capacity to measure the "output" of the N.H.S. in terms of measuring the outcome of treatment. Strangely, it does not put nearly as much emphasis on measuring the input, though the productivity of the N.H.S. can be assessed—if at all—only if there is some way of measuring the value-added dimension, the extent to which there has been an improvement in health. Indeed, a model for doing precisely this has been put forward by Rosser and Watts.[5] Equally, it realizes that effective allocation of resources demands an information system which can compare costs of treatment in hospital with those provided by the general practitioner backed by community services. Hence the working party's proposals for moving towards a system of records which ignores the present administrative boundaries.

The obstacles to such a development, as the King's Fund report recognizes, are great. General practitioners would have to add patient identification data and medical condition or diagnosis whenever they recorded a prescription. Both the public and the profession are worried about problems of confidentiality. It would mean developing a simplified, action-orientated classification of diseases and disabilities so as to be able to relate costs of treatment to clarify defined conditions. It would also be expensive. No wonder, then, that the working party cautiously urges much preliminary investigation and a field trial. However desirable in theory such an information system may be, it will not be available to guide the allocation of N.H.S. resources within the next decade.

This may be regrettable but is not disastrous. For there is a risk that in spelling out what is a sound case for a better information system its usefulness will be over-stated. At least some of the information required to decide what forms of treatment are most cost-effective—namely, to achieve the desired result at the least cost—can be obtained by special studies. The recent study of the effects of different methods of treating varicose veins is a case in point,[6] and there is still ample scope for this approach.[7] Furthermore, information helps policy-makers to decide but does not replace the need for judgements based on professional or political values. For there is a temptation to think of information as a substitute for such judgements instead of as an aid in removing some of the guess-work. Even the authors of the King's Fund report do not entirely avoid this danger when they write that in allocating resources "the first step must always be to define objectives," and that the success with which these are achieved may then be "monitored through the costing system."

At the end of an era in which it has been insufficiently realized that one patient treated at too great a cost may mean another patient untreated, this emphasis is understandable. But management by objectives can all too easily come to favour those aims which can be easily quantified (and therefore monitored) at the expense of those where it is more difficult to be precise.[8] What is more, the cost-benefit approach could be used to justify increasing resources in those sectors of the N.H.S. where it is possible to demonstrate an economic benefit—the curing as distinct from the caring sectors. It need not do so and it should not do so. The best use must be made of scarce resources and a better information system will help towards this goal. But it is not a recipe for taking the agony out of deciding between competing priorities.

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Spread of Colds

Coughs and sneezes spread diseases, but do they spread the common cold? A large variety of viruses may cause "colds." The commonest are rhinoviruses,[1 2] but influenza and para-influenza viruses, respiratory syncytial virus, adenoviruses, and coronaviruses may also do so.

Comparatively little is known about how colds are spread. Exposure of susceptible people to others with naturally or experimentally acquired colds gave low attack rates. But the intranasal inoculation of filtered rhinovirus-infected nasal washings may induce colds in from 17% to 95% of volunteers.[3] Flash photography has shown that in talking droplets were excreted from the mouth but not the nose.[4] From a sneeze droplets with velocity of up to 150 ft (45 m) per second may be released.[5] Again most of these droplets are from the mouth,[6] though a big sneeze not trapped in a handkerchief will probably release some nasal secretions as large droplets.[4] Nasal secretions are more likely to contain rhinovirus than oral secretions, and even though coughing results in droplets being released from the lower respiratory tract rhinoviruses are not common pathogens there.

Direct transmission of virus to susceptible people by large droplets from the nose is theoretically possible, but most of them fall away to the ground rapidly. While droplet nuclei may remain airborne for extended periods, to be wafted from place to place by air currents, many respiratory viruses lose much of their infectivity by drying in air,[7] though the rate at which infectivity declines also depends on temperature and humidity.[8]

Recently J. O. Hendley and his colleagues[9] in the U.S.A. have provided some new information about the transmission of colds caused by rhinovirus. They confirmed that naturally infected patients shed virus in high titres from the nose but much less frequently and at lower titres from the throat, saliva, and cough secretions. Furthermore, when 25 naturally infected patients with common colds coughed or sneezed, only two shed virus, probably because rhinoviruses were absent from the saliva or present only in low concentrations.

Despite the poor recovery of rhinoviruses from specimens obtained from coughs and sneezes virus could be recovered from the hands of four of 10 persons with naturally acquired colds. This may have resulted from finger contact with concentrated nasal secretions during nose blowing, rubbing, or sneezing. Furthermore, in experiments in which rhinovirus-containing fluid was placed on the hands of volunteers and allowed to dry, infectious virus could be recovered up to three hours later when hands were kept still and for a slightly shorter time when hands were in use—

for example, during studying or eating. Rhinoviruses also survived for up to three hours on such non-porous surfaces as Formica and stainless steel as well as on synthetic fabrics. But virus did not survive on such porous materials as facial tissues or cotton cloth, and this work confirms that a soiled handkerchief is a poor vehicle for rhinovirus dissemination.[6] That virus on non-porous surfaces and skin may actually cause colds was conclusively demonstrated in four of 11 volunteers, who picked up virus from such surfaces and caught colds after touching their nasal or conjunctival mucosa with infected fingers.

But is such a sequence of events likely to provide a common method by which colds are transmitted naturally? This seems possible. Only an extremely small dose of rhinovirus is required to produce a cold.[10-12] Again, the American workers recorded the frequency of eye rubbing and nose picking among medical staff at conferences. In 68 person-hours of observation one in three picked their nose and one in 2·7 rubbed their eyes. In contrast, observations conducted on a group of adults attending Sunday school classes showed that, though eye rubbing was equally frequent, nose picking scarcely occurred.

Can these observations be applied to the control of colds? Rhinovirus infections occur commonly at home, often being introduced by schoolchildren,[13 14] who are apt to contaminate their skin and the environment with nasal secretions. Washing of hands and the use of absorbent handkerchiefs with avoidance of eye rubbing and nose picking may help to reduce transmission of virus. Perhaps such measures may be of particular benefit to bronchitic patients in families with children, for bronchitics are liable to exacerbations of their illness caused by viruses such as rhinoviruses that are usually of low pathogenicity in healthy adults.[15]

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Carcinoma of the Second Breast

A neoplasm of the breast may invade the breast on the opposite side either by permeation of lymphatics across the midline or by dissemination through the blood stream. It may spread by both routes in advanced cases. In earlier cases it may be difficult to distinguish whether the patient has separate primary carcinomas of breast or a primary on one side with spread to the other. Occasionally their different histological appearances make the distinction between two primary tumours obvious. C. D. Haagensen[1] classifies a second primary cancer of the breast as one in which there is no evidence of local spread of carcinoma across the midline or of distant metastases and the carcinoma in the second breast is a solitary lesion. In his personal series of 626 women treated by radical mastectomy 4 had bilateral synchronous breast cancers and 36 developed a subsequent primary carcinoma in the second breast (5·8%). Figures ranging from 1% to 12% have been given, with an average of 7%.[2]

Recently J. P. Shah and his colleagues,[3] from the Memorial Hospital for Cancer in New York, reported the surprisingly high figure of 110 patients having bilateral disease out of 508 (21·6%) with breast cancer. Thirty-seven had simultaneous bilateral tumours, and the others had subsequent development of a second cancer. The high proportion of bilateral cases resulted from the referral of difficult cases to this centre of international reputation, a fact which must always be considered in interpreting statistics from specialist hospitals.

Whatever the exact figure may be, it is clear that a woman who has had one carcinoma of the breast is more likely to develop a tumour on the opposite side than an unaffected woman. Several courses of action have therefore been advised to deal with this problem. They include prophylactic opposite mastectomy at the time of or after mastectomy for the primary lesion, random biopsy of the non-cancerous breast, and continued observation by clinical and special screening techniques of the second breast.

As long ago as 1921 J. C. Bloodgood[4] advocated prophylactic simple mastectomy of the opposite breast at the time of radical mastectomy, and G. T. Pack[5] supported this approach in 1951. Some surgeons have reserved this procedure for "high risk" patients, notably those with a strong family history of breast cancer, while others have carried out the second mastectomy only on those patients who have survived some specified interval free of disease after the first operation. The fact is that after so-called "curative" surgery for carcinoma of the breast about 50% of women will die of the disease within five years and others, particularly the elderly and unfit, will die of other conditions. This large group of women would therefore have been subjected to an unnecessary and mutilating prophylactic procedure.

J. A. Urban[6] has been the principal advocate of biopsy of the opposite breast. He has carried it out in about 80% of his patients, excluding those with uncertain survival such as the elderly and those with advanced lesions. The biopsy includes any thickened area or any zone that appears suspicious on mammography. If the breast seems perfectly normal it incorporates a generous wedge of breast tissue in the upper outer quadrant together with an area in the opposite breast which is the mirror image of where the primary tumour lies. However, many of the lesions found in this way are carcinoma-in-situ, and their clinical significance is still the subject of considerable controversy. Few surgeons have been tempted to follow Urban's lead.

J. B. Herrmann[2] has recently reported a detailed study of his personal series of 418 patients operated on for carcinoma of the breast. Three had synchronous bilateral primary operable carcinomas, and 28 (6·7%) had asynchronous double lesions. The review includes only patients treated up to 1967, so that there is a minimum of five years of observation after the second mastectomy. The five-year cancer-free survival rate through the entire group was 52·6%; for those