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 detected³ but this is not surprising if a long and variable latent period exists. A generalization of Knox's method⁴ 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

diagnoses, though within a sibship there is a tendency for the affected children to have similar diseases.

A method for estimating the risk for sibs of affected children, as compared with the general population, has been developed, taking into account the problems associated with varying probabilities of ascertainment and changes in family size which arise in a continuing survey. This is an extension of Weinberg's sib method for estimating genetic segregation ratios.

The results suggest that, in addition to the known familial element in two or three rather rare diagnostic groups, there is an approximately twofold increase in risk for subsequent children if one child in a family is known to have malignant disease. In absolute terms this represents a risk of about 1 in 300 of developing malignant disease by age 15, as compared with the overall population risk of about 1 in 700.

A Study of Breast Cancer on the Isle of Wight. E. D. ACHESON, S. ALLISON, W. R. EDWARDS, and R. WRIGHT (*Department of Community Medicine, University of Southampton*)

This is a preliminary report of a survey in which family histories of breast disease are being collected from all mothers delivered of babies at St. Mary's Hospital, Newport, Isle of Wight, together with specimens of breast milk and blood from mothers with positive family histories, and controls.

Of the 478 mothers delivered up to the end of August, 450 have been interviewed (94%). Information is requested about breast disease in the patient's mother, sisters, maternal and paternal grandmothers and aunts, and in the husband's female relatives.

For patients giving a positive history samples of breast milk and blood are collected, frozen, and stored. Similar samples are collected for two controls matched to each case for age and parity. The specimens will be examined blind for virus antigen and tumour specific antibody.

If the age-specific incidence of breast cancer is known and certain assumptions are made about the average age of mothers having babies and of their mothers and grandmothers, it is possible to estimate the proportion of mothers who should report an affected relative. Assuming a cumulative life risk of breast cancer of 5%, it was estimated that about six mothers who had had breast cancer and approximately 25 maternal and 25 paternal grandmothers would be ascertained. In the event, this estimate was remarkably accurate as regards the patient's mother (5 cases) but there was a substantial deficiency in relation to grandmothers (14 cases). This shortfall may be due to patients' incomplete knowledge about their grandmothers' illnesses.

A preliminary investigation of the accuracy of reports of breast cancer was carried out. Of the 21 instances in which it was known that the patient was treated for the reported illness, a record was found for 17 and the diagnosis of carcinoma was confirmed in 16. In the remaining case the occurrence of a mastectomy was confirmed but no histology given. It seems likely that a positive history of breast cancer is accurate and that the

terms 'breast cancer' and 'breast removed' may prove for practical purposes to be synonymous.

Medical Care for Stroke Patients in a Defined Community. JEAN WEDDELL (*Department of Social Medicine and Clinical Epidemiology, St. Thomas's Hospital Medical School*)

A study was made of 380 patients who received medical care for a stroke over a 12-month period from 1 June 1971, from a defined population of nearly 280,000. The patients were seen as soon as possible after the stroke and again three weeks and three months later. A record was made of each place of care and the length of time spent in each. The patient's ability to carry out the activities of daily living, to perform simple household duties, to travel outside the home, and changes in their occupational status were recorded. It was found that the Index of the Activities of Daily Living was a good indicator of a patient's survival as most of those who were dependent at the first visit died. Most of the deaths had occurred by the third week, leaving a survivor population of 198. By three months 36 patients were still in hospital; 85 patients had gone home. The general practitioner cared for 50% of patients immediately after the stroke, either at home or in community hospitals. The Index of the Activities of Daily Living was a poor indicator of the patient's ability to lead an active life. Of those classed as independent by this index only a small proportion could still carry out simple household activities, travel by public transport, drive a car, or pursue the same occupations. Better measures of independence need to be developed and methods to increase this independence need to be evaluated.

Locomotor Disability—A Study of Need in an Urban Community. MALCOLM THOMPSON, MARY ANDERSON, and PHILIP H. N. WOOD (*Royal Victoria Hospital, Newcastle upon Tyne, and ARC Epidemiology Research Unit, Manchester*)

The Social Services Department in Newcastle upon Tyne recently made a detailed survey of a sample of chronically sick and disabled persons living within the city. Arthritis and related rheumatic conditions were reported by 163 individuals, 39% of the total sample, and in 120 (28%) these disorders were the major cause of disability. A special study is being made to assess the medical care needs of these persons with disorders of the bones and organs of movement, and this preliminary report is based on the first 78 individuals seen, 23 of whom were male and 55 female.

They were predominantly elderly (mean age 69) and many lived alone. One in 6 were single and 1 in 2 widowed (though only 1 in 4 of males were widowed). Almost one-third were unable to attract attention in an emergency. Stairs within or at the entrance to the home caused difficulty for about half the respondents. The principal limiting disability was located in the knees in half, and elsewhere in the legs in a further quarter. In almost three-quarters the main pathology was osteoarthritis. Other, non-locomotor, disabilities were present