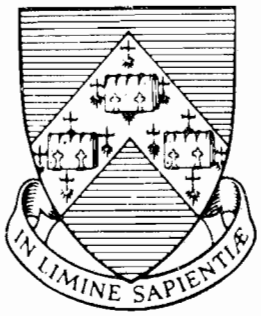

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ABSTRACT

The cost of training doctors, both in terms of expenditure on medical education and in terms of the induced demand for NHS expenditure created by having more doctors initiating care and cure, are considerable. However, the forecasting of their number and the planning of their utilisation remains crude and deficient in the UK.

This paper reviews doctor manpower planning in the UK in the recent past and criticises official practices. There has been a failure to consider the implications of alternative levels of funding for the performance of the NHS and the use of doctors. There has been a reluctance to analyse substitution possibilities e.g. to what extent could nurses be substituted for doctors in general practice? Analysis of the relative "attractiveness" of general practice and hospital work for graduating doctors has been cursory but has important implications for career structures and the efficient use of scarce manpower. For instance, an increase in the size of the consultant grade at the expense of "juniors" has implications for night and weekend cover, for the review of medical practice and, if the labour market is to be kept flexible to avoid "surpluses" and "shortages", for the nature and duration of consultant and GP contracts. i.e. short term contracts rather than "jobs for life" may be consistent with efficiency if inconsistent with professional "restrictive practices".

These and other major issues need to be analysed by the UK Health Department's Medical Manpower Steering Group. This analysis need to be informed by careful research of a fundamental nature which emphasises that doctors are merely one input into the processes by which health care is produced for patients. Furthermore, as two of the authors argued nearly a

decade ago, this work needs to be part of a continuous public process of review so that scarce intelligent manpower is not diverted into inefficient uses.

Introduction

In 1977 two of the authors of this paper wrote a critical review of doctor manpower planning (forecasting and policy) in the UK, pointing out that it had as its foundation a manpower forecasting exercise, (carried out by the Royal Commission on Medical Education, (The Todd Commission 1968) which had serious methodological weaknesses, (Maynard and Walker 1977). This forecasting exercise had provided a justification for a major expansion of medical education in the UK since the late 1960's, but was rendered irrelevant almost as soon as it was completed, because the Commission assumed a dramatic reduction in the inflow of foreign trained physicians to the UK. Instead this doctor inflow increased, and no action was taken to reverse this flow until 1976. As a consequence, there was a far larger number of overseas trained doctors than had been anticipated which, together with a much lower rate of population growth than had been forecasted, meant that by the mid 1970's Britain had a far larger number of doctors per head of population than the authors of the Todd Report had forseen. This meant that although the threatened short term "shortage" of doctors expected by the mid 1970s had been avoided, the longer term effects of medical school expansion meant that a "surplus" of doctors appeared to be a real possibility by the 1980s.

Since 1977 further doctor manpower forecasting exercises have been undertaken by the Royal Commission on the NHS (1979) and three DHSS working groups, the most recent having appeared in May 1985. It therefore seems appropriate at the present time to reassess the state of doctor manpower planning in the UK. The conclusion we draw is that while the methodology of the manpower forecasting has improved, serious methodological flaws remain and have been obvious for many years (see Maynard and Walker 1978(a) 1978(b) and Maynard (1981)). The 1985 DHSS report, like its predecessors, is very limited in its scope and the

implications for the NHS of the most recent manpower forecasts appear to have been seriously misunderstood. An alternative interpretation of current inaction about medical manpower would be that the forecasts suggest policy changes which are politically unattractive.

Perhaps the most significant aspects of the present position are that the increasing stock of doctors is at serious variance with the funding constraints facing the National Health Service; that at a time when less doctor intensive input combinations appear desirable the health care system is being pushed toward a more doctor intensive pattern of care; that doctors salaries, far from having fallen as a result of growing doctor surpluses, have risen significantly relative to those of other health service labour inputs over the last eight years; and that there is an increasing imbalance in the hospital career structure which, unless tackled by policy makers, will lead to frustrated expectations and could totally undermine the whole manpower planning exercise. Recent recommendations for dealing with these structural problems (UK Health Departments et alia (1986) and British Medical Journal 1986), if implemented would have important implications for NHS resources and hence undermine the basis of existing plans.

The next four sections of the paper assess the current state of manpower forecasting and policy making by examining the forecasts in the most recent report produced by 'the Advisory Committee for Medical Manpower Planning', (DHSS 1985(a)), drawing particular attention to methodological improvements on previous forecasts, and considering the major methodological flaws that remain. The paper concludes with an analysis of the policy options currently faced, and suggestions for further refinements of forecasting and policy.

1. Present Medical Manpower Planning Arrangements.

Since the last war a great deal of attention has been devoted to the problem of obtaining the appropriate number and type of doctors to staff the National Health Service. Until 1978 doctor manpower policy was guided by a series of separate reports which appeared at approximately ten year intervals (reports of the Goodenough Committee, (Ministry of Health 1944), the Willink Committee, (Ministry of Health 1957) and the Todd Committee (Royal Commission on Medical Education 1968). Since 1978 there has been a commitment to more frequent reviews (Department of Health and Social Security (DHSS), 1978, 1980, 1985(a)). The most recent report was produced by the 'Advisory Committee for Medical Manpower Planning', set up by the Minister for Health (hereafter referred to as the Committee) in 1982 on the recommendation of the Medical Manpower Steering Group (MMSG). The MMSG had estimated the future supply of and demand for doctors and the implications for medical school intake in 1980. In its report the MMSG recommended that owing to the wide range of uncertainty surrounding many of the assumptions underlying these estimates regular monitoring of the position and review of the estimates were necessary (DHSS 1980).

The Committee, consisting of doctors, academics and officials of the Health Department, had the following terms of reference:

> "Within guidelines as to the resources likely to be available to the Health Service, to advise Health Departments upon factors relevant to the Government's decision about the appropriate future level of medical school intake in the United Kingdom, including, in particular, consideration of the most likely range of assumptions about:
>
> i) the future demand for doctors both within and outside the NHS;
>
> ii) changes in the supply of doctors, including patterns of activity, participation and retirement;
>
> iii) possible changes in migration flows from and to the United Kingdom". (DHSS 1985(a) p2).

The Committee was not therefore required to recommend what the appropriate level of medical school intake should be but to advise on the factors that might influence such a recommendation. Furthermore it was left to the Government to decide when to publish its findings. The present report was completed in 1983 but remained on Ministers' desks for over a year.

The report of the Committee took the now traditional form of forecasting the future supply of doctors given present medical school intake plans, forecasting the future demand for doctors, bringing the supply and demand forecasts together, discussing the implications for the medical manpower market and making suggestions for the future. Unlike previous reports, which have excluded Northern Ireland from consideration, the forecasts of the present report relate to the whole of the UK.

In sections (2) to (4) each part of the report is analysed and compared with previous medical manpower reports.

2. The forecast supply of doctors

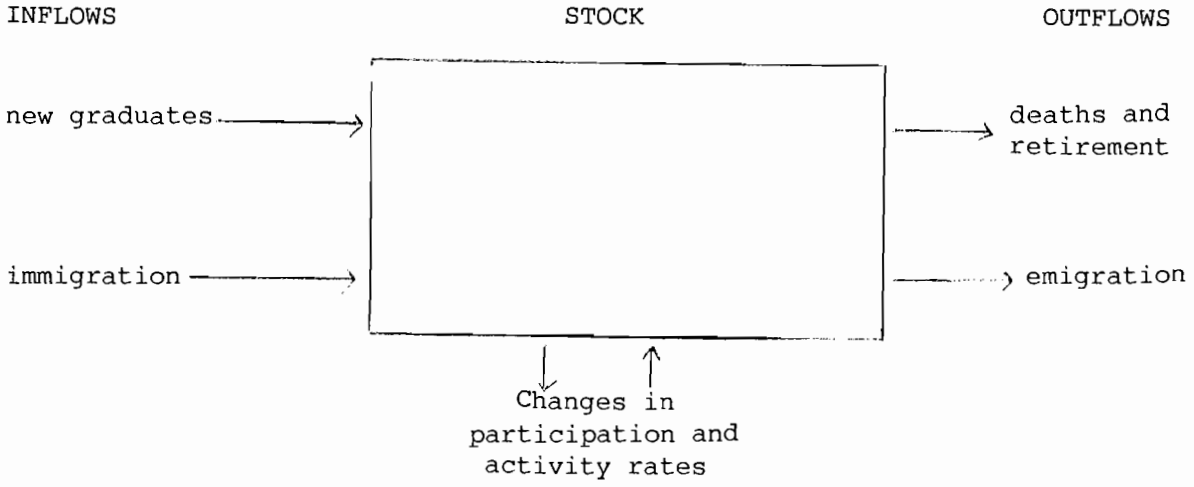
The Committee forecasted the supply of doctors, in terms of whole time equivalents (wtes), for a 30 year period (1980 -2010) although particular attention was focused on the year 2000.

The basic model used for forecasting doctor supply is outlined in Figure 1. Future doctor stock is given by existing stock plus future inflows less future outflows. The two main inflows into the doctor stock are new graduates and doctor immigration. The main outflows are deaths, retirements and emigration. Additional outflow occurs as doctors leave the medical manpower market for other domestic labour markets.

In addition to changes in the size of the doctor stock over time the supply of doctor services is affected by the rates of participation and

activity of the given stock of doctors. Hence changes in participation and activity rates in the future must also be estimated.

Figure 1 : The forecasting model for the supply of medical manpower



The use of this forecasting model is not new to medical manpower planning. Indeed it has formed the basis of all forecasts of doctor supply made in the post 1940 period. However successive reports have developed the modelling of the inflows and outflows beyond that of previous reports. Furthermore although all reports have made reference to the uncertainty surrounding forecasts of these flows, it is only in recent reports (DHSS 1978, 1980, 1985(a)) that the sensitivity of the forecasts to the underlying assumptions has been explored.

In the case of the most recent report the Committee based its forecasts of supply on the following assumptions:

i. Medical school intake

- annual UK born intake constant at 4,230 from 1983.
- females comprise 50 per cent of home intake from 1985 onwards.
- overseas born students comprise a constant 12 per cent of the intake.

ii. Wastage rates

- for home entrants to medical school eight per cent of males and six per cent of females do not take out provisional registration.

- the corresponding figures for overseas born students are 22 per cent and 20 per cent respectively.

iii. Death rates

- age and sex specific death rates for doctors are estimated from recent mortality data for doctors.

iv. Migration of UK born doctors

- both outflows and inflows are assumed to be proportional to age and sex specific doctor stocks, the estimated net outflows rising from 120 per annum at the beginning of the period to about 160 per annum at the end.

v. Migration of doctors born in the Irish Republic

- net inflow assumed to be 90 per annum at the start of the period falling to 60 per annum over the forecasting period as a result of action by the Government of the Irish Republic

vi. Residential migration

- changes in doctor stock not otherwise identified are assumed to be of the order of that observed in recent years.

vii. Migration of overseas born doctors

- inflow assumed to fall steadily to 40 per cent of its observed trends.

- outflow assumed proportional to age and sex specific stocks.

viii. Activity rates

- for doctors aged over 65 the rate falls steadily to zero by year 2000.

- for males under 65 the rates remain constant throughout the period.

ix. Participation rates

- for hospital doctors rates are assumed constant and based on NHS census data for 1980.

- for GPs it is assumed all work full-time.

x. Females

- activity and participation rates increase steadily until they are midway between the current values for males and females by 2010.

The two main bases of the assumptions were the observed level of the particular variable or the extrapolation of the observed trend in the variable. The major development of this supply forecast was that sensitivity analyses were performed on all those variables which were considered to be subject to a significant level of uncertainty.

Previous reports had paid little attention to the sensitivity of the forecasts to the underlying assumptions. Indeed the early reports relied entirely on point estimates. The uncertainty surrounding the assumptions was acknowledged but no consideration was given to the effect of using inaccurate assumptions on the accuracy of the supply forecasts. The first attempts to consider ranges of supply forecasts based on different assumptions were the 1978 studies. The first of these was the study commissioned by the Royal Commission on the National Health Service (Maynard and Walker 1978(a)). In that study alternative assumptions were made for:

i. the sex and nationality composition of new medical graduates

ii. migration rates of British and Irish doctors

iii. immigration rates of overseas doctors

iv. female participation rates

All other assumptions were point estimates. The authors considered three combinations of these sets of alternative assumptions:

a) the "best guess" combination of assumptions based on the authors' own assessment of "best guess"

b) the "minimum supply" combination

c) the "maximum supply" combination.

Sensitivity analyses were also considered in the 1978 Green Paper on medical manpower planning (DHSS 1978) and in the MMSG report (DHSS 1980). These analyses were mainly concerned with the effects of different assumptions about retirement rates and the activity rates of female doctors.

Compared with these previous reports the treatment of the sensitivity of the forecasts of supply to the underlying assumptions in the Advisory Committee's report is much more comprehensive using a range of assumptions for all factors which are subject to uncertainty. With the exception of the inflow and outflow of overseas born doctors all other factors were considered to vary independently. The cumulative effect of varying different assumptions is additive, however, the report considered it unlikely that all variables "...would go to their extreme values at the same time" (p14), although it was "...quite possible that each will go part-way towards their extremes producing a combined effect rather greater than any one acting on their own" (p60). The Committee therefore chose to base upper and lower projections of supply on one half the sum of the upper and lower projections resulting from varying individual assumptions. This work produced a main projection of doctor supply in 2000 of 103,900 wtes with upper and lower variants of 111,700 and 91,000 respectively (see table 1). This main projection represents an increase in doctor stock of around 20,400 wtes by the end of the century. This would be generated by an average annual rate of growth of 1.1. per cent, with a margin of uncertainty of around 0.5. per cent on either side, although the rate of

growth would be higher between 1980 and 1990 than during the following decade.

Table 1 Alternative projections of the supply of active doctors in the UK 1980-2010

	main projection	upper variant	lower variant
1980	83,500	84,200	82,600
1990	93,900	98,500	85,800
2000	103,900	111,700	91,000
2010	115,700	126,400	98,800
Average annual rate of growth (%)	1.1	1.42	0.48

Source: DHSS (1985(a))

Although the sensitivity analysis carried out by the authors of the report continues the trend of successive reports by improving upon the methodology of the previous report, the particular approach adopted to deal with uncertainty is at best primitive. The use of extreme values and the half sum approach results in a wide range of possible outcomes without any consideration being paid to the probabilities attached to each outcome. While precise estimates of the probabilities of particular assumptions are not available the half-sum approach is based on an implicit assumption that the probability distributions of each variable are identical. Furthermore, there is no capacity in the forecasting models for automatic feedback on the policy instruments (e.g. target medical school intakes) as a result of unexpected values of particular variables occurring. For example, if doctor emmigration falls below what was expected at the time of the planning exercise, appropriate adjustments would not be made in medical school intakes until the next report on medical manpower is commissioned. It would appear more appropriate to allow for automatic feedback to the

policy instrument as new information appears on the dependant variables: e.g. a departure from the desired doctor stock of more than some (given) percentage would trigger a change in medical school intake.

A further aspect of doctor supply which has been persistently neglected in the forecasts is the cost of training doctors. This reflects a reluctance to regard education as an investment and has led to the failure to compare the efficiency of training additional doctors with alternative policies producing the same doctor input, e.g. substituting other sources of doctors service such as increasing female doctor participation rates for additional numbers of doctors. Not only is there a reluctance to analyse such modest proposals but there is also an unwillingness to examine carefully even more radical proposals such as substituting between types of health service inputs (e.g. training more nurses and substituting nurse inputs for doctor inputs).

3. The forecasted demand for doctors

The forecasting methodology for doctor demand, unlike that for doctor supply, has changed significantly over the post-war. The first two reports based demand forecasts on the notion of requirements for services or achieving target doctor-population ratios. The relationship between the forecasts of requirements and the allocation of funds to the health service was only given passing consideration by Todd (Royal Commission on Medical Education, 1968). Doctor demand in the short run was estimated on the basis of service needs determined partly from professional assessment of what can and should be done and partly from projections of the changing requests for services from the population resulting fromn changing demographic structure, with long run demand being estimated by the extrapolation of observed trends in the doctor-population ratio. Consideration of the funding implications was confined to a brief analysis

of the growth in national income and the proportion of national income allocated to health care to support the forecasted doctor demand.

Forecasts of the future demand for doctors were not part of the terms of reference of the commissioned study of doctor supply (Maynard and Walker 1978(a)). However the authors did draw attention to the funding implications of the various forecasts of doctor supply in 2000.

The 1978 Green Paper on medical manpower (DHSS 1978) considered the implications for the future demand for doctors of meeting various targets concerned mainly with achieving target doctor-population ratios and equity in the regional distribution of doctors. However these forecasts were then put to one side and attention switched to considering future funding. The proportion of GNP devoted to health care, the relative price effect of health care provision and the proportion of health care resources devoted to doctor employment were all assumed to remain constant. Alternative values of the growth of GNP were assumed (2.5 per cent and 3 per cent), however no other sensitivity analysis was performed. These assumptions produced a forecasted annual increase in demand for doctors of between one and two per cent.

The report of the MMSG (DHSS 1980) continued the trend of switching attention away from doctor-population ratios and towards funding availability by basing the forecasts of future demand for doctors entirely on the forecasted future supply of funds for health services.

The Advisory Committee (DHSS 1985(a)) sought to reconcile funding availability and extrapolation of requirements to forecast future demand. The problem of estimating future rates of growth of national income, which have tended to be consistently inaccurate in the past, is avoided by adopting the DHSS resource (funding) assumptions for planning purposes issued to Health Authorities (HC (83) 12). This suggests that 0.5 per cent

annual growth in real funding should be used as a basis for long-term (ten years) planning although it is noted that this should not be seen as a commitment.

The authors of the Advisory Committee report introduce a margin of 0.5 per cent on either side of the figure to allow for uncertainty, and estimates the proportion of these funds to be allocated to doctors' salaries by extrapolating the observed trend. With further allowance for uncertainty this produces a forecasted rate of increase in demand for doctors by Health Authorities of between zero and two per cent per annum.

The report recognises that the independent contractor status of GPs implies that growth in the demand for their services is determined "...not by available financial resources but partly by supply...and partly by the perceived need of existing GPs for additional partners" (p23). Consideration is given to extrapolating the observed trend in the rate of increase in GPs. However adoption of this figure of 1.4 per cent per annum would result in GP supply considerably greater than that required to meet the target average list size of the BMA of 1,780 well before the year 2000. An annual rate of growth in demand for GPs of one per cent per annum is therefore assumed since this is consistent with satisfying the target average list size around the end of the century. With an allowance for uncertainty and a forecasted growth of demand for doctors outside the NHS of similar magnitude, this produces an overall forecasted rate of increase of demand of between zero and two per cent per annum, with 0.5 per cent, to 1.0 per cent seen as the most likely range of values.

As with the forecasts of doctor stock the Committee's forecasts of future demand are methodologically superior to previous reports. The advantage of basing forecasts on available funding is that they are forecasts of effective demand as opposed to the much higher levels of

demand that result from considering improvements in services without regard to their cost. However in focusing on available funds the report fails to give adequate attention to the level of provision of health care services and improvements in health these demand forecasts allow. Since 1968 the incremental funding assumptions for the health service have become progressively less generous. The most recent report has been produced in an era of almost zero growth in real health service funding (see table 2). However, throughout this period we have had a doctor supply policy which has hardly changed. The initial large medical school expansions recommended by Todd for the 1970s occurred although further recommended expansions into the 1980s and 1990s have not taken place because the population growth assumptions have not been fulfilled.

As a consequence of these conflicting trends (doctor numbers rising faster than funding) even if doctors' wages had remained constant relative to the price of other health service inputs, an increasingly large proportion of the health service budget has been and will, in the view of the Committee, continue to be committed to employing doctors. In addition doctors' wages have risen much more rapidly than the earnings of other health service staff (see Table 3). This shift to a more doctor intensive pattern of care requires careful evaluation, given the substantial element of administrative discretion in the fixing of doctors wages, the observed trend seems rather anomalous.

We drew attention in 1977 and 1978 to research from the U.S.A. along with work done in the UK which suggested that health service output might be most effectively increased by moving toward a less doctor intensive input combination. The failure of policy makers to follow up such initiatives in the intervening period only increases the need to consider the options now. For example, GPs may or may not provide better care for

Table 2 : Resource Assumptions of the Doctor Manpower Forecasts 1965-85

	1 Growth of GNP	2 Proportion of GNP devoted to health care	3 Growth in Health Service Resources	4 Growth in Volume of Health Care[1]	5 Proportion of Health Exp. Devoted to Doctors	6 Growth in Doctor Numbers to be afforded
Royal Commission on Medical Education (Todd) 1965-68	3% per annum	Constant	3% per annum	1.5%	Constant	1.5%
DHSS 1978	2.5%	Constant or rising	2.5% or 2.5%+	1.5%	to depend on wages	1-2.0%
Medical Manpower Steering Group Report 1980	2.0%	Constant or rising	2%+	1.5 - 2.0% (Hospital and Community 1.0 - 1.4%)	Constant or rising	1-2.0%
Report of the Advisory Committee for Medical Manpower Planning 1985	no estimate	cannot be predicted with any certainty	approx. 0.5% but does not imply committment to such growth Report considers range 0 - 1.0%	0.0 - 1.0%	rising but more slowly than in the past	0.0 - 2.0% with 0.5 - 1.0 the most likely

1. i.e. column 3 adjusted for the relative price effect.

Table 3. Gross weekly earnings[1] by occupation 1977 and 1984

	1977 £	1984 £	Change 1977-84 %
Males			
Medical practitioners	131.8	381.4	189
Nurse administrators and executives	86.6	198.3[2]	129
Registered & enrolled nurses & midwives	63.3	147.3[1]	133
Ambulancemen	73.5	164.1[2]	123
Porters	58.8	115.5[3]	96
All non manual men	88.9	212.4	139
Females			
Nurse administrators and executives	78.2	172.4[2]	120
Registered & enrolled nurses	52.4	127.9[2]	144
nurse auxilliaries and assistants	47.4	103.0[2]	117
Ward orderlies	51.9	99.6[3]	92
All non manual women	53.8	125.3	133

Notes

1. Full time when pay unaffected by absence.
2. Includes settlement delayed by dispute which was paid later than normal.
3. Settlement for 1984 delayed.

patients if they have smaller numbers of patients to care for: some GPs operate with list sizes in excess of 4,000 and claim (because of substitution of nursing and other inputs) to provide a good quality of care, (Fry 1977). Doctor inputs in mental handicap may be of little use. Cure is not possible and care may be best provided by other inputs (e.g. nurses) supplemented with general physician or GP services, the latter being a natural result of the policy of community care for this client group. Consequently it is important to introduce assumptions concerning these influences and subject them to sensitivity analysis, in order to consider the effects on the demand for doctors given the uncertainty involved.

Although a first reaction from doctors might be that more doctors are needed it must be remembered that they are being employed at the expense of other cooperating inputs. Hospital doctors are the main initiators of demand for other inputs and their apparently lower morale in recent years may be partly due to the fact that each doctor now has a smaller command over other inputs than was the case a few years ago.

In summary, although it is a useful exercise to forecast doctor demand on the basis of available funding it is important that the implications of these forecasts for the output, or at least service provision of the health services be assessed. This depends not only on doctor numbers but also on the other inputs employed.

Various factors which affect the demand (in the sense of requirements to meet stated objectives) for doctors are recognised in the report but are not introduced explicitly into the forecasting procedure. In particular changes in the demographic structure of the population, changes in health service priorities and changes in the mode of delivery of health care would all affect the future demand for doctors. Although predicting what these

effects will be is difficult this is no excuse for assuming that their effects are unimportant for policy.

All the forecasting methodologies used to date fail to give recognition to the nature of the demand for doctors. In particular doctor demand is derived from the demand for health improvements with doctors being only one of many inputs in the production function for these improvements. Much of what is produced in the health service has never been subjected to careful evaluation. However, as resource constraints bite the pressure to evaluate procedures for both their clinical and cost-effectiveness will increase. As the number of evaluations increases resources will be switched from the less effective to the more effective services. Similar shifts in service mixes will occur as priorities within the health service and the nature of the demands of the population (arising from changing age structures, consumption patterns, etc) change. However, since different service mixes will give rise to different input mixes (i.e. doctors, nurses, equipment, etc) the demand for doctors will depend on the cost effective mix of service provision.

Although forecasting the demand for doctors has moved on from the extrapolation of time trends in crude doctor-population ratios its current focus continues to overemphasise the role of doctors. The present approach also fails to consider the effects of changes in the ratio of doctors to other inputs on the production of health status improvements, which are the ultimate objective of the NHS.

4. The balance between supply and demand

The Committee found that on the basis of the main forecasts of supply and demand a small doctor surplus of approximately 2,000 would emerge rising to 3,000 by the end of the planning period.

Sensitivity analyses were performed by comparing the main forecasts of supply with the extreme forecasts of demand and vice versa. These suggested that:

i. the estimated surplus (shortfall) was very sensitive to the underlying assumptions.

ii. the estimated surplus is more sensitive to demand assumptions than to supply assumptions.

Attention was drawn to the implications of the forecasts for the career structure. Even if the number of career vacancies becoming available remains at its present level (approximately 3,200 per annum) then career prospects are unlikely to improve and, should the main forecast of demand prove over-optimistic, then prospects would deteriorate. The main cause of this implication for career prospects is the forecasted increase in UK graduates, who will in general be seeking career grade posts in the long-term, and the forecasted reduction in overseas graduates who are less inclined to seek such posts. As a result, unless there is to be a steady increase in career grade posts the Committee suggests that:

> "...medical unemployment, or excessive lengths of time spent in the training grades, would become an increasing problem". (p52).

No agreed view was reached by the Committee on the future level of medical school intake but this was not required under the terms of reference. However a number of recommendations were made in the report. In particular the Committee recommended that any reductions made to medical school intake should be small and easily reversible given the uncertainty surrounding the forecasts of supply and, in particular, demand. As a result reductions should be spread around medical schools as opposed to being aimed at closing down individual departments or schools.

Secondly the authors of the report note that restrictions on the numbers of overseas graduates entering the UK would be advantageous as a method of fine-tuning the doctor stock since this has a greater effect on short-term supply and less effect on long-term supply than changing medical school intake, the effects of which are essentially long-term.

Thirdly, the authors suggest that the forecasted problems in career structure should not be influential in determining the aggregate level of medical manpower requirements. Any structural problem should be dealt with separately with the planning priority being to attempt to achieve an overall balance in supply and demand for medical staff. However, this fails to recognise the effects that problems in the career structure may have on other elements of the planning model. In particular imbalances in the career structure are likely to affect the rate of withdrawal from the profession as expectations become frustrated. Attempts to deal with the structural problems in terms of increasing the number of career posts, such as those recently recommended by the Working Group representing the Joint Consultants' Committee and the DHSS (UK Health Departments et alia (1986) and British Medical Journal 1986), have implications for funding and, with a fixed budget constraint, for the attempt to deal with the structural problems in terms of increasing the number of career posts would have implications for funding and, with a fixed budget, for the relationship between the total amount of funding allocated to health care provision and the number of doctors or other inputs employed. As a result attempts to solve the structural problems of the medical profession implicit in the forecasts will have implications for either the levels of forecasted supply and/or demand. The order of magnitude of any changes in the required future supply of doctors, the nature of the imbalance between supply and demand (i.e. long-term or short-term) and hence the appropriate parameter for adjustment will therefore depend on the future structure of the profession.

5. An Agenda for Action

The Government response to the Committee's report has been confined to the provisions for entry into the UK of overseas doctors (DHSS 1985(b)). The provisions have been brought more into line with the tight immigration rules applying to other groups. Doctors wishing to become general practitioners now need to comply with the relevant entry provisions for the self-employed. All other doctors will be subject to normal work permit requirements with the exception of those intending to undertake a period of postgraduate training, who will be admitted for a period of four years after which extensions will be required under the normal immigration provisions (the new provisions do not apply to EEC doctors who continue to have free entry).

No change has been made to the target medical school intake of 4,230 per annum nor to the structure of the medical profession, even though the need for Government policy in this latter area has been highlighted (House of Commons' Social Services Committee 1981) and accepted by the Government (Clarke 1982).

Whilst recognising that there have been theoretical and practical advances in official manpower planning practices, a number of weaknesses of a fundamental nature remain, which cast serious doubts upon the findings of the 1985 report and upon current practice. These defects need to be explored by those involved in the current DHSS review of medical manpower. In particular:

i. Demand and Supply Forecasts

The demand forecasts fail to consider the implications of alternative levels of "effective demand" (funding) for the performance of the health care system. Yet performance in terms of the level of achievement of stated objectives and changes in the stated priorities of the health

services will influence both the total amount of funding allocated to health care and the proportion of this allocation used to fund doctors' posts.

This is particularly important for future work in at least two ways. Firstly, the emphasis on the development of community care makes it likely that doctors' roles will alter substantially with, for example, general surgeons working in health centres and consultants' increasing involvment in community care.

Secondly, both within and outside the hospitals, the scope for substituting between inputs (e.g. nurse practitioners or community carers for doctors) seems likely to develop and be exploited e.g. a recent US study has shown that compared with Federal forecasts for 1990, the employment of doctors in the delivery of ambulatory care for children and adult members of Health Maintenance Organisations was respectively 25 and 50 per cent lower than forecast (Steinwachs et al. 1986).

It is remarkable that substantial changes have taken place in doctor-nurse and other input ratios in health care in recent years but there has been little in the way of systematic analysis of these changes. Econometric work (most of which has been confined to the USA) has not increased our understanding of these changes as much as it might have done. For instance, results seem to depend on the form of production function used with Reinhardt (1975) using a Cobb-Douglas form and identifying considerable scope for the substitution of nurses for doctors in ambulatory care and Pauly (1980), using Cobb-Douglas and alternative functional forms, reaching an opposite conclusion for hospitals. As Pauly notes the choice of functional form inevitably involves judgement (Pauly 1980, p.29)

Careful econometric investigation, using alternative forms of

production function for the same UK-NHS set of data, and the extensive use of well designed clinical trials would enable researchers to determine the nature and scope of substitution between types of labour and capital in the health care production process.

The supply forecasts are subjected to considerable sensitivity analysis to identify the effects of competing assumptions on outcomes. However, no attempt is made to consider the relative probabilities of the variant assumptions.

Furthermore, little account is taken of the relative "attractiveness" of the two main "career paths", hospitals and general practice, for the graduates of medical schools. In recent years, graduates have elected to enter general practice in increasing numbers due to hospital career blockages, the relative financial attractiveness of general practice, the lack of monitoring (e.g. no cash limits and no RAWP) of this service and other factors, with the result that the GP stock has been growing by 1.8 per cent per year. The current review of general practice (DHSS 1986) may alter this trend and have significant implications for the supply of manpower to the competing sectors.

ii. Equalising Demand and Supply

The reliance of planners on the manipulation of entry to medical schools as a method of equalising the supply of and demand for doctors may be inefficient. Reliance on emigration, a "foreign aid" transfer by Britain whose tax payers finance the cost of doctor training, to richer countries generally, or immigration, effectively a "foreign aid" transfer to Britain from poorer countries generally, are also clumsy, inefficient and inequitable devices for use in equilibrating the medical manpower market. In future these mechanisms may be supplemented by greater reliance on manipulation of real incomes (for instance, by depressing

salaries and employment tenure) so that market signals guide scarce manpower into their most productive uses.

The political and economic effects of such a development may be considerable but cannot be ignored. The implications of the use of management skills and competitive mechanisms in the NHS can be ignored in the short term, but in the longer term the results will be similar to those in the USA: greater fluctuations in doctors' incomes and career prospects.

iii. The Structure of the Medical Profession

Structural problems in the medical profession, although acknowledged in the 1985 report, are considered to be of no importance for the planning of the aggregate level of medical manpower. However, the pressure of such problems is likely to influence the value of some of the variables in the planning model. In particular "career blockages" may inhibit recruitment into medical schools. The failure of National Health Service managers to implement the findings of the Select Committee (House of Commons Social Services Committee 1981) as recommended by the Secretary of State has meant that junior posts have been "frozen" and consultant posts have not been increased. The extension of the consultant grade at the expense of junior staffing could lead to significant changes in practice, e.g. shift arrangements, and closer control by peers or managers of work practices to ensure cover.

The development of a sub-consultant career grade, long mooted, but largely underdeveloped, might require the division of work loads according to the skill of the doctor and the severity of the case-load. Such an arrangement would require careful consideration of existing and future working patterns, e.g. there is a relationship in some practices between the degree of specialisation of a hospital and its consultants/specialists and outcomes (e.g. mortality). For instance, Luft et al (1979) show that

for hospitals doing more than 200 coronary by-pass and other open heart procedures, death rates, adjusted for case mix were 25 to 41 per cent lower than for hospitals with smaller volumes of activity.

Such issues cannot be ignored much longer and raise the issue of whether increased monitoring of medical practice is not overdue given inefficiency is unethical. Whilst such monitoring could and should be done by the medical profession, it is also of interest to NHS managers. These people are responsible for efficient use of scarce resources and the achievement of policy objectives. In the absence of rigorous and effective peer review, which is associated closely with service delivery objectives, such work may require changes in the content and duration of consultant and GP contracts with periodic review and "roll- ons" rather than jobs for life and inadequate evaluation of job performance.

All these issues are important and contentious. Changes of this nature would radically affect the prospective life time earning profiles of doctors and other "attractions" of the medical profession. To assert that they have no relevance for the planning of medical manpower seems somewhat bizarre and may reflect the conservative nature of the members of the Medical Manpower Steering Group rather than the practicalities of manpower planning in the 1980s.

iv. Future Developments

Doctor manpower planning since the Second World War has improved in quality but continues to have serious defects. Indeed, in the absence of systematic forecasting and planning of all inputs, its processes may reflect the power of and convenience to the medical profession rather than the interests of NHS patients or taxpayers. Doctor manpower planning needs to be set in the context of the overall planning system which could and should address issues such as:

(a) what are the priorities of the NHS in terms of service provision?

(b) how much of these priorities can be financed from limited NHS resources and when?

(c) how are inputs (doctors, nurses, other labour, capital) to be combined to produce these services efficiently (i.e. what is the least cost way of generating output additional life years and quality thereof: quality adjusted life years (QALYs))?

From (c) it would be possible to derive the demand for all types of manpower, not just doctor manpower. Such forecasts, across the full range of labour inputs, are essential if the performance of the doctors' role is not to be made impossible by a shortage of nurses, other labour inputs or capital. When will the Medical Manpower Steering Group and the Department of Health improve its forecasting of doctor manpower and complement this with analysis of medical manpower forecasts across the whole range of labour inputs rather than only one medical manpower input, doctors?

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