Discussion

In 2001, we conducted a survey that aimed to evaluate the practice of drug keeping and self-medication in the households of a sample of the Zagreb University medical and pharmacy students. The results were assessed in relation to a survey that we conducted 25 years ago in an identically defined sample and using the identical methodology (12).

NSAIDs were the most frequently found drugs by far in virtually all of the surveyed households in both surveys, and their self-medication was a common practice. These findings were expected because NSAIDs are known as commonly used drugs. Although they are not "innocent" in terms of safety and tolerability, their use, especially if informed, as it appeared to be in the two surveys, does not generally represent a medical risk. What remains unknown is whether, under the conditions of self-medication, the indication for their use is always the right one, and whether it really confers benefits to the patients. The widespread presence of antibiotics and chemotherapeutics for systemic use was less expected: they were found in close to 50% of the surveyed households in 2001 and in a comparable proportion of households in 1977, ie, more regularly than the common over-the-counter drugs like vitamins and nutrients or cold relief products, and equally frequently in the households with and without healthcare professionals among the members. It appears that antibiotics were rather commonly self-medicated in both 2001 and 1977, that is, in around 40% of the households in which they were found. These findings do not indicate as widespread presence and self-medication of antibiotics as was recently reported in some other countries, such as Russia, where antibiotics were found in 84% of the households in a systematic survey in 9 cities (11). Nevertheless, our findings still do not seem to fit the description of "responsible self-medication." Although self-medication of antibiotics was more frequently reported in households with a healthcare professional among the members, and a similar tendency was observed in 1977 (12), it is likely that even in such cases self-medication of antibiotics was largely inappropriate considering the parameters needed for a fully adequate prescription of antibiotics. Self-medication of antibiotics is a well-recognized form of inappropriate drug use (9-11). Typically, this means the use of antibiotics in inadequate indications, e.g., for common cold or upper respiratory viral infections; a discrepancy between the drug's antimicrobial spectrum and the agents causing a disease; inadequate dosing and inadequate duration of treatment. The most common medical risks associated with inappropriate use of antibiotics are the lack of therapeutic effect, progression of the disease and the development of bacterial resistance to anti-microbial agents (14).

In around a quarter of the surveyed households in the both surveys and irrespective of the presence of healthcare professionals among the household or family members, medicaments that were either past expiry dates or with purpose unknown to the household members, or both were found. From a toxicological and safety point of view this fact may represent a theoretical or even a practical risk factor, especially if combined with the availability of drugs to children. It also illustrates a general attitude towards drug keeping that could best be described as "carelessness."

Overall, the two surveys conducted 25 years apart have consistently pointed to a largely irrational tendency of accumulation of various over-the-counter and prescription drugs, even if past expiry dates or of unknown purpose, as an important feature of drug keeping in the surveyed households. At the same time, an important feature of self-medication appeared to be a rather common practice of self-medication of prescription drugs – a major deviation from the concept of "responsible self-medication" Such practices may be unfavorable on both individual and community levels as sources of direct medical risks and related burden to the healthcare system (2). Although the samples in our surveys were relatively small and not representative for the whole country, we do not believe that the situation is substantially different on the national level. The present findings support the need for a broader survey because activities addressing the issue of rational household drug keeping and rational and responsible self-medication would contribute to the ongoing efforts aiming to improve the cost-effectiveness of the Croatian healthcare system (15).

References

1 World Health Organization. Report of the WHO expert committee on national drug policies. Contribution to updating the WHO guidelines for developing national drug policies. 1995. Available from: *http://www.who.int/medicines/library/dap/who-dap-95-9/who-dap-95. 9.shtml*. Accessed: April 20, 2004.

2 Homedes N, Ugalde A, Chaumont C. Scientific evaluations of interventions to improve the adequate use of pharmaceuticals in Third World countries. Public Health Rev. 2001;29:207-30.

3 Leybishkis B, Fasseas P, Ryan KF. Doxylamine overdose as a potential cause of rhabdomyolysis. Am J Med Sci. 2001;322:48-9.

4 Stevenson R, MacWalter RS, Harmse JD, Wilson E. Mortality during the winter flu epidemic – two cases of death associated with self-medication. Scott Med J. 2001;46:84-6.

5 Schabitz WR, Berger C, Knauth M, Meinck HM, Steiner T. Hypoxic brain damage after intramuscular self-injection of diclofenac for acute back pain. Eur J Anaesthesiol. 2001;18:763-5.

6 Hughes CM, McElnay JC, Fleming GF. Benefits and risks of self medication. Drug Saf. 2001;24:1027-37.

7 Barat I, Andreasen F, Damsgaard EM. The consumption of drugs by 75-year-old individuals living in their own homes. Eur J Clin Pharmacol. 2000; 56:501-9.

8 Okumura J, Wakai S, Umenai T. Drug utilisation and self-medication in rural communities in Vietnam. Soc Sci Med. 2002;54:1875-86.

9 Cagri Buke A, Ermertcan S, Hosgor-Limoncu M, Ciceklioglu M, Eren S. Rational antibiotic use and academic staff. Int J Antimicrob Agents. 2003;21:63-6.

10 Orero Gonzalez A, Ripoll Lozano MA, Gonzalez Nunez J. Analysis of automedication with antibiotics in Spain [in Spanish]. Enferm Infecc Microbiol Clin. 1998;16:328-33.

11 Stratchounski LS, Andreeva IV, Ratchina SA, Galkin DV, Petrotchenkova NA, Demin AA, et al. The inventory of antibiotics in Russian home medicine cabinets. Clin Infect Dis. 2003;37:498-505.

12 Lacković Z, Richter M, Borić V. Self-medication and home pharmacies [in Croatian]. Pharmaca 1978;16:195-210.
13 Kovačić L, Šošić Z. Organization of health care in Croatia: needs and priorities. Croat Med J. 1998;39:249-55.
14 Liu YC, Huang WK, Huang TS, Kunin CM. Inappropriate use of antibiotics and the risk for delayed admission and masked diagnosis of infectious diseases: a lesson from Taiwan. Arch Intern Med. 2001;161: 2366-70.
15 Homedes N, Ugalde A. Improving the use of pharmaceuticals through patient and community level interventions. Soc Sci Med. 2001;52:99-134.

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Correspondence to:
Zdravko Lacković
Laboratory for Neuropharmacology
Department of Pharmacology
Zagreb University School of Medicine
Šalata 11
10000 Zagreb, Croatia
lac@mef.hr