Admissions to hospital caused by adverse drug reactions: cross sectional incidence study

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The incidence of adverse reactions to drugs has been assessed with prospective epidemiological studies conducted within single units, departments, or hospitals.[1–3] Because of the variability of the results and a lack of representativeness, it is difficult to confidently extrapolate these results to a national level. To calculate the incidence of admissions caused by adverse drug reactions we conducted a prospective cross sectional study of a representative nationwide sample of medical wards in public hospitals.

Methods and results

Between 2 March and 20 April 1998, the study was conducted for 14 days in each of a representative sample of medical departments in French teaching hospitals and general hospitals. The sample size required was calculated from the results of a pilot study.[4] All patients admitted to the departments sampled were included in the study. Each patient was assessed by a team of local clinicians and pharmacologists to determine whether the admission was the result of an adverse drug event.

A case was defined as a patient admitted because of an adverse drug reaction.[5] Information collected for each case included the patient's drug treatment, characteristics and evolution of the adverse reaction, and the duration of the hospital stay. All cases were later validated by an independent committee.

The 95% confidence interval was calculated for the normal distribution of complex sampling when requirements for using such a method were fulfilled—that is when $n > 20$. The Poisson distribution was used when the design effect was negligible (< 1.5). The χ^2 test and tests of analysis of variance were also used.

In all, 3137 patients were admitted to the 62 medical departments of the 33 hospitals in the study. Altogether 100 (3.19%) patients had been admitted to hospital because of an adverse drug reaction (95% confidence interval 2.37% to 4.01%) (table). These patients tended to be older than those admitted for other reasons (60.5 *v* 52.9 years, P = 0.009) and were more likely to be female (57/100(57%) *v* 1457/3137 (46%), P = 0.03). The incidence of admission for an adverse reaction increased with age (P = 0.005). Gastrointestinal complications were the most frequent cause of admission for an adverse reaction (27/100). Nine of the 100 admissions resulted from gastrointestinal bleeding caused by non-steroidal anti-inflammatory drugs (incidence 0.29%, 0.13% to 0.55%); 13 patients were admitted with a haemorrhage caused by anticoagulant drugs (data not shown). Of the 193 drugs identified as being associated with admission, cardiac stimulants and antiarrhythmic drugs were the most common, accounting for 18 (9%) of the drugs; they were followed by antineoplastic drugs (16/193; 8%), antithrombotic drugs (15/193; 8%), and antihypertensive drugs (15/193; 8%).

Seventy eight of the patients recovered completely, nine had irreversible lesions, and nine died. Among those who died, the adverse effect was the direct cause of death in four cases (0.12%, 0.034% to 0.33%). Three patients were lost to follow up. The average stay in hospital was 9.7 days. Using national statistics we estimated that each year in France 134 159 (97 382 to 170 777) admissions were caused by adverse drug reactions (1 285 256 (920 486 to 1 641 263) days spent in hospital).

Incidence of adverse drug reactions in 3137 hospital admissions

	No of admissions	No of adverse drug reactions	Incidence (%; 95% CI)
Age:			
⩽15	525	10	1.91 (0.91 to 3.5)
16 to ⩽64	1184	31	2.62 (1.57 to 3.66)
⩾65	1428	59	4.13 (2.72 to 5.54)
Total	3137	100	3.19 (2.37 to 4.01)

Comment

This is the first prospective, national study conducted to determine the incidence of hospital admissions related to adverse drug reactions. Our findings are similar to results obtained by two meta-analyses. In Australia an incidence of between 2.4% and 3.6% was found[3] and in the United States an incidence of between 3.1% and 6.2% was found.[1] The mortality found in our study is the same as that found in the United States (0.13%, 0.04% to 0.21%). Older age and female sex are considered to be risk factors for hospital admissions caused by adverse drug reactions; this was confirmed by our results.

Admissions caused by adverse reactions are only one aspect of drug related morbidity and account for about 10% of the adverse effects observed in hospitals.[4] A larger proportion of adverse effects probably occurs in the community and never leads to admission.

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