sufficient to provide for acute medical, surgical, and psychiatric conditions; for assessing children with mental and or physical handicaps; and for the long-stay care of all handicapped children who required it. This figure was subsequently endorsed by the Committee on Child Health Services, in the sense that they did not find sufficient reason for recommending an alternative.⁵

As it happens, the Court Committee also encapsulated a whole strategy when they affirmed the principle that, whenever the illness and the circumstances permit, a child should be cared for at home.⁶ This contrasts sharply with the priority implicit in the decision of Soviet health planners to continue with the large-scale construction of additional inpatient accommodation for children—as for other age groups and disease categories.

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Medical Education

Postgraduate education and the doctor

DAVID C EVERED, HILARY D WILLIAMS

Training a doctor is expensive and time-consuming. Substantial public funds (about £100 000 000 a year in the UK) are invested in this process and yet little has been done to ensure that the community obtains the maximum return on its investment. The medical schools accept only the most gifted students and then expose them to an educational process so rigid in its structure and limited in its horizons that at graduation the medical student is the best informed but most poorly educated of all graduates. This system, which is designed to eliminate the incompetent, also often succeeds in stifling the inventiveness and imagination of the most competent and signally fails to develop those intellectual attitudes necessary for continuing self-education. These errors are subsequently compounded by the creation of systems of continuing medical education that have rarely been subjected to objective evaluation and often seem inappropriate to the needs of the medical graduate.

The object of this paper is to review the systems of continuing medical education described in publications, with an emphasis on those papers purporting to contain objective data.

Methods

Publications have been reviewed using *Index Medicus* as a source—and all papers published in English from 1960 up to and including March 1979 under the heading "Continuing medical education" have been examined if the titles suggested some methodological evaluation. This review, therefore, extends the earlier one by Bertram and Brooks-Bertram.¹

Results

POSTGRADUATE COURSES AND LECTURES

Of twenty-nine publications examined, five contained some limited data for assessment.²⁻⁶

(a) Two consecutive courses on occupational health, the first using lectures (11 students) and the second seminars (17), were studied using pre- and post-tests—there were no significant objective differences but there was subjective preference for the formal lecture.²

(b) A course on recognition of heart sounds showed improvement in the study group compared with controls, which was not maintained when testing was carried out six months later.³

(c) Doctors in ten hospitals were allocated to three groups (control, lecture course, and consecutive case conferences). Pre- and post-testing showed no appreciable change in performance of any group.⁴

(d) Six "workshops" for anaesthetists were evaluated by MCQ test. Improvements were seen in test subjects and in controls.⁵

(e) Seven courses (92 subjects) were evaluated by pre- and two post-tests. Testing immediately after the course showed improvement with poor retention on retesting three to five months later.⁶

Most papers (that is, the other 24) either merely reported approval by participants or had only the results of a test after the lectures without an earlier test or a control group.

TELEVISION PROGRAMMES (OPEN CIRCUIT)

Of thirteen papers examined, only two^{7,8} contained data on performance. Both were studies on diabetes mellitus and showed minor improvements in the performance of the study groups (although the discriminant level of the questions in one was low on account of their simplicity—for instance, in which newly diagnosed diabetics would you test the urine for ketones?).

Five publications from New York City⁹⁻¹³ have reported average audience sizes increasing from 3.6% to 5.3% of the study population (over 7000 doctors). This increase was attributed to increasing awareness of the series. The audience for these programmes has subsequently declined. These audience figures are similar to those reported in other studies.^{14,15}

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TWO-WAY RADIO

The paper examined¹⁶ contained few data. The authors commented that little use was made of the facility and that the level of use did not warrant continuation of the service.

TELECONFERENCE

There was one report¹⁷ of a teleconference that was popular with the participants. The authors claimed an improvement in performance but provided no data to support this claim.

TAPE-SLIDE AND VIDEOTAPE

Of three publications examined, two^{18,19} contained some data. These showed an improved performance in a large group of doctors studied intensively in a major educational experiment¹⁸ and some improvement in a much smaller group in which only 13% responded to a questionnaire and 7% completed the tests.¹⁹

CLINICAL ATTACHMENTS AND TRAINEESHIPS

Of three publications examined, one²⁰ contained data. A considerable gain in knowledge by 50 participating doctors was noted and was maintained over six months.

PEER REVIEW AND MEDICAL AUDIT

One paper studied described a single uncontrolled experiment—with many changes in other variables. The results could not, therefore, be assessed.

COMPARATIVE STUDIES

Three studies comparing different modes of postgraduate education have been reported and each of these is worthy of comment.

(a) Manning *et al*²¹ investigated the rate of acquisition of the same information by 151 subjects using four techniques: programmed text, standard textbook, lecture/demonstration, and lecture with workshop. All four groups showed similar and significant improvements on testing but there were pronounced differences in the times taken to acquire the information (means only): standard textbook 49 mins, programmed text 73 mins, lecture/workshop 80 mins, and lecture/demonstration 90 mins.

(b) Denne and Ulicny¹⁶ have reported a survey of preferences for modes of postgraduate education in the intermountain area of the USA (Utah, Idaho, Montana, and Wyoming). The questionnaire response rate was 64%, and the rank order of preferences was: journals and other publications; postgraduate course; conventions; local hospital activities; audio digest (cassettes); medical society meetings; television; and others (drug representatives, two-way radio, etc).

(c) A recent report by Murray-Lyon²² from Scotland described a study of how family doctors obtain information on recent advances in the treatment of the rheumatic diseases. The questionnaire response rate was 65.5% (131/200), and the preferred means of obtaining

information were ranked as follows: journals, postgraduate courses, free literature, information symposia, textbooks, patients, personal contact with consultant, TV and radio, and non-medical publications. Participants were also asked to record the frequency with which they read different journals (see table).

Discussion

Several points arise from this review. The papers examined are only a few of those indexed under "Continuing medical education" and were selected purely because the titles suggested some methodological evaluation. Most, however, merely state that a high proportion of those who select a particular mode of postgraduate education are satisfied with their choice (an observation that will surprise no one). Study of these 51 papers showed that only 11 contained any objective data and no more than five included adequate control data (and one of these was unsatisfactory for other reasons). Thus only four out of 51 papers met the most modest criteria for scientific validity, and the paucity of information relating to the most appropriate mode(s) for continuing medical education has not been appreciably relieved by the studies reviewed. The design of valid educational experiments does pose many problems, but it is reasonable to conjecture that the effort in performing 47 unsatisfactory experiments might have been sufficient for the conduct of one or two valid studies. It is possible, however, to use some of these data and conclude that objective gains in knowledge may be achieved by postgraduate courses and lectures, but that this information is likely to be retained only if subjected to periodic reinforcement. Moreover, any formal assessment of knowledge is likely to have a beneficial educational effect, as shown by the gains in knowledge achieved by the control groups in some studies.

The use of available resources is very low, and this is particularly true of the use of television, tape cassettes, and two-way radio. This reluctance to use electronic aids⁹⁻¹⁴ is striking and extends to include open-circuit TV programmes. The low rate of use of an item of domestic equipment as simple to use and as commonplace as a television set suggests that more complex items of electronic equipment are unlikely to be acceptable at present. The installation of computer terminals entailing not only some capital outlay and running expenditure but also a modest amount of training seems unlikely to appeal to the medical graduate who will not operate his own television set to receive postgraduate programmes.

These views are supported by the three comparative studies reported, which clearly indicate a preference for traditional methods of postgraduate education. Self-instructional techniques particularly are shown to be effective and efficient and also acceptable to the medical graduate. Clearly journals, particularly those that are most widely distributed and are of high quality—for example, *Prescribers' Journal* and *British Medical Journal*—are most valued. Wide distribution or high quality alone is not sufficient for a journal to have a major educational impact. This view is supported by another study,¹¹ which shows that the reading of specialty journals is positively and uniformly related to high information scores on testing. Postgraduate courses and lectures are valued and effective—particularly if the participant is removed from his normal working environment—but attendances are usually poor.

On the basis of these limited observations we may draw several conclusions.

(1) Journals of high quality play a major part in providing information for the medical graduate. The publications that contain concise summaries describing new advances or reviewing current practice are very highly valued. *Prescribers' Journal* is an excellent model for publications of this type. Other journals that review procedures and practice are also valued—the original scientific papers in these journals (for instance, *British Medical Journal*) are presumably read with care only by a limited number of subscribers.

Frequency with which family doctors use various journals to obtain information on recent advances in rheumatic diseases (modified from Murray-Lyon²²)

Journal	Regularly read	Occasionally read	Total
<i>Prescribers' Journal</i>	68%	27%	95%
<i>British Medical Journal</i>	63%	31%	94%
<i>Update</i>	55%	34%	89%
<i>Pulse</i>	53%	35%	88%
<i>Practitioner</i>	44%	25%	69%
<i>World Medicine</i>	32%	49%	81%
<i>Journal of the Royal College of General Practitioners</i>	28%	14%	42%
<i>Medical News</i>	23%	47%	70%
<i>Doctor</i>	20%	39%	59%
<i>Medical Week</i>	19%	30%	49%
<i>British Journal of Hospital Medicine</i>	3%	13%	16%
<i>Lancet</i>	2%	13%	15%
<i>Quarterly Journal of Medicine</i>	1%	8%	9%

(2) Educational processes that include personal contact—for example lectures, seminars, and courses—are valued and effective but little used. Probably contact with both teachers and other participants is important—and the value of these contacts is enhanced if they occur outside the participants' normal working environment. The use of appropriate incentives to encourage regular participation in courses and lectures should be considered.

(3) In general, electronic aids are neither valued nor used. The growing number of publications on teaching machines testifies to the enthusiasm of their proponents but not to their value as a means of conveying information to the medical graduate. New techniques should be introduced only after rigorous evaluation in a pilot study has established a solid *prima facie* case for a more extensive experiment.

(4) A high proportion of the published studies on techniques of postgraduate education are valueless. There is a clear need for adequate studies of educational techniques, which will not only assess information acquisition but will also measure performance.

(5) Self-instruction is the basis of effective postgraduate education. The development of appropriate educational attitudes is an important function of secondary and tertiary education—particularly the latter. A recent survey²³ suggests that the rigidity of present-day medical curricula reflect attitudes in staff more appropriate to primary school teaching than to university education, and that this is to the detriment of medical practice.

(6) The studies identified all relate to the continuing processes of education at postgraduate level. Probably there will be a growing demand for problem-determined information, which cannot be adequately met from standard sources. These demands for information are most likely to be related to pharmaceuticals or to environmental hazards (chemical, physical, or biological). There is a good case for developing a limited number of data banks to meet these demands, and several data bank systems are already available in the UK (for example, TOXLINE* and the poisons centres in London and other major centres). Particular care must be taken in developing a simple means of access to these banks through a human contact. The evidence suggests that it is in this area alone that automated data storage and retrieval systems are likely to play an important part in improving medical practice.

*US National Library of Medicine's Toxicological data bank.

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A very high fat diet is said to be bad for Europeans. Severe restriction of food intake in obesity effectively puts the patient on a very high fat diet. Have harmful effects been observed in these patients?

Low-calorie diets, used to reduce obesity, do not necessarily contain excess fat—indeed, as fat is a high calorie provider they cannot be effective if they do. Most calorie-reduced diets have high protein concentrations, but reduce both carbohydrate and fat.

Is atopy an inheritable condition?

The atopic individual produces large amounts of IgE antibodies to commonly encountered antigens with undue readiness. The pattern of inheritance of this state is complex, almost certainly including the interaction of several genes—that is, it is "polygenic." Various primary defects of the immunological system appear to predispose to the development of atopy, and these include T lymphocyte defects,¹ transient IgA deficiency, defective yeast opsonisation, and C2 deficiency.² The presence of such defects probably leads to unbalanced immunological responsiveness, and this is manifest as excessive IgE production. IgE differs from other antibody classes by virtue of the mechanism for the amplification of its biological effect provided by the mast cell system. Since, for this reason, synthesis of IgE must be especially finely controlled, disturbances of those mechanisms responsible for limiting antibody production in general might conversely be expected to have a particularly profound stimulatory effect in the case of IgE. Quite apart from the influences of these immunodeficiencies, individuals differ in the readiness with which IgE antibodies are produced and several studies have indicated that these differences are genetically determined.³ Furthermore, the ability of individuals to respond to particular antigens may vary and this also appears to be a genetic effect.³ Thus the interaction of different genetic influences appears to be important in determining the state of atopy. This interaction is complex and poorly understood, but nevertheless gives a fascinating insight into the way polygenic inheritance actually works.

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² Soothill JF. *Proc R Soc Med* 1976;69:459.

³ Marsh DG, et al. *Monogr Allergy* 1977;11:106.