

Use and wastage of prescribed medicines in the home

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SUMMARY. A survey of prescribed medicines was carried out in 192 homes, broadly representative of households in England and Wales. The average home had 3.2 containers of such medicines; 56 per cent were in current use, 16 per cent in occasional use, and 28 per cent were never used. One fifth of all oral antibiotics found in the study were wasted. A rough estimate suggests that £23 million of prescription products (5.6 per cent of the total) are wasted annually in England and Wales.

Introduction

THE cost of medicines in England and Wales for the NHS for 1975/76 was £362 million. The report of the Prescription Pricing Authority 1975/76 calculates the average cost of a prescription as 134p. Department of Health and Social Security annual reports show that although this cost has risen from 15p in 1948, pharmaceutical services have remained at about ten per cent of total NHS costs ever since.

Method

In an attempt to estimate the quantities and potential hazards of drugs stored in the home a survey was carried out. Two hundred households were drawn randomly from the electoral list of one ward in Birmingham; 215 premises were selected, but empty houses (six), failure to contact after three repeat visits (four), or refusal or inability to co-operate (13) reduced the sample to 192 homes.

The interviewing pharmacist, armed with a carefully evaluated survey form to enable rapid recording, introduced himself, explained his survey, and sought the householder's participation. He attempted to record the whereabouts, frequency of usage, and number or volume of every medicine in the home. Medicaments purchased over the counter were separated from prescription products by their different labelling.

Costs have been estimated using the procedure employed by the Prescription Pricing Authority, namely increasing the wholesale price by 10.5 per cent on cost, subtracting the average discount, and adding container allowances and professional fees.

Since 1972, pharmacists have labelled all dispensed products with proper names, including strengths for tablets and capsules, so that identification was straightforward. The quantities were either counted, for small numbers, or estimated for larger quantities.

We report only those aspects of this survey which refer solely to the quantities, use, and costs of products obtained on prescription.

Results

Table 1 summarizes the findings and shows that almost two thirds of the homes visited had fewer than ten prescribed medicines on their shelves, while almost a third were without prescription medicines altogether. All products were grouped using the pharmacological classification employed in *MIMS* (Table 2). The three most commonly found classes of therapeutic agents were for treatment of central nervous, respiratory, and skin disorders.

The main factor leading to increased numbers of drugs in the home was household size. This rather obvious conclusion is clearly shown in Table 3 and has previously been reported for the total of prescribed and

Table 1. Homes with prescription medicines.

Number of medicines	Homes with prescription medicines	
	Number	%
0	60	31.2
1-9	119	62
10-19	12	6.3
20-29	1	0.5

Table 2. Number of households containing at least one prescription medicine in the pharmacological class mentioned.

Pharmacological classification	Number	%
1. Alimentary	28	15
2. Cardiovascular	22	11
3. Central nervous system	68	35
4. Musculoskeletal disorders*	22	11
5. Hormones	13	7
6. Genitourinary system	17	9
7. Infections and infestation	32	17
8. Nutrition	24	13
9. Respiratory system	46	24
10. Ear, nose, oropharynx	22	11
11. Eye	12	6
12. Allergic disorders	7	4
13. Skin*	41	21
14. Surgical	1	1
15. Diagnostic	2	1
16. Miscellaneous	5*	3*
Total	192	100

*Include rubefacients, embrocations, rubs, and liniments.

Table 3. Relationship between size of household and number of prescription medicines found.

	Number of people in household					
	1	2	3	4	5	6 or more*
Mean number of medicines	2.3	2.3	3.3	4.5	4.9	2.7
Mean number per head of population	2.3	1.2	1.1	1.1	1.0	0.5

*Only 11 households.

Table 4. Use of prescription medicines.

	Number	%
Medicines in current or regular use	296	56
Medicines rarely or occasionally used	92	16
Medicines never used	155	28
Total different medicines	543	100

purchased products in the home by Dunnell and Cartwright (1972). Our results also suggest that the presence of children, taking into account the larger household size, leads to increased numbers of drugs stored in the home. However, sub-samples for comparison are in some cases very small.

The frequency of use of prescription products is indicated in Table 4. The contents of more than 50 per cent of containers were in current or regular use and need no further explanation. The 16 per cent of medicines "rarely or occasionally used" implied that the patient would start treatment when, for example, a rash returned or hay fever recurred. Inevitably, some overlap could occur between these two headings. The questioner established that the remaining 28 per cent of containers were never used; indeed, these products frequently elicited the comment, "Oh, I meant to throw those away."

The numbers and costs of prescribed medicines are shown in Table 5. They thus represent the actual cost to the NHS, except that the prescription charge of 20p has not been subtracted.

Although 28 per cent of stored medicines were never used, the actual cost of these wasted medicines was 19.3 per cent of the total cost. Table 6 shows how the 155 different wasted medicines were classified. The figures of 21 per cent and 17 per cent for central nervous system (CNS) and respiratory drugs respectively are useful pointers to the main categories of wastage. Further analysis of wasted drugs revealed that almost 20 per cent of containers held antibiotic formulations such as ointments, drops, or tablets, and 11 per cent held oral antibiotics. Presenting this data in another way, 21 per cent of actual doses of oral antibiotics found in the survey were never taken. Similarly, the quantity of wasted tablets and capsules acting on the CNS was 25 per cent of the total of all CNS drugs found.

Discussion

If the sample of homes visited was broadly representative of all households in Great Britain, a national figure could be extrapolated for wastage of prescribed medicines. Judged by the criteria of size of household (Table 7) and social class of householder (Table 8), the

Table 5. Numbers and costs of prescription medicines stored in 192 households.

Number of medicine containers	623
Average number of medicine containers per household	3.2
Total cost—£	463*
Average cost per container—£	0.74
Average cost per household—£	2.41

*Costed as actual charge to NHS.

Table 6. Classes of drugs most commonly wasted.

Class of drug	% Containers of unused medicines
CNS drugs	21
Respiratory/cough medicines	17
Gastrointestinal medicines	13
Oral antibiotics	11
ENT preparations	11
Skin preparations	8
Iron, tonics, and vitamins	6
Antirheumatic products	6
Others	7

Table 7. Size of household.

Number of occupants per household	This survey %	Great Britain %
1	15.5	18.1
2	38.9	31.5
3	16.1	18.9
4	17.1	17.2
5	6.7	8.3
6 and over	5.7	6.0

comparative data suggest the sample was broadly representative of the national picture.

The estimates of wastage in Table 9 are data extrapolated from the findings of the survey. These figures are, however, gross underestimates since 69 per cent of householders assured the questioner they destroyed all surplus medicines indicating their mode of disposal. These estimates therefore represent only the

Table 8. Social class of householder.

Social class	This survey %	England and Wales %
1. Professional	5.7	5.1
2. Intermediate	11.4	17.5
3. Skilled non-manual	46.1	49.3
4. Semi-skilled	19.7	17.0
5. Unskilled	11.4	7.8
Unclassified	5.7	3.3

Table 9. Estimated costs of wasted prescription medicines stored at home.

Group	£
This study—192 households	89.4
England and Wales—16.4 million households	7.6 million
UK—18.5 million households	8.6 million

unused medicines not yet destroyed.

In the survey, few containers bore the date of supply, so that it was not possible to estimate the period during which the medicines had been accumulating. In any case, this would vary from house to house and possibly between medicines also. The absence of a definite period of accumulation made it difficult to estimate accurately the cost of wasted medicines per year, or to express this as a percentage of annual drug costs. However, if we assume that just the same number of unused medicines had already been discarded in one year, the total wasted medicines for England and Wales would have cost £13.3 million or 3.7 per cent of total NHS drug costs. If double the amount found had been destroyed during a year the figures would be £22.9 million or 5.6 per cent.

The figure of about £23 million could be obtained in another way. The national figure of £7.6 million is a direct extrapolation from our survey data, which also suggested that 69 per cent of households destroyed all surplus medicines. Thus this £7.6 million could be considered to represent only those in the remaining 31 per cent of homes. On this basis the total value of destroyed medicines would be about £24 million. Estimates based on this approach would be at some variance with our findings, since many homes had some surplus prescribed medicines, rather than a large surfeit in about one third of houses. Nevertheless, if it were accepted that in the average household 69 per cent of surplus medicines were destroyed, this alternative calculation is reasonable.

By extrapolating from the rough estimate of Nicholson (1967), for which exact numbers of contributing households is unavailable, a figure of £7.2 million can be calculated for costs of wasted prescription products in households in England and Wales. Multiplying this figure by 2.48 to correct for the rise in average prescription cost between 1967 and 1976 gives an estimate of about £18 million. This figure lies half way between the estimates of £13.3 and £22.9 million suggested above.

If the figure of about £23 million or 5.6 per cent for annual wastage is accepted then the corollary is that the remaining 94 per cent of prescribed medicines are completely consumed. This is a very high figure compared with the results obtained in compliance studies. For example, Bonnar and others (1969) found that 32 per cent of pregnant women had given up iron tablets after two months, and Porter (1969), in a general-practice survey on short-term antibiotic treatment, noted that 31 per cent of patients stopped prematurely or took their drugs in a desultory manner. More recently, a highly satisfactory compliance rate of 86 per cent for both dose and time for a wide variety of patient treatments has been reported by Drury and his colleagues (1976).

The inability to define the factor relating the unused medicines found to those destroyed in a given period prevents the preparation of accurate estimates. However, alternative methods such as asking a cross-section of households to record details of all ethical medicines destroyed over a number of months would equally militate against accurate extrapolations on several grounds. Hence, only rough estimates can be made.

Although drug costs have attracted considerable attention and the overuse of medicines is becoming increasingly recognized, there are few reports of the wastage of medicines after they have been prescribed. This paucity of published information is surprising since the many returned medicines campaigns supported by local branches of the Pharmaceutical Society have clearly shown that surplus medicines exist in large quantities in the community. For example, during a five-day collection of unwanted drugs in West Hartlepool some 45,000 tablets and capsules were received (Nicholson, 1967), while a three-week campaign in Manchester (Bradley and Williams, 1975) recovered 762 kg (15 cwt) of medicines for disposal. Similarly, more recent evidence suggests that medicines valued at more than £1 million are returned annually to hospitals for destruction (Hart and Marshall, 1976).

Although our study did not investigate reasons for wastage of medicines, it is likely that both the prescription of an excessive quantity on a single patient visit, the lack of patient compliance, or changes in treatment shortly after initiating therapy, contribute towards the unused drugs in the community. Perhaps the temptation to prescribe treatment for each symptom or to continue treatment too long are other reasons. Our own experience suggests that patients are rarely told

what adverse effects to expect from their medicines and, after experiencing a dry mouth, some constipation, or sleepiness, decide "the tablets do not agree with them". Clearly the reasons why NHS drugs are wasted demand further study.

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Acknowledgements

P. L. White gratefully acknowledges sponsorship from the West Midlands Regional Health Authority for an M.SC course, of which the study formed a part.

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Stress-induced alcohol consumption: a new paradigm

Thirty-two female albino rats were fluid-deprived and were given 15-minute non-contingent shock sessions on alternate days of the experiment. Half of the animals had either alcohol or sucrose solution to drink on days when they were shocked, and on other days they had plain water to drink. For the other half, water was paired with shock, and either alcohol or sucrose solution was available on alternate days. Within each of these conditions, the fluid was available for 15 minutes immediately before the shock sessions for half of the animals and for 15 minutes immediately following the shock sessions for the other half. In addition, eight animals were run which were never exposed to shock. During test days when both alcohol and sucrose solution were available, the animals which had had liquid available before their shock sessions consumed more alcohol than those animals which had had liquid available after the shock sessions ($p < 0.05$). These results suggest that alcohol is drunk in order to alleviate anxiety, which antedates a stressful situation, rather than as a 'healing' agent after stress has already been experienced.

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