Relation between general practitioners' prescribing of antibacterial drugs and their use of laboratory tests

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Only doctors can prescribe antibacterial drugs, and they must take responsibility for prescribing effective, appropriate, safe, and economic drugs. We audited the prescribing habits of general practices and related these to a list of antibiotics selected as first line drugs by a group of general practitioners. Compliance with this list was assumed to represent good practice. General practitioners have unrestricted access to facilities for laboratory testing of suspected infections, and we studied the association between practices achieving a high standard of prescribing antibiotics and their appropriate requests for investigations of children's urinary tract infections and women's genital infections.

Methods and results

Forty one general practitioners attended prescribing forums and formulated a list of first line antibacterial drugs (see footnote of table 1) which they thought would meet all their prescribing requirements not guided by microbiological sensitivity data. In our study we regarded good compliance as 85% of a practice's antibacterial prescriptions being met from this list.

We studied 32 general practices that principally used Whittington Hospital's microbiology laboratory. We retrieved details of all requests submitted by these practices from the laboratory's data systems. We selected all the prescribing data for antibacterial drugs (as defined

in *British National Formulary*¹) for April 1993 to March 1994 from prescribing analysis and cost (PACT) records. We obtained data on list sizes and demographic details from the health authority's records, and we calculated a standardised number of prescribing units (ASTRO-PU) for each practice using the method of Roberts and Harris.²

The 32 practices covered 160 981 patients. Eighteen of the practices achieved at least 85% compliance with the list of selected antibiotics. The median level of compliance was 87% (95% confidence interval 80% to 87%). The number of prescriptions issued, the cost per ASTRO-PU, and the prescription cost did not differ between the practices that achieved good compliance and those that did not (table 1). The poorly complying group treated fewer children aged under 5 years ($P = 0.05$). Of the 16684 requests for bacteriological examination, 8130 were for urine samples (from 6460 patients), and 700 of these were from children aged under 5. Practices with good compliance submitted significantly more urine samples per 100 patients as well as per 100 children aged under 5 (table 1). Five practices submitted no urine samples from patients aged under 5, and all achieved less than 85% compliance. A total of 16 703 sensitivity tests were performed on 1720 isolates. There was no difference in the proportion of isolates with antibiotic resistance between the two groups of practices (table 1).

Practices with good compliance submitted significantly more high vaginal swabs, and the significantly higher ratio of cervical swabs to high vaginal swabs in these practices indicated that they were more likely to send samples from both vagina and endocervix (table 1). The level of performance, as indicated by the submission of urine samples and high vaginal swabs from each practice, was highly correlated (Spearman's coefficient of correlation 0.8558, $P < 0.001$).

Comment

The general practitioners' compliance with prescribing guidelines corresponded with other standards of quality. Confirmation of urinary tract infection in a feverish child requires microbiological investigation of a urine sample.³ Significantly fewer children's urine samples were submitted by the less compliant practices, and five practices did not submit any samples from children under 5. The use of urine dip sticks with nitrite and leucocyte esterase tests is not an adequate replacement for culture: the rate of false negative results for nitrite can be up to 48%.⁴ Microscopy for pyuria also has a substantial false negative rate.⁵

Both vaginal and endocervical infections must be diagnosed in sexually active women. The practices that underinvestigated urinary tract infections in children also submitted fewer genital samples from women, and this poor performance with genital samples was also related to antibacterial prescribing. Neither the cost nor the number of prescriptions issued related significantly to compliance with the prescribing guidelines.

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Table 1—Comparison of general practices' demographics and use of microbiology laboratory by compliance with list of recommended antibiotics* (values are medians (ranges) (95% confidence intervals) unless stated otherwise)

	Compliance with list		P value†
	Poor (<85%)	Good (≥85%)	
No of patients registered in practices	4245 (1689-8277) (3044 to 5490)	4611 (2007-11572) (1462 to 7219)	0.18
% Of female patients in practice	49.26 (43.93-56.13) (47.35 to 51.53)	49.53 (43.73-54.70) (47.96 to 50.91)	1.00
% Of patients aged <5 years in practice	4.81 (2.90-8.22) (3.99 to 5.74)	5.68 (3.53-8.98) (5.26 to 6.78)	0.05
No of ASTRO-PU	13947 (4655-26281) (10124 to 16916)	15172 (5957-35550) (13192 to 22684)	0.32
No of antibacterial prescriptions per ASTRO-PU	0.22 (0.13-0.32) (0.19 to 0.26)	0.22 (0.16-0.32) (0.19 to 0.23)	0.75
Cost of antibiotics per ASTRO-PU (£)	0.75 (0.28-2.01) (0.63 to 1.23)	0.62 (0.36-1.40) (0.54 to 0.81)	0.22
Cost per prescription for antibiotics (£)	3.13 (2.11-8.87) (2.88 to 5.45)	2.91 (1.82-5.44) (2.66 to 3.66)	0.21
Urine samples sent for investigation:			
No of samples per 100 patients	1.5 (0.02-9.65) (0.82 to 4.06)	3.5 (0.5-10.95) (3.14 to 6.03)	0.01
No of samples per 100 patients aged <5	1.0 (0-4.53) (0.64 to 2.71)	4.5 (0.4-11.2) (3.14 to 7.10)	0.003
% Of antibiotic tests showing resistance‡	14.6 (11.2-29.7) (11.5 to 21.6)	14.2 (8.5-30.0) (12.6 to 17.3)	0.95
Genital swabs from women aged 15-45 sent for investigation:			
No of high vaginal swabs per 100 women	0.4 (0-15.9) (0.40 to 4.49)	4.0 (0-13.9) (3.14 to 7.10)	0.004
Ratio of cervical swabs to high vaginal swabs	0 (0-0.26) (0.02 to 0.08)	0.01 (0-0.73) (0.03 to 0.26)	0.04

*Antibiotics recommended as first line treatments: penicillin V, amoxycillin, flucloxacillin, co-amoxiclav, erythromycin, trimethoprim, oxytetracycline, doxycycline, metronidazole, and cephalixin.

†Mann-Whitney U test.

‡Practices with more than 10 isolates.

1 Joint Formulary Committee. *British national formulary: No 23*. London: British Medical Association, Royal Pharmaceutical Society of Great Britain, 1994.

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3 Guidelines for the management of acute urinary tract infection in childhood. Report of a working group of the research unit, Royal College of Physicians. *J R Coll Physicians Lond* 1991;25:36-42.

4 Powell HR, McCredie DA, Ritchie MA. Urinary nitrite in symptomatic and asymptomatic urinary infections. *Arch Dis Child* 1987;62:138-40.

5 Buys H, Pead L, Hallett R, Maskell R. Suprapubic aspiration under ultrasound guidance in children with fever of undiagnosed cause. *BMJ* 1994;308:690-2.

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