# General Practice Observed

# Quality of prescribing for children in general practice

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## Summary and conclusions

**In a feasibility study of how often doctors prescribe drugs inappropriately for children 6331 FP10 forms issued to children in September 1978 by a random sample of 72 general practitioners in Wessex were examined. Prescriptions for drugs long known to be contraindicated in children—for instance, chloramphenicol, barbiturates, tetracyclines, and those with effects on appetite—were not encountered. Most scripts were for one drug only. Only about 1% (80/6331) of prescriptions could legitimately be called into question on the basis of current modern specialist teaching, although 42% of the doctors used drugs that have recently been considered to be hazardous or undesirable. These were predominantly drugs to control the symptoms of diarrhoea, vomiting, and enuresis. It is concluded that aspects of prescribing for children are responsible in the main but that there is a lag in the availability or use of important information relevant to general practice. The approach used in this study is applicable to many other areas of clinical practice and does not threaten individual doctors. It may prove to be a convenient way of assessing the general quality of medical care for children.**


## Introduction

The need for medical audit to assess and improve the quality of medical care is widely acknowledged.[1-4] Although quality assessments of child health care have been undertaken in the United States, information is lacking for Britain.[5-7]

Chemotherapy is a common form of management for childhood illness; 60% of children under 14 years of age receive at least one prescription a year from their general practitioners.[8] There have been few attempts, however, to assess the quality of prescribing for children. Two descriptive studies in Britain[9 10] provided baseline data on the frequency of the broad groups of drugs prescribed for children and showed that the performance of a few doctors may have a considerable effect on certain prescribing rates.

Monitoring the quality of prescribing may focus either on the prescription of a specific drug—for instance, was tetracycline given appropriately for the illness and the patient?—or the occurrence of a specific illness in a given patient group—for instance, for otitis media in infants was an appropriate drug regimen given? The first method is the more attractive because prescription events are recorded on FP10 prescription forms. Furthermore, in childhood, because certain drugs and drug combinations are contraindicated for certain age groups, inappropriate prescriptions may be identified in the absence of information concerning the illness. The *British National Formulary* states, for example, that "aspirin is not recommended for infants under 1 year because of the danger of metabolic disturbance. Fatal poisoning may occur with repeated doses."[11] Such a prescription in general practice may be presumed to reflect inappropriate care.

This paper describes a feasibility study which sought to determine the utility and validity of a method of assessing the quality of general practitioner prescribing for children. The study was part of a larger research project[7] that examined and evaluated methods of assessing the quality of medical care for children using the tracer technique described and tested in the USA by Kessner.[12 13]

## Methods

### MATERIALS

With the approval and help of the local medical committee, the local pharmaceutical committee, DHSS Branch P1E, and the Prescription Pricing Authority, 6331 original FP10 prescription forms for children who were exempt from prescription charges because they were under 16 years of age were obtained from the Prescription Pricing Authority at Newcastle. These forms represented the prescriptions for the month of September 1978 of a random sample of 72 general practitioners divided equally between two health districts in Wessex out of a work force of 277. Forms issued by locum doctors were not considered. Consent for the study was given on the understanding that anonymity and confidentiality would be assured. No permanent record of the names of the doctors or patients was made. I had sole access to the prescription forms.

### QUALITY CRITERIA

Explicit criteria that would indicate poor quality of prescribing for children were developed for 17 drug groups or drug combinations. Controversial practices or the use of esoteric or rare drugs were not considered. Support for the criteria was found in current, widely available medical publications that presumably reflected accepted medical opinion. General practitioners who had received adequate undergraduate and postgraduate training in the treatment of childhood illnesses would have been well acquainted with these standards of recommended practice. Deviation would therefore not be justified in the context of normal British general practice.

Inappropriate drug prescriptions, which should be avoided within certain age groups of children, were categorised into those that were "hazardous" (potentially life-threatening) and "undesirable." The latter group also comprised obsolete drugs and those of dubious medical efficacy. A list of supporting references for the following quality criteria is available on request.

*Hazardous* drugs according to age groups in years: aspirin $<1$, barbituarates other than phenobarbitone $<16$, chloramphenicol $<16$, diphenoxylate (Lomotil) $<2$, loperamide (Imodium) $<4$, antiemetic phenothiazines (prochlorperazine, trifluoperazine, perphenazine) $<1$.

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*Undesirable* drugs according to age groups in years: tetracyclines <11, tricyclic antidepressants <5, topical antihistamines <16, diphenoxylate (Lomotil) 2-4, metoclopramide <1, antiemetic phenothiazines (prochlorperazine, trifluoperazine, perphenazine) 1-4. Other undesirable drugs were antidiarrhoeals (as in *MIMS* (14) section 1E) <1, the combination of any two antidiarrhoeals <16, appetite depressants (amphetamines, fenfluramine) <16, tonics and appetite stimulants (as in *MIMS*[14] section 8a) <16, tricyclic antidepressants simultaneously with a urinary antimicrobial (for instance, co-trimoxazole) <16.

AUDIT

Standard pharmacology texts, such as *MIMS*,[14] were used to compile a list of proprietary and non-proprietary names of the above drugs. For each doctor I collected the following data: number of all forms with and without age recorded by whether the writing was in the same hand or apparently written by more than one person; average (mode) number of prescriptions per form; and number of prescriptions of each hazardous and undesirable drug by age group and handwriting.

Where age was not recorded on forms containing prescriptions for tetracyclines and another drug commonly used for treating teenage acne vulgaris was not listed, dates of birth were obtained where possible from the family practitioner committee.

The validity of the data was assessed as follows: 10% of the prescription forms were reinspected so as to determine the levels of agreement with the initial measurements. No serious errors were found; the repeatability indexes ranged from 95% to 100%. In particular no doctor was falsely found to have prescribed a hazardous or undesirable drug. The validity of age recording was not determined, but there is no reason to suspect gross misrepresentation. The data were processed manually by extensive cross-tabulation.

## Results

The mean number of FP10 forms issued by each general practitioner to children in September 1978 was 88±57 (SD). The mode number of prescriptions per form was one, but one doctor issued 339 forms with a mode of two items per form and another issued 280 forms with a mode of three items per form. Only 56% of the 6331 forms had the age of the child recorded on them, though all were exempt from prescription charges because the child was under 16 years of age. Thirteen per cent of all forms were considered to have been written by more than one person (probably by an ancillary and then signed by a doctor). The proportion of forms without a recording of age was significantly greater ($p < 0.001$) in those written by an ancillary (64%) than in those written solely by a doctor (41%).

The table shows the frequency of general practitioners prescribing hazardous or undesirable drugs to children in one month. Inappropriate prescriptions of antisymptomatic drugs for diarrhoea, vomiting, and enuresis were the most widespread. Of the forms containing drugs where a specific record of age was essential for assessing quality of prescribing, 46% had no age recorded.

Nine doctors (13%) were found to have prescribed at least one hazardous drug during the month. Twenty-five (35%) had prescribed at least one undesirable drug, four of whom had also prescribed a hazardous drug. Altogether 30 doctors (42%) had prescribed at least one hazardous or one undesirable drug during the month. Ancillary staff had written 10% of the forms containing hazardous or undesirable drugs; thus they had not written proportionately more inappropriate prescriptions than the doctors.

Some examples of inappropriate prescriptions were as follows. A 2-year-old child was prescribed imipramine (Tofranil) syrup 10 ml at night (200 ml), and a 10-month-old infant was given prochlorperazine (Stemetil) elixir 5 ml thrice daily (200 ml). A 3-month-old baby was given diphenoxylate (Lomotil) syrup 2·5 ml daily (50 ml) with kaolin (paediatric) 5 ml thrice daily (100 ml), with promethazine (Phergan) elixir 5 ml daily (100 ml). Compared with 204 prescriptions for antidiarrhoeals on the 6331 forms inspected, there was only one order for a dextrose-saline preparation.

## Discussion

Quality is a relative term and like beauty is in the eye of the beholder. My advisers representing hospital as well as general practice considered the findings both reassuring and constructive since clear areas for improvements in practice were discovered. The major result of the feasibility study, however, was that levels of performance could be monitored conveniently and easily, subject to the necessary approvals and help. The approach could be used in other areas of audit—for example, prescribing in the elderly.

One of the objectives of quality assessment is to support good practice. It was encouraging therefore to find that most of the drugs considered for a long time to be hazardous or undesirable were not prescribed for children—for example, chloramphenicol, barbiturates, tetracyclines, appetite depressants, and stimulants. Furthermore, inappropriate prescriptions were infrequent (although a suitable denominator was not known), and most scripts were for one drug only. In Italy patients can expect to receive an average of two drugs for every visit to a doctor.[15]

The management in general medical practice of diarrhoea, vomiting, and enuresis in the young child needs improvement. It is also arguable that improvements in pharmacy practice are necessary, since the hazardous and undesirable drugs prescribed were also dispensed. Failure of doctors to record the age of children on prescription forms is not necessarily evidence of poor quality of care. There is, however, little doubt that doctors countersigning prescriptions written by ancillaries should know the age of the child concerned. Absence of age

*Frequency of general practitioner prescribing of hazardous or undesirable drugs to children in one month*

| Drug group or combination | Route of administration | Age group (years) | No of 72 doctors prescribing in one month | No of prescriptions in one month |
|---|---|---|---|---|
| Hazardous | | | | |
| Aspirin | Oral | <1 | 0 | 0 |
| Barbiturates other than phenobarbitone | Oral | <16 | 0 | 0 |
| Chloramphenicol | Oral | <16 | 0 | 0 |
| Diphenoxylate (Lomotil) | Oral | <2 | 6 | 6 |
| Loperamide (Imodium) | Oral | <4 | 1 | 1 |
| Antiemetic phenothiazines (prochlorperazine, trifluoperazine, perphenazine) | Oral | <1 | 2 | 2 |
| Any hazardous drug above | — | — | 9 | 9 |
| Undesirable | | | | |
| Tetracyclines | Oral | <11 | 0 | 0 |
| Tricyclic antidepressants | Oral | <5 | 7 | 10 |
| Antihistamines | Topical | <16 | 3 | 6 |
| Diphenoxylate (Lomotil) | Oral | 2-4 | 8 | 8 |
| Metodopramide | Oral | <1 | 3 | 3 |
| Antiemetic phenothiazines (prochlorperazine, trifluoperazine, perphenazine) | Oral | 1-4 | 1 | 1 |
| Other antidiarrhoeals (as in *MIMS* section 1E) | Oral | <1 | 12 | 15 |
| Combination of any two antidiarrhoeals | Oral | <16 | 2 | 7 |
| Antidiarrhoeals simultaneous with an antibiotic other than neomycin | Oral | <16 | 5 | 8 |
| Isoprenaline | Aerosol inhalation | <16 | 4 | 8 |
| Appetite depressants (amphetamines, fenfluramine) | Oral | <16 | 0 | 0 |
| Tonics, appetite stimulators (as in *MIMS* section 8A) | Oral | <16 | 0 | 0 |
| Tricyclic antidepressants simultaneously with a urinary antimicrobial (for instance, co-trimoxazole) | Oral | <16 | 4 | 5 |
| Any undesirable drug above | — | — | 25 | 71 |
| Any hazardous or undesirable drug above | — | — | 30 | 80 |

recording on the part of ancillaries is not likely to be conducive to good practice. It was therefore worrying to find that ancillaries were considerably less likely to record the age of children than were the doctors.

Most of the hazardous and undesirable drugs prescribed by 42% of the sample doctors have only been considered as such within the past decade. This raises the question whether standards of recommended practice are being passed to general practitioners in a speedy and effective manner. For example, the *Drug and Therapeutics Bulletin*[16] discussed in detail the management of childhood diarrhoea nine months before the prescriptions were issued and yet 10% of the sample doctors had prescribed drugs for children that were specifically cited as hazardous. This information, however, was distributed to only one-third of general practitioners in England—those that were newly qualified. The inappropriate use of some drugs, for instance, diphenoxylate, was confined to certain areas. Such prescribing does not appear to have stemmed from the region's teaching hospital (C F George, unpublished information) and may reflect the intensity of promotion activities of pharmaceutical companies.

From this study it would be unjustifiable to draw wider conclusions about a doctor who may be a high quality prescriber but who has had a single blind spot detected. For example, it is not known whether all doctors who prescribe one drug inappropriately also prescribe others inappropriately. Further work is required to establish to what extent quality of prescribing represents general quality of care. If it can be shown that there is a close relation prescribing would be an attractive indicator of quality since several diverse medical conditions can be studied conveniently by this approach.

The American experience makes it clear that there are no problem-free methods of evaluating the quality of health services. This study adopted the explicit (rigid) approach, which has been criticised since it might dictate complicated and exhaustive rule books. The alternative method of peer review, however, is unsuitable to gauge the level of care on a wide basis, particularly when several services are attempting to achieve similar goals, as is the case in child health care. Providing the explicit approach is restricted to assessment of the "practice" rather than the "practitioner", individual doctors should not be threatened. Both approaches should be complementary. Having determined the degree and type of general problem, peer review at local level should then elicit causes and, if appropriate, administer remedies.

I thank those who have supported the project, and in particular the local medical committee, the local pharmaceutical committee, the Prescription Pricing Authority, and Branch P1E of DHSS. The advice and help of Professor C F George, Dr F G R Fowkes, Professor R F L Logan, Dr G C Metcalfe, Professor I C S Normand, Professor P O D Pharoah, and Professor W E Waters are gratefully acknowledged.

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*(Accepted 12 February 1980)*

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*Is it true that the signs of hyponatraemia occur only when the total body sodium content is reduced, or may these be seen in dilutional hyponatraemia?*

The clinical features of hyponatraemia due to sodium depletion include muscle cramps, lethargy, loss of tissue turgor, sunken orbits, and postural and eventually sustained hypotension; the packed cell volume and plasma protein concentrations are raised if not affected by the primary disease. None of these features is encountered in dilutional hyponatraemia (defined as due to increased body water with a normal body sodium content). Two classic causes of this condition are inappropriate secretion of antidiuretic hormone due to carcinoma of the bronchus and acute renal failure. In carcinoma of the bronchus there are often no symptoms until the plasma sodium concentration falls below about 120 mmol (mEq)/l when mental confusion occurs. In acute renal failure the features are those of the primary disease and uraemia, but occasionally the same mental confusion is attributable to hyponatraemia and is relieved by correcting the plasma sodium concentration alone.[1]

1 Thompson FD. Hyponatraemia. *Br J Hosp Med* 1979;**21**:40-56.

*Are preparations containing 0·2% chlorhexidine gluconate safe to apply to nipples of women both antenatally and postnatally?*

The toxicity of hexachlorophane has no implications for the safety of chlorhexidine because they are entirely unrelated compounds. All the available evidence suggests that application of preparations containing 0·2% of chlorhexidine gluconate is safe even on cracked nipples, and that they represent no serious risk to mother or baby. Chlorhexidine preparations are widely used for surgical skin preparation, and reports of skin sensitivity are extremely rare. Reports of adverse effects on the oral epithelium are few, and their significance is doubtful in the face of trials with chlorhexidine gels for treating recurrent aphthous ulcers in which no such adverse effects were found.[1 2] Absorption of chlorhexidine administered by mouth is poor and toxicity low, as is suggested by the results of acute and chronic toxicity tests in animals; there is no evidence of risk of methaemoglobinaemia. Parachloroanaline, a postulated metabolite, has not been detected, but long storage at high temperature or heat sterilisation can lead to its formation, but even then all the evidence suggests that little risk results.[3] Chlorhexidine, as indeed are many antiseptics, is incompatible with soaps but only at high concentration. It retains its effect at low concentrations of soap as, for example, those that remain on skin after normal washing. Chlorhexidine does not stain fabrics unless these are subsequently exposed to substances releasing free chlorine, such as hypochlorites. In summary, the inquirer's fears seem unfounded.

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