TALKING POINT

Technical deficiencies in RAWP

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The report of the Resource Allocation Working Party¹ has been criticised on moral and political grounds, but some of the technical aspects have not been adequately discussed.

Briefly, the RAWP procedure allocates available resources to regions according to estimates of population, adjusted for age and sex by reference to national hospital inpatient bed-usage rates. Some areas are "unhealthy" places to live in, compared with the national average, so should receive additional resources. To measure "unhealthiness" RAWP proposed the use of standardised mortality ratios as measures of demand for hospital services over and above that generated by the given age/sex structure of the population.

Standardised mortality ratios

Standardised mortality ratio has been defined as the ratio of actual to expected deaths—that is, an SMR in excess of one indicates an "unhealthy" area.² RAWP gives examples of sex-specific SMRs for the English regions using 1971 data. The lowest ratio was 0.88 (for East Anglian males), the highest 1.13 (Mersey males)—that is, a range of 25%.

At regional level the total number of deaths from all causes is stable from one year to the next even when analysed separately for each sex. Even so, the formula proposed in RAWP requires the use of sex- and condition-specific SMRs at the subregional level. The categories of condition used are the international classification of diseases chapter headings of broad groups of conditions (ICD groups). SMRs for each ICD group were calculated for the 17 health districts in the Yorkshire region, giving a range of 225% about the regional average of 1.03.

High bed-usage ICD groups

Treatment of patients in some ICD groups requires more hospital care than others. This is reflected in high national bed-usage rates. RAWP proposes that the bed-usage of all conditions should be separately weighted by sex- and condition-specific SMRs. The most disturbing aspect of RAWP is the co-incidence of high bed-usage and low death incidence conditions. In the Yorkshire region certain conditions typified this coincidence: I infective and parasitic diseases; IV diseases of blood and blood-forming organs; VI diseases of nervous system, etc; X diseases of urinary system; XIII diseases of musculo-skeletal system and connective tissue; XV certain causes of perinatal morbidity; and XVI symptoms and ill-defined conditions.

Table I shows the magnitude of the problem. The combined expected bed-usage of these conditions is a consistent 28% of male and

25% of female beds for each area, that is, over one-quarter of the bed-usage in a given health area is to be weighted by a function of only 300 deaths. This compares with an average number of expected total deaths per area of approximately 6000.

TABLE I—Range of AHA/sex SMR and average expected deaths per AHA (men)*

Condition	Range of AHA/sex SMR	Average expected deaths† per AHA (men)
I	0.99	15.5
IV	1.42	9.5
VI	1.09	32.3
X	0.84	40.8
XIII	1.26	14.1
XV	0.78	22.1
XVI	1.65	16.7

*1971 data.

†Simple arithmetic mean of 1975 expected deaths to show magnitude of death figures.

Historical data

Only data collected since NHS reorganisation are consistent enough to allow detailed analysis without resorting to sweeping assumptions. Table II shows some comparison of SMRs for each of the above conditions when using 1974-5 combined and 1975 data: the results are shown for males though similar results for females were also produced.

Clearly, changes of this magnitude could cause wide fluctuations in the final budget allocation to an AHA (at the third tier—the district—the problems are compounded). In fact, for one AHA a growth rate of +4% would be turned into a rate of -0.7% by the use of 1975 data only.

TABLE II—Comparison of SMRs

Condition	Regional figure		Largest difference for AHA*	
	1975	1974-5	1975	1974-5
I	1.070	1.072	1.069	0.952
IV	1.092	1.132	1.167	0.414
VI	1.051	1.013	0.768	0.966
X	0.984	0.981	0.916	0.818
XIII	0.791	0.926	0.773	1.359
XV	1.182	1.133	1.660	1.282
XVI	0.990	1.104	1.428	1.917

*Because of the confidentiality of these "intermediate results" in the allocation calculation detailed tables of specific AHA results cannot be presented, and the results given here should only be regarded as indicative.

Possible solution

The problem described above was no doubt seen by RAWP but the solution suggested of

taking "as many years [data] as possible . . . subject to a maximum of 10 years" requires close attention. We considered one AHA/sex/ICD group with an expected deaths figure for 1975 of 10. Actual deaths for the combined period 1974-5 were 19, giving an SMR of 0.95. Usually the number of actual deaths in a given population will have a Poisson distribution with mean and variance (m). To investigate the impact of additional data on SMR values we generated random† death frequencies (using the standard techniques³) with a mean equal to the number of expected deaths—that is, m = 10.

A simulation of 300 trials was carried out and the results are shown in table III for the generated average SMR. Clearly, even with 20 years' data, the "true" SMR (=100) is not derived.

TABLE III*—Generated average SMR

Year	SMR (100)
1974	80
1975	95
1980	98.5
1985	99.1
1990	99.0
1995	99.5

*Again, due to confidentiality restrictions the actual figures cannot be related to a particular district or area.

Conclusion

While I sympathise with the strategy put forward in RAWP, several technical aspects—data collection and classification as well as the mechanics of the "RAWP formula"—could lead to results very different from those intended.

If RAWP is to be introduced using data which were not designed for that purpose then serious attention must be paid to reducing the possibilities of large changes in financial provision from one year to the next. One method of achieving this would be to amalgamate some of the ICD groupings or, in the extreme, use only a district/sex specific SMR. Another would be to apply the RAWP formula initially to only a small fraction of the national budget. These approaches should be discussed if the real forward steps of RAWP are not to be beaten back by technical inaccuracy.

The statistical work for this paper was carried out while I was employed by the Yorkshire Regional Health Authority. The views expressed are not necessarily those of the authority.

†Naturally the random number generating routine is critical in this analysis. The results presented are based on the IBM (RANDO) routine.

References

- 1 DHSS, *Sharing Resources for Health in England: report of the Resource Allocation Working Party*. London, HMSO, 1976.
- 2 Tyrell, H, *Using Numbers for Effective Health Service Management*. London, Heinemann, 1975.
- 3 Tocher, K D, *The Art of Simulation*. London, English University Press, 1963.

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