Health care equity, health equity and resource allocation: towards a normative approach to achieving the core principles of the NHS

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Introduction

Since the 1976 appointment of the Resource Allocation Working Party (RAWP), *health care equity* has been an explicit goal of resource allocation within the NHS. According to this principle, health care resources should be geographically distributed to ensure 'equal opportunity of access to health care for people at equal risk'. RAWP was superseded by the Resource Allocation Group in 1995, which was in turn replaced by the Advisory Committee on Resource Allocation (ACRA) in 1997. Throughout, equal opportunity of access for equal needs has remained a key objective of resource allocation. In 1999, however, ACRA introduced an additional requirement; that resource allocation should 'contribute to the reduction of avoidable inequalities in health'. This interpretation of equity as an 'equal opportunity to be healthy' is otherwise known as *health equity*.

There has been little explicit debate about the tensions that arise between the principles of health care equity and health equity or to the fact that, in practice, these goals are difficult to reconcile. A key difficulty is that the geographical distribution of population 'needs' varies according to the principle adopted. In order to promote *"equal opportunity of access for equal needs"*, the distribution of funding should reflect the existing burden of disease. In order to promote an *"equal opportunity to be healthy"*, funding needs to be targeted so as to reduce the health gap between the most advantaged and least advantaged groups. This implies that resources should not necessarily be directed at populations with the highest absolute burden of ill-health, but at those which have the worst health in terms of age-standardised measures. The point is that a population with a high absolute burden of need (perhaps because it comprises a large proportion of older people) may well, in age-standardised terms, be relatively healthy. Thus depending on whether crude or standardised measures are used, the distribution of 'need' is very different.

The aim of this paper is to explore how the current system of resource allocation in England resolves this tension. Does the distribution of health care funding reflect the core principle of the NHS, that of equal opportunity of access for equal needs, or has health equity displaced health care equity as the key objective of resource allocation? If such a shift in emphasis has taken place, is the targeting of additional NHS resources at deprived areas likely to promote greater health equity? Is the current method used to distribute resources 'getting it right' or should alternative approaches be considered? In order to address these questions, the paper provides a description and critique of the current weighted capitation system and concludes with a brief outline of how a more normative approach to setting health capitations could – and should - be developed.

The Weighted Capitation Formula

The technical approach to allocating health care resources also owes much to the work of original Resource Allocation Working Party. RAWP recommended that revenue resources for hospital and community health services (HCHS) should be distributed on the basis of population, weighted according to the 'need for health care' and the costs of providing services. In the intervening period, much of the technical effort that has gone into formula determination has focused on the measurement of the 'need for health care'. This is conceptualised as comprising two elements; 'age-related need' and 'additional need'. The latter concerns that part of a population's need for health care which is over and above that due to its demographic composition. This addresses, in other words, the effect of socio-economic deprivation on a population's healthcare needs. Unfortunately, whilst the link between deprivation and health status is well established, it is difficult to quantify this relationship in terms of resource needs. The variety of different approaches used since 1976 to measure (or use a proxy for) additional need is symptomatic of this difficulty.

Since 2003/04 the method used to distribute resources between Primary Care Trusts has followed the recommendations of the 'Allocation of Resources to English Areas' (AREA) report published in 2002 (Sutton et al, 2002). Like the previous 'York Model', this adopted the analytical principle that 'statistical modelling of the relationship between utilisation, socio-economic variables (including measures of health) and supply factors can identify which socio-economic variables are indicators of need because of their effect on utilisation' (Sutton et al, 2002, p.1).
To this end, a two-step procedure was used to model age-related and additional needs effects. This involved first establishing average levels of resource use for each of a series of age bands. These were then used to create 'indirectly-standardised resource use ratios for small areas' which were compared against a set of utilisation and supply indicators at small area level (Sutton et al, p,69). The goal was to define a plausible set of socio-economic 'additional need' indicators which would best explain, once age and supply factors had been taken into account, how utilisation varied at ward-level across England.

Any 'utilisation-based' approach such as this must assume that health service utilisation, once age and supply factors have been taken into account, is at least a reasonable proxy for health care needs. Analysis of Health Survey for England data suggested to the AREA team that some social groups were under-utilising health services relative to their needs, and thus certain 'unmet need' variables were incorporated within the model. In part, this was also to address ACRA's new health equity criterion.

This two-stage approach to calculating age-related and additional needs was undertaken separately for the four elements of the weighted capitation formula. These covered Hospital and Community Services (HCHS), Prescribing, Primary Care and HIV/AIDS, and each was assigned a specific set of socio-economic variables that was to be used as a measure of 'additional needs'. In addition, all but the Prescribing element of the formula are further adjusted to take account of variations in the unavoidable costs of providing health care. Market Forces Factors (MFFs) are applied to HCHS, Primary Care and HIV/AIDS. The former was also subject to a further, very small, adjustment known as the Emergency Ambulance Cost Adjustment (EACA).

For each PCT, a weighted population is thus calculated for each of the four elements of the overall formula. These take account of the target population and, as appropriate, the population's age-related needs, additional needs, MFF and EACA. The four resulting weighted populations (normalised as necessary) are then combined to reflect their relative contribution to the overall health care budget; with, in 2004/6, the HCHS element constituting 77.36% of the whole, Prescribing 13.23%, Primary Care 8.81% and HIV/AIDS 0.59%. The outcome is a 'Unified Weighted Population' which is used, once normalised, to calculate the PCT's resource needs vis-à-vis other PCTs. For 2006/8, two new elements were added, the Growth Area Adjustment and the English Language Difficulties Adjustment. Details are given in Department of Health (2005) and in Galbraith (2008).

The Allocation of Funding in Practice

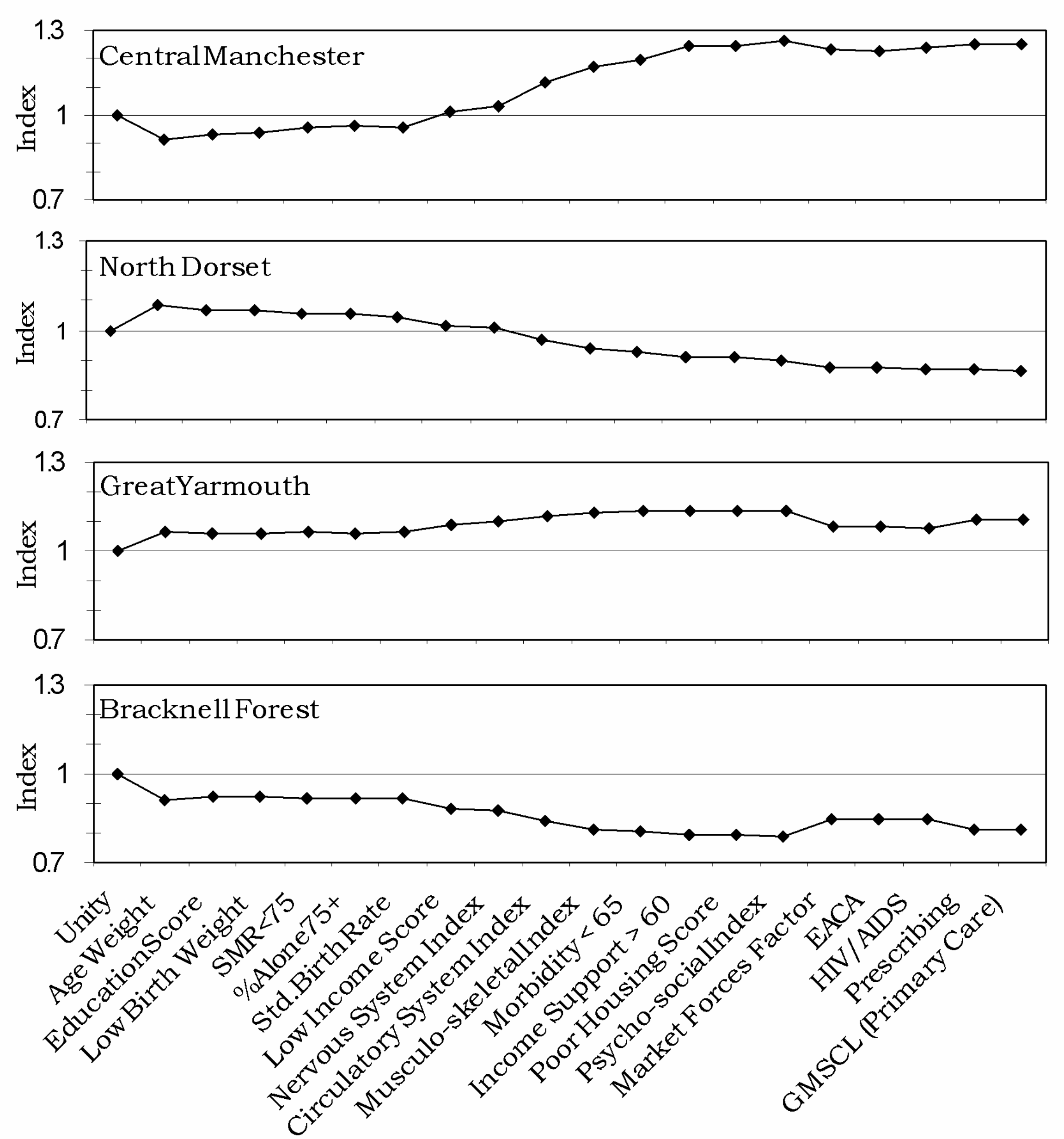
The implementation of the weighted capitation formula, no less than its derivation, can be difficult to follow. An Excel-based tool, developed by Professor Mervyn Stone of UCL, usefully demonstrates how the various elements of the current weighted capitation formula impact upon local allocations (Stone, 2006). The tool plots the sequential impact of the age-related, additional needs, MFF and EACA variables as used in the HCHS part of the formula, and then as composite indices, the HIV/AIDS, Prescribing and Primary Care (GMSCL) components of the formula. It is designed for use with pre-2006 PCTs (i.e. prior to amalgamation into larger Trusts); is based on the 2004/6 formula and uses 2003/4 data. However, the broad effects of the formula remain unchanged.

Using examples from four very different types of area, Figure 1 plots the cumulative impact of the formula’s elements as they build towards the Unified Weighted Populations used to allocate resources to pre-2006 PCTs. It shows how, depending on their particular demographic and socio-economic characteristics, some PCTs fare better than others.

In the first two examples, Central Manchester and North Dorset, the additional needs element of the formula opposes and outweighs the influence of the age-related needs element of the formula. Thus, although Central Manchester has a relatively young local demography (an age-related index of 0.91), its Unified Weighted Population is pushed up to 1.26 by the additional needs variables, reflecting the high level of deprivation experienced in this area. A slightly lower than average MFF means that once the HIV/AIDS and the Prescribing and Primary Care (GMSCL) components are included (and these also encompass age-related and additional needs variables), the final outcome is an index of 1.25. In other words, the Unified Weighted Population for Central Manchester is significantly larger than its actual population, giving this pre-2006 PCT one of the highest *per capita* funding allocations in the country.

North Dorset, by contrast, has a population with significantly higher than average age-related needs (an index of 1.08), but significantly lower than average 'additional needs' which, with the inclusion of the remaining elements, drives the final index down to 0.87. In other words, although the population of North Dorset is significantly older than average, it received a much lower than average *per capita* funding because of the very low 'additional needs' attached to its relatively affluent population.

Figure 1: Sequentially Incorporated factors in Capitation Formula

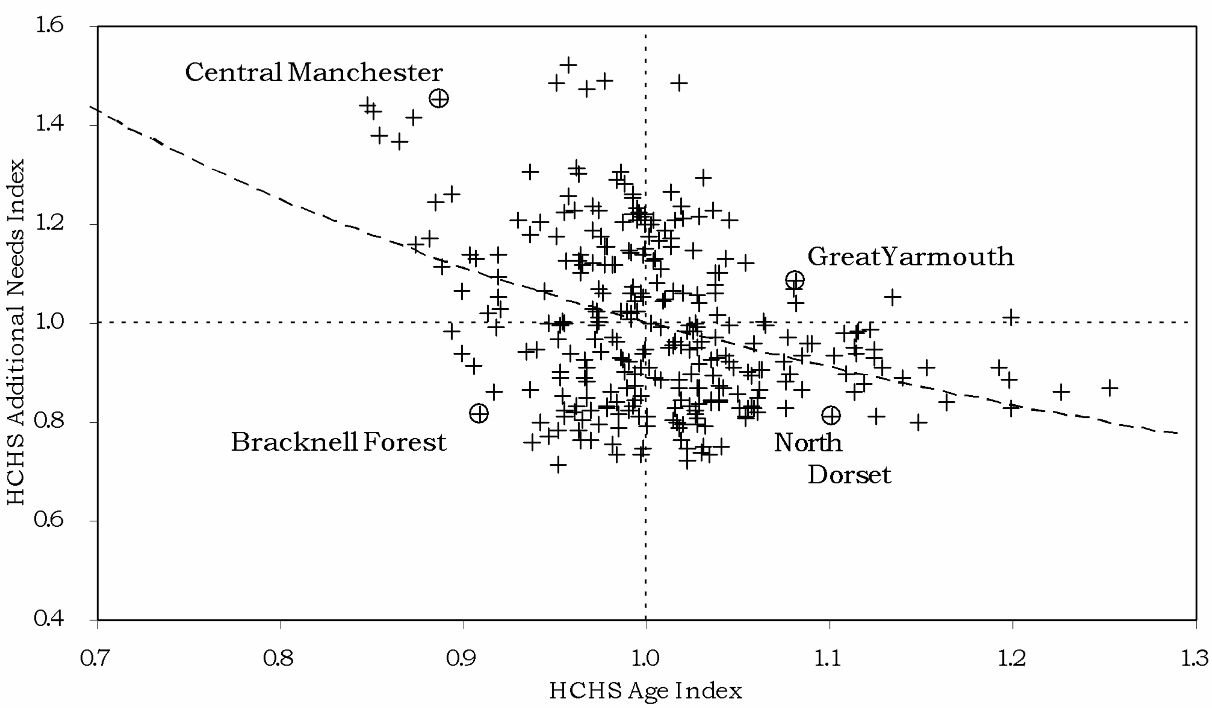


In the remaining two examples, the age-related and additional needs indices reinforce rather than oppose each other. Thus, the Unified Weighted Population of Great Yarmouth PCT, which served an older, deprived population, is higher than its actual population, whilst Bracknell Forest received a lower than average per capita allocation, reflecting the relative youth and affluence of this area.

To put these PCTs into a national context, Figure 2 plots all English pre-2006 PCTs on a graph illustrating the relationship between their 2006-07 HCHS age-related and additional needs indices (Department of Health, 2005b). The dashed curve running from the top-left to the bottom right of the graph marks the point at which the age-related and additional needs indices cancel each other out. Other things being equal, PCTs above the line will receive a greater than average allocation, whilst those below it will receive a lower than average allocation.

Our first example of Central Manchester falls into the upper left hand quadrant of the graph. This comprises PCTs which served younger, more deprived – and typically urban – populations. As can be seen by the number of PCTs above the dashed curve, the 'additional needs' weighting outweighs the 'age-related needs' weighting in the majority of cases, many of which received the highest *per capita* funding allocations in the country. In direct contrast, the lower right quadrant encompasses PCTs which, like North Dorset, served older and more affluent than average populations. The majority lie below the 'break-even' line. In other words, the positive effect (on allocations) of relatively old populations tends to be cancelled out by the negative effect of affluence.

Figure 2: HCHS Age-related versus Additional Needs Indices



In the remaining two quadrants the age-related and additional needs indices reinforce rather than oppose each other. As a result, PCTs which, like Great Yarmouth, served older, deprived populations always received a higher than average allocation, whilst PCTs with young affluent populations such as Bracknell Forest always received lower than average allocations. There are, however, many fewer PCTs in these two quadrants because, in England, demography and social deprivation are not independent of one another. In general, areas with older populations tend to be more affluent whilst those with younger populations tend to be more deprived. It is thus often the case that the age-related and additional-need indices oppose each other and, when they are incorporated into the weighted capitation model, the additional needs indices usually 'win the battle' (Stone, 2007).

The overall impact of the opposing influence of the age-related and additional need indices is such that PCTs with more ageing populations would usually be better off if there were no weightings at all. According to Stone's analysis of pre-2006 PCTs, if the distribution of funding was simply proportional to GP-registered populations, 67% of the most aged PCTs would gain relative to the current formula, while 52% of the most youthful PCTs would lose (Stone, 2007). This is an important finding. With *per capita* costs for Hospital and Community Health Services currently ranging from £269 for a child aged 5-15 to £2,799 for over 85 year olds, it is often assumed that areas with the oldest populations must receive the greatest funding allocations. Stone's figures make it clear that this is not the case.

The introduction of the AREA formula initiated a shift in resources towards PCTs serving more deprived populations and resulted in very large differences in targeted funding for PCTs[1]. Thus, in 2005-06 the average per capita formula allocation was £1,280 in the 20% most deprived PCTs compared to £927 in the 20% least deprived PCTs. When geography is taken into account, the positive targeting of NHS funds is even more apparent. PCTs serving populations that

[1] It should be noted that that these are *formula allocations* rather than actual *funding settlements*. For many PCTs, such was the magnitude of the difference between what they were currently receiving and what the formula calculated they should receive that it was impossible to immediately reconcile the two – hence differential funding increases to close the gap or "distance from target".

are both in the most deprived and most urban quintiles received the highest average per capita funding allocations (£1,323) while PCTs serving the most rural and least deprived populations received the lowest (£922).
It is important to point out that large differences in funding are not, in themselves, problematic. The very object of the formula is to identify whether PCT populations have higher or lower *per capita* health care needs than the English average. A HCHS age-related needs index of 0.9 simply means that, in view of what must be a younger than average population, a PCT is judged by the formula to require, other things being equal, only 90% of the average *per capita* resource set aside for Hospital and Community Health Services. Similarly, if a (relatively affluent) PCT has a HCHS additional needs index of 0.9 it simply means that its population, other things being equal, requires only 90% of the average HCHS *per capita* resource. The issue is whether the formula adequately captures how costs vary with age and deprivation, and whether the formula adequately captures the health consequences of the local interplay of demography and deprivation. This is explored below.

A Critique of the Weighted Capitation Formula

Notwithstanding the statistical sophistication of the empirical models that underpin the English health resource allocation system, the legitimacy of deriving health care needs from an analysis of health care utilisation is highly questionable. Doubts have long been raised about the extent to which it is possible to model utilisation data in such a way as to successfully disentangle health needs from, in particular, the impact of supply effects on patterns of health service utilisation (Sheldon and Carr-Hill, 1992). The complexity, and lack of transparency, of the current AREA formula is a direct consequence of this challenge. In this respect the AREA model represents the apotheosis of the tendency for researchers to "become besotted with the production of ever more refined empirically based formulas' (Sheldon, 1997).

A reliance on utilisation data presupposes that historical patterns of service uptake by different care groups are either appropriate or, if there is evidence of under- or over- utilisation relative to needs, can be adjusted to better reflect a population's underlying health needs. It is questionable, however, whether the current approach to adjusting for either unmet need or unjustified utilisation is adequate (see Galbraith, 2008).

A selective approach to conceptualising unmet need

The current resource allocation model is rather selective in its approach to unmet need. For example, it assumes that past patterns of utilisation across different age groups appropriately reflect the underlying need for health care. Older people do make high use of both primary and secondary care. However, several studies conclude that there is under-utilisation among this age group relative to need (Peake and Thompson, 2003; Bond et al, 2003; Holmes et al, 2003; Williams et al, 2004; Beswick et al, 2004; Crome and Natarajan, 2004; Yong et al, 2004; Grande et al, 2006). This would suggest that the *per capita* costs allocated to older age groups may be conservative.

While evidence of unmet need according to age is ignored by the formula, the HCHS component does incorporate additional morbidity variables to 'capture some of the effect of unmet need where ethnic minority groups and low income groups do not receive health care services to the same level to that of others with similar health care characteristics' (Department of Health, 2005a, p. 20). Yet, research evidence of a 'pro-rich' bias in health care is equivocal. Reports that poorer social groups have lower than predicted rates of utilisation (e.g. Ben-Shlomo and Chaturvedi, 1995; Black et al, 1995; Payne and Saul, 1997; Hippisley-Cox and Pringle, 2000; Morris, Sutton and Gravelle, 2005; Morris et al, 2005) have been challenged by evidence that suggests that poorer people receive as much if not more health care than richer people for equal need (e.g. Macleod et al, 2000; Asthana et al, 2004; Britton et al, 2004; Jones et al, 2005; Adams and White, 2005; Strong et al, 2006; Kee et al, 2007). Thus, as a recent large-scale review of inequalities in health care concluded, "the evidence does not consistently point to poorer access for socio-economically disadvantaged people, even when need is accounted for; some studies even suggest that there is a pro-poor bias in the NHS" (Dixon Woods et al, 2005, p.97). The picture that emerges with respect to ethnic minority status is similarly ambiguous (Dixon Woods et al, 2005, p.130-35).

It is important to acknowledge that people from lower income and ethnic minority groups may face similar difficulties with respect to processes of presentation, negotiation, adjudication and acceptance as do older people. Thus, the point is not to suggest that one group is more or less disadvantaged than another with respect to access to health care, but to demonstrate that the evidence on inequalities is complex and equivocal. Against this background, the selective and unambiguous approach taken to adjusting for unmet need in the resource allocation formula is questionable.

There is, of course, a geographical dimension to demography, deprivation and ethnicity. The youngest, most deprived populations tend to be urban, while populations in rural areas are often both demographically older and relatively affluent. Urban areas also have the highest concentrations of ethnic minority groups. The implications of social bias in health service utilisation (and subsequent resource allocation) are thus not geographically neutral. If the model's assumptions about unmet need are not met or if, indeed, there is pro-poor bias and/or ageism in health service use, then one would expect urban areas to be the prime beneficiaries.

There is some published empirical evidence which suggests that this occurs. A comparison of utilisation-based measures against direct health estimates as a basis for setting capitations for the inpatient treatment of coronary heart disease found that the former allocated resources to urban deprived areas to a higher level than implied by morbidity alone. Rural areas, by contrast, appeared to be under-resourced (Asthana et al, 2004).

Is it possible to adjust adequately for supply?

The weighted capitation formula is not only likely to reflect systematic inequalities in existing utilisation. There is a strong possibility that it will reinforce inequality in a vicious/virtuous cycle of resource allocation. Thus, a higher supply in areas that are well-resourced in relation to underlying need stimulates higher rates of utilisation which are in turn rewarded by higher allocations. By contrast, relatively low levels of funding influence lower rates of provision and use.

'Supply effects' are, of course, controlled for in the statistical models that inform the English formula. However, critics doubt whether '… modelling techniques (can) deal adequately with a system where demand, utilisation and supply are so inextricably linked' (Sheldon and Carr-Hill, 1992). The current approach to adjusting for supply uses physical measures such as access and capacity. This takes inadequate account of the demographic and socio-economic biases in health service utilisation which have a geographical dimension which largely parallels that of supply. Thus there can be 'no justification for the claim that consideration of supply effects can convert a formula to predict ‘standardized utilization’ into a formula to predict *appropriate* standardized utilization’ (Stone and Galbriath, 2006).

What are we achieving - health care equity or health equity?

Assumptions regarding the legitimacy of utilisation, together with the selective approach taken for conceptualising unmet need and the failure to adjust adequately for supply, suggest that bias (of uncertain magnitude) is likely to creep into the system of resource allocation. However, the pattern of allocation to urban deprived and rural affluent areas principally reflects the relative importance accorded to age-related and “additional” needs in the calculation of funding allocations.

The authors of the AREA report intended that their approach would yield target allocations which would appropriately reflect the relative impact of age, additional needs and other factors on local health care needs. However, this depends upon whether ‘needs’ are defined according to the health care equity or health equity criterion.

As noted above, the overall effect of the opposing influence of age-related and additional need indices is such that PCTs with demographically older populations would often be better off if there were no weightings at all. By contrast, highly deprived areas benefit strongly from the formula, even if their populations are relatively young. The formula clearly operates on the assumption that socio-economic deprivation has a greater effect on a population’s health care needs than demography.

Does resource allocation promote equal opportunity of access for equal need?

There is no doubt that standardised mortality and morbidity rates are highest, and average life expectancy lowest, in urban and declining industrial areas where social deprivation is more extreme (Dorling, 1997; Shaw et al, 1999; Shaw et al, 2005; Asthana and Halliday, 2006). Here, funding allocations are highest. By contrast, the most affluent areas, which receive the lowest target allocations, enjoy the highest levels of health – in standardised terms.

It does not necessarily follow, however, that areas suffering from the worst health inequalities also have the highest crude rates of morbidity and thus the highest health *care* needs. It has now become so common to age-standardise measures of disease prevalence that it is easy to overlook the fact that, for most conditions (mental health being a notable exception), population age structure is a far more significant determinant of morbidity and mortality than deprivation (Gibson et al, 2002). As people get older, they are more likely to develop conditions such as heart disease and cancers and this places significant demands on health care resources. Older people are also far more likely to die than younger people and, because progressive and fatal illness often requires high intensity care, this has important cost implications (Seshamani and Gray, 2004).

It is therefore quite plausible that older populations, even if affluent and with relatively good health status with respect to health inequalities, will have higher absolute burdens of ill-health. If this is the case, then the current distribution of funding is unlikely to secure equal opportunity of access for equal needs: to fulfil the principle of health care equity, the distribution of health care funding should reflect the existing burden of disease.

In the absence of a 'gold standard' by which to measure the needs for health services, difficulties arise in assessing whether or not the current system does promote equal access of opportunity for equal needs. However, a number of methods lend themselves to this important issue. As we discuss below, survey-based morbidity data provide one means of deriving more direct estimates of resource needs. In addition to offering an alternative approach to resource allocation, these provide a benchmark against which to assess the 'fairness' of current allocations. In a recent analysis, in which epidemiological estimates were used to provide a proxy measure of the overall health resource needs of PCTs in the East of England, the current utilisation-based model was found to overestimate the resource needs of deprived areas and to underestimate the resource needs of older areas compared to the morbidity-based approach (Asthana et al, 2007).

Another approach has been to analyse indicators of organisational stress (financial and service-related) which can result when local needs are not satisfactorily met. The systematic pattern of deficits in recent years suggests that the current resource allocation formula has failed to address the health care needs of particular populations adequately (Asthana and Gibson, 2005; Asthana and Gibson, 2006; Badrinath et al, 2006). Risk of deficit has been strongly associated with resource allocation. In 2005-06, for example, only 13% of the 60 PCTs with the highest per capita allocations ended the year in deficit, compared with 68% of the 60 PCTs with the lowest per capita allocations. With regard to the population characteristics of deficit PCTs, no less than 71% of PCTs serving the most affluent and most rural populations failed to break even, compared to only 6% of those serving the most deprived and most urban populations. The fact that such a systematic relationship exists in the distribution of financial deficits strongly suggests that the current resource allocation system is not adequately capturing the health care needs of particular populations.

Does resource allocation promote an equal opportunity to be healthy?

As urban deprived areas would be expected to benefit disproportionately from funding allocations for health inequalities, the fact that they may also be relatively 'over-funded' with respect to the health care equity criterion may appear to be unproblematic. However, the goals of health care equity and health equity require very different policy responses.

The vast proportion of NHS resources is spent on curative and particularly hospital services. Deprived groups that experience higher rates of premature disease must of course have access to high quality treatments and procedures as these can play a significant role in improving quality of life and reducing risk of mortality. However, the goal of reducing health inequalities is essentially about *prevention*. Targeting additional resources at hospital treatment rather than public health and primary-level care in deprived areas is tantamount to shutting the stable door after the horse has bolted.

The goal of reducing health inequalities should instead rest on policies designed to narrow or, through public health initiatives, mitigate the effects of, the unequal distribution of the social and economic resources that influence health. With respect to public health initiatives (which account for a very small proportion of the overall health budget), the existing evidence base tells us very little about the effectiveness of individualised behavioural interventions in addressing health inequalities (Asthana and Halliday, 2006). This casts some doubt upon the potential of the current public health strategy to promote greater health equity.

With respect to the distribution of social and economic resources, it appears that a reduction in overall inequality is *not* an aim of the current government. Low incomes may have improved in absolute terms, but overall levels of income inequality have remained fairly stable since Labour assumed power. At the same time, the distribution of wealth has become more unequal. Education continues to be characterised by large social class differences, with the gap widening in access to university places (Galinda-Ruedo et al, 2004). Similarly, improvements to housing have been made through reductions in the numbers of substandard homes, yet the gulf between the rich and the poor in terms of property wealth is now wider than at any time since the Victorian era (Thomas and Dorling, 2004). As the unequal distribution of health reflects the unequal distribution of the social and economic factors that influence health (Graham, 2004), it is hardly surprising that health inequalities continue to widen in the first years of the 21st century.

It would therefore seem that the current approach to resource allocation is flawed with respect to both equity criteria. The NHS (and particularly national hospital services) has little to contribute towards the reduction of health inequalities compared to other sources of variation such as income distribution, education and housing. Thus, the targeting of core services to urban deprived populations over and above levels of underlying morbidity is an ineffective response to health inequalities. It is one, moreover, that exacerbates health care inequity by underestimating the needs of older but less deprived populations.

Towards a normative approach to achieving the core principles of the NHS

However sophisticated the resource allocation system, and however wide the range of variables used to model the relationship between socio-demographic and socio-economic variables and health care utilisation, the fundamental difficulty of disentangling legitimate needs factors from other policy and supply influences in utilisation remains. Against this background, questions have been asked as to whether resource allocation formulae should shift from the current *empirical* approach based on observed variations in health utilisation to the formulation of more normative capitations (Schokkaert and Van de Voorde, 2004).

It is arguable that in order to promote a shift from *what is* to *what ought to be*, health care capitations should be built on direct measures of the health needs of populations. There has been little practical progress in developing more direct approaches to resource allocation. Wales is unique in using survey-based data on morbidity as the basis for distributing a large proportion of its health care expenditure (Gordon et al, 2001), an approach that has been explicitly rejected for use in Scotland (Carr-Hill and Dixon, 2006). Objections have been less on principle than in response to data and methodological considerations. In effect, critics have questioned whether it is possible to reliably measure the burden of ill-health in different areas, *and* whether it is then possible to establish the resources required to meet local health care needs (McConnachie and Sutton, 2004).

The particular approach adopted in Wales has its limitations and, as it requires that survey data are collected for all areas, it cannot be implemented in England. However, an alternative to the Welsh "sample-based method" is to generate risk-adjusted resource needs through statistical modelling. A variety of approaches are available to this end. The most basic use simple attribution and, like the Welsh method, assume that all cases have the same level of health care needs (a problematic assumption). More complex methods apply suitable models (including multilevel models involving both individual and area level covariates and both fixed and random effects) to individual survey data to generate predictive distributions of morbidity. All uncertainty due to the modelling process is incorporated into local estimates of morbidity, whilst any further uncertainty regarding the resource required is captured by sampling from appropriate historic cost distributions. This can be minimised by attaching age/sex-specific cost data to the corresponding morbidity estimates. It is thus possible to combine local predictive distributions of morbidity relative to defined service care and/or diagnostic groups with equivalent national-level predictive distributions of per capita resource needs to generate local risk-adjusted distributions of predicted resources and needs.

One relatively simple approach to modelling estimates of direct needs (but not estimates of resource needs) is provided by Gibson et al (2002). Here, cumulative data from the Health Survey for England were used to create an age, sex and social class matrix of the prevalence of ischaemic heart disease. Equivalent matrices were produced for general practices (n=539) in seven health authorities in contrasting locations in England. These were based on both patient registration data (which provide age and sex) and the patient-weighted attribution of census data. The matrices were then combined to derive an estimate of the disease burden within the target populations.

While this study generated estimates of morbidity, it did not attach these to resource weights in order to produce estimates of health care resource needs. The potential for this was explored in a later paper published by the same team (Asthana et al, 2004). Here, symptom-based estimates were produced of PCT-level prevalence of severe angina and myocardial infarction (MI). Derived from responses to Rose Questionnaire items in the Health Survey for England and adjusted for social class, these were combined with an age/sex resource matrix for the inpatient treatment of coronary heart disease (based on HRG Reference Costs for inpatient episodes with a main diagnosis code between ICD10 I20 and I25). In order to establish a CHD clinical programme budget for each PCT, the estimated number of people with symptoms of severe angina and/or MI in each age/sex cohort were multiplied by that cohort's average 'per capita in need' resource use, then the totals of all cohorts were aggregated.

While this demonstrated the feasibility of using morbidity as a basis for setting health care capitations, it produced a budget for only one clinical area. In a more recent study, in which a simplified epidemiological approach was used to develop resource need estimates for post-2006 PCTs in the East of England (Asthana et al, 2007), allocations were developed for 14 Programme Budget categories, accounting for the major proportion of NHS expenditure.

Using cumulative data from the Health Survey for England (n=>75,000 individuals), this modelled the relationship between, on the one hand, an individual's age, sex and general health status and, on the other, whether or not they had self-reported suffering from one of 14 ICD10-based categories of illness. These categories did not cover the entire spectrum of health care needs, but rather just those which could be mapped directly onto Programme Budget categories. Linking age/sex/general health status-based prevalence rates for different disease categories (derived from the Health Survey for England) with census-based count of the number of people in each age/sex/general health status 'cell' in each PCT, estimates were derived of the number of people in each cell likely to report a disease. Cell totals were summed and then divided by the total number of people in each PCT to generate overall and disease-specific prevalence rates. By attaching cost data drawn from Programme Budget category data, epidemiological-based estimates of *per capita* health care resource needs were then produced.

This was an admittedly small sample (there are 14 post-2006 PCTs in the East of England), but the results were promising. First, the study took advantage of the fact that, with the recent emergence of Quality and Outcomes Framework (QOF) data, there is now at least one independent source of data against which to compare estimates. It found that epidemiological estimates of the prevalence of 'disorders of the heart and circulatory system' were very highly correlated with QOF coronary heart disease prevalence rates (R=0.972) and QOF hypertension prevalence rates (R=0.960), supporting the efficacy of the epidemiological approach. Second, the morbidity-based estimates of overall health care resource needs were a far better predictor of actual programme budget expenditure (R=0.861) and *per capita* prescribing costs (R=0.83) in East of England PCTs than the weighted capitation formula (R=0.62 and 0.44 respectively).

Conclusion

As befits an approach still in its infancy, a wide range of methodological issues are being raised in explorations of the normative approach, not all of which have been satisfactorily resolved. For example, questions remain about the reliability and validity of survey-based data as a basis for resource allocation. Problems such as sampling and reporting bias can be reduced through good survey design and implementation. It is also possible to validate key dimensions of self-reported health status objectively (e.g. where surveys also collect physiological measurements and/or biological markers). In this respect, the Health Survey for England has several key advantages. There are, moreover, a growing number of available surveys which include evidence on the morbidity of individuals alongside socio-demographic and other characteristics.

Developing methods of attaching meaningful 'resource needs' to morbidity counts also remains a key challenge. Cost data need to be disaggregated to reflect legitimate variations in the costs of treating patients in different circumstances and with different co-morbidities. Outpatient, community and prescribing data do not lend themselves well to such analysis and, while inpatient cost data can be disaggregated by age and sex, Hospital Episodes Statistics (HES) do not include information on socio-economic status. Future work on the direct approach could therefore fruitfully explore methods of introducing socio-economic discrimination into the analysis of cost data and of incorporating overall, rather than just inpatient, costs.

Despite these reservations, the studies described above do demonstrate that a direct approach to setting health care capitations is methodologically feasible *and* that it can produce credible empirical results. Given evidence that the current utilisation-based approach is a questionable basis upon which to set 'fair' target allocations, we propose that there are strong grounds for further exploring the potential of a normative approach to better promote equity in a system where equal access for equal needs remains a central objective. We hope that our current research, in which we have adopted a more analytically rigorous method to developing normative capitations, may provide a further step towards this end.

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