

achieve its target of attracting 2000 new general practitioners by 2004.⁴ It is obviously more cost effective to attract existing doctors back to practice than to train a new generation from scratch.

Racism must be eliminated from recruitment procedures

Another important and welcome effect of the changes will be to improve the recruitment procedures for general practice registrars. Fair recruitment continues to be a problem for the NHS. Graduates from the United Kingdom of Asian origin, for example, continue to be rejected from "good" practices in ethnically homogenous small towns on the grounds that they wouldn't fit in. The involvement of postgraduate deaneries should help avoid such racism, ensuring that appointments are made on the grounds of merit alone. One of the first signs of this new regimen appears in the classified supplement this week in the form of advertisements for all the available vocational training places in England (www.bmjclassified.com). General practice trainers from individual practices will still play a part in the appointment process, but they will do so

within the influence of the more formal setting of the director's office.

Those who mourn the passing of the older and more informal arrangements may have cause: the change in the selection procedures reflects another stage in the corporatisation of general practice, and just as there are gains, so something will also be lost. No one would defend racism, but quirkiness in appointments procedures may allow individualists a chance to show what they can do. As the sign in a church hall in Edinburgh says, "God so loved the world, he didn't send a committee."

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Information technology and telemedicine in sub-Saharan Africa

Economical solutions are available to support health care in remote areas

Many developing countries have an acute shortage of doctors, particularly specialists. Sub-Saharan Africa has, on average, fewer than 10 doctors per 100 000 people, and 14 countries do not have a single radiologist.¹ The specialists and services that are available are concentrated in cities. Workers in rural health care, who serve most of the population, are isolated from specialist support and up to date information by poor roads, scarce and expensive telephones, and a lack of library facilities.² Can information technology offer solutions? If so, what technologies are likely to be most effective and economical?

The internet is making inroads into Africa: whereas three years ago only 12 countries in Africa had internet access, it is now available, at least in the capital city, in 53 out of 54 African countries.³ Free online resources include journals,⁴ research databases, and training courses.⁵

Email has many advantages in poor countries: it is cheap, hardware and software requirements are simple, and the information does not have to be transmitted in real time. These benefits have been shown by SatelLife, a charitable organisation based in Boston.⁶ Using a low earth orbit satellite and phone lines, it provides email access in 140 countries, serving over 10 000 healthcare workers. Where adequate telecommunications links exist, SatelLife and other organisations provide higher capacity email and internet connections. These allow sending email attachments such as image files, permitting a form of low cost tele-

medicine. The patient's findings are described in an email, and digital photographs of the patient and their investigations, such as electrocardiograms and x ray films, are attached. This "store and forward" telemedicine does not allow real time interaction, but it permits specialist support in the management of difficult cases and is economical. Modern digital cameras are small, robust, easy to use, and cheap (\$300-800). They can create high resolution images (1900×1400 pixels or better) that are adequate for teledermatology.⁷ With modification this technique can be effective for telepathology and teleultrasound.^{8,9}

Access to radiological expertise remains a challenge in developing countries. Digital radiology offers a potential solution but is expensive—laser film scanners cost around \$30 000.¹⁰ Consumer image scanners are cheaper and can provide reasonable quality but are not suitable for full size radiographs. Another approach is to photograph an x ray image on a lightbox with a digital camera. This can provide adequate diagnostic quality in many cases and is becoming increasingly practical as cameras approach the ideal resolution for digital x ray images of 2048×2048 pixels.¹⁰⁻¹² Digital image compression techniques (wavelet compression) can reduce a file of high quality chest radiographs to a size suitable for email (under 300 kb), thus enabling anyone with email to consult a radiologist for an opinion.¹³

These techniques may not provide the quality of data we expect in modern hospitals. However, if used by healthcare workers trained to follow simple photo-

graphic and email procedures they can improve specialist access in remote areas. Photographing x ray films taped to the window of a clinic in Ghana, West Africa, may seem rudimentary, but this approach allowed doctors in Massachusetts to advise Ghanaian healthcare workers in 1998 (D Carlin, personal communication). Clearly, further evaluations of diagnostic accuracy, usability, and cost are required.¹⁴

With the falling costs and increasing capabilities of computers and imaging systems, a store-and-forward telemedicine system can now be set up for little more than \$1000. Basic email capability costs much less than this, and while many hospitals do not yet have electronic communications an email is the cheapest and most efficient way to provide this. Connectivity and training remain the biggest challenges. The rapid growth of satellite phones, cell phones, and wireless networking is helping with the first problem. In more remote areas, however, we need to be inventive to overcome the many challenges to using information technology, including intermittent power supplies, unreliable phone lines, and maintenance. To reduce

the training requirements, our group is developing free email software that helps the user to organise images and incorporates encryption (for security) and efficient image compression.

It is vital that local healthcare workers take a lead in developing and operating telemedicine projects. Initiatives to train African healthcare workers in the use of information technology are also essential, such as those set up by the Fogarty International Center of the US National Institutes of Health.¹⁵ Simple, low cost techniques should be emphasised, rather than expensive video conferencing approaches that struggle to achieve sustainability even in developed countries.¹⁶

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The *BMJ* Christmas revue

Send us your sketches

The *BMJ* is planning a Christmas revue, and we want you, our readers, to show everybody your talents. The hospital revue is a great tradition, and we want to see if we can make it work nationally.

Hospital revues can bring everybody together. People may be overworked, oppressed, and miserable, but all that is forgotten at the revue. The juniors mock their seniors, pricking their pomposity. The mighty fall. The meek, perhaps fuelled by drink, prosper. The quiet technicians show their remarkable dancing ability. Everybody has a good time, money is raised for charity, and more important points are made than are ever made at committee meetings.

Now is your chance through song, dance, and humour to show what you think of Tony Blair, Alan Milburn, the national plan, the General Medical Council, Donald Irvine, Ian Bogle, George Alberti, Barry Jackson, and all the rest of the crew who speak

for the profession. Maybe you'll want to mock the *BMJ* and its pretensions. We hope for fun, catharsis, and a restoration of spirits.

This is the process we propose. You send us scripts or, better, videos of sketches by 7 October. Aided by bona fide comics we will then select the best and possibly hold auditions. We'll rent a theatre (perhaps even one night in London, one in Edinburgh, and one in Cardiff), and Phil Hammond—of *Trust me, I'm a Doctor* and *Struck off and Die*—will comper. It's an experiment. Maybe it'll never happen. Perhaps it'll be a disaster, or maybe it'll be the medical event of the decade. It's up to you.

Richard Smith *Editor, BMJ*

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