insulin regularly if this happens. I hope that doctors all over the world will help to persuade the Vietnamese government to free a heroic colleague before it is too late.

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Keeping babies in prison

EDITOR,—Luisa Dillner's editorial on keeping babies in prison is a welcome reminder of one of the greatest imhumanities towards children in the United Kingdom today.[1] The Children Act emphasises the rights of children and the importance of promoting their upbringing within their families,[2] yet our judicial system seems to take the opposite view.

We are not surprised that infants brought up in prison did not show significant developmental delay on Griffiths developmental testing as this scale was not designed to measure the "harmful" effects of an inadequate social and emotional environment. An assessment of play and social interaction in these very young children would be much more informative.

The few children who are allowed to spend their early months in prison with their mothers are at least spared sudden enforced separation, often with fostering and always with totally inadequate visiting arrangements. Dillner did not mention the thousands of children whose fathers are in prison, many of whom are rendered in need by social and economic consequences. How does a child maintain a positive relationship with a parent in prison? Why do we continue to punish children in this way? More consideration should be given to non-custodial sentencing for non-violent offenders who do not pose a threat to children (as in the Nordic countries and increasingly in other European countries such as Italy) and to developing the provision of quality child care both in and out of prison.

A humane society is one that cares for its children. The British Association for Community Child Health is a subspecialty group of the British Paediatric Association; we believe that the decision to separate children from their parents is rarely justified and that the rights of the children should always be paramount.

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1 Dillner L. Keeping babies in prison. *BMJ* 1992;**304**:932-3. (11 April.)
2 *Children act.* London: HMSO, 1991.

Predicting psychiatric admission rates

EDITOR,—Brian Jarman and colleagues report high correlations between psychiatric admission rates and indices of local socioeconomic deprivation.[1] We recently analysed data on the use of psychiatric services obtained from case registers in two areas in northern Italy, urban south Verona and rural Portogruaro, for 1983-9. In south Verona we, like Jarman and colleagues in their study, found high correlations between the all diagnoses psychiatric admission rates and the following census variables: living alone, unemployment, percentage of the total population who are dependants, and percentage who are divorced, separated, or widowed. These correlations were higher for schizophrenic patients than for all admissions (r^2 for best stepwise multiple regression model 0·94 and 0·79 respectively).

We suspect, however, that such a model may have important limitations. In rural Portogruaro, for example, there were no consistent associations between census variables and use of services. Furthermore, when we analysed only those admissions with a diagnosis of neurosis (ICD ninth revision) no significant correlations were found. Further research should perhaps look specifically at whether such correlations are found only in urban areas and only for psychotic, especially schizophrenic, patients.

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1 Jarman B, Hirsch S, White P, Driscoll R. Predicting psychiatric admission rates. *BMJ* 1992;**304**:1146-51. (2 May.)

Decision analysis in medicine

EDITOR,—Although many doctors consider formal decision theory[1] to have little practical application, decision making is so central to the practice of medicine that all help is welcome. As part of an examination of a recent technical innovation (thrombolytic treatment for myocardial infarction) and the development of appropriate policy options we sought help from decision analysis. We constructed a decision tree, using a combination of national, international, and local data, to estimate the probabilities of the various outcomes. We applied a range of utilities reflecting possible preferences of patients, and the various options available were substantially clarified. Three points, however, arose from our studies, two prompting caution and one enthusiasm.

Firstly, the quality of the available data needed to complete these models is generally poor. We need much more fairly simple local information about the processes and outcomes of everyday activities such as, for example, what actually happens when a patient arrives at the front door of an accident and emergency department. One of us has tried, recently, to provide an example.[2] Secondly, gazing at decision trees has a bemusing effect: they can be taken to mean much more than their essentially crude weightings can tell us. Finally, doctors have talked a lot about the ways in which they can achieve true participation with patients in their health care. Here at last is a good place to start. Utilities can describe patients' hopes, fears, attitudes, understanding, and imperatives: doctors should begin to use them.

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1 Thornton JG, Lilford RJ, Johnson N. Decision analysis in medicine. *BMJ* 1992;**304**:1099-103. (25 April.)
2 Hendra TJ, Marshall AM. Increased prescription of thrombolytic treatment to elderly patients with suspected acute myocardial infarction associated with audit. *BMJ* 1992;**304**:423-6. (15 February.)

EDITOR,—Two aspects of J G Thornton and colleagues' article on decision analysis in undergraduate medical training require comment.[1] The first is the decision analytical model adopted. Expected utility derives from econometric models of rational decision making in riskless situations using complete information. This does not reflect what happens in real life, when many complex medical decisions are made in risky situations with incomplete information. Subjective expected utility is an axiomatic utility analysis that can be used in risky situations where complete information is not available.[2,3] It has been used extensively to model human choice and decision making and is more appropriate in medical decision making.

My second comment concerns the acceptability of axiomatic decision making by patients. This cannot be justified by stating that "most people do agree that this is how they wish to make decisions." Rather, the test should be whether or not people make decisions that are consistent with the axioms of subjective expected utility. The research evidence is clear: they do not.[3]

Eraker and Politser reviewed the evidence on how decisions were reached between physicians and patients in the context of decision analysis.[4] They concluded that decision analysis had the advantage of being "explicit, quantitative and prescriptive" but there was "a large body of empirically based research in behavioural decision theory [which] indicates that there are many potential biases and distortions that could affect any recommendation based exclusively on decision analysis."

Those working in clinical medicine can cite instances of the gulf that can exist between what people say they want and how they behave. It is salutary to recall such instances. Otherwise we may be becoming more "explicit, quantitative and prescriptive" on the basis of a false assumption: that people are rational about health care decisions.

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1 Thornton JG, Lilford RJ, Johnson N. Decision analysis in medicine. *BMJ* 1992;**304**:1099-103. (25 April.)
2 Edwards W. The theory of decision making. *Psychol Bull* 1954;**51**:380-417.
3 Wright G. *Behavioural decision theory: an introduction.* Harmondsworth: Penguin, 1984.
4 Eraker SA, Politser P. How decisions are reached: physician and patient. *Ann Intern Med* 1982;**97**:262-8.

EDITOR,—The type of classic decision analysis described by J C Thornton and colleagues[1] has been an important development in the history of decision support systems. We believe, however, that there are compelling reasons why these systems have not been extensively used in a clinical setting.

Classic decision analysis may be very useful in resource allocation exercises on precisely defined problems, such as amniocentesis for prenatal diagnosis, where all outcomes are known at the beginning of the exercise. Probabilities can be determined accurately from published work and the value of each outcome can be estimated with some precision. Real clinical problems are seldom so simple and the variety of outcomes of the action is often not apparent at the start of the analysis. It is often necessary to introduce new options as the case develops and new information is acquired. There are major problems in calculating accurately what each outcome is worth to the patient; without this information the system cannot function. The authors allude to this problem in their paper.

The alternative approach is to use logical and qualitative techniques to represent and to reason with medical knowledge. These techniques offer a more flexible approach than simple numerical methods. Effective decision making is not dependent on the availability of precise numbers; achieving a proper understanding of the logical structure of the decision is more important.[2] The Oxford System of Medicine is a computer program which provides this type of more general reasoning and is also able to reason with numbers when appropriate. The system generates arguments for and against different decision options by logical inference from facts in a knowledge base. The arguments are considered and the logically correct decision options are presented. It is possible to examine the facts that were used to make the decision

and to change them by using a knowledge editor.

The DILEMMA project, sponsored by the European Community, entails integrating this form of logical and qualitative decision support with a general practice computer program – the Oxford Primary Care Management System. We will use it to provide decision support on prescribing, the management of chronic diseases such as asthma and hyperlipidaemia, and screening for colorectal cancer. We also intend to use this method of decision support to facilitate shared care between hospitals and general practitioners, particularly in oncology.

As these systems develop they will provide more flexible and sensitive decision support than those based entirely on numerical probabilities.

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1 Thornton JG, Linford RJ, Johnson N. Decision analysis in medicine. *BMJ* 1992;**304**:1099-103. (25 April.)
2 O'Neil M, Glowinski A. Evaluating and validating very large knowledge based systems. *Medical Informatics* 1990;**15**: 237-51.

BUPA and consultants over 70

EDITOR,—The reply from the group medical director of British United Provident Association (BUPA)[1] to D P Choyce's letter concerning payments in respect of consultants' fees for consultants over 70[2] is neither logical nor defensible; it is in line with the content of letters sent to some senior colleagues in which he made similar points and gave gratuitous advice to retire from practice. Like Choyce, I have treated many of my patients for 20 years or more and will continue to see patients who request consultations or are referred and to perform operations that have served well for many years.

Thelwall-Jones's main thesis is the promotion of up to date medical advice of the highest quality. This, he believes, is age related. Then why not choose age 60 or 62 or 65? The equation that he makes with NHS requirements is entirely inappropriate. The NHS insists on retirement at 65 to preserve career structure, not because of deteriorating standards.

The confusion in Thelwall-Jones's argument is apparent when one considers that BUPA accredits younger doctors who are not consultants. Many are well trained but without long years of senior hospital experience. Thus BUPA would reimburse a younger doctor who is not a consultant for performing an occasional complex major operation but not an older, more experienced physician, surgeon, or anaesthetist doing expertly what he or she has done successfully for many years.

Thelwall-Jones seems to be under the impression that consultants aged over 70 mainly carry out long term follow up and surveillance. Since I retired from the NHS my general surgical referrals from practitioners and colleagues have been comparable in range to those of colleagues, and my choice of anaesthetist—some are over 70—depends on who is most suited and skilled. I refer patients to other consultants under or over 70 because of their skill and ability to provide the highest standards of care.

Thelwall-Jones's letter is ill conceived; it is not based on any statistical evidence relating poor practice to age (the medical defence unions do not differentiate on the basis of age) and does not accord with the regulations of the General Medical Council in the United Kingdom or the practice in the United States and Canada, where such restrictive limitations for both patients and doctors are illegal. His directive seems to be bureaucratic meddling rather than a serious attempt to uphold standards and seems to me and many of my colleagues under and over 70 to be discriminatory and ill thought out.

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1 Thelwall-Jones H. BUPA and consultants over 70. *BMJ* 1992;**304**:1116. (25 April.)
2 Choyce DP. BUPA and consultants over 70. *BMJ* 1992;**304**:1116. (25 April.)

EDITOR,—The decision by British United Provident Association (BUPA) to refuse to pay benefit to members for fees from specialists aged over 70[1] and the subsequent correspondence on the subject[2] have missed the most important point of principle. A patient who has private treatment enters into a contract with the consultant. The patient may well have medical insurance and, therefore, has a contract with the insurance company or association to settle the medical fees. The consultant, however, does not have a contract with the insurance company.

There is already adequate protection to prevent patients being treated inappropriately by consultants aged over 70. Firstly, all patients should be referred by their general practitioner, and general practitioners should surely know whether such a referral is appropriate to a consultant aged over 70. Secondly, most private hospitals withdraw admitting privileges at the age of 70. Therefore, for a consultant to have admitting privileges over the age of 70 must be exceptional and have the approval of the hospital's management and its medical advisory committee.

It cannot be emphasised too strongly that private medicine is independent medicine. Consultants are not employed by the insurance companies as they are employed for their NHS duties by regional health authorities and trusts. Consultants may well charge fees within guidelines recommended by either the BMA or BUPA. They may accept payment made on behalf of patients by insurance companies, but this does not and must not make consultants contractually responsible to the insurance companies. It is therefore inappropriate for BUPA to refuse to reimburse the fees charged by a consultant to an insured patient referred by that patient's general practitioner, regardless of the consultant's age. To anticipate the suspicion that this may be personal pleading, I emphasise that I am a 52 year old surgeon who has made adequate provision to be able to retire at the age of 60.

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1 Choyce DP. BUPA and consultants over 70. *BMJ* 1992;**304**:1116. (25 April.)
2 Thelwall-Jones H. BUPA and consultants over 70. *BMJ* 1992;**304**:1116. (25 April.)

Agism and merit awards

SIR,—Discrimination of any kind is unacceptable, and the age discrimination shown by British United Provident Association with regard to payment of consultants over 70 should be vigorously contested.[1]

Geriatricians have been fighting against agism in clinical practice for over 40 years. We have achieved great successes in removing age limits in cardiac surgery and high tech, expensive treatments. We have managed to educate others that age should not be the only factor they consider when deciding on management.

The worst kind of age discrimination is the age limit introduced by the review body for merit awards: 60 for C awards and 62 for B awards. The reason given is to stop "golden handshakes" before retirement, and what is wrong with that? It means that the awards are not held for long before retirement, and that adds to the burden on pension and wages. What prevents someone getting an award at 56 and then taking early retirement the year after? The argument is untenable. It also means that the age limit is a cut in the total payments of all consultants and academics. The rule is unfair, demoralising, and counterproductive.

The age limit removes any incentives for consultants aged 60-65. It is, in effect, saying that if you haven't produced any meritorious work at the age of 60 then forget it, which is nonsense. How are good work and achievements or service between the ages of 60 and 65 going to be recognised? Who wants to work for five years with no incentive and no recognition? You might be eligible for an honour from the Queen but not a merit award. The age limit for merit awards is cruel to consultants who wish to continue after the age of 60 and live in hope. We all know that at least 40% of all consultants retire with no merit award, but to take away that flickering hope amounts to inhumanity.

It is surprising that the age rule has not been resisted and contested by the BMA and the Hospital Consultants and Specialists Association. "I'm all right, Jack" could be the answer. "If it doesn't affect me, I'm not bothered." It is about time that the large silent minority voiced an angry reaction. I call on all fair minded consultants and academics to campaign for removing the age limit in the merit award system.

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1 Thelwall-Jones H. BUPA and consultants over 70. *BMJ* 1992;**304**:1116. (25 April.)

This month, a little elementary science

EDITOR,—In answer to Bernard Dixon's article[1] questioning the validity of the burning candle experiment, the answer is that a combination of two main factors causes the water in the jar to rise by about a fifth of the jar's volume.

Firstly, he is wrong in supposing that all the oxygen molecules end up in carbon dioxide molecules. Candle wax is a simple hydrocarbon with a formula approximating closely to $(CH_2)_n$. In combustion the products of this basic unit are carbon dioxide and steam. To combust a single such unit one molecule of oxygen is required to make the carbon dioxide (CO_2) and half a molecule of oxygen to make water (H_2O)—that is, one third of the oxygen consumed makes steam. This steam condenses on the sides of the cool jar and the surface of the water, to practically zero volume.

The second point is that the combustion products are pretty hot. Holding your hand above even a small candle flame will quickly confirm this. As the jar is placed over the burning flame the average temperature of the gases in the jar might briefly be about 100°C or, say, 370K, with the ambient room temperature at about 300K. When the flame dies and the gases in the jar quickly cool back to 300K their volume would contract by 70/370, or 19%.

A combination of these two effects, varying according to exactly how the experiment is performed, accounts for the wide range of results obtainable from the experiment and explains how the experiment can indicate more than 20% oxygen in air.

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1 Dixon B. This month, a little elementary science. *BMJ* 1992; **304**:1252. (9 May.)