

## SUPPLEMENT

## TALKING POINT

## Medical care as a risk-avoidance procedure: underwriting the cost of care in the UK

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Much of medical practice is concerned with using medical knowledge and health care resources to avoid the risk of mortality and morbidity. The risks are principally the sequelae associated with not being diagnosed or treated properly or both (or not being diagnosed or treated at all). The National Health Service undertakes to ensure and assure society's health-risk avoidance through the provision of adequate resources. Doctors are the organisation's principal agents in executing this task.

The failure of the NHS to execute these responsibilities properly may create a problem for the patient, his family, and society at large. For example, failure to detect an asymptomatic intracranial haematoma in a patient with a head injury may result in the development of secondary brain damage which could leave the patient permanently handicapped. Society as well as the patient and his family would suffer, for the former would have to bear the cost of institutional medical care over the remainder of the patient's lifetime. This would not apply in a private insurance system of health care as it would be the family who would carry the financial consequences of failure of early detection unless negligence on the agent's part could be proved. Thus there may be a need for the NHS to pursue more extensive risk avoidance than a private system because the former has agreed to underwrite much of the social and all the medical costs of failing to avoid the risk. This implicit requirement has important consequences which I will examine.

The practice of medicine in the twentieth century has grown progressively more dependent on specialised high-technology diagnostic procedures that extend the clinicians' powers of observation. Procedures such as tissue microscopy, biochemical analysis of body fluids, radiography, computed tomography, and radioimmunoassay offer the benefits of accuracy and objectivity and permit the elimination of small risks associated with failure to make a proper diagnosis. Such risk avoidance is achieved at a cost—for any one procedure it may be calculated by multiplying the cost of the diagnostic test by the incidence of the disease among those tested. The decision that an individual "could possibly have a particular disease" and that there is a diagnostic procedure available which could confirm or refute this is a matter of clinical judgment. The decision that under these circumstances the NHS should underwrite the cost of avoiding the risk is a matter of social policy. Unlike clinical decisions, social policy decisions have to take account of financial and other social costs, and the loss of opportunity to use the money on other activities associated with improving health.

## Judging the worthwhileness of medical care

Three major issues influence a decision whether a medical risk-avoidance procedure is worth while or not.

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## COST AND BENEFITS OF RISK AVOIDANCE

Two examples are given which are based on actuarial data collected by the Royal College of Radiologists as part of its multicentre studies of the effectiveness of diagnostic radiology. The first relates to preoperative chest radiology, where it is argued that the availability of a preoperative chest x-ray film and report before the operation may permit the surgeon or anaesthetist or both to avoid a postoperative complication or death. The second concerns the identification of a skull fracture in a patient with head injury that, it is claimed, will forewarn the doctor of any increased risk of the patient developing an intracranial haematoma. In both examples it is claimed that the use of diagnostic radiology may help to prevent avoidable death or disability. While the statement is likely to be true for both examples, the college studies<sup>1 2</sup> have allowed the likely frequency of the "avoidable" event to be calculated. If this is multiplied by the cost of the procedure (in this example the cost per patient radiographed) the radiological cost of avoiding the risk may be calculated.<sup>3</sup>

This calculation assumes that the radiograph is always 100% effective in avoiding the risk. The college studies, however, also permit an estimate of the likely effectiveness of the radiograph in avoiding the risk. For example, if the radiograph might enable the risk to be avoided only once in every four times that it was used (25% effectiveness) the actual cost of avoiding the risk would be four times as high.

Table I shows that the cost of avoiding one postoperative death in patients aged 20 to 59 without cancer or chronic cardiorespiratory disease undergoing elective non-cardiopulmonary surgery is £67 700 if we assume that radiography is 100% effective, and £270 800 if it is assumed to be 25% effective. The cost of preoperative chest radiography has been estimated at £10 per patient. The college study, however, failed to find "any evidence at all for the effectiveness of preoperative chest x ray when used routinely" and recommended "an early decision about whether it should be abandoned as a routine procedure." So if we make the generous assumption that it is likely to be only 10% effective the cost of avoiding one death would be £677 000.

TABLE I—Some costs and possible benefits of preoperative chest radiology\*

Outcome Patients aged 20-59	Frequency of outcome among those currently undergoing surgery	Radiological cost† of possibly avoiding the outcome	
		100% effective £	25% effective £
Postoperative deaths in patients without cancer or chronic cardio- respiratory disease . . . . .	1 in 6770	67 700	270 800
Postoperative deaths in patients with chronic respiratory disease . . . . .	1 in 796	7 960	31 840

†From data collected in the Royal College of Radiologists multicentre study.<sup>1</sup>  
‡Assuming radiography costs of £10 per patient.

Table II shows that the radiological cost of detecting a vault fracture in the United Kingdom is currently £675 to £1500 depending on the cost of skull radiography. The principal risk that we wish to avoid using skull radiography—for example, the diagnosis of a

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hitherto clinically unsuspected intracranial haematoma—has a frequency of 1 in 4829 patients radiographed. The cost of detecting this one case (and hence the cost of avoiding the risk of failing to detect this one case) lies between £43 461 and £96 580. This is assuming that the detection of a skull fracture will always avoid this risk and if the risk is not avoided it will always lead to a fatal or serious permanent outcome. But it was found that 30% of patients with a skull fracture are at present sent home<sup>2,3</sup> either because the casualty doctor failed to see the fracture on the film or, less frequently, because the patient discharged himself against medical advice. Thus, using a cautious estimate of 25% effectiveness for skull radiography in this context, the risk avoidance costs would rise to between £173 844 and £386 320 per case detected.

However elementary these calculations, they indicate a considerable cost, both in absolute terms and in respect of opportunities lost of providing alternative forms of health care. In my experience doctors' and patients' perception of the cost of risk avoidance is often of an order of magnitude less than actual costs. In addition, many doctors and patients profess to have no perception whatsoever of the magnitude of cost, with some saying that the issue is no concern of theirs. This being so their individual or collective judgment of the likely usefulness of the activity is likely to be impaired.

TABLE II—Some costs and possible benefits of skull radiography in the management of patients with uncomplicated head injury\*

Outcome	Frequency of outcome to be avoided among those presently radiographed	Radiological costs† of possibly avoiding the outcome	
		(£9) £	(£20) £
Undiagnosed vault fracture .. ..	1 in 75	675	1 500
Undiagnosed depressed, basal, or frontal fracture .. ..	1 in 1609	14 481	32 180
Clinically unsuspected intracranial haematoma .. ..	1 in 4829	43 461	96 580
Any of the above .. ..	1 in 72	648	1 440

\*From data collected in the Royal College of Radiologists multicentre study.<sup>2</sup>  
†Assuming skull radiography costs to be £9 or £20 per patient.

#### NATURE OF THE HEALTH CARE SYSTEM IN WHICH THE RISK-AVOIDANCE PROCEDURE IS PRACTISED

Private health systems are financially open—that is, resources available for risk avoidance grow in direct proportion to the level of risk avoidance sought by the patient or advised implicitly by the system or its agents. In contrast, insurance systems, whether private or nationalised, are financially closed and so have to recognise that a limit must be put on the benefit (and that includes risk avoidance) that can be underwritten by the system.

As a consequence of the patient making a payment to the doctor for each and every item of service, a private system automatically adjusts itself to the prevailing level of risk. The smaller the risk the more the system earns proportionately in avoiding it on behalf of the patient. This is only right, because the smaller the risk the more it will cost to avoid. In such a system, provided that there is reasonably accurate knowledge of the cost of avoiding the risk in the first place, the resources available for risk avoidance will expand in direct proportion to consumer demand for greater risk reduction.

In the NHS resources cannot automatically increase in step with the demand for greater risk reduction. The provision of an increased level of risk avoidance (more tests or more people tested or both) must inevitably cost more. In the NHS the cost of any increase in the level of risk avoidance activity in one part of the system—for example, preoperative chest radiology, skull radiology—will have to be withdrawn from the finite pool of resources available to the system as a whole. Since this amount of available resources is fixed at any one time, payment for extra risk-avoidance costs can only be met by diverting resources from within the pool. These are known as opportunity costs and represent opportunities for alternative forms of health care foregone in order to achieve, in the case of skull radiography, extra risk avoidance in the management of head injury.

A private insurance system faces the same theoretical problems as the NHS, namely, coping with increasing demand within a finite budget. Such systems have, however, devised ways of coping with such eventualities that would be unacceptable to the NHS. For instance, private schemes place restrictions on eligibility into the system by age, initial health status, and in some countries by

occupation, and limits are placed on the range of benefits supplied. Such systems decline to operate in areas of health care where risk avoidance is most costly. Private insurance health care in the United Kingdom would, therefore, not see itself as providing accident and emergency services, or complex and time-consuming high-technology diagnostic "workups" on obscure and often chronic diseases. For it is in these latter categories that the cost of risk avoidance is high. Furthermore, private insurance systems have the capacity to make rapid changes in the sizes of their existing budgets by introducing substantial changes in premiums. Those who object to the size of the revised premium are always at liberty to leave.

In summary, a purely private payment for an item-of-service system has little trouble in responding to demand for greater risk reduction in health care. Private insurance systems control the problem by putting strict limits on the range of benefits available and on who is eligible to receive benefits. Because the NHS is also a closed financial system and since legislation specifically precludes any limitation on eligibility into the system and payment for services rendered it would seem that the only option open to the Health Service is to limit the amount of benefit provided by the system. Understandably, up to now many political leaders of the NHS have been reluctant to admit this and as a consequence few NHS patients are aware of this issue. A system that comes into being through the sharing of costs can only continue to exist through the sharing of benefits. So inevitably the NHS must consider introducing a limit to the level of risk avoidance that it is prepared to fund in any particular event.

#### ACCEPTABILITY OF THE RISKS TO MEMBERS OF THE PUBLIC

Some sharing of benefits is essential in the NHS. Implicit in this is the notion that patients must accept some predefined risk of not being treated or diagnosed properly in order that the total cost of provision of risk avoidance may be sensibly contained, thus allowing a reasonable range of benefits of contemporary care to be equitably distributed throughout society. If patients are to accept the case for risk-avoidance sharing it is necessary to consider the notion of the acceptability of risk and the factors that influence its perception by individuals.

Society's activities fall into general categories—those in which the individual chooses to participate on a voluntary basis—for example, smoking and motor racing—and those in which the participation is involuntary—that is, imposed by the society in which the individual lives (such as living next to a nuclear power station or a national airport).

In the case of voluntary activities the individual uses his own experiences and preferences to judge the acceptability of the risk. For example, an urban dweller may move to the suburbs because of the lower crime rate and better schools at the cost of more time spent travelling on the roads and the increased risk of a personal accident. Involuntary activities differ in that the options are determined not by the individuals likely to be affected but by a controlling or representative body of society at large. Such a body may be a government agency, a political entity, a leadership group, an assembly of authorities or opinion makers, or a combination. Because of the complexity of large societies, only the control group is likely to be fully aware of all the issues that have to be taken into account in making decisions.

The magnitude of voluntary and involuntary risks are substantially different. Of the voluntary risks, according to Kletz<sup>4</sup> the annual risk of death from smoking 20 cigarettes a day is 1 in 200; from drinking one bottle of wine a day 1 in 1333; from football 1 in 25 000; from car racing 1 in 833; from motorcycling 1 in 500; from contraceptive pills 1 in 50 000. Of the involuntary risks, there is a risk of death by being run over by a road vehicle (UK) of 1 in 22 222; from floods (USA) 1 in 454 545; from earthquakes (California) 1 in 588 235; from tornadoes (mid-west USA) 1 in 454 545; from lightning (UK) 1 in 10 million; from bites and stings of venomous creatures (UK) 1 in 10 million. As a rough generalisation it may be said that involuntary risks of approximately 1 in 10 million are, by and large, acceptable to the average person.<sup>4</sup> If the risk is voluntary—for example, some sports activities—a 1-in-500 risk may be acceptable.

The death rate from diseases seems to play, psychologically, a yardstick role in determining the acceptability of risk on a voluntary basis. The risk of death in many of the more dangerous sporting activities is fairly close to the risk of death from disease in people of approximately the same age. It is almost as though in sports the individual's subconscious computer adjusts his courage and makes him prepared to take risks associated with a fatality level approaching but usually not exceeding the statistical mortality due to involuntary risk exposure to disease.<sup>5</sup>

In 1980 in England and Wales the risk of death from disease in men aged 15 to 54 (excluding injury and poisoning) was 1 in 564.<sup>6</sup> This figure is close to the 1-in-500 acceptability of voluntary risk in sport referred to above. Interestingly, the 1980 all-cause mortality risk for people aged 20 to 59 in England and Wales for any two-week period was 1 in 8342. This is close to the risk of postoperative death after elective non-cardiopulmonary surgery in patients of the same age (1 in 6770—table II).

The occurrence of a head injury during a sporting activity would be an example of a voluntary risk. In this instance the subject may well be seen at an accident and emergency unit. An important question is whether the failure of the hospital to detect secondary brain damage would be perceived as a voluntary or involuntary risk. Since we define involuntary as "imposed by the society in which the individual lives" and because the NHS belongs to the society rather than to the doctor or the patient it may be in this example that the patient would be more likely to perceive the failure of the NHS to diagnose his secondary brain damage as an involuntary risk imposed on him by society than his counterpart in a private non-insurance system. If this were so he might thus perceive any unfortunate consequences of health care as an involuntary risk and therefore require risk avoidance procedures to operate as low as 1 in 10 million. This might be despite the fact that the original activity that gave rise to the head injury was a voluntary one, carrying a risk acceptable to him of 1 in 500.

Again, while the absolute magnitude of the risk does not matter, these examples may serve to explain the considerable gap that may exist between the patient's perception of what is desirable and the NHS's growing realisation of what is feasible. Once again, the purely private health care system copes reasonably well with the gulf between involuntary and voluntary perceptions of risk, for it automatically earns sufficient resources to allow it to practise risk avoidance at the involuntary risk level. Problems may be anticipated when such systems become insurance-based or nationalised but try to continue to operate at the involuntary level.

## Discussion

Progress in high-technology diagnostic medicine has raced ahead of the development of social policies to cope with the financial and social implications of this progress. Examples are whole-body scanning, cardiac and transplant surgery, and screening for cancer of the breast. Much of the impetus for the rapid development of high-technology medicine comes from the United States, which, having a private system of health care, is not constrained by the social implications of such clinical progress to anything like the extent that applies in the UK. The NHS has coped with the problem by tending to ignore the distinction between clinical judgment and social policy, all decisions being grouped under the heading of clinical judgment. Initially, clinicians were perhaps flattered by this, but now there is a rapidly growing unease that increasingly several of their day-to-day decisions mean an inner conflict between the desire to help the individual patient and the desire to contain costs in a sensible way.

Norcross<sup>7</sup> proposed that there must be a limit—a modest limit—on the expense we are prepared to incur just in case "a tiny risk can be reduced." Perhaps one of the gravest problems facing the NHS is that it largely precludes discussions of certain fundamental issues that must be clarified if worthwhile medical care is to continue. These issues, which are of a social, philosophical, and political nature but of no lesser importance than the results of a technical and scientific research, remain largely unexamined by doctors. Not the least important is the need to define acceptable limits of risk avoidance in the context of medical care. To argue that no risk is acceptable is to fail to face the problem that NHS resources are finite.

The medical profession has, as yet, paid insufficient attention to this conflict. This is due in part to a lack of awareness of the financial implications that a nationalised system of health care has for the treatment of individual patients. It is also due to the profession's mistaken belief that the matter is one that may be resolved in medical practice by the exercise of ad hoc clinical judgment. In reality, it is for society, not doctors, to decide what level of risk avoidance it wishes to finance for it

## Recommendations

- Sensible limits must be put on what levels of risk avoidance it is reasonable for the NHS to provide so that it can continue to distribute these benefits fairly and free at the point of consumption.
- The dissemination of a proper understanding of the aims, nature, and philosophy of the NHS is urgently needed together with acceptance of the notion that a system that operates by sharing costs can survive only if it also shares the benefits.
- Alternative means will have to be found for financing those risk-avoidance activities judged to be outside the proper and agreed remit of the NHS.
- The medical profession must take the lead in helping society to judge which benefits it is reasonable for the NHS to provide. In so doing, society will look to the administrators to ensure that efficient use of resources is maintained and to the medical profession for guidance about what is effective and worth while.
- Society as a whole—that is, including doctors, administrators, health care professionals, and politicians—must assume greater preparedness to contribute to judgments about the level of risk avoidance that the NHS should be prepared to underwrite.

is society, not the doctor or the individual patient, who pays the bill. No better example could be found of the distinction between social policy and clinical responsibility. Until recently, politicians have done little to relieve society or doctors of this misconception, preferring—perhaps unwittingly—to leave individual clinicians to cope as best they could with the impossible task of providing potentially infinite risk avoidance in the context of finite resources.

Only when society has shown its preparedness to examine some of the questions discussed above and has established an appropriate machinery to do so can the practical value of research such as I have described be fully realised. Much contemporary research on audit and evaluation in medical care in the UK is ahead of its time because the NHS has not yet developed the appropriate value systems, or frames of reference, within which such information may be properly utilised. What is required is a conceptual "shift" on the part of doctors and patients in the way that they perceive the NHS and what it may hope to achieve. This would not be unlike the conceptual shift that took place when people began to perceive the earth as round when once they thought it was flat. I have proposed five features of such a shift which would herald a fundamental change in attitudes towards the delivery of health care in the UK (see box).

## References

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