mates the scale of the problem in Britain. Ochronosis is often an incidental finding, and patients may not realise that their gradual facial darkening is a side effect of the cream that was intended to lighten their skin. Some continue to apply more cream as they get caught in the "skin lightener trap." Many patients may also feel guilty about using such creams and will often deny their use—even when histological evidence of ochronosis is available.

Although more public awareness of the dangers of skin lighteners may reduce their use, sufficient doubt exists regarding the safety of creams containing 2% hydroquinone to justify a temporary ban on over the counter use pending long term trials of their safety. The onus should be on manufacturers rather than consumers to establish such safety. Had it been a drug and not a cosmetic the product licence would have probably long been withdrawn.

HYWEL WILLIAMS

Wellcome Research Fellow in Dermatoepidemiology,
St John's Institute of Dermatology,
St Thomas's Hospital,
London SE1 7EH

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The demand for ophthalmic services

Increases are likely in number of patients and costs

In a study in Nottingham Sheldrick and colleagues found that during one year about one in 14 people consulted doctors with an eye problem (p 933).[1] One third of these consultations took place in an eye casualty department and the rest in general practice.

General practitioners will therefore need to be kept abreast of developments in examination and treatment, particularly those that affect general practice. Hospital eye services should be responsible for much of this continuing education. They would be building on surer foundations if all trainees had spent part of their vocational attachments with an ophthalmological service.

The authors showed that simple, traumatic injuries to the cornea make large demands on treatment services, yet most of them are preventable. A study by Chiapella and Rosenthal has shown that most foreign bodies and minor corneal injuries occur at work.[2] By insisting that protective goggles are worn employers could therefore reduce the number of corneal injuries and the number of hours lost from work. Management should be responsible for providing comfortable safety eye wear, educating workers about its importance, and enforcing its use.

The number of people aged 75 and over is increasing rapidly, with 10% more people in this age group expected by 2001 and 40% more by 2026.[3] Because age related cataract, age related macular degeneration, and chronic simple glaucoma increase substantially after 60 (and particularly after 80) the increasing numbers of elderly patients will further strain overstretched hospital eye services. Many services already have long waiting lists for first outpatient appointments and elective surgery. In addition, fundholders in general practice will have to cope with the financial burden of more patients needing ophthalmic services, and their budgets will have to reflect this.

Although Sheldrick and colleagues show how the demand for services for chronic ophthalmic diseases increases with age, they fail to emphasise ethnic variations. Patients from the Indian subcontinent are five times more likely to need surgery for cataract than other patients in all age groups over 45.[4] Eye departments serving large numbers of such patients should therefore plan for an increased workload from cataract surgery.

Important technological developments are occurring in ophthalmology, which will require hospitals to spend money if they are to provide the latest diagnostic and therapeutic advances for their patients. The move towards small incision cataract surgery with phacoemulsification and foldable intraocular lenses will eventually require all institutions doing ophthalmic work to purchase modern phacoemulsification equipment.[5] Laser treatment of the "wet form" of age related macular degeneration with preservation of central vision has proved successful, but its success is limited by the fact that existing fluorescein angiographic techniques cannot clearly define over half of all retinal neovascular membranes. The use of indocyanine green dye and digital angiography allows more precise definition of these membranes,[6] thus allowing the treatment of more patients with this common blinding condition. Each eye service will therefore want to buy digital angiographic apparatus to provide laser treatment to as many elderly patients with age related macular degeneration as possible. As ophthalmologists move towards progressively earlier surgery in chronic simple glaucoma[7] their demands for new ways of surgically controlling intraocular pressure, such as use of a Holmium laser, will also increase.

A phacoemulsifier costs about £35 000, digital angiographic equipment £55 000, and a Holmium laser £45 000; to provide this equipment for Britain's 163 ophthalmic training programmes would cost £22m. Satisfying financial demands of this size with the limited resources available poses an enormous challenge to the ophthalmic community, who will want their patients to have the best possible care.

Sheldrick *et al* have shown that about one person out of every 1000 consults for refractive problems each year.[1] Currently most refractive problems are dealt with by optometric services. With corneal laser surgery, however, the treatment of myopia,[8] hyperopia, and astigmatism could become the responsibility of ophthalmologists.[9 10] When these new techniques have been perfected the NHS will have to decide whether to provide them for patients—at a cost of about £200 000 per machine.

A RALPH ROSENTHAL

Professor of Ophthalmology,
University of Leicester School of Medicine,
Leicester LE2 7LX

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Audit and research

Research is concerned with discovering the right thing to do; audit with ensuring that it is done right

"If your research proposal is turned down then set your wordprocessor to change 'research' to 'audit' throughout and you might well get the project funded." This cynical but widespread view of how audit may grow out of research was repeated at a recent meeting in Newcastle upon Tyne on how the two relate. Another widely held view is that audit is a fashionable time waster that will soon pass into history with many other untested management notions. But when the government is spending some £42m a year on audit and working towards spending £350m a year on the NHS research initiative there are crucial questions to be asked on whether audit and research, particularly research into effectiveness, are the same activity carried out with different degrees of rigour and whether the two need to be better coordinated.

One common answer to the question of how audit and research are different is that research is concerned with discovering the right thing to do whereas audit is intended to make sure that the thing is done right. Audit, said Mike Peckham (director of research and development in the NHS), is usually ongoing, whereas research is a one off activity; and audit uses routine data, whereas research collects complex data. Another, almost philosophical difference, pointed out by Nick Black (head of the health services research unit at the London School of Hygiene and Tropical Medicine), is that those engaged in research do everything they can to control what happens in a project whereas the essence of audit is that the doctors or others included in the project find their own way to improve their practice. It is thus possible to generalise from research but not from audit studies.

But there are also similarities between research and audit. Both depend, said Raj Bhopal (professor of epidemiology and public health in Newcastle), on the spirit of inquiry, both are good for the brain, and both are trying to fill what he called "a black hole of ignorance." In addition, both must be "bottom up" to be fully effective: attempts to direct either audit or research are likely to backfire.

Another similarity between audit and research is that they use similar methods, but, warned Ian Russell (director of the health services research unit in Aberdeen), audit is often scientifically sloppy: the samples that are used are too small and collected by means of inadequate sampling methods, and analyses are unsound. Professor Russell believes that audit will be taken seriously and be effective in producing change only when its methods are just as solid as those of the best research. Doctors need to be trained in the methodologies of audit, and they need to be helped to design audits that are scientifically sound. Indeed, there was consensus at the meeting that too much of the money made available for audit had been spent on computers and too little on training. Effective audit can be conducted without computers, but computers cannot compensate for inadequate methods.

Researchers can bring benefits to those practising audit not only by sharing their methods but also by studying audit to develop better methods. The research studies that have been done on audit suggest that the participation of a clinical leader is crucial if audit is going to work; that concentrating on raising quality rather than reducing cost will produce better results; and that change is more likely if people have participated in the process rather than had it imposed on them. Researchers have also already applied themselves to asking whether audit is effective. Professor Russell said that the best designed studies support the effectiveness of audit and setting guidelines, but Dr Black was more cautious, pointing out that most studies of effectiveness have come from the United States and been primarily concerned with cost containment; that positive results are more likely to be published than negative ones; that the evaluations of effectiveness are often carried out by those who have done the audit; and that only a limited range of subjects has been covered by the studies so far published. Stephen Proctor (professor of haematological medicine in Newcastle) said that we must not expect too much of audit too early. The whole activity, he said, is "still in nappies": evidence of real benefit can hardly be expected yet.

But while research applies itself to audit, audit can also contribute to research. Its main contributions are to throw up questions that research must address and to provide a mass of data that researchers might use. Professor Proctor sees audit and research as intimately related, and he believes that they must operate together—only in series rather than in parallel. He used as an example the work of the Northern Regional Haematology Group, which includes all those in the region looking after patients with haematological malignancies. The group, which has a family atmosphere, meets weekly and has regular clinical, research, audit, business, and social meetings. Every patient from the region is included in a register, and the group conducts trials of new treatments that avoid the selection bias that limits the value of so many trials. But between research projects the group switches to audit to ensure that the best practice is being applied throughout the region. The group moves easily and naturally from one mode to the other.