show that patients approved of the length of stay they had experienced. Mean length of convalescence was 37 days for male short-stay patients without complications, and 35 for men who were long stay. If those patients suffering complications are included the two groups experience the same length of convalescence of 38 days. In terms of loss of income, among the 124 male patients in the study, 49 suffered some loss, 17 in the long-stay group and 32 in the short-stay.

Further analysis is being carried out.

Cost Benefit Analysis in the Health Service—A Case Study of Elective Herniorrhaphy. N. J. GLASS and I. T. RUSSELL *(Medical Care Research Unit, University of Newcastle upon Tyne)*

The paper complements recent review papers [1,2] of cost-benefit analysis in the Health Service by describing a case-study in which a recent proposal for a national policy of specialization in elective herniorrhaphy is evaluated using available data, but with emphasis on method rather than results.

Iles [3,4] has demonstrated how the establishment in Toronto, Canada, of a hospital specializing in elective herniorrhaphy has yielded substantial clinical benefits. More recently [5,6] he has proposed the addition of elective hernia wings to existing general hospitals as an answer to the hernia waiting list in Great Britain, stressing the clinical superiority of this solution and making a plea for economic considerations, such as working time lost, to be taken into account.

The benefits from the Iles' proposal are divided into two parts: first, those flowing from the reduction in the average length of stay from nine to three days and from the elimination of the waiting list; second, those arising from specialization, principally the reduction in recurrence.

An alternative, less radical, proposal to reduce length of stay and eliminate the hernia waiting list without recourse to specialist units is considered. This is shown to yield virtually the same substantial benefits. The advantages of specialization are almost entirely offset by the delay necessary to plan and build the special units.

It is concluded that while there are large benefits from a policy of reducing length of stay and eliminating the waiting list, a choice between policies for achieving this turns upon the value of beds released by building special units and upon the cost of building and running such units. The economic and clinical benefits flowing from specialization are not critical.

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Regional Variations in the Allocation of Financial Resources to the Community Health Service. A. J. TRICKEY, J. E. NOYCE, and A. H. SNAITH *(Derbyshire County Council Health Department)*

Differences in expenditure by the health service in the regions of England have been identified, together with factors with which low and high spending are associated. There is substantial variation in the amounts spent by executive councils, local health authorities, and regional hospital boards in the regions, with a standard deviation of 13%, 15%, and 19% of the mean expenditure in the three sectors respectively. Analysis showed that high spending in one sector of the health service was associated with high spending by the other two sectors, and conversely.

High levels of expenditure were associated with high socio-economic status of regional populations. Negative correlations with community health expenditure were obtained for low socio-economic status and birth rate. The same correlations were obtained for hospital revenue expenditure.

There are no regions of high spending which are not also high socio-economic status regions and it is concluded that the distribution of resources in the National Health Service has little relevance to need. It is suggested that a normative model for distribution of resources between regions is required. The local government formula for allocating the rate support grant is an example of a prescriptive model employed in the public sector. Resources are allocated to local authorities basically in accordance with population but with weightings for many factors, including the fraction of the population under 15 years and under 5 years and over 65 years of age, the density of population and whether the population is increasing or declining. These are just the sort of factors which the study showed had no effect on distribution of finance in the health service. Examination of local authority expenditure shows a small positive correlation between high expenditure and low socio-economic status of the population. Variation in expenditure between individual local authorities is also considerably less than in the NHS. A rational distribution of public funds is therefore possible but it is likely to be difficult to implement. In the hospital sector redistribution may have to be phased over a long period because of commitment to existing capital structures. In the community health services it should be possible over a much shorter period to redistribute resources in such a way that community health services compensate in some measure for the deficiencies in the hospital sector.

Development of a Formula for allocating Regional Health Authority Revenue Funds. J. H. RICKARD *(Department of the Regius Professor of Medicine, University of Oxford)*

Although there is now an official policy of distributing funds to Regional Hospital Boards on the basis of population, bed-stock, and case-flow, funds have been distributed *within* regions largely according to historical patterns with allowances for new developments. This has not necessarily resulted in an equitable distribution, though a comparison based simply on expenditure per head of the geographical population is inadequate since it ignores the problems of cross-boundary flows, differences in the morbidity of the populations, the costs

of financing regional and national specialties, and also the particular requirements of the teaching hospitals.

With the formation of the AHAs in 1974, with defined areas and with responsibility for both hospital and community services, it seemed appropriate to see if it were possible to derive an allocation formula, the main element of which is an 'equal spend per head of population at risk'. Taking one of the new English regions, models of inpatient flows across boundaries for hospital services were derived from HIPE and the notional catchment populations of the AHAs were calculated. Little variation was found in morbidity or social structure between the areas, but a small adjustment was made for age-sex distribution. The allocation for community services was based on actual populations, with weighting both for the age-sex bands using each service and for relative importance of each service to total expenditure.

This formulation reveals the implications of an equitable distribution of funds and so enables adjustments to be made in the future, while allowing the RHA to use explicit weights for different services. At the same time, AHAs are free to spend their 'fair' share as they choose.

Multiple-Cause Analysis of Deaths of Patients treated with Radio-iodine. J. W. DONOVAN and A. M. ADELSTEIN *(Office of Population Censuses and Surveys, London)*

Since iodine-131 treatment was introduced for thyrotoxicosis the development of cancers among patients to whom it has been given has been monitored. Between 1949 and 1967 some 35,000 patients were notified to the National Cancer Registry as having received this treatment. Mortality in this group, 3,937 of whom died by the end of 1967, has been compared with that in England and Wales. Patients with thyrotoxicosis treated by other means were not registered; the analyses thus do not distinguish effects of the disease from those of the therapy.

The analyses were presented not only to show what happened to the patients but to demonstrate methodological aspects of multiple cause coding. Analysing all the conditions mentioned on death certificates yields much additional information, even for rapidly fatal diseases which would not be expected to appear on death certificates except as the underlying cause.

Thyroid cancer mortality was greatly increased, but investigation of these cases showed that the majority were thyroid cancers registered in error or diagnostic errors; the true excess was small. Breast cancer mortality was also substantially increased, and as cervical cancer mortality was slightly in excess of expected it seems unlikely that this was due to an atypical distribution of reproductive histories. Mortality from lymphatic leukaemia was increased; this showed particularly in the multiple cause analyses.

Four hundred and fifty three deaths were attributed to thyrotoxicosis which was also mentioned on a further 399 death certificates but not as the underlying cause.

Mortality from ischaemic heart disease was approximately doubled, and deaths from embolism increased many times; many of the latter certificates mentioned atrial fibrillation.

Person-to-Person Transmission of Hodgkin's Disease. P. G. SMITH, M. C. PIKE, L. J. KINLEN, and ALISON JONES *(Department of Health and Social Security Cancer Epidemiology and Clinical Trials Unit, Oxford)*

Vianna and his colleagues [1,2] have recently described situations in which Hodgkin's disease appears to have been contagious with a long and variable latent period between 'transmission' of the disease and the onset of symptoms.

Space-time clustering of the disease has not been detected[3] but this is not surprising if a long and variable latent period exists. A generalization of Knox's method[4] has been applied to data from the Oxford Cancer Registry. This method overcomes the problems associated with a long latent period but does not cope with a variable latent period unless there is an *a priori* way of assigning a specific latent period to each patient. Assuming a similar latent period for each patient, a slight excess was found of pairs of patients with clinical onsets between 9 months and 18 months apart, which would be compatible with a latent period of this length, but the excess is not convincing.

A case-control study is under way in Oxford in which all Hodgkin's disease patients, aged under 40 years and resident in a defined area, diagnosed in the period 1962 to 1971 have been identified. Patients and their matched controls (matched for age, sex, social class, area of residence, and admission to hospital in the year of diagnosis of the patient) are being interviewed to obtain a history of their place of residence, schooling, work, and any social activities which may have brought them into regular contact with other people. To date 91 patients and 66 controls have been interviewed. A number of 'links' have been established between pairs of patients (some pairs attended the same school at the same time, others worked in the same factory at the same time, etc.) but a preliminary analysis suggests that a similar number of links is present among the matched controls.

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Occurrence of Childhood Neoplasms in Sibships. G. J. DRAPER, M. M. HEAF, and J. F. BITHELL *(Department of Social Medicine, University of Oxford)*

The Oxford Survey of Childhood Cancers now covers both registrations and deaths from neoplastic disease in Britain. Between 1953 and 1971 about 18,000 cases have been included, and interviews have been obtained with nearly 80% of the parents of these children.

Information has been collected about the occurrence of both malignant and benign neoplasms among relatives; more than 100 families have been identified in which one or more sibs of an affected child are also affected. In 17 of these sibships the affected children have each had a retinoblastoma, a disease in which it is recognized that a proportion of cases have a simple genetic origin. The remaining sibships include a wide range of different