*For Debate . . .***Hospital and community health service costs: England and Scotland compared**

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Abstract

In publications which have compared the health expenditure in the component parts of the United Kingdom by applying the Resource Allocation Working Party (RAWP) formula to the health budget of England, Scotland, Wales, and Northern Ireland it has been previously concluded that Scotland's hospital and community health services expenditure is more than 19% above what would be a fair distribution. It has also been implied that Scotland's allocation should be cut substantially to improve services in England.

On the assumption that the purpose of examining the distribution of the health and community health service budget is to ensure "equal opportunity of access to health care for people at equal risk" it is concluded that simple RAWP of the United Kingdom budget is flawed and a conclusion based on this is therefore untenable.

Introduction

Health authorities throughout the United Kingdom are accustomed to receiving their allocation of funds according to mathematical formulas that attempt, in the words of the Resource Allocation Working Party (RAWP) report, "to provide equal opportunity of access to health care for people at equal risk."¹ Different formulas have been devised in different parts of the UK. In Scotland the SHARE formula is used in place of the RAWP formula.² The two are similar in principle but differ in the detailed application of the factors that determine need and hence resource allocation.

Expenditure on health on a per caput basis is not uniform throughout the UK and neither are the variables that are thought to reflect need. It has been claimed, however, that applying the RAWP formula across the UK would provide a more equitable basis for determining the allocation of health care funds than the present system, whereby, for example, Scottish health service funding is provided from a total public expenditure allocation by the Treasury to Scotland.^{3,5} The calculations that are required to apply the RAWP formula to the component parts of the UK were carried out by Maynard and Ludbrook for the year 1977-8⁴ and similarly for 1984-5 and 1985-6 by Birch and Maynard.⁵ They compared the hospital and community health services budgets for England, Wales, Scotland, and Northern Ireland with the theoretical

allocations if the total amount from the four countries was divided by applying the English RAWP formula. Birch and Maynard calculated that Scotland is overfunded and claimed that the budget differentials bear no systematic relation to needs estimates of any kind.⁵

Such a claim has important implications for the health service in Scotland and requires justification. The detailed figures on which the claim is based are lacking in the published work but have been generously supplied to us by Maynard (personal communication). This paper re-examines some of the assumptions and calculations that are made in applying the RAWP formula to Scotland.

Basic data

To make a fair comparison of health costs in England and Scotland it is necessary to examine actual revenue expenditure, and published figures are available for the hospital and community health services, the ambulance service, the blood transfusion service, and headquarters costs for both countries. Table I shows such a comparison for the year 1984-5. The health service costs for England and Scotland expressed in this way are £8948·644m⁶ and £1321·007m⁷ respectively.

TABLE I—Actual hospital and community health service revenue expenditure in England and Scotland, 1984-5^{6,7}

	England (£m)	Scotland (£m)	England and Scotland (£m)
Hospital services	7387·520	1125·222	
Community health services	855·830	108·498	
Blood transfusion service	46·903	12·465	
Ambulance service	242·218	23·502	
Headquarters administration	416·173	51·320	
Total	8948·644	1321·007	10 269·651

Special factors

Medical teaching and local authority rates are special factors that affect the financing of the National Health Service disproportionately in Scotland. As teaching costs are considered separately in the RAWP formula and rates, though substantial, are not part of the RAWP consideration they can be removed from the calculations before attempting to allocate shares of the budget to the different countries of the UK. After the RAWP calculations have been carried out the actual teaching and rates expenditure can be added back to each country's share to give the total allocations.

Teaching—Teaching costs are recognised in the RAWP formula as the service increment for teaching, a protected allocation to

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regional health authorities with medical schools, and in Scotland by additional allocations to the appropriate health boards. In 1984-5 the amount allowed in England was £235.63m⁸ and in Scotland £49.02m⁹ (£52.14m for 1984-5 at 1985-6 prices), totalling £284.65m. Thus Scotland's share of the total—17.2%—is in line with Scotland's share of medical and dental teaching load. In Scotland the SHARE formula also attempts an adjustment for the additional costs of teaching. In 1984-5 this was 62% of the undergraduate teaching costs borne by the health boards. With this adjustment the total cost of medical teaching borne by the hospital and community health service budget in Scotland and England would be £461m (284.65m × 1.62), of which Scotland's share (17.2%) is £79m and England's £382m.

SPARSITY

The RAWP formula takes no account of population density when allocating resources, and Birch and Maynard also ignore this factor in their report. In Scotland, however, through the operation of SHARE, part of the community health services budget is weighted by the "sparsity factor." This is calculated according to a formula that depends on the distance between each patient's house and the nearest general practitioner's surgery (in rural areas). Unfortunately, the data on which the calculation is based differ appreciably between England and Scotland, and so no direct comparison of sparsity factors for the two countries can be made.

An approximation, however, can be attempted because it is

TABLE II—Distributing health and community health service costs for England and Scotland combined between England and Scotland using method of Maynard and Bosanquet

Activity	Proportion of expenditure for this activity calculated from English costs in 1982-3 (%)	Correction for need*	Calculated share (fraction) for the activity (England and Scotland = 1.0)		Fraction of total expenditure for Scotland for the activity
			England	Scotland	
Inpatient, non-psychiatric	54.94	SMR	0.894	0.106	0.106 × 0.5494 = 0.05824
Outpatients	11.94	SMR	0.889	0.111	0.111 × 0.1194 = 0.01325
Community health	9.00	SMR	0.890	0.110	0.110 × 0.090 = 0.00990
Mental illness	11.34	None	0.915	0.095	0.095 × 0.1134 = 0.01077
Mental handicap	5.23	None	0.912	0.098	0.098 × 0.0523 = 0.00513
Ambulance	2.77	SMR	0.888	0.112	0.112 × 0.0277 = 0.00310
Administration	4.77	None	0.901	0.099	0.099 × 0.0477 = 0.00472
Total for all activities	99.99				Scotland = 0.10511

*All ages standardised mortality ratio.

Local authority rates—Local authority rates do not feature in the RAWP formula, presumably because they are reasonably uniform across England. In Scotland, however, rates are much higher, and this must be allowed for as they do not contribute to health care. The total sum paid in rates by the health authorities in England in 1984-5 was £137m¹⁰ (£2.94 a head), and in Scotland it was £43m¹¹ (£8.34 a head). The recent rates revaluation in Scotland has increased this discrepancy.

RAWP calculations

To effect a RAWP distribution of hospital and community health service resources we followed the detailed method of Birch and Maynard (A Maynard, personal communication), who aggregated the actual hospital and community health service expenditure of the four countries of the UK and then reallocated it by a method that uses some of the calculations of RAWP.⁵ The total expenditure was first split into seven service areas in the same proportion as the English costs were in 1982-3: (i) non-psychiatric inpatient services, (ii) outpatient services, (iii) community health services, (iv) mental illness services, (v) mental handicap services, (vi) ambulance services, and (vii) administration. Each was then considered in turn and the sum available to provide that service on a UK basis was divided among the four countries. This was done according to the UK expected bed utilisation rate, adjusted for the population of the country or for the population weighted according to its age structure and in some cases with a further adjustment for need.

We applied Birch and Maynard's calculations as described above but confined our analysis to England and Scotland. Table II gives the method and results for the English and Scottish budgets. The budget for each service area was divided between England and Scotland, and the fraction available for Scotland was calculated. The sum of these fractions gives Scotland's decimal share of the total budget: 0.10511. This share of the budget requires further adjustment to take account of two other factors that affect expenditure differentially between England and Scotland, population sparsity and the influence of private medicine.

known that the density of population in Scotland is five times lower than that in England.¹² For 1984-5, when health board areas in Scotland differed in population density by a factor of 5 (±10%), the average net effect of the sparsity factor is £8.30 a head. Furthermore, if Scotland is divided by a line to the south of the Fife, Tayside, and Highland Health Board Areas the difference in population density between the south and north is a factor of 5.86, and the effect of the sparsity factor would be to allocate £7.82 a head more to the north than the south. Using these examples, a reasonable estimate of the net effect of applying the SHARE sparsity factor to Scotland and England would be £8.00 a head; +£7.21 a head (£37m) in Scotland and -£0.79 a head (£37m) in England.

PRIVATE MEDICAL CARE

The expanding and now substantial provision of private medical care can no longer be ignored when distributing National Health Service resources to different parts of the UK. In 1982, 7% of the population of the UK were covered by private medical insurance policies,¹³ the premiums for which totalled (in 1984) £413m.¹⁴ Moreover, 44% of private inpatient stays and 51% of outpatient consultations were not covered by such policies.¹³ Allowing for inflation and the steady increase in private medicine, the total amount spent on private medical care is probably now in excess of £1000m. This spending is uneven across the UK, being concentrated in the outer metropolitan area, where 13% of the population are insured, and being least in Scotland, Wales, and the north of England, where only 3% are insured.¹³

The provision of private medical care should reduce the need for the NHS to provide medical services. For equity the benefits of that reduction must be distributed across the UK, not concentrated in those areas where most private medicine is practised. Its effect cannot be ignored in the distribution of resources between England and Scotland. If the benefit to the hospital and community health service costs in 1984-5 is estimated conservatively at £500m and if it is distributed between Scotland and England to balance the inequality of spending on private medical insurance a transfer of

TABLE III—Private medical care: calculation of adjustment required to counter imbalance in distribution of private medical care

	Scotland and England	England	Scotland
Population (millions)	51.998	46.848	5.150
Proportion with private medical insurance (%)	7.0	7.7	3.0
No with private medical insurance (millions)	3.64	3.485	0.155
"Benefits" to NHS (£m)	500	478.709*	21.291†
"Benefits" per head (£)	9.62	10.22	4.13
Adjustment required per head (£)		-0.60	+5.49
Transfer of resources required (£)		-28m	+28m

*478.709=(500/3.64)×3.485. †21.291=(500/3.64)×0.155.

Sources: General Household Survey.^{13,14}

resources from England to Scotland of £28m would be required (table III).

Target allocation

Table IV shows a revised target allocation for the year 1984-5 for Scotland and England arrived at by making the adjustments to the actual combined hospital and community health service costs of the two countries according to the information provided in this paper. A

published by the Department of Health and Social Security and the Scottish Home and Health Department and are comparable (table I).

The application of the RAWP formula to Scotland as well as England is not straightforward. The problems and anomalies are examined in turn. Of the seven "service areas," the non-psychiatric inpatient services absorb the largest proportion of the total hospital and community health service costs (54.9% of the English allocation in 1982-3). Dividing this money between England and Scotland entails applying global—that is, England and Scotland combined—bed utilisation rates, adjusted according to age and sex distribution and to take account of need, according to the standardised mortality ratio in each country.

Because of its size England's bed utilisation rates dominate the UK rates so that in areas of great need the effectiveness of the standardised mortality ratio in providing a fair adjustment is severely tested. The all ages standardised mortality ratio for Scotland is by far the highest of the ratios for the four countries of the UK, being 113 for men and 112 for women, compared with 98 in England for both sexes (UK value 100 by definition). The difference between England and Scotland is emphasised if the standardised mortality ratio for the age groups 0-64 years is used. This is 121 in Scotland compared with 96 in England. This is relevant because the compilers of the SHARE formula (the Scottish equivalent of RAWP) considered this to be a more sensitive measurement of need than the all ages standardised mortality ratio and use it and a

TABLE IV—Distribution of health and community health service budget between England and Scotland, 1984-5

	England and Scotland: total (£m)	England (population 46.848m)		Scotland (population 5.150m)	
		Total (£m)	Per head (£)	Total (£m)	Per head (£)
Actual expenditure (rounded from table I)	10 270	8 949	191.0	1 321	256.5
Deduct:					
Total UK cost of medical teaching	461				
Total UK rates	180				
Remainder	9 629				
Distribute by RAWP formula	9 629	8 617		1 012	
Correction for sparsity		-37		+37	
Correction for private medical care		-28		+28	
		8 552		1 077	
Add:					
Actual cost of medical teaching	461	382		79	
Actual rates bill	180	137		43	
Provisional target distribution	10 270	9 071	194	1 199	233
Difference between actual expenditure and provisional target distribution		-122	-3	+122	+23

further adjustment was made by deducting the total cost of medical teaching and rates in each country. The remainder was then distributed by the RAWP formula as described by Birch and Maynard. Correction for sparsity and for the effect of private medicine was applied before restoring the actual costs of teaching and rates to give a final target allocations.

Discussion

The figures for the English and Scottish hospital and community health service costs presented here differ from those published for the same year by Birch and Maynard.⁵ Because of Scotland's separate and different health administration system it is essential to probe for precise figures rather than rely on overall totals. Birch and Maynard obtained their basic data from Treasury public expenditure plans.^{15,16} They failed to recognise that several items, including the state hospital, limb and appliance services, dental and prescription costing, central research, and welfare foods, which were included in their cost estimates for Scotland, are central, non-regional costs in England and were therefore excluded from their calculation of the English budget. Our figures (which include teaching, whereas Birch and Maynard excluded it) are derived from the detailed returns

separate cost factor for patients aged 65 years and over in the calculations to allocate resources to the various Scottish health boards.

There is substantial published work that illustrates the limited effectiveness of the all ages standardised mortality ratio to adjust for morbidity and, therefore, need,^{17,19} and at best it is an approximate guide. Forster believes that mortality should not be considered a valid indicator of morbidity in a population.¹⁷ The effect of social deprivation on health care needs is recognised by Forwell¹⁹ and Holland²⁰ in their papers on resource allocation, and social deprivation is not evenly distributed between Scotland and England. The average length of stay in NHS hospitals is longer in Scotland than in England, but this occurs principally in the geriatric sector²¹ because in Scotland more patients who need continuing care are looked after by the NHS than in England, where more are in local authority or private nursing homes.

For outpatient services the global attendances are applied to the population of each country, using the all ages standardised mortality ratio to correct for need. The difficulties in assessing a fair division of resources associated with the inequality of size and the inadequacy of the standardised mortality ratio are compounded by the lack of outpatient attendance figures related to age for Scotland.

Expected expenditure for community health services depends

again on calculations from figures dominated by the larger English numbers and are therefore biased for a healthier population, corrected only by the all ages standardised mortality ratio. The method used by Birch and Maynard takes no account of the differences in population density between England and Scotland. In Scotland the sparsity factor is an important part of the SHARE formula for distributing funds between health boards. Its effects are seen in a section of the community health service costs, where its application produced in 1984-5 a difference of £27.55 a head in the allocations to Greater Glasgow and the Western Isles Health Boards and £7.52 a head between neighbouring health boards Lothian and Borders. The corrections for sparsity between England and Scotland are akin to the smaller of these corrections but are nevertheless important.

A simple application of the RAWP formula makes no adjustment for need in the calculations on the mental illness services, effectively imposing English bed usage rates on Scotland. There is evidence of a parallel between general morbidity and increased mental illness in a community, but despite this there are fewer staffed beds for mental illness in Scotland (3.3 per 1000 population)²² than in England (4.8 per 1000 population), and it may be that a proportion of patients who are treated in psychiatric beds in England are treated in general medical units or in geriatric hospitals or at home in Scotland.

For the mental handicap service global rates of provision are derived from observed rates related to age in England and calculated rates in Scotland, and these global rates are then applied to England and Scotland individually. There is no correction for need. Care of the mentally handicapped differs greatly between the two countries. In Scotland it is provided largely by the NHS, and the burden falls heavily on the hospital and community health service budget. In England, where relative to Scotland there are three times more patients in local authority care, there is greater support from the personal social services budget (R Farquharson, personal communication).

Ambulance service costs are allocated according to country and sex specific populations adjusted by the all ages standardised mortality ratio. The actual ambulance cost per head of population for the year 1984-5 in Scotland was £4.56 and in England £5.20.⁶⁷ This is surprising in view of the sparsity of the population in Scotland and the additional costs of the air ambulance service. Paradoxically, greater distance in Scotland may result in lower usage because outpatient attendance and early discharge from hospital become impracticable, loading costs on to inpatient facilities. Another important factor is underprovision in Scotland through understaffing. Roughly 10% of all accident and emergency ambulance callouts in Scotland are served by ambulances with one attendant. Similar calls in England are always covered by two attendants. An estimate of the funding required to eliminate this understaffing is £3.1m for the year 1984-5 (director, Scottish Ambulance Service, personal communication).

Country specific populations are used to allocate costs for administration. We believe that it would be better to apply a sparsity factor to these costs and a correction for need (standardised mortality ratio) as the greater health service activity in Scotland requires more administration.

The corrections for the effects of medical teaching and local authority rates match known data precisely. Corrections for sparsity and private medicine have been provided as best estimates. All of these are substantial and cannot be ignored in comparisons between England and Scotland.

The difference between the target allocation to Scotland and its actual allocation for the year 1984-5 calculated here shows that whereas Scotland receives £23 per head of population more than target this is less than half the excess calculated by Birch and

Maynard (£53 a head)⁷ and is only 9% of the actual hospital and community health service expenditure.

Moreover, though some of the factors, such as the failure to recognise that Scotland's status is different from that of an English region and the effects of sparsity and private medical care, have been accounted for in the figures presented here, others that are equally valid and might introduce further substantial alterations have only been suggested. Principally these are: (a) the inadequacy of the all ages standardised mortality ratio as a corrective factor for need, especially when applied to the Anglo-Scottish situation, where England's size dominates the rates applied even though Scotland's mortality and morbidity are substantially worse; (b) the fact that in England there are areas of "health care"—especially in the "mental handicap" service and in geriatric medicine—in which a substantially higher proportion of patients are in the care of local authorities and private institutions than in Scotland, where more are cared for by the NHS; (c) the requirement to introduce corrective factors in the "administration" service area; and (d) the effect of the uneven distribution of social deprivation.

Conclusion

NHS expenditure in the different countries of the UK needs to be re-examined. This, however, must be undertaken by a joint working party drawn from all four countries, and it must examine factors that are not covered by the RAWP report. This paper deals only with the circumstances in Scotland and relates them to England. It takes no account of Wales or Northern Ireland, which must affect the relationship between England and Scotland. Though not seeking to make a definitive comparison, by providing alternative calculations we seek to create a more equitable view of the funding of the health service in Scotland.

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