Research Policy

Peering into the bowels of the MRC I: setting priorities

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The Medical Research Council does not set the priorities for British medical research. Nobody does. Many bodies fund health research, and few set priorities even within their own programmes. Most are "bottom up" rather than "top down" organisations, which means that they choose between competing grant applications rather than set priorities and then propose or commission research. The logic of this approach is that scientists—particularly clinical researchers who also treat patients—know what needs to be done and, importantly, know what can be done; they also have the skills needed to determine the relative scientific excellence of different proposed projects. But, critics argue, scientists and doctors have priorities that often do not match those of the public^{1,3} and vested interests in awarding grants to friends in their own coterie rather than to those with genuinely new ideas.^{2,9}

The current British government is impressed with some of these arguments and is encouraging the organisations that spend government money on research to be much more "top down" in their approach. The government, borrowing its thinking from the commercial sector, wants objectives set, guidelines issued, and criteria of success and failure determined. A Priorities Board for Research and Development in Agriculture and Food has already been established and has produced two reports.¹⁰ The board uses "criteria related to output value, competitive position, social and political influences and scientific potential"¹¹ (note the order) to reach its recommendations on priorities, and the Agriculture and Food Research Council and the relevant ministries commissioning research dance to its tune. How long will it be before we have something similar for health research?

Here I look at how priorities might be set in general for scientific research and then consider in more detail the MRC's priorities and how it sets them. The next article will examine the mechanisms that the MRC uses for determining who will be supported: in effect these mechanisms set the priorities—haphazardly. Although the council funds less than half of British biomedical research, its mechanisms merit such close attention not only because they are more accessible and are used to spend public money but also because something similar is used by many of the other funding organisations.

The "science" of setting priorities

Ronayne identifies two methods of setting research priorities—the rational and the incremental.¹² In the rational model the decision makers collect as much information as possible on what research is needed and what is possible. They then identify objectives and collect data on what value is placed on these objectives by various groups (including the public and scientists). They survey the means of achieving these objectives and examine the consequences of using each of these means. Eventually they establish a policy that will

Criteria for scientific priorities—from the Advisory Board for the Research Councils

Internal

Timeliness—expectation of rapid scientific advance (in 5, 10, or 20 years)

Pervasiveness—likelihood of a wide range of links with other research

Excellence

External

Exploitability—potential for nationally profitable industrial or commercial use (in 5, 10, or 20 years)

Applicability—potential for uses leading to other benefits: social, environmental, or related to government policy (in 5, 10, or 20 years)

Significance for education and training.

In all judgments, whether internal or external considerations are to the fore, the question of affordability comes into play: the likely benefits of scientific and non-scientific programmes must always be weighed against their cost.

achieve what is required. Industrial research and development might well be directed in this way.

Government sponsored priorities are more often set incrementally: research managers do not consider all the choices available, rather they inch forward from what is happening now. It is "a process of step by step adaption, piecemeal experimentation, bargaining and mutual adjustment between rival interests" and is thought by many to be more effective and democratic than the rational approach. The incremental system works best when neither opportunities nor resources are changing too fast. Its main disadvantages are that it encourages conservatism and inertia and discourages innovation. These disadvantages may not have mattered in the days when generous funds could be spread around.

Perhaps both because opportunities are expanding rapidly while resources are shrinking and because conservatism with a small "c" is out of fashion interest is growing in the rational approach to setting priorities. Setting priorities is not a science, but the process might become much more scientific. In the past few years activities that have much in common with priority setting—for instance, risk assessment and measuring the cost effectiveness of medical treatments—have become much more quantifiable, and the same is beginning to happen with priority setting.¹

Weinberg in 1963 identified "intrinsic" and "extrinsic" qualitative criteria for setting priorities.¹³ (Interestingly, the Advisory Board for the Research Councils has developed criteria for scientific priorities that also use the plan of internal and external criteria (see box),¹⁴ although they are different from those of Weinberg.) The intrinsic criteria of Weinberg are concerned with how well a piece of research is likely to be carried out and therefore ask whether the subject is ripe for study and whether the scientists are competent to

do the work. These intrinsic criteria are easier to judge but, Weinberg (a sociologist) argues, less important than the extrinsic criteria that ask about the "technological, scientific, and social merit" of the proposed research. Judging social merit is especially difficult, but the International Research Group on Values and Benefits of Research has developed a preliminary method for doing so.¹

Peer review is used to assess the competence of the scientists, but more elaborate systems may be necessary to predict what subjects are ripe for study. Irvine and Martin have compared the systems in four countries for forecasting important research lines, and they were most impressed by the Japanese systems, which have been uncannily accurate in some of their predictions.¹⁵ The Science and Technology Agency in Japan has conducted a series of 30 year forecasts. The first began in 1969 when 1500 experts selected from a list of 4000 were asked 500 questions on future social and economic needs and research possibilities. A list of 650 important research developments was generated from the replies, and a second questionnaire was sent to all 4000 experts (more than three quarters responded) asking them to assess the relative importance of the projects and suggest when they were likely to be realised. The questions were repeated in a third questionnaire, which also contained the results of the second one. Eventually a report was published and widely circulated.

This process (rather than the report) is much appreciated in Japan because among other benefits it permits the government to set priorities with a thorough knowledge of what those at the "bottom" are thinking. It also encourages scientists to think long term and, perhaps most interestingly and importantly, "in a very real sense creates the future."¹⁵

The MRC's central structure: implications for priorities

Britain has nothing like the Science and Technology Agency to help in setting priorities, and priorities have been set incrementally. The MRC's corporate plan of 1986 does not contain a section on priorities.¹⁶ Rather the plan looks at problems and scientific opportunities; the MRC's philosophy has been actively to develop work on a subject when a need, an opportunity, an idea, and a man coincide. This general philosophy has prevailed for a long time and is not efficient for determining priorities.

The MRC's priorities have been set mostly from the bottom, but it is worth taking a look at how the council is organised—because some small attempt has been made to set priorities from above and much bigger attempts are likely to be made in the future. The central structure of the MRC is shown in figure 1: the council itself has under it four boards, which were established when Sir John Gray was secretary.¹⁷ The health services research panel was set up when

FIG 1—Central structure of the Medical Research Council.

money for health services research was returned to the council in 1981, and it has now been reconstituted as an executive committee. It can make decisions on short term (project) grants, and, as the figure shows, three of the boards have project grants committees that do the work of deciding which project grant applications will be funded. With a lighter load the tropical medicine research board makes its own decisions on which applications will be funded; much of its work is concerned with the MRC's laboratories in the Gambia and Jamaica.

Main functions of the council of the Medical Research Council

- (1) The organisation of the machinery for running council's affairs.
- (2) The forms of support for research which should be available to meet changing circumstances and respond to new opportunities.
- (3) The allocation each year of resources between broad areas of science and between different forms of support.
- (4) Major investments such as the setting up or closing of units, the appointment of directors or major capital schemes.
- (5) Its policies as an employer.
- (6) The appointment of subordinate bodies to advise them or to exercise any of their functions.

People are not elected to membership of the various committees of the MRC, and some critics see the committees as a self-perpetuating élite. Lay representation is particularly thin. The boards and grant committees have no lay membership, but the council does have four lay members: Earl Jellicoe, the chairman, Sir Austin Bide, the chairman of Glaxo Holdings, Renée Short, the former Labour member of parliament, and Mrs Virginia Bottomley, a Conservative member of parliament.¹⁷ To me and others this seems like far too little lay representation,² but the recently announced appointments of Mrs Short, who did such good work as chairman of the House of Commons Social Services Select Committee, and Mrs Bottomley, who is vice chairman of the National Council for Carers and their Elderly Dependents, is good news to those who think that the MRC has been too élitist and rather out of touch with problems in the community (rather than in the hospitals). Those who have attended council meetings assure me that the lay members have their say, but their influence over what research is done (and not done) must be small. The National Institutes of Health in the United States have much more extensive lay representation, including on the committees that award grants.

The membership of the council of the MRC is to some extent predetermined because among its 20 members it has to include the secretary, four officers of government departments, and the chairmen of the three main boards. The MRC's charter limits the number of lay members to four. The membership of the lower committees is less predetermined, and people are appointed often on the recommendation of the existing committee. People are elected for four years, and gaps are filled mainly with the aim of ensuring that the committees have representation in all the relevant subjects (although this becomes progressively more difficult with increasing specialisation). Factors such as age, sex, and geography are considered but are secondary to getting the "best person in the right subject." Chairmen of the committees are appointed largely on their administrative and scientific knowledge of the committee's business and their ability to command the respect of their committee and researchers.

The system thus does lay itself open to accusations of bias, and Irving, for instance, has analysed the membership of the committees and shown a bias against surgeons and those from the north of England.¹⁸ Of the 185 members of committees running the MRC in 1984-5 only nine were filled by members of surgical disciplines and none were anaesthetists, and only one surgeon was included in the 62 members of grant giving committees. Also the northern universities, which train roughly a third of British medical students, had no representatives on the council of the MRC (in contrast to 60% from London and Oxbridge), 17% of the membership of the boards (in contrast to 59% from London and Oxbridge), and 10% of the members of the grant giving committees (in contrast to 61% from London and Oxbridge). Professor Irving was inspired to do this analysis when the MRC decided to close the trauma unit in Manchester: his accusation was that the bias in the membership of the committees led to a bias against surgery and the north when supporting research. He showed that only one of the MRC's 55 units

was surgically oriented and only six of its 128 programme grants were in departments of surgery or anaesthesia. Then, only 11% of units were in the north and only 8% of programme grants were held by northern universities.

The secretary of the MRC did not dispute Irving's figures.¹⁹ He thus accepted that membership of the committees was biased against surgeons and the north but effectively argued that this was to a large extent inevitable with so many centres of excellence being in Oxford, Cambridge, and London. He repeated the MRC's central philosophy that the MRC's "money goes to those with originality and talent wherever they choose to work" and units and sponsored programmes are placed "in the best possible academic environment."

The MRC tends to resist many criticisms of the way it works by replying "We are the medical research community. Our committees, which make our decisions, are staffed with an ever changing collection of medical researchers, both clinical and non-clinical." The council also points out that serving on one of its committees is a demanding job that brings little material return. Committee members are paid £69 plus expenses. For the amount of work necessary for each meeting this is very little, but most members will receive the money in addition to their usual salaries.

The ex-director of one of the MRC's units, who had emigrated to Australia was inspired, however, by Irving's allegations of bias to argue that the "real power [in the MRC] is uneasily balanced between the boards and the secretariat. . . . The boards are composed of visiting academics with their own full time responsibilities, whose constantly changing members have only a limited grasp of how the MRC actually works."²⁰ Certainly, at one time the secretary had great power within the MRC, but many of those I spoke to, while accepting that it was still considerable, thought that it had diminished—not least because of the growth in the MRC.

The council, whose functions are shown in the second box, has had only the broadest and vaguest influence on priorities.¹⁶ It does look at the allocation of funds among different subjects, but the changes have tended to be small and slow. The council also participates in setting up and closing units, but its role is only a little above rubber stamping.

The boards have more tasks that look as if they are associated with determining priorities: they are responsible for "evaluating the progress of [work within their subject] both in the council's units and from grants which are placed within university departments . . . [and] for identifying opportunities for new research and for reviewing scientific fields."¹⁶ Again the changes made by the boards have been small. They do decide exactly what should be supported through programme grants (an expenditure of about £10m annually) and recommend the establishment of new units, but they rarely close units except when directors leave, make only small changes to the recommendations of the grants committees, and have little money to spend on special project grants (about £3-£4m, most of which is spent on clinical trials).

In the recent past the MRC has been reluctant to propose work on particular subjects, believing that such work may often be second rate and that scientists doing scientifically better work on other subjects may be discouraged. Some of the National Institutes of Health take a different view of encouraging work on particular subjects, and a study of the system used by the National Heart, Lung, and Blood Institute showed that research generated in this way was just as scientifically sound as work that was generated by the investigators themselves.²¹ The MRC's policy may well change with the new secretary but is in complete contrast to the system suggested by Dr David Horrobin, who would like to see large cash prizes offered to those who can solve important problems.²² He uses the historical example of a prize being used to find a way to measure longitude (see third box).²²

Reactive or directive?

The MRC is sensitive to the idea that it is a reactive organisation, funding grant applications that it thinks excellent, and paying little attention to vast problems that nobody excellent wants to research.

Solving the problem of longitude

In 1714 the British government offered a prize of £10 000 for a method that would determine longitude to within 1° and £20 000 for one that would determine it within 0.5°. The need for a solution to the problem was desperate because ships, men, and battles were being lost because of the inability to measure longitude accurately. The prize offered was so substantial that many people began research to solve the problem.

[Mary Evans Picture Library.]

John Harrison (1693-1776) inventor of the chronometer.

It was already known that an accurate clock would allow measurement of longitude (by comparing it with local time), but nobody thought that such a clock could be made—apart, that is, from the "poor, provincial, self taught" clockmaker John Harrison. He built increasingly accurate chronometers that were proved to work in Royal Navy trials. The Royal Society, however, tried to deny Harrison the prize and not until he was 80 did he receive the £20 000.

Horrobin draws four lessons from this story: large cash rewards for solving a problem will generate large amounts of research; the objective must be practically defined and all that must matter is that the solution works—it need not be intellectually brilliant; the competition must be open to anybody, not just the scientific élite; and carrots are better than sticks for encouraging research.²² Horrobin is being provocative rather than scientific in concluding so much from one case, but should the government offer £1m for a cure for schizophrenia?

It points out that almost three quarters of its money is spent on its institutes and units and on long term projects and that all these are directed to a considerable extent. Just how much this means that the MRC's overall programme is directed is, however, debatable.

Firstly, units have a tendency to grow from long term programme grants, and the main criteria for deciding that a unit should be established are excellence and a clear indication that the work will continue to be productive long term. The MRC's corporate plan says that units are also set up to encourage the growth of new subjects (as was the case long ago with virology and immunology) and to meet public needs or to pioneer techniques.¹⁶ The scientific priorities seem to come first, and units are rarely set up simply because of an unmet need—and, says the MRC, it is difficult to do

so. Researchers, particularly excellent ones, cannot be plucked out of the air; nor is it easy to redirect an excellent immunologist to, say, research into incontinence.

Secondly, the chain that leads from the council of the MRC to individual research workers is long and fragile. I spoke to at least one research worker who had never had a scientific discussion with his unit director in more than a decade of working in the unit, and the MRC has only limited ability to direct the work of its units through its four year reviews. Some unit directors are also adept at telling the MRC that the unit is going to do work that suits the fashion of the moment and then using at least some of the resources for what they really want to do. Furthermore, units are rarely closed because their work is not up to scratch or because funds need to be freed for work of greater scientific, clinical, or social importance.

Thirdly, the council's ability to assess the health priorities of the nation is limited. It says disingenuously in its evidence to the House of Lords subcommittee inquiring into medical research that its committees are staffed with 150 scientists and doctors and that these doctors, themselves a changing group, are "well aware of the medical problems of the community." The problem is that they are, for example, much more likely to be aware of the needs (and exciting possibilities) of molecular biology than those of the incontinent.

One other way that the council has of being made aware of the health needs of the nation is through its links with the health departments. Representatives from the departments sit on the council's three main research boards, and annual high level meetings are held between the MRC and the health departments. These annual meetings are largely, however, talking shops and quite how the subjects raised at the meetings are translated into research is far from clear. Furthermore, health needs as seen from the health departments may be different from those seen from a district general hospital in Halifax, and they may in their turn be different from the health needs as seen by the community in Halifax. This is one reason why the limited lay representation on the MRC matters.

The real priorities

Although it is difficult to trace the mechanisms of how priorities are set, it is not so difficult to see what current priorities actually are (fig 2).²³ The subcommittee of the House of Lords Select Committee on Science and Technology, which any day now will produce its report on medical research, has been primarily concerned with priorities. Behind this concern lies, I suspect, a feeling that too much medical research attacks abstruse problems and rare diseases and so is ultimately of little benefit to the taxpayers who support the

research. "Do [priorities in medical research] reflect," asks the subcommittee, "the particular needs of the NHS or, more generally, the health needs of the nation?"

The subcommittee will have to think about how the "particular needs of the NHS or . . . the health needs of the nation" can be measured and will find that it is not easy. Black and Pole attempted this exercise more than 10 years ago, using five indices of the burden of 54 categories of disease—inpatient days, outpatient referrals, consultations with general practitioners, morbidity (measured from sickness and invalidity benefits), and mortality.²⁴ (The Black of this paper is incidentally Sir Douglas Black, who was then chief scientist at the Department of Health and Social Security and who has since been president of the Royal College of Physicians and chairman of several important committees.) The authors then crudely lumped the five indices together and came up with a list of priorities (see table). The table also shows the percentage of MRC expenditure in 1985-6 that went on these various categories.²⁵

Expenditure by the Medical Research Council related to health priorities determined by Black and Pole²⁴

Category	Burden (%) as assessed by Black and Pole	MRC spend (%)*	
		Method 1	Method 2
Mental illness and handicap	13.6	3.6	3.3
Respiratory disease	13.5	0.6	3.1
Ischaemic heart disease	6.6	4.0	4.5
Bone and joint disease	6.4	3.6	4.8
Accidents and suicide	6.3	0.7	0.7
Neoplasms	6.1	6.6	8.1
Digestive disorders	4.6	1.5	4.1
Neurological disorders	4.1	7.2	8.9
Cerebrovascular disease	3.7	0.5	8.9
Skin diseases	2.6	0.4	1.9
Urogenital disease	2.3	0.8	2.1

*The MRC has two methods of calculating its expenditure on particular categories. In method 1 the money spent on a project is assigned to one category. Often, however, projects will produce information relevant to more than one category, and in method 2 the money spent on a project may be assigned to more than one category.

FIG 2—Allocation of Medical Research Council funds to major subject areas.

Not too many conclusions can be drawn from this table because all the measures are imprecise. (And the burden is measured for the early 1970s, whereas the expenditure is for 1985-6, although I think that neither pattern has changed much over the decade and a half.) Much fun can, however, be had by speculating on the implications of the table. The MRC's bias has always been towards basic research, and fellows of the Royal Society have always had a large say in the running of the council. The MRC is confident that basic research will ultimately produce the richest rewards. Most medical researchers whom I spoke with would agree, but hard evidence (rather than endless anecdote) that this is the case is sparse. Another bias within a bias is towards immunology, which consumed more than 4.5% of MRC expenditure calculated by method 1 and 9.5% calculated by method 2. The last secretary was an eminent immunologist, and immunologists have for a long time been prominent in the MRC.

The other biases that are suggested from the table might be said to be the biases of clinical medicine itself. Thus neurology and heart disease do well, while mental illness and handicap, respiratory disease, skin disease, and urogenital disease do badly. And the problem that does worst of all in relation to its disease burden is "accidents and suicide," which is one reason that such a furore surrounded the council's decision to close its trauma unit in Manchester. The council did, however, do everything in its power to keep the unit open, even trying to recruit a director from abroad. The failure to find a director illustrates how priorities tend to be self perpetuating. The best people tend to go into activities already populated by the best people because those activities are well funded and are made intellectually exciting. These "best people" then tend to get on to committees that allocate research funds, and as their priority is excellence they allocate funds to people working in the same activities—immunology, molecular biology, or whatever. And so it proceeds.

The MRC is proud of its bias towards basic research and is convinced that this is the way ultimately to ameliorate the suffering caused by the most common diseases. Conditions cannot be cured simply by throwing money at them, as Richard Nixon's famous war against cancer showed. And what, for instance, can you achieve in tackling dementia simply by giving generous funds to psycho-geriatricians to take into their outpatient clinics and wards full of demented old women? Not much, the MRC thinks: researchers must have a way into the problem. And the way in comes from understanding more about how the brain works, which is why more of the MRC's money has gone into research to understand the basic mechanisms of the brain, although money has gone into clinical studies of dementia. As progress has been made around the world in understanding the basic mechanisms so the MRC has begun to put more money into the subject, and its corporate plan says that there is an urgent need for a major new centre to conduct research into Alzheimer's disease.¹⁶

The predevelopment gap

More important than the bias of the MRC's priorities may be the inefficiency in turning the fruits of medical research into benefits to patients and to the health of the well. Much of the worry with all of British science is focused on the "predevelopment gap," the failure to turn first class basic research into saleable products. And the same goes for medical research, where the failure is not only in producing saleable products but more importantly in producing benefits to health.

The MRC has begun to accept more responsibility for ensuring the commercial development of any spin offs from research it has sponsored. But for the more general uptake into health care it has not accepted responsibility beyond wide dissemination of results. In its evidence to the House of Lords Committee the MRC said:

It must be emphasised that the council's responsibility is to conduct medical research and it is for other agencies (for example, government, the National Health Service, health practitioners, the Health Education Council [now Authority]) to see that the results are carried through to patient care and health education... it might be argued that the inadequacy of society's response to the results of research is as important as the way in which the health needs of the nation influence what research is undertaken.

The blocks to the translation of research into benefits to health are many. Resources are important, and their lack has, for instance, impeded the development of in vitro fertilisation and prenatal diagnosis. These programmes have also been held back by moral stances. Political considerations and vested interests have blocked programmes to build on the results of research into the effects of smoking and nutrition on health. But a further block is lack of knowledge, and publishing the results of research in *Nature* or a

prestigious specialist American journal is not enough to ensure their uptake by doctors in Britain. The MRC should perhaps accept more responsibility to ensure the uptake of its work, and I suspect that the new secretary recognises this.

Conclusion

Priorities in British medical research have been set incrementally rather than rationally, and ultimately are set mostly by the people who do the research. One result of priorities being set primarily by scientists has been that many socially important health problems have not been adequately researched. The importance of this disparity between what scientists think interesting and what the public needs has grown as scientific and medical possibilities have increased and resources have failed to keep pace. I believe that medical research might benefit from a priorities board that included representation from the MRC and other research councils, the universities, the relevant ministries, the medical charities, and industry, particularly if lay representation was generous and quantifiable methods were used to assess needs and opportunities. A strong input from researchers could be achieved by copying the Japanese and asking many researchers from many disciplines to forecast what medical research could do and should do.

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Is prostate specific antigen of any value in screening for prostatic cancer?

It is difficult to justify using measurements of serum prostate specific antigen concentrations for screening for prostatic cancer. This is because of the high percentage of false positive results produced by patients with benign prostatic hyperplasia. In an attempt to increase the specificity of the test, however, many groups have taken higher levels as a cut off point above which cancer is likely. Most centres in the United Kingdom use an immunoradiometric assay (Tandem R, Hybritech) and take 10 µg/l as the cut off level for diagnosing cancer. The specificity of the test is improved from 40% at 4 µg/l to 85% at 10 µg/l with a minimal fall in sensitivity (unpublished data). But as there is still considerable overlap between some cases of intracapsular carcinoma and some cases of benign hyperplasia the widespread use of the test to identify early cancer is inappropriate.

It is important to differentiate between the use of a test as a screening tool in an asymptomatic and unselected population and its use in assessing a suspicious or at risk case. We think that a concentration above 10 µg/l in a patient with a suspicious nodule or a history indicating possible prostatic

cancer should be an indication for detailed investigation of that patient. We accept that the most appropriate use for measurement of prostate specific antigen is in following the progress, response to treatment, or recurrence of prostatic cancer. In this way sequential measurements may be of value in monitoring patients with prostatic cancer in whom treatment has been deferred. It may also be potentially of value in identifying developing malignancy in patients at risk.

Finally, while few centres routinely estimate prostate specific antigen concentrations, the number offering this service is increasing. In view of the superior sensitivity of prostate specific antigen over prostatic acid phosphatase some centres, including our own, are considering substituting prostate specific antigen for prostatic acid phosphatase. This will be cost effective and acceptable only if the indications for performing the test are carefully defined. Studies nearing completion should provide sufficient information to allow us to decide whether prostate specific antigen should indeed supersede prostatic acid phosphatase in clinical practice.

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