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LARGE DIFFERENCES BETWEEN PRESCRIBED AND DISPENSED MEDICINES COULD INDICATE UNDERTREATMENT

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The difference between prescribed and dispensed medicines in Sweden has been determined for the 20 most common diagnoses for all outpatients. For all diagnoses together, the value of dispensed medicines was 14% lower than for those prescribed. For some diagnoses a considerable number of the prescriptions never appeared at the pharmacies, for example, climactic symtoms—48%, allergic rhinitis—42%, glaucoma—41%, and diabetes—39%. If the doctors intended that the medicines prescribed should also be consumed by the patients in order to obtain appropriate treatment, these data indicate that considerable undertreatment occurs for patients with certain diagnoses.

Key Words: Compliance; Prescribed/dispensed medicines; Undertreatment

SWEDISH DRUG STATISTICS provide a detailed description of the sales of medicines both at the local and national levels. Most of the data collection occurs from the deliveries to the pharmacies and when the prescriptions are dispensed at the pharmacies.

It could be assumed that the sales obtained at the pharmacies should closely reflect the doctors' prescriptions to their outpatients. This would require that all the doctors' prescriptions are also dispensed at the pharmacies. There have been indications however, that this may not always be the case. Therefore, the authors conducted a study to determine whether there are any differences between prescriptions issued by the doctors and those that appear in the pharmacies. This study was conducted by combining data from two of the available databases for drug statistics in Sweden. The study was limited to the 20 most common diagnoses for outpatients during 1991. To the authors' knowledge, similar studies have not been previously performed on a national level.

METHODS

Drug statistics in Sweden are produced by Apoteksbolaget (The National Corporation of Swedish Pharmacies). The system has previously been described in detail (1, 2). Four separate databases are used:

1. *Deliveries to the pharmacies*—Data on the total drug sales in Sweden are provided by a continous monitoring of all drugs delivered from the wholesalers to the pharmacies,
2. *The National Prescription Survey (NPS)*—This survey is based on the results of

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a one in 25 random sample drawn from nearly 50 million prescriptions dispensed annually. Among the data recorded from the prescriptions are name of the medicine as well as the age and sex of the patient,

3. *The National Diagnosis and Therapy Survey (NDTS)*—This survey is based on data produced by physicians. In one year about 2,000 out of 18,000 eligible physicians participate, and each doctor participates for one week per year. On copies of their prescriptions, the doctors add diagnosis or symtoms of the patient and the data are registered according to the International Classification of Diseases (3). The name of the drug and the patient data are registered as in the National Prescription Survey,
4. *Local Prescription Survey*—Each doctor can order his/her own private prescription survey. This can also be arranged for health centers, communities, and so forth. The statistics are used in the doctor's self auditing of his/her personal prescribing pattern as well as for other auditing purposes (4).

In this study, data from the NPS and NDTS were combined in order to estimate the ratio of the prescriptions for various diagnoses that were dispensed at the pharmacies. Data for prescriptions written were obtained from NDTS and data for prescriptions dispensed from NPS. The prescribed amount of a certain drug at a specific diagnosis could be obtained either as defined daily doses (DDD) or in monetary terms (Swedish crowns, SEK—one US dollar is about seven SEK) expressed in pharmacy retail prices.

The dispensed amount of a certain medicine for a specific diagnosis was calculated as the total sales of this medicine multiplied by the fraction of this medicine prescribed for the diagnosis according to NDTS. Prescribed and dispensed amounts for each diagnosis are expressed in SEK rather than in DDD, since this would also cover drugs without DDD value available and sometimes the drug costs has a wider interest.

The 20 most common diagnoses in terms of drug costs were studied. Together, they represent about 54% of all drugs prescribed to outpatients in Sweden during 1991. Preliminary studies of data for 1992 and 1993 indicate similar results to those presented below.

NPS and NDTS do not cover exactly identical time periods. The data from NPS covers the calender year of 1991, whereas NDTS covers October 1990 to September 1991. This difference may introduce a certain error in the data, although a comparatively small error since the fraction of prescriptions for a specific diagnosis taken from the NDTS database is not likely to change much over a few months.

RESULTS AND DISCUSSION

The results of the study are presented in Table 1. Overall, the value of dispensed medicines was 14% lower than the value of those prescribed. For eight diagnoses, the prescriptions that were not dispensed at the pharmacies ranged between 25–48% of what was prescribed. The highest value was found for climactic symtoms with 48%. High values were also found for allergic rhinitis—42%, glaucoma—41%, diabetes—39%, and so forth. Diagnoses with a low level of dispensed prescriptions seem to be primarily chronic diseases with periods when the patient is free from symtoms.

There may be several reasons why the patients do not bring all their prescriptions to the pharmacies. It is possible, for example, that for patients with chronic diseases, the doctors tend to supply the patients generously with prescriptions, more than they really need to treat their disease. That could not account, however, for all the differences observed. Results from patient interviews (5) indicate that the patients have their own opinions on what is "good or bad medicine." If they have been prescribed a medicine they consider inap-

TABLE 1
Value* of Prescribed and not Dispensed Medicines in Sweden in 1991 for the 20 Most Common Diagnoses

Diagnosis (ICD-9)†	Prescribed SEK · 10^6	Not dispensed SEK · 10^6	Difference in %
Hypertension (401)	953	177	19
Asthma (493)	666	136	20
Diabetes (250.0)	489	184	38
Angina Pectoris (413)	355	64	18
Glaucoma (365)	200	81	41
Cardiac insufficiency (428)	180	44	25
Allergic rhinitis (477)	171	71	42
Climactic symptoms (627)	163	78	48
"Pain"	134	24	18
Psychoneurosis (300 + 799.2)	120	−29‡	−24‡
Esofagitis (530.2)	117	−2‡	−2‡
"Ulcer" (531–533)	114	−3‡	−3‡
Hyperlipedemia (272)	110	27	25
"Allergy"	109	28	26
Rheumatoid arthritis (714.0)	106	29	27
Depression (311)	96	15	15
Bronchitis (466 + 490)	96	−7‡	−7‡
Upper respiratory tract infections (460.0 + 462.0 + 465.0)	91	−10‡	−11‡
Sleep disturbances (780.5)	91	−7‡	−8‡
Parkinsonism (332.0)	88	13	15

*Value in pharmacy retail price SEK (Swedish crowns. One U.S. dollar approximately seven SEK.)
†Classification code according to International Classification of Diseases (3).
‡Negative values indicate that the value of dispensed medicines is larger than the estimated value of prescribed medicines.

propriate for them, they may not bring their prescriptions to the pharmacy.

If the doctors' primary intentions are that the medicines prescribed should also be consumed in order to obtain appropriate treatment, these data may indicate that considerable undertreatment occurs for patients with certain diagnoses. This may contribute to a lower cost for medicines, but it may result in higher costs in other parts of the health care system.

Some diagnoses have negative values in Table 1. This indicates that the pharmacies have dispensed more medicines than what has been prescribed according to the collected data. Small negative values are probably due to statistical error. The largest negative value, −24%, is found for psyconeurosis. Most of the drugs used for this diagnosis are benzodiazepines. This group of drugs is under debate and its use and prescribing are closely monitored by the regulatory agencies. It is, therefore, possible that the doctors tend to underreport their prescribing of benzodiazepines when they participate in the data collection. The same argument can probably be used for sleep disturbances. Bronchitis and upper respiratory tract infections may also be diagnoses where underreporting can easily occur. It is likely that these patients are treated by doctors who are not selected for the NDTS because they do not see patients regularly.

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