Reviewing RAWP

Variations in admission rates: implications for equitable allocation of resources

GWYN BEVAN, ROLAND INGRAM

Abstract

The review of the Resource Allocation Working Party (RAWP) formula by the National Health Service Management Board has considered the method used to account for cross boundary flows between health authorities. There is no consensus on how this should be done subregionally, as it raises the unresolved problem of the best method of estimating the size of catchment populations. Different methods produce different population sizes when the admission rates of individuals living in different districts vary. The National Health Service/Department of Health and Social Security acute services working group on performance indicators recently considered the assumptions made by different methods in terms of admission thresholds set by hospital clinicians. More complicated methods of assessing catchment areas seem to offer little advantage over the simplest method, but none of the methods answer the underlying questions of what truly determines admission rates and whether higher admission rates are better than lower ones. Empirical research into variations in admission rates and their relation to outcomes is important for determining the fair allocation of resources in future.

Introduction

The problem of accounting for "cross boundary flows" (of people who live in one authority and are admitted as inpatients by a hospital in another) has been considered by the review of the Resource Allocation Working Party (RAWP) formula by the National Health Service Management Board.¹ Earlier papers^{2,3} in this series have pointed out that, although RAWP targets for acute services appear to be based on capitation (through the residential component of populations of regions and districts), the activity element in the allowances made for cross boundary flows can dominate the capitation element for some inner city districts. When a hospital mostly provides services for people who live outside its district the size of the population it serves—its catchment population—has to be estimated to determine its finance by capitation.

The report of the National Health Service and Department of Health and Social Security acute services working group on performance indicators saw its analysis of methods of estimating

sizes of catchment populations as relevant to the way regions calculate district targets in determining future allocations for acute services.⁵ The working group asserted that the failure of regional statisticians and others to agree on the best method needed to be brought smartly to a head and resolved. This it aimed at doing through examining each method's model of explaining variations in admission rates in terms of hospital admission thresholds. We outline those models and consider possible relations between variation in admission rates and the need met at the margin of corresponding admission thresholds.

As this is the last paper in this series on RAWP, the concluding discussion summarises the implications of our analysis for resource allocation in the context of earlier papers in the series^{2,3,6-8} and the initial report¹ of the RAWP review.

Choice of method of estimating catchment populations

A hospital's catchment population is estimated by using admission rates to translate its caseload into a population equivalent. When admission rates from different districts are the same there is only one rate to use and the various methods of estimating catchment populations produce the same result.^{9,10} When district admission rates vary a choice has to be made about which rate to use for patients from different districts treated by the same hospital. The choices made by the various methods then produce different results.^{9,10}

Regions have used three methods to estimate catchment populations for determining district RAWP revenue targets: net flow is the most common, and its incentive effects were analysed in an earlier paper in this series²; North Western and Mersey regions use treatment intensity; North West Thames uses proportionate flow. Each has been recommended by the Department of Health and Social Security on different occasions.^{4,5,11} The three methods translate cases into population equivalents by the following choices of admission rates.

Net flow assumes that the regional average admission rate applies to cases crossing district boundaries and the admission rate of the district to cases treated within districts.

Proportionate flow assumes that the admission rate of the district of residence applies wherever cases are treated.

Treatment intensity assumes that hospital admission rates apply regardless of district of residence.

Each method assumes an inverse relation between population equivalents and admission rates: high admission rates result in low population equivalents and vice versa. The acute sector working group argued that only the treatment intensity method had a credible underlying model of clinicians' behaviour and caricatured the model underlying each of the three methods as follows.

Net flow—"This case has crossed a boundary. We have an agreement that all cases crossing boundaries should be decided by uniform criteria, which are not the same as we use in this district for

Department of Community Medicine, United Medical and Dental Schools of Guy's and St Thomas's Hospitals, St Thomas's Campus, London SE1 7EH
GWYN BEVAN, MA, senior lecturer in health economics

Harvard Medical School, Brigham and Women's Hospital, Boston, Massachusetts 02115, USA

ROLAND INGRAM JR, MD, Parker B Francis professor of medicine

Correspondence to: Mr Bevan.

our own residents. Although I would not admit him were he resident in this district, I must remember that this district has a lower admission rate than our agreed common policy for cases crossing boundaries. Therefore I will admit him."

Proportionate flow—"Although I would admit someone in this state were he a resident of this district, he is not. He lives in a district known for a lower admission rate. Therefore I shall not admit him."

Treatment intensity—"The level of provision, management skill, and so on cause me to adjust the threshold for admission but the threshold is the same for all the patients I see. Colleagues next door may make different judgments in their different districts, and I am sure that like me they treat all cases the same regardless of where they live."

In practice, each of these three methods results in only minor changes in the size of districts' RAWP targets.¹² Whatever method is used does not resolve the intrinsic difficulty of determining district allocations by subregional RAWP: that districts cannot be responsible for their residents' use of services in other districts.¹² Furthermore, the treatment intensity method generates its own kind of perverse incentives, although these are different from those of the net flow method: the treatment intensity method places overriding importance on an equitable distribution of services without regard to the volume delivered.¹³

The acute services working group has, however, highlighted an important issue: are variations in admission rates due to hospital admission thresholds? This has an important corollary: if high rates are caused by low admission thresholds then there is a strong argument for redistribution from districts with high rates to those with low rates. We explore these points before returning to consider briefly the argument of the working group in favour of the treatment intensity method.

Relations between variations in admission rates and the marginal need met by admission thresholds

DEFINING MARGINAL NEED

To explain variation in admission rates in terms of admission thresholds is circular without an independent measure of thresholds. Steele has proposed measuring hospital admission thresholds in terms of the need of the "marginal" patient, one who has the least need of admission of all patients admitted.¹⁴ The need of that patient is the marginal need met by that threshold.

POSSIBLE RELATIONS BETWEEN MARGINAL NEED AND ADMISSION RATES

Schedules X and Y in the figure postulate two relations between admission rates and the marginal need met by the corresponding admission thresholds, the residents of district A having a higher admission rate than those of district B. We assume that the marginal patients of each district—that is, those in least need of admission—have been identified. Schedule X assumes that the marginal patient from A is less in need of admission than the marginal patient from B. In general, schedule X assumes that as district admission rates increase the need of marginal patients diminishes. Schedule Y assumes that there is no difference in the need of marginal patients from A and B, and that for the given range of variations in admission rates the need of marginal patients is constant.

MARGINAL NEED AND EQUITY

According to Mooney Steele's¹⁴ concept of marginal met need is attractive as the basis of determining an equitable allocation of resources for two reasons.¹⁵ Firstly, it focuses on the need of patients admitted to hospital at the margin. Secondly, the definition of degree of need is based on the ratio of benefit to cost and so embraces the likely outcomes of treatment and its costs as well as the state of the patient when admission is being considered.

If schedule X applied redistribution from A to B would be justified because the unmet need created in A would be less than the need satisfied in B. If schedule Y applied the argument for redistribution from A to B would then be justified only if one thought that the likelihood of admission ought not to vary geographically. This appears to be RAWP's objective: "aiming to secure through resource allocation equal opportunity for access to health services for people at equal risk."¹⁶ But inequality of this kind does not mean that the unmet need created by cuts in A would be greater than the need met by growth in B.

Marginal met need of admission thresholds for different admission rates.

EMPIRICAL EVIDENCE

The relation between admission rates and admission thresholds is hard to investigate empirically because a population is commonly served by more than one hospital. Furthermore, as Connell *et al* point out, the various hypothetical explanations of the causes of variations in admission rates generally lack clinical corroboration.¹⁶ Thus there is no clear empirical evidence which of the two hypothesised relations in the figure actually applies. We cite some examples to illustrate this.

Steele advanced the concept of marginal met need based on the hypothesis of schedule X but failed to find a clear relation between changes in available beds and admission threshold as indicated by the proportions of cases admitted ranked by their degree of "seriousness."¹⁴ In a study of variations in admission rates for diabetes mellitus in Washington State Connell *et al* found that hospitals in high rate counties tended to admit proportionately more patients who were mildly ill and that their medical care may have been "less vigorous and complete."¹⁶ Thus their study provided support for schedule X.

Wennberg has emphasised that wide variations in admission rates generally go unremarked by clinicians and the public: "Hospital beds and expenditures for New Haven are less than half that for Bostonians [but] . . . clinicians I have spoken to in each of these markets are unaware of the difference and often cannot guess which is more expensive."¹⁷ He observed that it was therefore feasible to set target levels of investment within surprisingly wide ranges without provoking either professional or patients' perceptions of unmet need. He suggested that health maintenance organisations "seem to have discovered this secret."

The most recent analysis of hospital services and utilisation rates by Wennberg and his colleagues showed that most of the extra beds in Boston were used for higher admission rates for medical conditions in which the decision to admit is discretionary.¹⁸ The

authors state, "If the marginal benefits of the high Boston admission rates are positive they do not seem to be so recognised by the clinicians of New Haven"; and they call for clinicians to investigate further the outcome and cost implications of their differences in practice.

One rationale for the observation by Wennberg and the findings of Steele is that the people in need of care but who do not get it (and who make up the "clinical iceberg") may have the same need as those who do get treatment. The size of this "iceberg" is therefore what varies between districts A and B, not the marginal need of those who do get hospital treatment. Furthermore, there may not be a conflict between the observations of Wennberg and Steele and those of Connell *et al.*¹⁶ This is because Connell *et al.* found that hospital size was associated with variation in admission thresholds, small hospitals having lower thresholds than large ones. Thus in similar hospitals serving populations with quite different admission rates the admission thresholds could be similar.

Examination of the treatment intensity method

Given uncertainty over the relation between admission rates and the marginal need met by corresponding admission thresholds, we consider here how the treatment intensity method might explain variations in admission rates for both schedules X and Y in the figure.

If schedule X applied then that would appear to justify the assumption underlying the choice of the treatment intensity method: that variations in hospital admission thresholds do cause variations in admission rates. But the treatment intensity method assigns both populations and admission rates through solving simultaneous equations. This means that the populations are metaphysical entities, rather than identifiable people. The gap between the algebra of the treatment intensity method and real understanding of the relation between admission thresholds and admission rates is illustrated by the study of Connell *et al.*, which gave empirical support for schedule X.¹⁶ The algebra of the treatment intensity method would have to assume that a hospital which predominantly served a high rate county would have a high admission rate (and an admission threshold with low marginal met need). So two large hospitals with the same admission thresholds would be assigned different populations by the treatment intensity method depending on whether they were located in high rate or low rate counties.

If schedule Y applied then this might also appear to justify the treatment intensity method, because the decision to admit would be made independently of district of residence. But under these circumstances how could variations in district admission rates be explained without reference to the referral process?

Discussion

The initial report of the RAWP review has soundly rejected more esoteric methods of estimating catchment populations than that of net flow.¹ Nevertheless, the acute services working party has drawn attention to the importance of understanding the relation between variations in both admission rates and thresholds. We have considered that relation in terms of its possible implications for the marginal need met at admission thresholds and equitable allocation of resources. To understand these implications more fully empirical research is required: no clear inferences may be drawn from current knowledge. The importance of such research is highlighted by the points made in this series of papers.²³⁻²⁸ We summarise those and contrast them with the emphases of the initial report of the RAWP review.¹

Papers in this series have vindicated four of RAWP's judgments: the choice of standardised mortality ratios (SMRs) as measures of relative morbidity⁶; the need to examine the interaction between services provided by family doctors and health authorities⁷; the use of approximate costs for cross boundary flows²³; and the generosity

of RAWP's estimate of the additional service costs of teaching medical students.⁸ The intervening decade has failed to provide substantial developments in any of these.

RAWP devised methods for using data that were routinely available and were as simple as possible consistent with their objective. Those methods have therefore been criticised for their adequacy, in particular over the need to account for social deprivation and for more precision in costing. These criticisms naturally spring from those who stand to lose resources, such as the teaching districts. We believe that these districts' problems are mainly due to their populations using services at a higher rate than the national average,^{23,28} and that there is little they can do about this given large cross boundary flows.²³ Furthermore, we believe that accounting for social deprivation,⁶ case mix,²³ and teaching⁸ is not likely to do much to ease their financial problems, nor will the introduction of cross charging,³ which is currently in vogue.

The response of the initial report¹ of the RAWP review to issues raised in this series is as follows. The report recognises districts' lack of control over outflows, exhorts regions to base the subregional allocation of resources on plans, and recommends that these plans should take account of factors not covered by the present formula and that the composition and presentation of targets should be improved. The report recommends research into morbidity, mortality, and social deprivation; teaching hospital costs; and cross boundary flows. The report is, as we have argued, correct in rejecting compensation through resource allocation to health authorities for inadequacies in primary care and in retaining the net flow method of accounting for cross boundary flows.

Although the report's emphases fairly reflect the commonality of perceived inadequacies in RAWP, our emphases are different. We agree with the report on primary care and cross boundary flows, but to achieve RAWP's objective of equal opportunity of access to health care for those at equal risk it is necessary to examine equity of access to primary care and, in particular, general practitioner services. The acute services working party has identified the importance of understanding the cause of variations in admission rates, and this in turn raises questions about general practitioner referral rates and the need met at different levels of resources.

RAWP was correct to state that, as supply fuels demand, health services will always appear to be inadequate as measured by criteria of demand. But it is wrong to infer from this that it does not really matter at what level services are provided. The question of what total National Health Service spending ought to be is commonly examined by two kinds of comparisons: with the past—in other words, whether there has or has not been real growth; and with other countries (commonly over spending on health services as a proportion of gross domestic product). The first is the subject of continuing dispute.¹⁹ Parkin *et al.* have recently shown that the second is more problematic than has commonly been assumed²⁰; for example, taking account of the relative purchasing power of different countries might suggest that the United Kingdom spends the "correct" proportion of its gross domestic product on health services.

Not only are comparisons with the past and other countries equivocal, they are not directly relevant to whether more or less ought to be spent on the National Health Service in the future. To answer that question we must judge the costs and benefits of different levels of spending. Wide range of use of acute services by different populations does not provide evidence for the case of regression towards the mean. Rather it offers an opportunity to assess the costs and benefits of different levels of spending with a view to informing judgments about what future spending in total on the National Health Service ought to be. And we believe that the concerns of London teaching districts are essentially about the kind of health service that is entailed by equity under current policies.

Finally, therefore, we emphasise the importance of research to improve understanding about the impact of variations in admission rates. The main issue in further movements towards targets is reduction in that variation. Yet increases in hospital admissions are taken to be an indication of increased output. Hospitals in inner London and the North Western region have increased admissions at reduced cost per case and are therefore deemed more "efficient,"

but these increases in efficiency threaten financial crises.^{21,22}

Attempts to explain variation in admission rates in the context of RAWP have so far concentrated on measures of social deprivation. But that variation is more likely to be due, as RAWP believed, to access to supply. Questions that do not seem to be asked are whether high admission rates are justified in terms of their outcomes and whether increases in admission rates are indeed genuine increases in efficiency. Although difficult, research into these questions is likely to be more soundly based than attempts to estimate the need for health services arising from social deprivation by using data on use and attempting to control for supply. We hope that the final report of the RAWP review recognises that research into the impact of variations in a populations' use of services in terms of outcomes is fundamental to future policies for the fair and efficient allocation of resources.

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References

- 1 Department of Health and Social Security. *Review of the Resource Allocation Working Party formula report by the NHS Management Board*. London: DHSS, 1986.
- 2 Bevan G, Brazier J. Reviewing RAWP: financial incentives of subregional RAWP. *Br Med J* 1987;295:836-8.

- 3 Brazier J. Reviewing RAWP: accounting for cross boundary flows. *Br Med J* 1987;295:898-900.
- 4 Department of Health and Social Security. *Sharing resources for health in England: the report of the Resource Allocation Working Party*. London: HMSO, 1976.
- 5 Department of Health and Social Security. *Report of the Acute Services Working Group of the joint group on performance indicators*. London: DHSS, 1984.
- 6 Mays NB. Reviewing RAWP: measuring morbidity for resource allocation. *Br Med J* 1987;295:703-6.
- 7 Bevan G, Charlton J. Reviewing RAWP: Making access to health care more equal: the role of general medical services. *Br Med J* 1987;295:764-7.
- 8 Bevan G. Reviewing RAWP: is the medical service increment for teaching (SIFT) adequate? *Br Med J* 1987;295:989-91.
- 9 Cottrell K. *Proceedings of statistics for strategic planning*. London: DHSS, 1979.
- 10 Pinder DC. Catchment populations: the properties and accuracy of various methods for their estimation. *Comm Med* 1982;4:188-95.
- 11 Department of Health and Social Security. *Acute services in London: a profile by the London Health Planning Consortium*. London: DHSS, 1979.
- 12 Beech R, Craig M, Bevan G. Estimating catchment populations: implications for target allocations. *Hosp Health Serv Rev* 1987;March:77-80.
- 13 Bevan G. Catchment populations, health maintenance organisations and cross-charging: a review of problems of different ways of delegating responsibility for their residents' use of services to English health authorities. *Fin Acc Man* (in press).
- 14 Steele R. Marginal unmet need and geographical equity in health care. *Scot J Polit Econ* 1981;28:186-95.
- 15 Mooney G. *Economics, medicine and health care*. Brighton: Wheatsheaf, 1986:107-26.
- 16 Connell FA, Blide LA, Hanken MA. Clinical correlates of small area variations in population-based admission rates for diabetes. *Med Care* 1984;22:939-49.
- 17 Wennberg JE. On patient need, equity, supplier-induced demand, and the need to assess the outcome of common clinical practices. *Med Care* 1985;23:512-20.
- 18 Wennberg JE, Freeman JL, Culp WI. Are hospital services rationed in New Haven or over-utilised in Boston? *Lancet* 1987;i:1185-9.
- 19 Maynard A, Bosanquet N. *Public expenditure on the NHS: recent trends and the outlook*. London: Institute of Health Service Management, 1986.
- 20 Parkin D, McGuire A, Yule B. *International comparisons of expenditure on health care and its relationship to national income: a critique and some new evidence*. Aberdeen: Health Economics Research Unit, University of Aberdeen, 1986. (Discussion paper, 03/86.)
- 21 King's Fund. *Planned health services in Inner London*. London: King Edward's Hospital Fund for London, 1987.
- 22 Hodges C. North-western—a region that lost its way? *Health Serv J* 1986;96:1414-5.

How To Do It

Write for money

MICHAEL O'DONNELL

Don't tell the editor, or at least not till after I've been paid, but I am not a good person to give advice about writing for money. I'm unusually lucky in that I've survived by writing what I want to write and then finding someone willing to publish it. It is not a course I'd recommend to anyone concerned with making money. I could call my bank manager as witness.

The nearest I get to a direct bid for the lucre is when I accept a commission for an article, or a script, on a subject I haven't chosen for myself and try to deliver what I hope is expected. But even then the most valuable reward is not the payment—though it can produce a comfortable feeling in the pocket—but the discipline that the exercise imposes. (Again I beg you, gentle reader, please don't tell the editor until he's signed the cheque.)

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Like everyone else, I find writing a laborious business and I'm sure that if my working habits came under the scrutiny of one of

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those city analysts who have proliferated under our present regime with the exuberance of thistles in a cow byre, he would consult his Filofax and say I spend too much time writing things that offer a low financial return per mmol of sweated blood. He would, I'm sure, advise me to desist from writing novels and return to writing the television plays I wrote when I was harder up, or advertisements for Snibbo or for Treadgold's Thoroughgrip Garterettes. Just as he would demand that I should never again write for such ill paying publications as... but this is no place to be naming names. The problem with Filofax man, of course, is that while he is good at measuring returns he has no measure of rewards.

That said, let us consider this business of earning money. Doctor writers if they can make any show of competence should find it easier than other writers to get their work published. Thanks to the

Cedar Tree House, Weybridge Park, Weybridge, Surrey KT13 8SJ

MICHAEL O'DONNELL, MB, BCHIR, author, broadcaster, and one time general practitioner