

Drug-Related Illness resulting in Hospital Admission

A. J. BLACK, MB, *Medical Registrar*

K. SOMERS, MB, FRCP, FRACP, *Associate Professor, University Department of Medicine, Royal Perth Hospital, Perth, Western Australia*

Several publications have discussed the incidence of hospital admissions attributable to drug-related illness [1-6]. The present retrospective study describes the experience at Royal Perth Hospital, a 1,000 bed general teaching hospital, and compares the results from a 12-month period in a single general medical unit with the figures derived from the computerised medical record system covering all hospital admissions during one year.

Methods

All in-patient discharge summaries for a 12-month period from one of the eight general medical units at Royal Perth Hospital were examined in detail (January to December 1979—481 admissions). Cases of deliberate self-poisoning were excluded. A number of admissions were considered from the information contained in the discharge summaries to be definitely or probably due to drug-related illness, where the patient's admission to hospital was due to a recognised effect of a particular agent, and there was adequate documentation of a causal relationship such as drug assays or expected clinical response on cessation of the drug. A further number appeared likely to be due to drug-related illness, although a causal relationship could not be definitely proven because of lack of data, or because of the ill-defined nature of the suspected adverse reaction. The admissions which were 'definitely or probably' or 'likely' due to drug-related illness were recorded together with the principal diagnosis and the particular drug involved.

In addition, the Medical Records Department figures for all hospital admissions for the year 1977 (total 37,318), classified according to the International Classification of Diseases [7], were examined, and those admissions coded as due to 'complications and misadventures in administration of drugs and biologicals', either coded as 'principal condition' (115 admissions) or 'underlying condition' (130 admissions), were extracted and subdivided according to the nature of the therapeutic agent implicated [7].

From the Medical Records Department information it was also possible to group the individual admissions according to their duration and thus to estimate the bed utilisation that had resulted from the adverse drug reactions.

Results

There is a discrepancy between the results derived from examining the in-patient discharge summaries and those from the Medical Records Department figures. The number of admissions in the first group considered definitely or probably due to drug-related illness is 13, and the number regarded as possibly due to drug-related illness is 17, making a total of 30 admissions out of 481, or 6.2 per cent. The drugs most commonly implicated in both sub-groups were anti-inflammatory agents: exacerbation of cardiac failure due to phenylbutazone (4 of 13 patients) and gastrointestinal disorders (10 of 17) making a total of 14 out of 30, or nearly half of these admissions (Table 1).

The results from the Medical Records Department figures are quite different. The total number of admissions related to 'complications and misadventures in administration of drugs and biologicals' was 245 out of a total of 37,318 admissions to the hospital (including elective admissions and admissions to surgical, psychiatric and specialist medical as well as general medical units). The proportion is 0.66 per cent. The agents most often implicated in the group of admissions where drug-related illnesses were coded as the 'principal condition' were 'cardiac tonics' and hydantoin derivatives (digoxin and phenytoin respectively), although a wide spectrum of pharmacological agents is included (Table 2).

The bed-stay of the patients from the second group is shown in Table 3. The number of 'total patient days' could be converted to an estimate of cost by applying the average cost per occupied bed per day to the total of 1,523 patient days. The average stay of approximately seven days is similar to that reported by Ghose [3], although the available figures exclude patients remaining in hospital for longer than 20 days.

Discussion

The proportion of hospital admissions due to drug-related illnesses presented here is somewhat lower, although of the same order as that reported elsewhere [2-6]. The striking difference between the results derived from the in-patient discharge summaries and those from the medical records figures deserves comment. The former results

Table 1. Drug-related admissions to a general medical unit. (Total 481 admissions in 12 months.)

Illness and/or drug implicated	No. of patients
<i>Admissions definitely or probably due to drug-related illness (13)</i>	
Cardiac failure exacerbated by phenylbutazone	4
Insulin-dependent diabetics admitted with hypoglycaemia	3
Hypokalaemia secondary to frusemide and laxatives	1
Intracerebral haemorrhage on warfarin (prothrombin ratio greater than 5)	1
Phenytoin toxicity	1
L-dopa toxicity	1
Syncope due to glyceryltrinitrate	1
Orthostatic hypotension exacerbated by diuretics	1
<i>Admissions possibly due to drug-related illness (17)</i>	
Gastrointestinal bleeding or ulcer or inflammation thought to be caused or exacerbated by aspirin or other anti-inflammatory agents	10
Altered mental state for investigation:	
(i) theophylline and/or digoxin excess	1
(ii) anti-hypertensive medications	1
Cerebrovascular accident secondary to thrombocytopenia in a patient taking quinidine and warfarin	1
'Drug fever' due to penicillin	1
Colitis due to antibiotics	1
Syncope due to glyceryltrinitrate	1
Ataxia due to carbamazepine toxicity	1
Total	30

Table 2. Drug-related admissions to a general hospital: patients coded as 'principal condition'.

Drug implicated	No. of patients
Cardiac tonics	14
Hydantoin derivatives	10
Insulin and anti-diabetic agents	9
Anticoagulants	9
Penicillin	7
Tranquillisers	7
Hypotensive agents	6
Cardiac depressants	5
Anti-neoplastic agents	5
Miscellaneous and other therapeutic agents	39
Total	111

are likely to be more representative of the number of patients presenting to a general medical unit with drug-related problems, as the circumstances of the presenting illness and the final diagnosis are contained in the discharge summaries. However, there is still the possibility that drug effects in precipitating an illness may have been overlooked where a known underlying disease was

Table 3. Drug-related admissions to a general hospital: bed stay. (Admissions with a duration of more than 20 days are excluded.)

Duration of admission (days)	No. of patients	Patient days
1	44	44
2	11	22
3	8	24
4	15	60
5	9	54
6	18	108
7	14	98
9	25	225
11	28	308
14	17	238
18	19	342
Total	208	1,523

given as the principal diagnosis. The Medical Records Department figures almost certainly represent an underestimate. Part of the reason for this may lie in the coding system, whereby any particular event can be coded as an 'underlying condition', a 'principal condition', an 'other associated condition', or perhaps even left out. In a patient with a number of medical problems there is frequently some ambiguity about the particular category of a specific event.

The disparity noted above highlights the difficulty of obtaining accurate retrospective information about the incidence of hospital admissions as an indication of drug-induced morbidity in the community, and indeed the common difficulty of deciding to what extent drug effects contribute to the development of disability requiring admission to hospital. In most cases it is also impossible to ascertain the reason for the adverse drug reactions, be it inappropriate prescribing, individual sensitivity to drug effect, or simply a statistically expected adverse effect given optimum conditions of drug usage.

In any event, the particular agents most commonly implicated are the same as in the large series reported by Miller[4], namely, digitalis preparations, anti-inflammatory analgesics and anti-diabetic agents. This similarity implies that the results of the present study are representative of the true incidence of drug-related admissions to a general hospital.

The relatively large number of patients admitted because of complications of treatment with digitalis and non-steroidal anti-inflammatory drugs suggests that physicians should prescribe these agents with a degree of caution.

References

1. *British Medical Journal* (1979) **11**, 1246.
2. George, C. F. and Kingscombe, P. M. (1980) *Adverse Drug Reactions Bulletin*, **80**, 288.
3. Ghose, K. (1980) *Journal of the Royal Society of Medicine*, **73**, 853.
4. Miller, R. R. (1974) *Archives of Internal Medicine*, **134**, 219.
5. Wood, S. M., Turner, P. and Vere, D. (1980) *Journal of the Royal Society of Medicine*, **73**, 355.
6. D'Arcy, P. F. (1980) *Pharmacy International* (July), p. 129.
7. World Health Organisation (1977) *Manual of the international statistical classification of disease, injuries, and causes of death*. Geneva: WHO.