Patterns of medical drug use — a community focus

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The pattern and extent of medical use of drugs was examined by survey in a rural Ontario community (Smithville) and a suburban (Burlington) family practice. Changes in established patterns of drug use that occur after the introduction of a nurse practitioner were also examined in the suburban practice. In both surveys 60% of respondents were using at least one medication and 30% were taking at least one medication prescribed or suggested by a doctor. There were consistently high rates of use of nonprescribed drugs at all ages, especially among females. Vitamins and tonics were the most commonly used drugs, and were taken by 25 to 28% of the respondents, 40% of whom used them on the advice of a physician. From 8.8 to 10.5% of respondents used sedatives or tranquillizers, and reduction in the prescribed use of these drugs was found among patients managed by the nurse practitioners. Self-medication is apparently unrelated to the frequency of medical consultation.

Les modalités de l'emploi médical des médicaments et le degré de cet usage ont été analysés par une enquête menée dans une communauté rurale de l'Ontario (Smithville) et au sein d'une pratique médicale familiale dans une banlieue (Burlington). Après l'apparition des infirmières cliniciennes nous avons aussi étudié les changements intervenus dans les modalités d'usage des médicaments au sein de la pratique de banlieue. Dans ces deux enquêtes 60% des répondants utilisaient au moins un médicament et 30% employaient au moins un médicament prescrit ou conseillé par un médecin. On a noté également que des individus de tout âge, surtout des femmes, recouraient souvent à des médicaments non prescrits. Des vitamines et des toniques étaient les médicaments les plus souvents utilisés, étant pris par 25 à 28% des répondants, dont 40% sur le conseil du médecin. De 8.8 à 10.5% des répondants avaient recours à des sédatifs ou à des tranquillisants, et il y a une réduction des posologies prescrites parmi les malades traités par les infirmières cliniciennes. L'automédication ne semble pas avoir de lien avec la fréquence des consultations médicales.

Medicine taking, whether physician- or self-initiated, is the most frequent health-related activity in developed countries. In the United States, pharmaceutical production data indicate that the consumption of prescription drugs has doubled over the past 10 years.[1] Adjustments for price increases and population growth expose a real increase in drug taking.

Recognized benefits of drug therapy are now being examined in light of an increasing awareness of drug-induced illness. In the United States about 3% of patients admitted to hospitals have a drug-induced illness[2-7] and 10 to 31% of hospitalized patients have untoward reactions to prescribed drugs at some time during their hospital stay.[5-8] Ogilvie and Ruedy[9] reported that adverse drug reactions accounted for 6.6% of hospital admissions and occurred in 18.0% of hospitalized patients in Montreal over a 1-year period in 1965-66.

Despite the increase in consumption of medicines and the importance of complications resulting from drug therapy, there is little information about the nature and extent of medicine use by delineated nonhospitalized groups.

By comparing drug-related morbidity and mortality to drug-use information gained from a sample of hospital patients Jick[10] concluded that drugs are remarkably nontoxic. While Jick's conclusion is probably correct, inferences about drug use in the community from data supplied by such a selected, unrepresentative group may be inappropriate. Persons hospitalized for adverse drug reactions are from the community, so a good complementary estimate of drug-related risk obtained from drug-use data in samples of nonhospitalized persons in the community is important. Such information is usually obtained by survey.

In this paper the pattern and extent of the medical use of drugs in a rural Ontario community and a suburban Ontario primary care practice are examined. Changes in established patterns of drug use that occur after the introduction of nurse practitioners into the suburban practice are also examined.

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Finally, an analysis of patterns of self-medication and an assessment of use of physician or nurse services by persons prone to self-medication is reported.

Methods

General plan and data sources

Information on patterns of drug use was obtained in the course of two surveys recently conducted in southern Ontario under the auspices of the McMaster University school of medicine.

The first survey was conducted in a rural south-central Ontario municipality, Smithville, on a simple random sample of 20% of households, and is referred to here as the community survey. The details of the methods have been described.[11]

The second survey was conducted on a stratified random sample of members of enumerated families receiving their primary medical care from a suburban Ontario (Burlington) family practice, and is referred to here as the practice survey. The interview data were collected to assess changes in health status and utilization of health services as a result of the introduction of nurse practitioners. The basic design and data-gathering instruments have been described.[12,13]

Data gathering

The information was obtained by pretested, standardized questionnaires administered in respondents' homes by interviewers of the McMaster University health sciences field survey unit (FSU).* The field work for the community survey was carried out from May through July 1971 and repeated from May through July 1972.

To minimize problems in recall, questions pertaining to drug use were limited to the use, within the previous 48 hours, of 10 categories of "medicines, pills or ointments" — specifically, pain relievers, cough and cold remedies, laxatives and stomach remedies, vitamins and tonics, sleeping pills, tranquillizers and sedatives ("nerve pills"), oral contraceptives, antibiotics, and medicines for the heart and blood pressure. Provision was made for recording additional types. The wording of the key question was:

Question 1. *Yesterday or the day before that, did you take or use any of the following medicines, pills or ointments?*

A respondent reporting use of any of the specified types of medicine was then asked:

Question 2. *Were they prescribed or suggested by a doctor?*

The studies were not concerned with prescribing rates but rather with overall use of medications and the influence of a health professional on this use. Replies to question 2 would differentiate self-initiated and professionally initiated drug use.

Because self-medication as a method of alleviating discomfort may be a substitute for traditional medical care, all respondents were asked if a visit to a nurse or a physician had been made in the previous 2 weeks. Responses were examined with reference to non-use and self-initiated use of four categories of common drugs readily available to the consumer.

In this report "prescribed" means recommended by prescription or suggestion and "nonprescribed" means taken without professional recommendation by prescription or suggestion. "Medicines" include pills and ointments.

If one or more medicines in any single drug category was prescribed or suggested by a doctor, then the drug use was considered advised whether or not the respondent was using a similar medicine concurrently of his own accord. As a result, the data may underestimate the extent of self-initiated drug use.

Statistical analysis

The McNemar chi-square test was used to determine whether changes in drug use were significant.

Results

Description of surveyed populations

The age and sex distributions of respondents in the community and practice surveys are shown in Table I. Provincial figures are given for comparison. The Smithville sample was weighted heavily to young age groups, reflecting the age distribution of West Lincoln Township, where Smithville is located.

Compared with the entire province the practice population was underrepresented in the pediatric age group and overrepresented in the adult age groups. These differences may be related to local community differences, the family physician practice patterns and the availability and accessibility of specialty pediatric care. A differential response rate is an unlikely explanation, for the final response rate was 89%. Females predominated in the practice survey.

To render the observations from the two surveys comparable, given the differences in the composition of the samples, the rates reported in this article have been standardized for age and sex according to the 1971 census information for the entire province.[14]

Extent of medication use

Overall, 60% of respondents had taken at least one medicine in the previous 48 hours.

Nonprescribed medicines: Approximately 58% of interviewed subjects in both the community and practice surveys had taken at least one nonprescribed medication in the previous 48 hours (Fig. 1). Of these, about 60% had taken one drug, about 25% two, and about 20% three or more.

Prescribed medicines: Use of at least one prescribed medicine in the previous 48 hours was reported by 35.8% of respondents in the community survey and 28.6% in the practice survey (Fig. 2).

Patterns of self-initiated and advised use of medicines

The patterns of use of prescribed and nonprescribed medicines were examined by age and sex and by specific drug categories.

Use of prescribed and nonprescribed medicines: The age- and sex-specific

Table I—Age and sex distribution of survey respondents and total Ontario population

Age group (yr)	Community survey Smithville, 1971 (n = 1501) %	Practice survey Burlington, 1972 (n = 1133) %	All Ontario, 1971 (population, 7 452 000) %
0 — 9	23.8	8.8	19.5
10 — 19	24.1	14.4	18.9
20 — 29	10.6	16.6	15.1
30 — 39	10.5	16.9	13.0
40 — 49	12.0	17.6	11.2
50 — 59	7.9	13.8	9.4
≥ 60	11.1	11.9	12.9
Sex			
Male	50.5	45.7	49.9
Female	49.5	54.3	50.1

*For 228 pages of questionnaire instruments used in this project, order NAPS Document 02178 from National Auxiliary Publication Service, c/o Microfiche Publications, 305 East 46th St., New York, NY 10017, USA, remitting $1.50 for microfiche copy reproduction or $34.70 for photocopies. Cheques or money orders should be made payable to Microfiche Publications.

rates of use of prescribed and nonprescribed medicines by respondents in the practice survey are shown in Fig. 3. Similar results were obtained from the community survey. It appears that there is a substantial amount of self-medication in all age groups. Use of nonprescribed medicines exceeded that of prescribed medicines in all age–sex categories. As well, use of nonprescribed medicines by females exceeded that by males in all age groups. Use of prescribed medicines by males in the community and practice surveys decreased to low rates in middle life, then gradually increased to maximum rates in the oldest age group (Fig. 4). When use of oral contraceptives was excluded, a similar trend for use of prescribed medicines by females was found (Fig. 4). No such age trend was evident in use of nonprescribed medicines.

Use of specific nonprescribed medicines: In four drug categories there were considered to be a substantial number of preparations available to the public without prescription for readily recognizable problems (e.g., colds, constipation and headaches). The frequency of use of these drugs, which are available mostly as over-the-counter or proprietary agents, is illustrated in Fig. 5 for the practice survey; results from the community survey showed similar rank order and similar differences in self-initiated and prescribed drug use. Nonprescribed use substantially exceeded prescribed use in three of the four categories. Use of vitamins and tonics was the result of a physician's recommendation in 40% of instances. For pain relievers, self-medication was 2.6 times more frequent than physician-prescribed medication, whereas for laxatives and stomach medicines the rates were about equal. As well, the data suggest that at least twice as many persons treated their own colds as went to a physician for treatment. Persons taking medication for the prevention or symptomatic relief of fever, pain, colds or bowel problems were more likely to use of their own accord pain relievers than the two other types of medicine.

Use of specific prescribed medicines: Among the drugs issued predominantly by prescription, tranquillizers and sedatives appear to be the most fre-

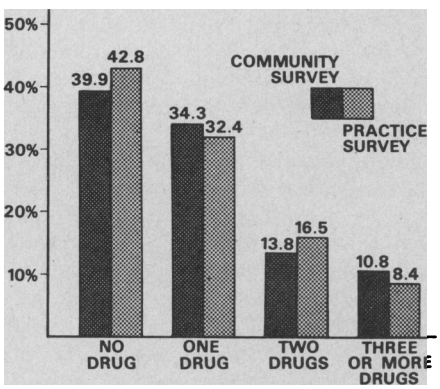

FIG. 1—Extent of use of nonprescribed medicines in previous 48 hours in rural community and suburban primary care practice. Data standardized for age and sex according to 1971 census data for all Ontario.

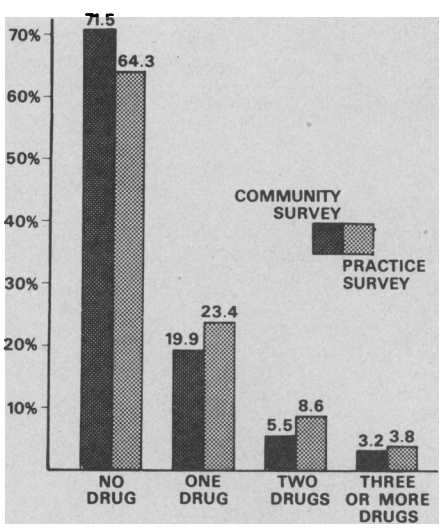

FIG. 2—Extent of use of prescribed medicines in previous 48 hours in the two groups. Data standardized as for Fig. 1.

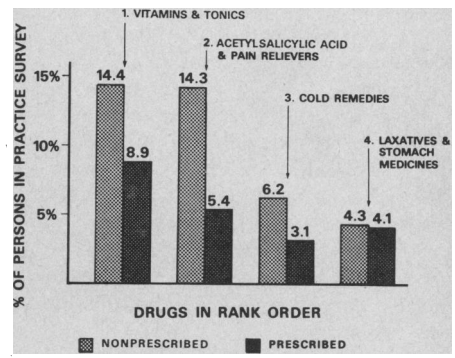

FIG. 5—Use of specific prescribed and nonprescribed medicines.

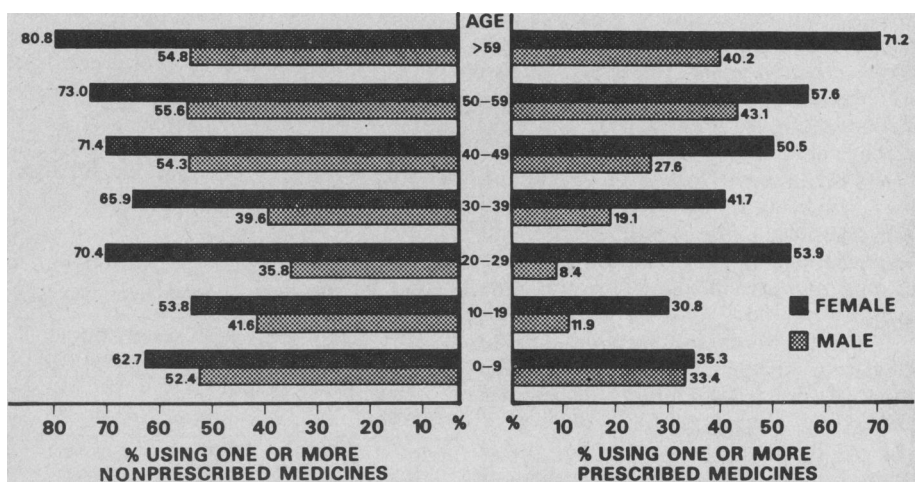

FIG. 3—Use of prescribed and nonprescribed medicines by respondents in practice survey, by age and sex.

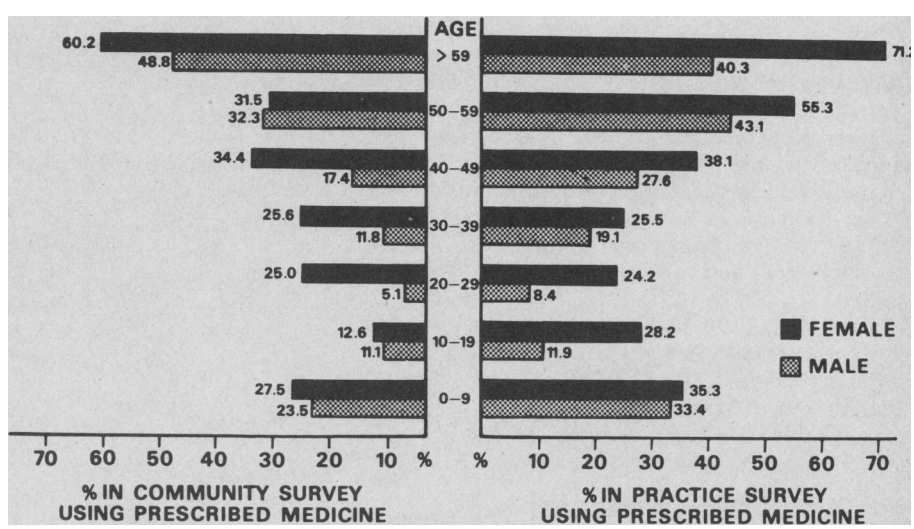

FIG. 4—Use of prescribed medicines (oral contraceptives excluded) by respondents in both surveys, by age and sex.

quently used. More than 50% of sedative and tranquillizer users were 50 years of age or over. Use of these drugs was 2.2 times more frequent among females than among males in the community survey, and 1.6 times more frequent among females in the practice survey. This sex disparity was largely due to the greater use of these drugs by women 30 to 49 years old. Overall sex-standardized rates for those 20 years of age and older were 8.8% (community survey) and 10.5% (practice survey).

Oral contraceptives were used by 14.7% of respondents in the community survey and 17.3% in the practice survey (standardized for all women aged 20 to 59 years).

Antibiotics accounted for 1.7% of use of prescribed medicines in the community survey and 2.4% in the practice survey.

Effect of the nurse practitioner on established patterns of drug use

From the Burlington randomized controlled trial the use of a nurse practitioner in routine patient care was found to be effective, safe, cost-effective and of reasonable quality.[12,13,15] The nurse collected clinical data (history and physical examination) and made decisions from the alternatives of no treatment, treatment advice or consultation with the physician. She could recommend medicine but all prescriptions were confirmed and countersigned by the physician.

Families were randomly assigned to physician or nurse practitioner at the start of the trial. During the control period the frequency of use of each of the 10 drug categories did not differ significantly among the 817 persons subsequently randomly assigned to either the physician or the nurse. The same 817 persons were among those reinterviewed 1 year later.

Among the 521 patients assigned to the physician there was a significant decrease ($P < 0.01$) after 1 year in the use of acetylsalicylic acid and other analgesics (Table II). There was an increase in the frequency of use of vitamins and tonics, largely attributable to an increase in self-medication. No change in the frequency of use of tranquillizers and sedatives was detected.

Among the 296 patients assigned to the nurse practitioner there was a significant decrease ($P < 0.02$) after 1 year in use of tranquillizers and sedatives (Table II). Use of drugs in all other categories was unchanged.

Use of drugs and of primary care services

Use of the four categories of common over-the-counter agents appeared to be independent of whether a patient had visited a health professional in the preceding 2 weeks (Table III).

Discussion

Haggerty and Roghmann[16] reported that during a 48-hour period 25% of persons in an upstate New York area had taken a prescribed medicine and 22% a nonprescribed medicine. Jeffereys, Brotherston and Cartwright[17] found 25% of persons sampled in an English community to have taken a prescribed medicine and about 67% a nonprescribed medicine in a 4-week period. In an international comparative study of medical care utilization Anderson[18] reported the proportion of the surveyed population using prescribed drugs to be 43% in the United States, 46% in England and 62% in Sweden. Jick[10] has estimated that 75 million adults in the United States take on the average two drugs regularly (at least once per week) per year. Josie[19] reported the use of drugs in a 48-hour period in four western Canada communities to be 36.6% (nonprescribed medicine), 25.1% (prescribed medicine) and 53.7% (overall). The evidence from our two surveys confirms previous findings of extensive medical use of drugs by suggesting that 60% of persons are taking at least one medicine at any one time and 30% are taking at least one drug prescribed or suggested by a doctor.

We have found that for every nonprescribed drug used as a result of a physician's prescription or advice, at least one other comparable agent is being used on the initiative of the consumer. Vitamins and tonics are the most commonly used drugs. They may be used by 25 to 28% of the population, 40% of whom use them as a result of a physician's prescription.

The pattern of use of prescribed drugs appears to follow well known morbidity patterns. The frequency of use in childhood is probably determined by the problems of growth and development and the incidence of infectious diseases and respiratory illnesses. Adolescence and middle life are frequently prime years of health and well-being and are characterized by the lowest rates of use of prescribed drugs. The overall use of prescribed drugs by the patients in our study suggests that the physicians' prescribing practices are consistent with expected morbidity patterns.

There appeared to be no morbidity-related pattern of use of prescribed drugs by age. Physicians have little influence on the use of nonprescribed medicine: the patient is both the deci-

Table II—Changes in drug use, practice survey

Drug class	Patients assigned to physician (n = 521)			Patients assigned to nurse practitioner (n = 296)		
	P_1	P_2	McNemar chi-square	P_1	P_2	McNemar chi-square
Pain relievers	0.267 (139/521)	0.196 (102/521)	$X^2 = 9.993$ $P < 0.01$	0.270 (80/296)	0.240 (71/296)	$X^2 = 0.976$ NS
Vitamins and tonics	0.025 (13/521)	0.035 (18/521)	$X^2 = 5$ $P < 0.05$	0.037 (11/296)	0.024 (7/296)	$X^2 = 1.6$ NS
Tranquillizers and sedatives	0.081 (42/521)	0.084 (44/521)	$X^2 = 0.105$ NS	0.074 (22/296)	0.041 (12/296)	$X^2 = 5.556$ $P < 0.02$

P_1 = proportion using drug in 1971 survey; P_2 = proportion using drug in 1972 survey.
NS = not significant.

Table III—Self-medication and use of primary care services

Drug class	% (and no.) visiting nurse or physician in previous 2 weeks*			
	Community survey		Practice survey	
	Nonusers	Self-medicators	Nonusers	Self-medicators
Pain relievers	13.3 (1183)	15.4 (266)	17.4 (902)	19.1 (162)
Cold remedies	13.7 (1348)	15.0 (107)	18.3 (1063)	16.3 (43)
Laxatives and stomach medicines	14.4 (1407)	11.5 (61)	18.2 (1037)	18.4 (49)
Vitamins and tonics	14.1 (1060)	10.2 (294)	17.5 (859)	21.1 (175)

*No significant differences in any comparison.

sion maker and the consumer. Our data suggest that there is little relation between how people use nonprescribed medicines and expected patterns of clinical illness. Jeffereys and colleagues[17] found that nonprescribed medicines were consumed by about 3 out of 10 adults and 4 out of 10 children who claimed they had no illness or symptoms. Prophylactic use of nonprescribed drugs may account for the high rates of use in all age groups in our study. Nevertheless, Knapp and Knapp[20] reported a clear association between morbidity and use of nonprescribed medicines.

Our finding of an 8.8 to 10.5% rate of use of tranquillizers and sedatives at any one time is comparable to the results of the cross-national study reported by Balter, Levine and Manheimer,[21] who found from household surveys that the 1-year rates of drug use among persons aged 15 years and over varied from a low of 10% in Spain to a high of 15% in Belgium and France. They defined a user as a person admitting to the use of such a drug on 1 or more days during the preceding 12 months. Many believe that the data of Balter and colleagues underestimate the use of these drugs because of the potential failure of a subject to recall occasional use in a 12-month recall period.[22]

Antibiotics were used with surprisingly low frequency. Our findings differ from those of Stolley and colleagues,[23] who found antibiotics to be the most frequently dispensed class of prescribed drug, representing 15% of prescriptions issued in a defined mid-Atlantic US community in 1968. Our definitions of medicines and prescription were broad, and our focus of interest was not the doctor's pen but the community, consisting of users and nonusers of medical services. With this perspective antibiotics were the least prescribed medicine out of 10 drug categories, led closely by prescribed laxative and stomach medicines, and cold remedies.

We used a broad category of miscellaneous drugs in our summary analysis, including anorexiants, hypoglycemics and topical agents. This heterogeneous group accounted for 10% (community survey) and 13% (practice survey) of use of nonprescribed drugs and 7.4% (community survey) and 13.5% (practice survey) of use of prescribed drugs.

The nurse practitioners in the primary care practice were able to function adequately within the described terms of reference for drug prescribing. There was no appreciable change in self-medication patterns among their patients after 1 year but there was a significant decrease in prescribed use of tranquillizers and sedatives. Either the nurse practitioners were recommending tranquillizers and sedatives less often or the patients' conditions had improved so that use of these medications was no longer indicated. Another possibility is that patients requiring tranquillizers had stopped having them prescribed. Use of drugs in all other categories was unchanged. The first explanation is the most likely because the nurses' training had emphasized the management of psychosocial problems with minimal use of medications. Confirmation of our finding in other settings is important.

In summary, this analysis exposes Canadian society's considerable dependence on drugs in everyday life. Pharmacologic support for prophylactic, symptomatic or curative purposes is apparently accepted by 60% of Canadians at any one time. The extent of medical use of drugs is of sufficient magnitude to warrant monitoring on a periodic or continuous basis. It is against this type of denominator data that the consequences of this type of use (adverse drug reactions, drug interactions, drug-related accidents, suicide by overdose, and drug addiction and dependence) should be evaluated. A longitudinal perspective could allow an appropriate evaluation of changes in community drug-taking habits. As well, the effects on the community of legislative changes pertaining to drug availability (e.g., restriction of medical use of amphetamines) could be monitored. Community patterns of drug use may also predict or explain variations in the incidence of disorders resulting from medical use of drugs.

Our findings suggest that the behaviour of both consumers and health professionals contributes to the extensive use of drugs for health purposes, a new manifestation of "galloping consumption". The pattern and appropriateness of physicians' prescribing practices justify concern that iatrogenic drug abuse may be emerging as a socially significant phenomenon. Finally, more extensive, longitudinal studies into the demographic and psychological characteristics of consumers who obtain drugs from licit sources may provide needed insight into this prevalent behavioural phenomenon.

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Postgraduate Courses

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