

A survey of undergraduate and continuing medical education about antimicrobial chemotherapy in the United Kingdom

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- 1 A questionnaire about undergraduate teaching on antimicrobial chemotherapy was sent to academic Departments of Clinical Pharmacology, Pharmacology and Medical Microbiology throughout the UK.
- 2 Questionnaires about postgraduate lectures and information circulated to doctors about antimicrobial chemotherapy were sent to Drug Information Centres and Postgraduate Tutors throughout the UK. Review articles and editorials in general medical journals were assessed.
- 3 The median amount of core undergraduate teaching on antimicrobial chemotherapy was 13.5 h but the range was from 9.0 h to 102.0 h. Content was predominantly oriented towards drugs rather than diseases and towards prescribing in hospital rather than in the community. Most teaching was by formal lecture as part of a core programme. On a scale from 0 to 5 the median emphasis given to individual topics ranged from 2.50 to 3.75 but the range of emphasis given by individual medical schools was wide, for example from 1.00 to 4.50 for teaching on pharmacokinetics.
- 4 Postgraduate tutors identified advice from local specialists and requests from local practitioners as the most important determinants of content of continuing medical education. Material from drug information centres was predominantly oriented towards discussion of individual drugs rather than management of specific diseases and even this limited survey found evidence of duplication. The UK general medical literature contained a total of 112 reviews or editorials on antimicrobial chemotherapy covering a wide range of topics but these were not, and should not be assumed to be comprehensive.
- 5 Almost all doctors regularly prescribe antimicrobials and require education about the subject. Wide variations in current medical practice should be addressed explicitly through more extensive use of problem solving. The literature suggests that knowledge is most effectively disseminated through local networks of practitioners. There should be more national co-ordination of the content of information to be disseminated through the existing drug information networks.

Keywords education undergraduate postgraduate
continuing medical education antibiotics antimicrobial chemotherapy

Introduction

The British Society for Antimicrobial Chemotherapy (BSAC) set up a working party in 1988 to examine methods of determining and influencing antimicrobial use in the United Kingdom. The Working Party has surveyed methods used to control antibiotic use, such as formularies and policies [1]. Information and education are well established methods for influencing doctors' prescribing [2]. The Education Group were asked to survey undergraduate and postgraduate education on antimicrobial chemotherapy to establish what information is available about both amount and content of education. This work has coincided with intense interest in undergraduate and postgraduate education in the UK literature (3–11). In the present paper we discuss the results of our surveys in the context of this debate.

Methods

Undergraduate education

A questionnaire was constructed on the SPICES model of content of an undergraduate curriculum [12] to assess whether teaching is student-centred, problem-based, integrated, community-based, elective and systematic. The questionnaire was piloted in Departments of Medical Microbiology and Pharmacology/Clinical Pharmacology in five medical schools and revised according to comments received. The final questionnaire was sent to Professors of Medical Microbiology and Professors of Clinical Pharmacology/Pharmacology at 28 medical schools. In addition to completing the questionnaire, respondents were asked to identify other departments which made a major formal contribution to education on antimicrobial chemotherapy in their medical school. Additional questionnaires were sent to these people. The results of the survey were sent to all original respondents for comment.

Postgraduate education

Advice was sought about a possible survey from the Conference of Postgraduate Deans. It was felt that any questionnaire would need to be brief and to be perceived as offering some help in order to be successful. The final questionnaire asked about the amount of education on antimicrobial chemotherapy, about current influences on the content of the programme and whether advice from the BSAC about topics for future programmes would be helpful. The questionnaire was submitted to the Conference of Postgraduate Deans and modified according to suggestions made before circulation to 430 Postgraduate Tutors in the United Kingdom.

Drug information centres

There are 20 Regional Drug Information Centres in England, Wales and Scotland supervising a network of approximately 200 local drug information centres. The Regional Centres were asked to provide examples of items about antimicrobial chemotherapy which they, or

the local centres had produced in the year January 1988 to December 1989.

General medical literature

The aim was to survey amount and content of information on antimicrobial therapy in journals which are readily accessible to hospital or general practice prescribers in the United Kingdom. The following journals were included: *British Medical Journal*, *Lancet*, *Update*, *Hospital Update*, *Drug and Therapeutics Bulletin*, *Adverse Drug Reaction Bulletin*, *Practitioner*, *Prescribers' Journal*, *Committee on Safety of Medicines Current Problems*. Editorial or review articles about antimicrobial chemotherapy were identified. Their content was assessed with a list of descriptors by two people working independently (PD, SH). The method for the literature search was a personal search. The results were reviewed by the third member of the group (GR) and conflicting classifications were resolved by discussion.

Pharmaceutical industry

An attempt was made to determine the extent to which the pharmaceutical industry contributed to continuing medical education on antimicrobial chemotherapy. Letters requesting information were sent to the Association of British Pharmaceutical Industries (ABPI), the Department of Health and to members of individual companies.

Data analysis

Information from questionnaires was analysed with Minitab, Version 7.0. Non-parametric statistics were used because much of the information consisted of discontinuous variables (e.g. score 0–5) and continuous variables (e.g. hours of teaching) had very skewed distributions. Point estimates of the median and its 95% confidence intervals (CI) were calculated with the WINTERVAL command, which is based on calculation of Walsh averages. The Mann Whitney test was used to assess statistical significance of differences. Agreement between measurements was assessed by the method of Bland & Altman [13].

Results

Undergraduate questionnaire

On the advice of respondents, the information for some London Medical Schools was amalgamated (UCH/Middlesex and Guy's/St Thomas's). Incomplete information about content was obtained from four Medical Schools. The analysis of content is confined to the remaining 20 Medical Schools who returned completed forms from both Medical Microbiology and Pharmacology/Clinical Pharmacology. The analysis of total hours taught included information from 22 Medical Schools.

Not all Medical Schools identified separate teaching by pharmacologists and clinical pharmacologists so we have combined this teaching under the heading Clinical Pharmacology. Respondents from 15 Medical Schools identified other departments which made a significant contribution to core teaching on antimicrobial chemotherapy. Additional questionnaires were sent out to these individuals and eight responses were received. Of the original 15 individuals, seven were infectious diseases physicians, one was in a Department of Primary Health Care and seven were in pre-clinical scientific departments outwith the Departments of Medical Microbiology or Clinical Pharmacology (four biochemists and three pharmacologists).

The median time spent in teaching on antimicrobials was 13.5 h, but the range was from 9.0 h to 102.0 h. The relative contributions of Microbiology and Clinical Pharmacology were variable, as were the contributions from other departments (Figure 1). Other departments taught from 3 h to 21 h on antimicrobial chemotherapy and in three Medical Schools (1, 4 and 21) this teaching accounted for at least 50% of the total hours of teaching. Elective programmes were not included in the analysis but were sometimes substantial. For example, School 20 offers a 50 h elective in the third year, and this is taken by about 1/3 of the students.

School 9 was exceptional in offering a total of 96 h of core teaching on antimicrobials in the Microbiology course, 75 h in the second year, 20 h in the third year, and 1 h in the final year. The respondent confirmed by letter that this was all core teaching by formal lectures.

The median number of hours taught by Microbiology was 7.5 h (95% CI 5.0 to 10.5 h) vs 4.5 h for Clinical Pharmacology (95% CI 3.0 to 6.5 h); $P = 0.023$, Mann Whitney test. The bulk of the additional teaching by Microbiology took place in the second year.

The teaching of Microbiologists and Clinical Pharmacologists tended to be drug-oriented, rather than disease-oriented, taught by formal lectures rather than by a problem-oriented approach, core rather than elective, and hospital-oriented rather than community-oriented (Figure 2). None of the respondents rated their course as overall community-oriented. Only one School suggested that we write to the Department of Primary Care or General Practice for further information. Examples of handouts were received for eight of the Clinical Pharmacology courses and 12 of the Microbiology courses. However, these were summaries of the lecture rather than suggestions for further reading and only two Schools provided examples of case histories as a basis for discussion of antimicrobials.

There were some significant differences in emphasis given to topics within the courses (Table 1). Overall, the greatest emphasis was given to clinical indication and mechanisms of action which received equal emphasis from both departments. Mechanisms of resistance received significantly more emphasis from Microbiology (median 3.5 vs 2.0 Clinical Pharmacology), whereas toxicity, drug interactions and pharmacokinetics received significantly more emphasis from Clinical Pharmacology (Table 1). Antibacterial drugs received much more emphasis than antiviral, antifungal and antiparasitic drugs.

The method of residuals was used to assess whether

there were complimentary differences in emphasis between Microbiology and Clinical Pharmacology. The hypothesis was that in a well balanced course, topics such as pharmacokinetics should not receive either low emphasis from both departments or high emphasis from both departments. In fact, a residuals plot clearly showed that this topic received low emphasis from both departments in some Schools, and high emphasis from both in others (Figure 3). The same was true for mechanisms of resistance, toxic effects and drug interactions.

Postgraduate tutors

Replies were received from 196/430 (46%) of tutors. Of these 189 (96%) said they would find it helpful if the BSAC prepared a list of current topics in antimicrobial chemotherapy and 184 (94%) said they would like suggestions for speakers. Antimicrobial chemotherapy accounted for <20% of the programme for 170 respondents (87%), 25–40% for 23 (12%) and 41–60% for 3 (2%).

Amongst current influences on selection of topics for postgraduate programmes, advice from local specialists and requests from local practitioners received the highest overall rating, but it is interesting to note that every item received a rating of either 0 or 5 from some of the respondents (Table 2).

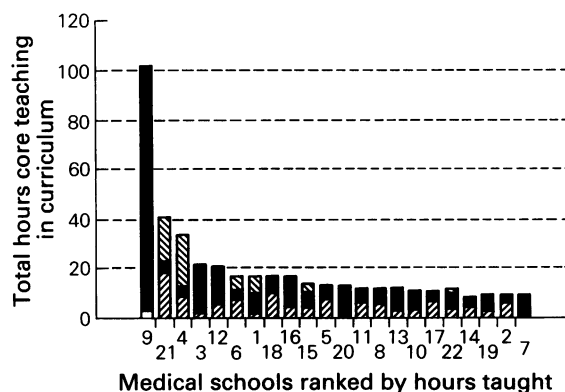


Figure 1 Hours taught to undergraduates on antimicrobial chemotherapy by Clinical Pharmacology (▨), Microbiology (■) and other (▩) Departments in 22 Medical Schools. The figures on the abscissa are the numbers allocated to identify each medical school.

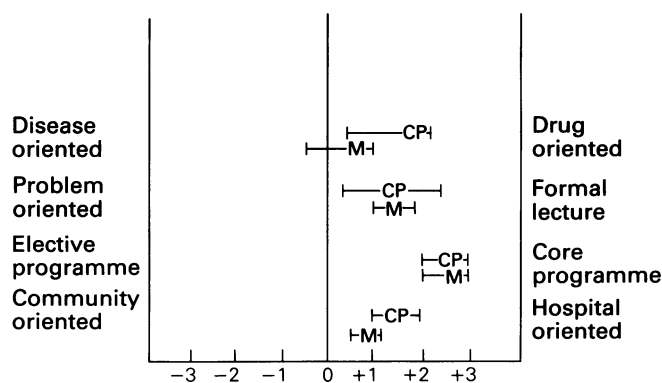


Figure 2 Orientation of undergraduate teaching on antimicrobials, on a scale of -3 to +3, by Departments of Clinical Pharmacology (CP) and Microbiology (M). Graph shows median and 95% confidence intervals.

Table 1 Emphasis given to different topics and to drug types in undergraduate courses taught by Clinical Pharmacology or Microbiology. Topics are listed in descending order of overall emphasis and separate scores are also given for Clinical Pharmacology and Microbiology. Respondents were asked to grade each topic or drug type in a numerical scale from 0 to 5, with 0 representing least important and 5 most important; there were no adjectives describing the intervening numbers 1 to 4. For topics emphasised differently by Clinical Pharmacology and Microbiology, *P* values are identified by an asterisk (*)

<i>Emphasis given to topics</i>	<i>Overall, average emphasis (n = 20)</i>		<i>Emphasis by Clinical Pharmacology (n = 20)</i>		<i>Emphasis by Microbiology (n = 20)</i>		<i>P value (Mann Whitney; Clinical Pharmacology vs Microbiology)</i>
		<i>95% CI</i>		<i>95% CI</i>		<i>95% CI</i>	
Clinical indication	3.75	3.50–4.25	4.00	3.00–4.50	3.50	3.50–4.00	0.645
Mechanism of action	3.25	2.75–3.50	3.50	2.50–4.00	3.00	2.50–3.50	0.999
Mechanism of resistance	2.75	2.50–3.00	2.00	1.50–2.50	3.50	3.00–4.00	0.001*
Drug interactions	2.75	2.50–3.00	3.50	2.50–4.00	1.50	1.50–2.00	0.001*
Toxicity	2.75	2.25–3.25	3.00	3.00–4.00	2.50	1.50–3.00	0.017*
Pharmacokinetics	2.50	2.00–3.00	3.00	2.50–4.00	2.00	1.50–2.50	0.035*
<i>Emphasis given to drug types</i>							
Antibacterial	4.50	4.25–4.75	4.50	4.00–4.50	4.50	4.50–5.00	0.220
Antiviral	2.75	2.25–3.25	2.50	2.00–3.00	2.50	1.50–3.00	0.490
Antifungal	2.50	2.00–3.00	2.50	2.00–3.00	3.00	2.00–3.50	0.855
Antiparasitic	2.00	1.50–2.50	2.00	1.50–3.00	2.00	1.00–2.50	0.948

Drug information centres

Full replies were received from 13 of the 20 regional drug information centres, with examples of material prepared at both regional and local level. Of the 13 respondents, 11 said that drug information centres contributed to decisions about local drug formularies or policies. The

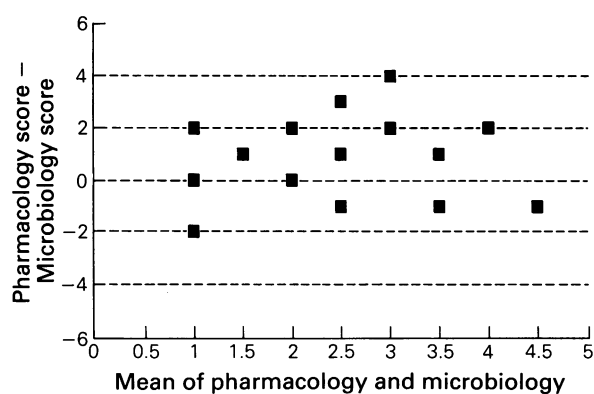


Figure 3 Residuals plot for emphasis given to kinetics by 20 paired Departments of Clinical Pharmacology and Microbiology. The difference between the scores is plotted against their mean. Differences of +1 to -1 are evenly distributed from a mean score of 1 to a mean score of 4.5, implying that this subject receives either low emphasis or high emphasis from both departments in individual Medical Schools.

drug information newsletters showed some evidence of duplication. For example, four regions had prepared newsletters on surgical prophylaxis in the year 1988 to 1989, and new drugs such as ciprofloxacin or imipenem had prompted newsletters from three regions each. Apart from surgical prophylaxis, management of specific clinical problems was not a common topic: urinary infection (three regions), respiratory infection (one region) and skin infection (one region). The remaining 23 newsletters which mentioned antimicrobials were all about specific drugs, either comparing the pros and cons of different members of a drug class, or highlighting specific problems, such as monitoring of aminoglycosides, erythromycin resistance or foetal adverse effects of griseofulvin.

Current medical literature

A total of 112 reviews or editorials was identified and divided into four broad categories according to main topic. Each article was then reviewed to see whether the content specifically mentioned individual drugs, management of individual infections, management of infections in the community and management of infections in the hospital (Table 3). Of the 112 articles, 79 (71%) mentioned antibacterial drugs, whereas 27 (24%) mentioned antiviral drugs, 17 (15%) antiparasitic drugs and only 8 (7%) mentioned antifungal drugs. Overall, 90 (80%) of the 112 articles specifically mentioned community aspects

Table 2 Grading of influence for selection of current topics for postgraduate lectures by postgraduate tutors. Median and 95% CI for number of respondents for each influence and the number (%) of respondents who graded each influence 0 (least influential) or 5 (most influential)

Influence (n of respondents)	Median score	95% CI	Number (%) of 0 scores	Number (%) of 5 scores
Advice from local specialists (n = 185)	4.0	3.5-4.0	7 (3.8%)	32 (17.3%)
Requests from local practitioners (n = 191)	3.5	3.5-4.0	7 (3.7%)	49 (25.7%)
Curriculum for postgraduate examinations (n = 189)	2.5	2.5-3.0	21 (11.1%)	14 (7.4%)
Editorials in the medical press (n = 182)	2.5	2.5-2.5	12 (6.6%)	5 (2.7%)
Introduction of new drugs (n = 187)	2.0	2.0-2.5	10 (5.3%)	1 (0.5%)
News items in the lay press or other media (n = 182)	2.0	2.0-2.0	22 (12.1%)	1 (0.5%)
Outside sponsorship (n = 187)	1.5	1.5-2.0	42 (22.5%)	8 (4.3%)

Table 3 Classification of articles by main subject and by content of the articles

Main subject	Number of articles	Content (n and % of articles in each main subject which refer to each topic)								
		Drug		Infection		Community		Hospital		
		n	%	n	%	n	%	n	%	
New drugs	7	7	100	4	57	5	71	5	71	
Old drugs/ADR	9	9	100	1	11	5	56	8	89	
Public health	28	9	32	24	86	22	79	12	43	
<i>Specific infections</i>										
Respiratory	17	0	0	17	100	17	100	14	82	
Skin/soft tissue	15	1	7	15	100	13	87	9	60	
Tropical	10	1	10	10	100	10	100	7	70	
Other	26	2	8	25	96	18	69	19	73	
Total articles	112	29	26	96	86	90	80	74	66	

(Table 3), however, most articles made some mention of both hospital and community aspects of the problem under discussion. Amongst specific diseases, respiratory infections accounted for 17 (15%) of the articles but there were no articles specifically about urinary tract infection. Management of tropical diseases accounted for 10 (9%) of the articles.

Pharmaceutical industry

The Department of Health have very general figures on the promotional expenditure allowed for the purpose of the Pharmaceutical Price Regulation Scheme. These figures are not broken down to show educational efforts, much less educational efforts on antimicrobial prescribing. The Department was not aware of any other source of more detailed information, other than the individual companies themselves and the Department doubted whether such information would be made available to the Working Party.

The Association of British Pharmaceutical Industries (ABPI) indicated that industry had spent about £20 million *per year* on symposia in the UK in the previous 3 years (1989, 1990, 1991). The ABPI did not have any further details about these symposia.

Five major pharmaceutical companies with strong interest in antimicrobials were contacted through individuals known to members of the Working Group. The consensus was that companies were unable to comment on the amount of educational opportunities in any meaningful way, as it is variable dependent on the current interests of the company and the available budget. Moreover, apart from the difficulty in obtaining the information, some aspects are likely to be regarded as confidential. The respondents identified general activities which industry regards as educational. These include promotional material (booklets, reprints, monographs, audio-visual material) distributed via company representatives and sponsorship of postgraduate programmes. Promotional material and sponsorship of meetings are not always directly related to a specific product, but may be of a general, educational nature. Similarly, Medical Information Departments may provide literature searches about general topics, in addition to product-specific information. Finally, both the ABPI Data Sheet Compendium and the Faculty of Pharmaceutical Medicine were identified as industry-sponsored activities which are primarily educational.

Discussion

Undergraduate education

In 1980 the General Medical Council issued voluntary Recommendations on Basic Medical Education setting out a move towards a reduction in the amount of compulsory material in the curriculum. The recommendations suggested a core programme of material plus optional electives in a ratio of about 2:1 [3]. These recommendations were largely ignored and the GMC has reacted by initiating a programme of auditing to ensure a reduction in the standard core curriculum [3, 14]. These recom-

mendations have received wide support in the general medical literature [3–5, 14, 15] and in a report from the King's Fund [8].

Having achieved general agreement that medical students are overburdened with facts, it is necessary to decide what not to teach [14]. One potential criterion for inclusion is that topics included should be common to all doctors [14] but this is easier said than done. How much common ground would a psychiatrist, a urologist, a general practitioner, a public health doctor and a clinical chemist identify? [14]. This group might not immediately identify antimicrobial chemotherapy as common ground, but the general practitioner and urologist would all regularly prescribe antimicrobial drugs and, although public health doctors do not often prescribe, they do have responsibility for policy on communicable diseases. Antimicrobials account for between 3–25% of all drug prescriptions throughout the world [16]. More importantly, our heterogeneous group of curriculum discussants would have some responsibility for decisions about who should be treated, what they should be treated with and whether they have responded to treatment. If they were asked to identify common clinical problems and critical incidents they would soon come up with a list of infections, both trivial and serious. In fact sore throat and shock were two of five suggested model topics to be used to build a core curriculum [14].

We believe that this is a good case for inclusion of teaching on antimicrobial chemotherapy in the core curriculum. If this is accepted then it will be necessary to define how much should be taught and which aspects of the subject should receive most attention. Our survey suggests that there is currently little consensus about either aspect in the UK. The amount of core teaching is highly variable (Figure 1). The contribution of Departments other than Clinical Pharmacology and Microbiology can obviously be considerable, in some medical schools it accounts for as much as the other two Departments combined (Figure 1). The five topics used to examine content (Table 1) were not widely separated on average scores, achieving overall average emphasis from 2.50 to 3.75 on a scale from 0 to 5. However, the range of emphasis across Medical Schools was wide (Figure 3) so that pharmacokinetics might receive either very low or very high emphasis from both Clinical Pharmacology and Microbiology.

Our survey also suggests that current teaching on antimicrobial drugs is largely done in formal lectures with relatively little emphasis on problem based teaching, or on community aspects (Figure 2). A move to problem-based teaching looks formidable but can be achieved remarkably quickly [17]. Fraser [5] has defined the aim of the undergraduate curriculum as production of an educated person who becomes qualified during postgraduate training. An educated person is defined as someone who is able to reason and act in situations which have more than one solution. There is very wide international variation in prescribing of antimicrobials [16]. Some is systematic and is due to profound differences in 'standard treatment' between countries. For example, otitis media would be treated with antibiotics by 31% of doctors in The Netherlands, vs 97–98% in the UK or USA. However, 93% of doctors in the UK would prescribe 5–7 days' treatment, whereas 93% of doctors in

the USA would prescribe for 8–10 days [18]. The doctors of The Netherlands, the UK and the USA do agree about the first line drug (ampicillin or amoxicillin for 74–92% of patients) [18] but here they differ from Danish doctors, who prescribe penicillin V to 68% of patients with otitis media, in accordance with the recommendations of the Danish Medical Association [19]. Apart from being an offence to intellectual honesty, failing to discuss international variations in medical practice with UK undergraduates will leave them unprepared for increasing contact with doctors from other countries in Europe [20].

In summary, most doctors diagnose and treat infections regularly, therefore teaching on antimicrobial drugs should form part of the core curriculum. However, this teaching should be directed at solving common clinical problems with an open discussion of the options available. The factual content of core lectures should be revised with that in mind. For example, it might be asked how often does a knowledge of the mechanism of action of an antimicrobial help in clinical decision making? Having decided on content, appropriate teachers should be identified. It is quite possible that the person most interested and able to teach pharmacokinetics of antimicrobials is not a Clinical Pharmacologist, rather a Microbiologist or a member of another Department. Duplication of effort should be avoided wherever possible.

Postgraduate education

As with undergraduate education, there has been general concern about postgraduate education, including in-service training and supervision of junior doctors [7, 21, 22] and lack of time made available to the continuing medical education of all doctors [4, 9, 10]. Our survey has focused on continuing medical education in general and has not specifically addressed the training or examination of junior doctors. In comparison with undergraduate education, the scale and complexity of postgraduate education is daunting. Each aspect of our survey revealed that considerable effort is being put into postgraduate education about drugs in the United Kingdom: 430 postgraduate tutors; 20 Regional Drug Information Centres supervising approximately 200 individual Drug Information Units; 112 reviews or editorials annually in the UK general medical press on management of infection and some £20 million spent annually by the pharmaceutical industry on education related to drugs.

While this is a very rough estimate of quantity of some aspects of postgraduate education, it is much more difficult to assess the content. Indeed, the issue of content could only be addressed with respect to Drug Information and items in the Medical Press, since neither Postgraduate Tutors nor Pharmaceutical Companies could provide a listing of topics covered by their efforts. We have established however that the Postgraduate Tutors would value some advice from the BSAC about content (Table 3) and the fact that advice from local specialists ranks top amongst current influences suggests that advice from a national specialist group would be heeded (Table 3). What then should the content be?

Our survey of 1 year of general medical literature

shows that the range of topics covered does not reflect the everyday practice of the average doctor in the UK, and there is really no reason why it should. There is in fact very little common ground and even if there were, the function of these journals is to alert doctors to current issues, not to provide annual statements about the management of common conditions [23]. Moreover, there is increasing evidence that doctors do not keep up to date by passive absorption of written material or lectures [23, 24]. Rather they respond to problems raised in their everyday practice, and they seek the solution to these problems as much by discussion with colleagues as by reference to textbooks or journals [23, 24]. In a fascinating study of knowledge about recent recommendations about chemoprophylaxis for endocarditis, Kunzel *et al.* [24] found that knowledge about these recommendations was inversely proportional to time since qualification, yet it was the older practitioners who were the major users of formal continuing education programmes. These findings are consistent with other studies which have shown that older practitioners become increasingly isolated from teaching centres and from their colleagues in general [23]. Information must be provided in a form which is readily accessible when a question arises [23]. Perhaps the efforts of an organisation like the BSAC would be best directed to the Drug Information Centres, to help with updating their databases and preventing duplication of effort by providing multi-disciplinary assessments of new drugs and other topical issues.

There is an extensive literature on active interventions to change prescribing of antimicrobial chemotherapy. In general, the more personal the approach, the better the result. For example, circulation of printed material saying 'use less cephalosporins' has little effect [25, 26], whereas printed material with a specific message about the advantages of alternative drugs for specific diseases may be successful [27], especially if it is accompanied by feedback about changes [28, 29], or regular reminders on laboratory reports [30, 31] or if it is directed at the needs of individual prescribers [26]. Emulating the techniques perfected by the pharmaceutical companies is a fruitful way to influence prescribing. Personal visits to prescribers are highly successful [2, 25, 32, 33] and can be combined with written material in an 'Educational Advertising Programme' [34] not unlike the activities surrounding the launch of a new drug.

The caveats about 'standard UK practice' which were raised in the discussion about undergraduate education also apply to postgraduate education. Extensive variations in medical practice should be acknowledged but these are most likely to exist because of lack of information [35] as opposed to lack of consensus about information [36]. We agree with Mulley [37]: 'Policy makers should resist the temptation to use consensus-based criteria for care as a quick fix to potential cost or quality problems associated with variations. . . there is a real risk that such criteria could codify practices that reflect current consensus but that have not been adequately tested.' International movement of medical practitioners can only increase medical practice variations [20], so those involved in postgraduate education should prepare for this challenge with information, not dogma.

In summary, providing information about current

recommendations for practice is a necessary step in continuing education and an organisation like the BSAC should be well equipped to help select the topics and to provide some advice about content, especially to drug information centres. At the same time, variations in practice should be explicitly acknowledged but should be resolved by research and audit of clinical decision making, not artificial consensus [16]. Antimicrobial chemotherapy is an ideal topic for this type of research, because the outcomes of treatment can often be measured within days or weeks [16]. Again, an organisation like the BSAC should be well equipped to identify suitable topics for investigation. Who is to fund these activities? The Pharmaceutical Industry cannot be expected to provide

open ended funding for education, especially when the ultimate message may be to use less drugs [16]. Moreover, there is some evidence that information which is perceived as being linked to industry sponsorship is regarded as being less credible by doctors [38]. We hope that the commitment to research and education within the National Health Service will resolve some of the questions we have raised. With the completion of the Working Party on Antimicrobial Use, the BSAC has decided to form an Education Group to continue to investigate these questions.

The authors gratefully acknowledge the advice of Professor Ronald Harden.

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*(Received 30 June 1993,
accepted 13 August 1993)*