FACTORS WHICH MAY AFFECT EXPENDITURE ON HEALTH

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The Office of Health Economics' Analogue Computor of Health Expenditures (ACHE) was designed by Dr. G. O. Jolliffe of the Chelsea College of Science and Technology, and constructed by him in association with The Mickle Laboratory Engineering Company of Gomshall, Surrey.

The economic assumptions and the calculations of costs and expenditures, on which it is based, were made by the Office of Health Economics.

FACTORS WHICH MAY AFFECT EXPENDITURE ON HEALTH

When the National Health Service was first planned it was thought that apart from the effects of inflation, its cost would remain constant over the years or perhaps even fall as effective medical care reduced the volume of ill health in the community. In the event, costs have risen steadily, and it has come to be acknowledged that at least in part this is the result of extending the scope of medical care. Diseases for which there was formerly no treatment may now respond to newly discovered medicines or newly developed surgical techniques. Ill health which was previously ignored may now be brought for treatment; the existence of the "clinical iceberg" of untreated illness has been recognised. This, however, is only one of many considerations which may influence expenditure on medical care and welfare services. Too little attention is often paid to other factors which by design or otherwise can either increase or reduce the nation's spending on health.

To illustrate and focus attention on some of the types of event which can affect expenditure on medical care, the Office of Health Economics have produced a simple Analogue Computer of Health Expenditures (ACHE). It shows the cost of the health service and of sickness benefit payments in 1961/62. Apart from the total, it indicates the costs of the individual parts of the service—e.g. the hospitals and general medical services and the local health authorities. It also indicates how the costs are apportioned between each of the main groups of diseases. ACHE demonstrates the way in which each of these costs might change as a result of various events, or combinations of events. The purpose of this booklet is to describe how these changes have been estimated, and to discuss some of the underlying principles. In many cases, other assumptions could have led to other equally valid estimates. It is not so much the actual figures which are important; the main value of the exercise is to demonstrate the way in which many varied factors can affect health costs. Nevertheless, although the actual figures cannot be precise, there is little doubt that their different orders of magnitude generally give a true indication of the sorts of events which most greatly influence costs.

No attempt has been made to estimate long-term secondary effects which may occur. For example, a new treatment for cancer will increase the expectation of life

of those who contract the disease. However, in computing the changes in costs which would follow the introduction of a "cancer cure", no allowance has been made for the consequent increase in the proportion of elderly people in the population. Conversely, it has been necessary to ignore the fact that some measures would take time to have an effect. For example, for the purpose of the calculations, the savings resulting from better health due to an "anti-smoking" campaign have been set directly against the cost of the campaign—even though in practice the benefits would not start to accrue for several years.

Nor do the changes in costs always reflect actual changes in the sums of money which would have to be spent on the health services. For example, an epidemic increases the work-load of general practitioners, and thus results in an additional burden on the service. However, if the epidemic is short-lived, this burden will be absorbed within the existing framework of the service. No extra doctors could be recruited to deal with the epidemic; and apart from the cost of the medicines they prescribe no extra payments would be involved—at least when doctors are remunerated by capitation fees or salary. Nevertheless in economic terms the extra calls on the doctors' time certainly involve some "cost". The estimates, therefore, include these costs, which are a measure of the extra work load on the health service rather than an extra cash outlay. In other cases—for example, if all doctors receive an increase in their remuneration—the extra cost is immediately reflected in higher expenditure by the health services. In either case, in economic terms, the "costs" involve the use of extra resources in the provision of medical care.

In this description of some of the factors influencing the costs of medical care, they have been divided into broadly four categories. The first are the external economic and environmental changes whose occurrence is unrelated to the health service but which, nevertheless, influence its cost; secondly, there are medical advances, making new techniques available for the prevention and treatment of illness; thirdly, there are changes in the organisation and practice of medicine; finally, there are changes in the expectations of the public and the professions. Each of the latter two factors may, in turn, have resulted indirectly from medical progress; indeed there is a considerable

overlap between each of the categories and, in some cases, one single event affecting the cost of the health service may reflect changes under all the four broad headings.

External economic and environmental factors

10% rise in the cost of food

It is easy to forget that many of the costs of providing medical care are directly affected by economic circumstances outside the health services. As an example, variations in the cost of food have a marked effect on the cost of the hospital service. 8·8% of hospital expenditure goes on food—almost three times as much as is spent on medicines. Therefore a ten per cent. increase in the price which hospitals pay for food increases their costs by almost one per cent., and raises the cost of the health service by almost a half per cent.—just over £4m. Looking at expenditure in terms of diseases, the cost of caring for mental patients under the health service would be increased by almost £1m. simply as a result of a ten per cent. rise in food prices. Circulatory diseases—another group involving large numbers of hospital patients—would cost £400,000 a year more; and the cost of obstetrics in hospital would rise by about £300,000.

As well as affecting the hospital costs, food prices can also affect the cost of the local authority welfare services. At present, the local health authorities' subsidies on milk account for about half the actual price of the milk supplied for children. If the local authorities were to absorb a ten per cent. rise in the price of milk, it would cost them £4·2m. a year. Thus between the hospital and local authority costs there would be a total increase of about £8·5m. on health expenditure as a result of a ten per cent. rise in food prices.

5% rise in other hospital salaries

Salaries are another item more or less directly affected by the general economic situation. Non-medical salaries in hospital inevitably reflect changes in salary levels outside hospital; for example, the salaries of engineers or clerical staff must be determined by the amounts paid to similar types of employee outside the health service. For nurses, although wage rates are negotiated within the framework of the

health service, better pay for the other types of employment open to young girls must eventually be matched by better pay for nurses if sufficient girls are to be recruited into the profession. A five per cent. rise in non-medical and nursing salaries in hospital would increase hospital costs by £12·5m.; the cost of caring for the mentally disordered would rise by about £2·5m., circulatory diseases would cost an extra £1m., and obstetrics and cancer would each cost about £800,000 more.

10% rise in hospital doctors' salaries

Proportionately, medical salaries cost the hospital service considerably less—about one-fifth of the cost of non-medical and nursing salaries. Nevertheless, an increase of ten per cent. in the remuneration of hospital doctors would increase the costs of the hospital service and the health service as a whole by about £5m.

10% increase in birth rate

Changes in the population are another external factor affecting health service costs. A ten per cent. increase in the birth rate, for example, should automatically be reflected in a ten per cent. increase in the cost of the maternity services, if the quality of the service is to remain unchanged. The cost to the health service would be an extra £4·5m., £3·1m. of which would be incurred in hospital. The increased cost of maternity benefit payments would account for an extra £2·2m. Thus a ten per cent. increase in the birth rate would be expected to cost the taxpayers an extra £6·7m. a year for expenditures on health and welfare.

500,000 more "over 65s" added to the population

An increase in the elderly population also results in a disproportionate increase in costs, because the elderly tend to require a greater share of medical care both in hospital and general practice. In total, an increase of half a million people aged over 65, evenly divided between the sexes, would involve extra costs to the health service of about £22m. a year. Thus, in this case, a one per cent. increase in the population would be responsible for a rather more than two per cent. rise in health service costs. Extrapolating from current sickness figures for the elderly, £3m. of the increased cost would be accounted for by mental illness; about £2·6m. by circulatory disorders; about £1·3m. by respiratory illness, and £1m. by neoplasms. The hospital service could expect to face extra costs of about £15m., and the general practitioner and pharmaceutical services would rise by about £1·4m. and £1·6m. respectively. On the arbitrary assumption that the elderly receive twice as much attention from the local health

authorities as the population as a whole, an increase of half a million "over 65's" would raise local authority health and welfare costs by two per cent.—about £3m. The remainder of the £22m. estimate is made up by a two per cent. increase in the cost of the supplementary ophthalmic service, and a one per cent. increase in dental costs.

External factors can also affect the cost of illness by changing the incidence of diseases or injuries requiring treatment. Increased promiscuity, for example, can add to the number of cases of venereal disease; and a new virulent strain of bacteria or virus, spreading round the world, can result in a serious epidemic. Based on the sickness absence figures in England and Wales in 1957/58, compared to other years, it is reasonable to postulate that the influenza epidemic that year trebled the incidence of influenza and increased other respiratory diseases by about ten per cent. The consequent extra payments for sickness absence amounted to some £23m. The corresponding increase in the work load in hospital and general practice could be estimated at £2·4m. and £4·4m. respectively, while the extra antibiotics and other medicines prescribed cost about £4·3m. Thus an epidemic only half as great as that in 1957/58 could be said to cost some £17m.

Flu epidemic, half as great as in 1957/58

More numerous and faster motor cars, resulting in more injuries on the roads, are another factor which can increase the demand for medical attention. About 85,000 people are seriously injured in road accidents each year, and about 250,000 others are injured. A fifty per cent. increase in these figures would, therefore, involve about 42,000 serious injuries and some 120,000 other injuries. If one assumes that the former would be admitted to hospital and would remain there for the same length of stay as the average for all accident cases, the cost to the hospital and health service would be approximately £2·5m. Sickness benefit payments, if increased for accidents in proportion to the rise in their medical costs, would show a corresponding increase of £2m. The cost of the other injuries, probably mostly treated outside hospital wards and involving little absence from work, would be unlikely to affect significantly the costs of the health service or of sickness benefit payments. Thus a 50 per cent. rise in the number of road accidents would probably raise health costs by about £4·5m.

50% increase in road accidents

Conversely, if the wearing of car safety belts were to be made compulsory, and strictly enforced, there would be reductions in hospital costs and sickness benefits for accidents. It has been estimated that 50 per cent. of serious injuries to car occupants are prevented if the occupants are wearing seat belts. About one-fifth of road deaths involve car drivers or passengers. If one assumes that the same proportion of injuries occur amongst car occupants, and that they could be reduced by half, the wearing of safety belts could effect an overall reduction in road casualties of ten per cent. Based on the assumptions above, the total saving would amount to £900,000, split almost equally between hospital costs and sickness benefit payments.

Car drivers compelled to wear safety belts

Changing medical organisation and practice

Measures to make the wearing of car safety belts compulsory border on the type of public health measure which falls in the second broad category of factors affecting costs. Administrative changes, whether they involve legislation, the manipulation of public opinion, or simply the adoption of different procedures, can affect both the incidence of illness and the way it is handled.

For instance, the introduction and enforcement of a "clean air" policy by Local Health Authorities, under powers given to them by the central government, can substantially reduce the incidence of respiratory diseases, and the resulting costs. As an example, if bronchitis could be reduced by ten per cent. by extending the smokeless zones, there would be a saving of approximately £1·7m. in sickness benefit payments, £700,000 to hospitals, £500,000 to the general practitioner service, and £900,000 to the pharmaceutical service, mainly by reducing the need for broad-spectrum antibiotics, making a total of about £3·7m.

10% less bronchitis through enforcing "clean air" policies

Similarly, a reduction in cigarette smoking would reduce respiratory disease and lung cancer. It is possible, for example, that if the Local Health Authorities were to spend £2m. a year on a health education campaign, they could cut down the incidence of lung cancer amongst men by a half (leaving it still three times as high as for women)

£2m. spent on anti-smoking campaign cuts cigarette consumption by half

and could reduce the incidence of bronchitis by, say, five per cent. If this were the case, the cost of neoplasms would fall by £1·6m. and respiratory diseases by £4·9m. The greater part of the savings would be in the hospital service, which would be reduced by £2·7m., and for sickness benefit payments, which would be reduced by £2·1m. Taking account of the Local Health Authority expenditure on health education, there would be a net saving of £4·5m.

Apart from these general measures to make the environment healthier, there are more specific health procedures which can affect expenditure on medical care. Immunisation campaigns are an example, and already many diseases, such as smallpox, diphtheria and poliomyelitis, have been virtually eliminated by them. Similarly, early detection and treatment of insidious and progressive diseases, such as diabetes and cancer, are a further aspect of preventive medicine which can alter the pattern of expenditure on health. Many of these procedures are at present available, but not yet adopted in practice. However it is probably more appropriate to consider them in the category of medical progress, rather than as changes in organisation and practice. It is a salutary observation that progress in medicine often comes only when an *available* procedure is adopted in practice, rather than when a *new* procedure is first demonstrated to be safe and effective. All too often there is a lag of many years, or even decades, between these two events.

Other changes in medical practice appear to depend largely on fashion. Sometimes this is linked with the development of alternative treatments; for example, it has been possible to replace some surgical procedures by medical treatments, as in some cases of hypertension, mastoiditis, or even mental illness. In other cases, it depends on more critical assessment of established customs, as with the current reappraisal of the benefits of long post-operative bed rest. In others, variations between different countries or different counties suggest that practices may truly be determined by local traditions or fashions. Altogether apart from convenience and possible benefits for the patient, changes in these fashions can often substantially affect the cost of medical care.

For example there are substantial variations between the length of stay in hospital

in different parts of the country for certain simple and relatively unambiguous diagnoses. Three examples are hernia, appendectomy and peptic ulcer. For each of these diagnoses, the average stay in hospital in certain counties in England and Wales is less than half as long as the average in other counties. Between them, these three diagnoses are responsible for hospital expenditure of £16·8m. If the average length of stay throughout England and Wales could be reduced to that in the counties with the lowest average stay, this cost could be reduced by £5·1m.—very nearly one third.

Hernia, appendectomy and peptic ulcer in-patients' stay reduced to lowest county average

Another procedure which has been fashionable for many years, but whose value is now often questioned, is the more or less routine removal of tonsils and adenoids if they become infected during childhood. These operations are at present responsible for £6·2m. of the hospital costs; if it were eventually felt that only one quarter of them were necessary there would be a saving of £4·6m. to the hospitals and the health service.

75% fewer tonsillectomies

In obstetrics, it would be possible if more hospital beds were available to arrange for all deliveries to be in hospital. In 1961, 277,600 confinements out of the total of 770,000 took place at home. If instead they were to be in hospital, with the present average stay of nine days for normal hospital confinements, maternity costs in hospital would rise by £12·3m. There would be some corresponding drop in the cost of local authority midwife services, and if it is assumed that at present midwives spend half their time on home confinements, and the immediate follow-up of such confinements, the saving would amount to £3·4m. General practitioners who receive a fee of twelve guineas for deliveries for which they provide domiciliary ante- and post-natal care, would presumably still provide this service even though the deliveries were in hospital. There would, therefore, be a net increase in cost to the health service of £8·9m.

All births in hospital; average stay unchanged

If, however, the transfer of all confinements to hospital were accompanied by a reduction in hospital stay to an average of only five days for normal cases (corresponding to the current American practice), the increase in cost due to larger numbers in hospital would be more than offset by their shorter average stay. Assuming that the additional admissions and time spent in hospital attributable to complications of

All births in hospital; "normal" deliveries discharged after 5 days

pregnancy were to remain unchanged, there would be a net saving of £6·7m.

All diagnosed as obese treated by two weeks dieting in hospital

Outside the National Health Service, many people who are overweight spend two weeks or so at some health establishment, on a carefully supervised slimming diet. This is presumably an example of what has been recently called "luxury medicine"; but it is interesting to see how health service costs might be affected if obesity were treated by dieting in hospital under the National Health Service, instead of by the prescription of various slimming medicines. About 500,000 patients consult their doctors each year for obesity. The proportionate cost for general practitioner consultations is £700,000, and the medicines they prescribe for this diagnosis cost about £1·7m. If, instead, these 500,000 people were to spend two weeks in hospital, the cost—based on "long-stay" hospital costs, rather than those for an "acute" hospital—would be £13·4m. Assuming that only 75,000 of them were entitled to sickness absence pay this would cost about another £500,000. Thus, as a hypothetical example, the introduction of dietary treatment for obesity in hospitals to replace the present pharmaceutical treatment, would result in a net increase to health service costs of £11·5m.

Payments imposed on the patient can also affect the use of the health services, and hence their total cost. Very little is known about the true effect of such charges, but it is interesting, although probably unprofitable, to speculate on how they might influence health costs. It is certainly reasonable to suppose that high charges for general practitioner consultations, and free access to hospital out-patient departments, would tend to shift the burden of the provision of medical care more onto the hospitals. Conversely, a charge for hospital consultations, coupled with free general practitioner care, would tend to increase the load on the general practitioner and lighten that on the hospitals. For ACHE, it has been arbitrarily assumed that a charge for general practitioner consultations would reduce their number by ten per cent., reduce prescriptions by five per cent. and increase the burden on hospitals and Local Health Authorities by two per cent. In the case of a charge for out-patient consultations, the burden on general practitioners has been assumed to rise by five per cent. with a corresponding increase in their prescriptions, and hospital expenditures have been reduced by two per cent. Clearly, there can be absolutely no significance in these

"Deterrent" charges imposed on G.P. consultations

"Deterrent" charges imposed on out-patient consultations

Estimated

	CURRENT TOTAL 1961/62 £ million	10% more general medical practitioners	10% more dentists	10% rise in hospital doctors' salaries	5% rise in other hospital salaries	10% rise in the cost of food	Hernia, appendectomy and peptic ulcer in-patients' stay reduced to lowest county average	75% fewer tonsillectomies	25% fewer mental patients in hospital	All births in hospital; average stay unchanged	All births in hospital; "normal" deliveries discharged after 5 days	10% increase in birth rate	
Infectious diseases	34	+0·2		+0·2	+0·6	+0·2							
Neoplasms	31	+0·1		+0·4	+0·8	+0·4							
Endocrine, etc.	24	+0·4		+0·1	+0·2	+0·1							
Mental disorders	113	+0·4		+0·5	+2·5	+0·9			—19·6				
Diseases of the eyes	25	+0·1		+0·0	+0·2	+0·0							
Circulatory diseases	69	+0·6		+0·4	+1·0	+0·4							
Respiratory diseases	97	+1·5		+0·2	+0·6	+0·2		—4·7					
Digestive disorders	57	+0·5		+0·3	+0·8	+0·3	—5·1						
Pregnancy	67	+0·6		+0·6	+0·7	+0·6				+8·9	—6·4	+6·6	
Diseases of joints and bones	49	+0·4		+0·0	+0·4	+0·2							
Symptoms senility, etc.	36	+0·8		+0·0	+0·2	+0·1							
Injuries and accidents	64	+0·4		+0·3	+0·6	+0·2							
TOTAL	1080	+7·5	+5·6	+5·1	+12·5	+8·4	—5·1	—4·7	—19·6	+8·9	—6·4	+6·6	+
Sickness benefits, etc.	179											+2·1	
Hospital Service	467			+5·1	+12·5	+4·2	—5·1	—4·7	—23·2	+12·3	—6·4	+3·1	
General Medical Services	76	+7·5							+1·0			+0·8	
Pharmaceutical Services	87								+1·6			+0·1	
Local Health Authorities	145					+4·2			+1·0	—3·4		+0·7	+
Dental Service	56		+5·6										
Supplementary Ophth. Service	15												

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actual figures, which merely illustrate that some shift of work-load would have to be expected.

There are other ways in which charges can be used to shift the demand for medical care, and the extent of the use that is made of various services. For example, the imposition of dental charges for adults resulted in a larger proportion of dental treatment being given to children. It should be emphasised that in quoting these examples the Office of Health Economics is not advocating either the imposition or abolition of charges. It does, however, advocate that the effects of such measures should be carefully considered, and if possible estimated by experiment, before they are introduced.

Medical Progress

Early detection of diabetes and of cancer of the cervix have already been mentioned as examples of new medical techniques which are now available and which could be adopted into current medical practice. The implications of the former were fully examined in *The Pattern of Diabetes*, and it was pointed out that screening of the population once every five years and following up those with glycosuria to identify the diabetics amongst them would probably cost about £600,000 a year if it were carried out by the Local Health Authorities. In addition, the cost of treating these previously undetected diabetics would raise N.H.S. costs by about £2·4m. a year—about half for the insulin or other pharmaceutical preparations prescribed for them and the remainder for hospital and general practitioner treatment. It must be a matter of speculation how much the early detection of diabetics will eventually reduce the need for costly hospital treatment, which at present accounts for more than half the total N.H.S. expenditure on the disease. If the need for hospital treatment was reduced by ten per cent., this would present a saving of about £300,000. A corresponding ten per cent. saving in sickness benefit payments to diabetics would account for a further reduction of about £100,000. On these assumptions, the net effect of introducing a national campaign for the detection of diabetes would be to increase

Whole population screened for diabetes—five yearly

expenditure by about £2·6m. As the Office of Health Economics has pointed out in previous papers, it must almost inevitably be cheaper to leave patients to live and die untreated, instead of detecting their illness and providing them with appropriate medical care.

Mature women screened every five years for cervical cancer

Screening for cervical cancer is another example of this principle, although in this case it is reasonable to suppose that hospital costs would be reduced to an extent that would more nearly offset expenditure on detection and early treatment. At present carcinoma of the cervix can be estimated to be responsible for about 200,000 patient days in hospital, and to cost about £900,000 a year. If all the 4,000 new cases each year were detected at an early enough stage, and if it was assumed that they could each be cured with an average hospital stay of ten days, hospital costs would be reduced by about £700,000 to £200,000. The cost of screening mature women every five years has been estimated at about £1m. a year. There would probably be no other significant changes in the health service or sickness absence costs. Thus, screening for cervical cancer would result in a net rise in costs of about £300,000.

Prevention of flu by vaccination

A similar pattern emerged with the prevention of poliomyelitis. In this case, also, vaccination—which, like early detection, is an aspect of preventive medicine—proved more costly than the former expenditure on treating the relatively rare cases of poliomyelitis. However, with commoner diseases, immunisation can show a net saving. At present flu vaccines cost about 6/– per shot, and must be repeated each year. However, following the pattern of price reduction in polio vaccine, which fell from 7/9 to 2/– over the three years in which its use became general it is reasonable to assume that if flu vaccination was universally adopted its price also would fall to about 2/–. In addition, it is assumed that if the Local Health Authority were to carry out the vaccination, the cost each year would be comparable to the total costs they incurred in the polio vaccination campaign. The latter only involved people under the age of 40 but necessitated three injections; influenza immunisation necessitates one injection for those of all ages. On this basis, the cost of immunising 80 per cent. of the population would be about £4m. for the vaccine, and £5m. for its administration—a total of £9m.

Obviously the economic impact of flu vaccination will depend considerably on whether it would otherwise have been an epidemic year, or merely an average one for influenza. If 80 per cent. of the population were immunised with an effective vaccine, it is reasonable to assume that the effect—again as with polio—would be virtually to eliminate the disease. It would also reduce the incidence of other respiratory diseases. A two-fold increase in absence from work due to influenza in 1957/58 was accompanied by a ten per cent. rise in other respiratory disorders. It is therefore reasonable to postulate that the elimination of influenza would be accompanied in an average year by a proportionate five per cent. reduction in other respiratory illnesses. On this basis, for a year in which there would in any case have been no major influenza epidemic, sickness absence payments would be reduced by about £11·6m., and pharmaceutical expenditure by £2·1m., while the saving to the general practitioner and hospital service would be equivalent to £2·2m. and £1·2m. respectively. The total reduction would be £17m., leaving a net saving for an average year of £8m. after taking account of the cost of the immunisation campaign. On the other hand, had the immunisation prevented an epidemic only half the magnitude of that in 1957/58, the net saving would have amounted instead to £25m.

Prevention of measles by vaccination

Another preventive medicine campaign which should show a marginal net saving is immunisation against measles. In this case, the economy results from the fact that only a small proportion of the population—the children—need protection, and because a single injection should provide immunity throughout childhood. Basing the cost of immunising the child population against measles proportionately on the actual cost of the polio immunisation campaign, it would amount to about £500,000 a year. In an epidemic year, measles accounts for about £800,000 worth of the general practitioners' time, and is responsible for about £200,000 spent on pharmaceutical supplies. In these years, its elimination by vaccination would, therefore, show a net saving of about £500,000. In the alternate, non-epidemic, years, measles is responsible for only about one-fifth as many cases, so there is a net increase in costs of about £300,000 as a result of the expenditure on immunisation. On average, therefore, the annual saving would be about £100,000.

So far, the four procedures discussed in the category of "medical advances" have either already been available waiting to be put into practice, or else are expected to be sufficiently proved to justify general introduction shortly. More speculatively, it is possible to consider what would be the cost implications of a "cancer cure". As might be expected, these would depend very much on the actual type of "cure" or "cures" which were eventually developed. It is worth considering two examples. The first might be a method of effectively treating cancer which involved an average of three months in an acute hospital—depending, for example, on surgery or radiotherapy. Assuming that there are about 100,000 new cases of cancer each year, in this case, all present hospital expenditure on carcinoma would be replaced by the cost of 100,000 spells of 13 weeks in hospital. At the average weekly cost in the acute non-teaching hospitals of about £28 a week, this would amount to £36 million—a net increase over existing expenditure of £7·8m. It is assumed that the small costs at present incurred outside hospital would remain unchanged.

"Cancer cure" needing 13 weeks treatment in hospital

On the other hand, a treatment might be developed which involved three months' domiciliary treatment with anti-cancer medicines and which required no special nursing or other facilities. In this case, existing costs might be replaced by the cost of weekly visits by the general practitioner—say £500,000 for the 100,000 cases—and by the cost of the prescribed medicines. Even assuming that these cost £5 per patient per week, the total pharmaceutical expenditure would be £6·5m., and the net overall saving would be £22·6m. This illustrates the general principle that domiciliary treatment even with very costly medicine is much less expensive than hospital treatment—always provided that home nursing or other ancillary services not required, and that treatment is equally effective.

"Cancer cure" involving 13 weeks medication at home

Another example where there is much scope for reducing expenditure by cutting the demand for hospital beds may be in the case of mental illness. Much progress has already been made. However, so far all that can generally be achieved is to maintain patients at home on psychotherapy or tranquillisers or antidepressants, with only perhaps occasional short spells in mental hospital. This is incomparably better than the prospect of permanent incarceration in a mental hospital which faced many patients

25% fewer mental patients in hospital

in the 1930's and before. However continuous domiciliary treatment and extensive ancillary support by social workers is often necessary, in addition to the fact that patients may need to be readmitted to hospital periodically. Thus the costs involved at present may be no lower than those of the former permanent hospitalisation. The hope must be that further progress will be made so as to effect long-term control or complete cure of many mental disorders. Were such progress to result in a 25 per cent. reduction in the numbers in mental illness and mental subnormality hospitals, some 48,000 patients would be discharged into the community. The resulting saving in hospital costs would be £23·2m. If each were seen weekly by their general practitioner, and received prescriptions for medicines costing the same as those prescribed for the average mentally ill patient in general practice, at present, the corresponding costs would amount to about £1m. for the general practitioner service and £1·6m. for the tranquillisers, anti-depressants and other medicines. In addition, it is reasonable to assume that some of these 48,000 patients discharged from hospital might require support from psychiatric social workers, at an additional cost of perhaps an extra £1m. The resulting net saving would therefore be £20·9m., if a quarter of those in hospitals for the mentally ill could be discharged on this basis.

Changing expectations by the public

As the standards of living in a community are raised, there is a corresponding increase in the scope and quality of medical care which people expect to receive. As one example, people in Britain no longer resign themselves to toothlessness in old age, as many did in the 1930's and before. They either expect dentures to be supplied or—increasingly—they call for conservative dentistry to preserve their own teeth. The result is an increased demand for dental care. Unless this is thwarted by a shortage of dentists, or unless technical innovation enables dentists to work faster, this demand must be reflected in a larger number of dentists being in practice. A ten per cent. increase in the number of dentists practising and a proportionate increase in the work they carried out, would raise the cost of the National Health Service by £5·6m.

10% more dentists

There tends to be a more subtle increase in the demand for general medical care as the community becomes more sophisticated. Apparently minor deviations from good health which are tolerated in an under-privileged community will be brought to the doctor's attention in a more affluent society. Most of these "minor" conditions would indeed prove trivial and self-limiting, like the common cold; but they will include some which are more serious and require prolonged or indefinite medical attention. In either case the work-load on the doctor is increased. If the disease is self-limiting, he will have had one or two visits from the patient before the latter recovers either spontaneously or as a result of the medical treatment. If, on the other hand, the symptoms reveal a significant underlying disorder—as malaise may indicate diabetes, or a "smoker's cough" may indicate chronic bronchitis—the doctor may require to see the patient regularly for the rest of his life. People who in a less advanced society would have died untreated from their illness have their lives prolonged in a more sophisticated community by continuous medical care.

10% more general medical practitioners

To some extent, also, people who are better educated, and who have been brought up in a more or less classless society, may rightly expect more from their doctor than poorly educated people who have been taught to "know their place". This effect might be partly offset by the better educated members of the communities making fewer *unnecessary* calls on the doctor; but unless the quality of medical care is artificially suppressed—for example by a shortage of doctors—it seems likely that the number of general practitioners should tend to increase to cope with the rising expectations of the community. A ten per cent. rise in the number of general medical practitioners, without altering their level of remuneration, would cost the health service £7·5m. This would raise the cost of treating all groups of diseases presumably in proportion to the amount of time at present spent on each by general practitioners. The group most affected would be the respiratory diseases whose costs would be increased by about £1·3m.

Local Health Authority establishments raised to 1972 target

Similarly, an increase in the number of the ancillary workers employed by the local health authorities can result from a growing realisation that domiciliary care sometimes needs to consist of more than consultations with one's general practitioner, or visits

from the district nurse or midwife. This is perhaps an example where more initiative has come from the government and the medical profession than from the public, but certainly in some measure the greater use made of health visitors, social workers and home helps reflects a new realisation by the public that the health service should care for the "whole patient" rather than merely his disease or symptoms. The Ministry of Health have published the plans of the local health authorities for increasing their staff between 1962 and 1972. The extra cost involved in reaching their 1972 target levels, with no increase in salaries, would be £11·7m. No attempt has been made to allocate this cost to individual groups of diseases.

5% rise in National Insurance benefits

When the average earnings in a country rise, those who are dependent on social security payments expect comparable increases to prevent their becoming proportionately worse off. In general, therefore, larger national earnings are eventually reflected, for example, in higher sickness benefit payments. This is another simple case where higher standards of living raise public expectations which, in turn, raise the costs of sickness. A five per cent. increase in the rates of sickness absence pay would increase costs by £9m., spread over the diseases in proportion to the absence which they cause. Once again respiratory disease would be most affected, with an increase of £2·1m.

Public attitudes can also have an opposite effect. In general, changing public expectations result in improvements in the quality of medical care. Sometimes, however, public and official opinion is concentrated on the possibility that some sector of the health service may be responsible for too large a proportion of national expenditure, rather than too little. In the early days of the National Health Service, public attention was largely directed onto the supposedly excessive increases in expenditure on the service. The remuneration of dentists was one example, and substantial reductions were made in their scale of payments. Although the cuts may have seemed justified at the time, they must have made it more difficult to recruit enough dentists to expand the service in order to make dental treatment promptly available for everyone who should receive it. Another example is the cost of some prescribed medicines, which have also come in for some criticism. A 25 per cent. reduction in the price of antibiotics to the pharmaceutical services would bring down

25% cut in pharmaceutical services, antibiotic prices

their cost by £4·5m. Again the costs of the respiratory diseases, which would fall by £3·1m., would be those most affected. As in the case of the dental service, such reductions would have no immediate impact on the quality of medical care, but might delay progress which depended on future research.

Spectacles replaced by contact lenses for 10% of N.H.S. prescriptions

The last example, like many others, falls partly under each of the headings, of medical progress, of changing practice, and of rising public expectations. If there are medical reasons for the provision of contact lenses they are available under the National Health Service, but people who would prefer them for purely cosmetic reasons must purchase them privately. As more people—especially young girls—think that it is important not just to correct the faults in their vision, but to do so as inconspicuously as possible, the demand for contact lenses will increase. As experience with them increases, their disadvantages will probably be eliminated, and they will be more generally recommended by ophthalmologists. There would no longer be any justification—except on the grounds of cost—for denying them to those who wished them.

Those responsible for the National Health Service have always been sensitive to any suggestion that it provides second class medical care. It is therefore likely that further development of contact lenses, a more widespread acceptance of them in private practice, and consequent public pressure for them to be supplied "on the National Health" would indeed result in their being made available for those who wanted them. At present the Health Service pays about £40 a pair for the contact lenses which they do supply, compared to an average of about £2.10.0 for ordinary pairs of spectacles (or lenses for fitting into privately purchased frames). Prices would fall with wider use, but it is not unrealistic to suppose that at least initially the additional cost of supplying contact lenses instead of framed spectacles would amount to £25 a pair. If one in ten of those having spectacles prescribed under the Health Service were to prefer contact lenses, about 475,000 pairs would have to be supplied annually. The additional cost to the ophthalmic service, including the small additional demand on ophthalmologists' time, would amount to about £12m.

Conclusion

In conclusion, it is important to re-emphasise that ACHE concentrates only on a very few of the events which could affect the costs of sickness. They are a random selection; they are in no sense recommendations. The provision of ancillary staff for general practitioners, routine determinations of blood pressure and blood cholesterol amongst all middle-aged men, a typhoid epidemic spreading rapidly through the London area, or a 30 per cent. pay rise for hospital pharmacists are a few of the countless others which might have been chosen. Nor does ACHE pretend to calculate exactly how costs would change, as a result of any combination of these events. It suggests ways in which they might change, and this booklet explains the basis for these suppositions.

Logical predictions about health expenditure, and sensible attitudes towards it, are possible only if the underlying factors have been objectively considered. ACHE is an educational toy which it is hoped will stimulate such objective consideration. Most computers think for those who work them; by contrast, ACHE should make those who work it think.

THE Office of Health Economics is an independent research organisation, which was founded in 1962 by the Association of the British Pharmaceutical Industry with the following terms of reference:

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1. To undertake research to evaluate the economic aspects of medical care.
2. To investigate, from time to time, other health and social problems.
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