non-prescription doses and administration (Department of Health). Part of the explanation for the widespread use of cholera vaccine was recently highlighted in a study of the prescribing practices of British general practitioners. Nearly three in four general practitioners would immunise travellers to the tropics, giving reasons such as the risk of cholera, fear of litigation, need for certification, and advice from expert sources. The study also highlighted the disparate opinions on the indications for cholera vaccination from various travel health information sources.¹¹ Another undoubted influence on prescribing is the demand of some border health officials for evidence of cholera certification as a prerequisite for entry to a country. This practice continues covertly, disrupting many a traveller's passage. Vaccination at the port of entry may be risky: one traveller developed hepatitis B after he was vaccinated by a border official to satisfy local requirements on cholera.¹² WHO advises that official cholera certification is not a legal requirement for international travel and on no account should travel be restricted because of cholera.¹³

Until WHO's agreed entry requirements on cholera immunisation are enforced by WHO signatories, consistent and effective advice on indications for cholera vaccination are not feasible. Replacements for the parenteral vaccines are currently being evaluated, and field trials of an orally administered killed whole cell *V cholerae* vaccine combined with a B subunit peptide suggest it provides comparable protection to that provided by the parenteral form.¹⁴ Results of studies on the efficacy of live oral cholera vaccines are

awaited. The risks of cholera or associated morbidity are so low, however, that the cost-risk benefit of any vaccine must be carefully considered before it is widely adopted for use in travellers.¹⁵ The protection of travellers against diarrhoeal illnesses is unlikely to advance greatly until vaccines against enterotoxigenic *Escherichia coli* become available.

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An NHS research strategy

Overdue but potential problems with implementation

For the first time in its history the NHS has a research strategy. It was announced last week, three years after the House of Lords Select Committee on Science and Technology advocated that "the NHS should be brought into the mainstream of medical research."¹ The committee asserted that no research system could work effectively when the principal customer had so small a direct input into the initiation of research programmes. "The needs of the NHS and its problems," argued the committee, "will be met only if those needs are clearly expressed. The needs are not expressed."

The solution proposed by the House of Lords committee, an NHS research authority, appealed to very few—not least because special health authorities have an undistinguished history. Instead, the government proposed appointing a director of research and development, who would sit on the NHS Management Executive. Professor Michael Peckham, director of the British Postgraduate Medical Federation, was seconded to the post in January and has now cleared his strategy through the management executive and the Secretary of State for Health.

Many strategies fail because they do not start by analysing the current position of an organisation. Recognising this, Professor Peckham and his team began by surveying the existing health research effort. This is no mean task because it is so fragmented, but the team estimates that altogether Britain spends something like £1.5 billion on health research. Even with a health service budget of £30 billion this seems a reasonable sum to spend on research. But most of the money is spent by industry, much of it on routine toxicological

studies. The Medical Research Council's budget is about £200m a year, and the Department of Health spends something like £225m—through SIFTR (service increment for teaching and research), locally organised research schemes, special health authorities, the former department of the chief scientist, and organisations like the National Radiological Protection Board and the Health Education Authority. To the annoyance of an incoming director, most of this money is spoken for, although by bringing it into the new research and development framework it might eventually be redeployed.

How much should be spent on health research? It is hard to find an answer from industry or other countries, but Professor Peckham believes that the NHS should be spending about 1.5% of its turnover. This would mean something approaching £400m. This, believes Professor Peckham, is a reasonable amount because the service is desperately short of information, performing many expensive and unvalidated procedures, and ultimately driven by new technologies and scientific developments. Few technological industries would spend as little as 1.5%, and successful research based industries—like the pharmaceutical industry—spend as much as 10% of their turnover on research. Despite these arguments £400m is a large sum for a cash starved service to spend—but the management executive has accepted the sum in principle.

The content of the NHS strategy will include clinical and health services research, and Professor Peckham believes that these are "two sides of the same coin." Also important will be the development part of research and development,

with emphasis being placed on developing outlets for basic research, which continues to be strong in Britain. Thus Professor Peckham is keen that there should, for example, be means to develop vaccines to exploit new technologies like magnetic resonance imaging.

The strategy will be implemented through the management executive and the regions, each of which will be required to produce a research and development plan. The research will have to be multidisciplinary with input from NHS professional staff, managers, and scientists, and because the NHS lacks many of the skills necessary universities will play a central part. All regional plans will need to include proposals for training. Professor Peckham foresees two tensions: firstly, between getting everybody involved and spreading the effort too thin; and, secondly, between the top down and bottom up approaches. All research organisations struggle with these tensions, but Professor Peckham believes that the NHS can achieve a balance. Thus many of the proposals for research will come from regions, but at the same time some half a dozen national priorities will be set. There will be a national research and development committee, and it may be that the committee will need a subcommittee to award grants.

In order to implement the strategy Professor Peckham and his team have been busy forming links with the Medical Research Council, the medical research charities, industry, and international organisations. Thus he imagines that the United Kingdom Coordinating Committee for Cancer Research might provide a model for other categories of research, and one is already being talked of for cardiovascular research. Working groups have also been set up to look at priorities, technology assessment, clinical evaluation, and screening, and there are other groups concerned with implementation and data handling.

What Professor Peckham and his team have produced is not a fully formed strategy, it is a bold sketch; and now begins the difficult part of trying to make it work. As every business school graduate knows, thinking up strategies is the easy part.

It's making them work that is hard, and there are some worries about this one. Firstly, it's not clear how the research strategy will relate to the overall health strategy that the Department of Health is about to produce. The World Health Organisation argues that all countries should have a research strategy—but it should underpin the overall health strategy.^{2,4}

A second problem with the British strategy is how the MRC will fit in. It has long been closer to scientists than the health service and may well feel threatened by this potential rise of a research empire, larger than itself within the NHS. Past relations between the Department of Health and the MRC have not been happy, and the money intended for health services research has already been taken away from the MRC and given back again at least once. One radical solution might be for the MRC to receive its funds not from the Department of Education and Science but from the Department of Health. This model, which works well in Australia,⁵ might make the council more sensitive to NHS needs and improve the transfer of research ideas into practice.

A final problem with the grand strategy could be people. Does Britain have enough health service and public health researchers, epidemiologists, health economists, and the like to make the plan work? Many people doubt that it does, but Professor Peckham thinks that there may be more such researchers around than people realise. Let's hope that he is right, because an organisation as large as the NHS undoubtedly needs a coherent research strategy and people to make it happen.

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Heart transplantation in children

Short term results are encouraging

The technical feasibility of heart transplantation in infancy was established in 1967,¹ but uncertainties regarding its long term prognosis and the adverse consequences of immuno-suppression, accompanied by complex ethical questions, delayed progress. The improved prognosis of heart transplantation in adults after the introduction of cyclosporin encouraged some centres to embark on paediatric transplantation in the early 1980s.

Indications for transplantation in childhood are end stage cardiomyopathy and congenital heart disease when conventional surgery is not feasible, carries prohibitive risks, or provides poor palliation.² The short term to intermediate term prospects for children undergoing transplantation are reasonably favourable. Currently, actuarial survival of 80% at one year and 62% at five years is being achieved.^{3,4} Excellent quality of life is reported,^{3,6} although the psychological sequelae of transplantation in children have not been studied in detail. From the limited data available it seems that graft function remains normal, at least up to six years after transplantation, with normal growth of myocardium and arterial anastomoses⁷ and normal exercise capacity in these children.^{8,9}

By the end of 1989, 169 transplant operations had been

performed worldwide in infants (children less than 1 year old), of whom two thirds were less than 2 months old.⁴ It is in infants and neonates (less than 1 month old) that the merits of transplantation have been most vigorously debated, and recent correspondence aired profound concerns over the ethics and expense of what is generally regarded as an experimental procedure.¹⁰⁻¹⁴ Only Bailey's group at Loma Linda has much experience of neonatal transplantation; they recently reported that 21 of 25 infants survived four to 40 months after transplantation for the hypoplastic left heart syndrome, which is otherwise invariably fatal within a few weeks of birth.¹⁵ Interestingly, Bailey *et al* have suggested that the ideal time for transplantation may be in the preterm or neonatal period, as "immunologic privilege" ensures that the host response is less aggressive and more easily controlled.^{16,17} This window of opportunity appears to last for only the first 30 days of life.^{16,17} A further problem in neonatal transplantation is the source of donor organs. In July 1988, after a public outcry, the Loma Linda group stopped using anencephalic donors as only three of 14 such babies fulfilled the criteria for brain death and only one proved suitable for transplantation.¹⁸