Health gain has been rather narrowly defined in primary care studies of diabetic care to date. When audits have gone beyond counting activity alone they have focused mainly on blood glucose concentration as a proxy measure of outcome.⁶ Pringle and coworkers do this in their large descriptive study of possible associations between a range of variables related to the patient, doctor, practice, and process of care and the concentrations of glycated haemoglobin in diabetic patients in Nottingham (p 630).⁹

Attempts to capture the contribution of more than 25 factors possibly associated with glycaemic control left 85% of the variance in glycated haemoglobin concentrations unexplained. Among modifiable factors only access to a dietitian and an interested general practitioner featured significantly in the final multiple regression analysis.

Such a study raises many questions. The findings support other evidence of the importance of doctors' attitudes towards helping patients to achieve good glycaemic control¹⁰ and that skilled strategies to support dietary change can make an appreciable contribution to glycaemic control¹¹ and may even affect survival.¹² The study also raises the question of which are the right outcomes to measure and how psychosocial variables should be taken into account.¹³ Future studies might pay more attention to the beliefs and behaviour of patients, doctors, and nurses as these probably strongly affect morbidity and mortality in diabetes.¹²⁻¹⁴ We might also base management more firmly still on a multifactorial model of the risks of microvascular and macrovascular disease, paying particular attention to smoking, blood pressure, and lipids as well as blood glucose.¹⁵ At the same time we need to remember that interventions, particularly those aimed at minimising hyperglycaemia, can themselves impair the quality of life.^{13 16}

The increasing recognition that diabetes frequently coexists with other chronic diseases¹⁵ and may originate in early life¹⁷ suggests an increasing role for primary care in the manage-

ment and prevention of the condition in future. Attention to surveillance and the rational use of primary and secondary resources are still needed, but as we try to add "quality to quantity" we may need to look to social science as well as to epidemiology. Its methods may improve our understanding of our patients and ourselves and form the basis for behavioural changes, on which reduction of the risks of the disease still largely depend.¹¹

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Treating hypoglycaemia in general practice

Glucagon is the drug of choice for unconscious, agitated, or uncooperative patients

Severe hypoglycaemia is probably the commonest metabolic emergency seen in general practice. People with diabetes are mainly affected, but other causes (except in neonates) include excess alcohol consumption after inadequate food intake^{1 2} and insulinomas and non-islet cell tumours, especially mesotheliomas. These and other uncommon causes should be considered when hypoglycaemia is suspected in non-diabetic patients.

Diabetic hypoglycaemia occurs mainly in insulin treated patients. It has been estimated that mild, self managed episodes may occur about twice weekly; severe episodes without unconsciousness but requiring help from another person twice yearly; and episodes of unconsciousness three times in 40 years.¹

Proper education of patients should reduce the incidence of severe hypoglycaemia. All patients with diabetes and their relatives or carers should understand the range of hypoglycaemic symptoms, appropriate self treatment, and when to call for help. In patients taking insulin this may mean deliberately inducing hypoglycaemia under controlled circumstances. Patients in whom there is a loss of warning of hypoglycaemia, possibly linked with the use of human insulin,³ should be identified, counselled, and given the

choice of switching to animal insulins (specific advice is available from the British Diabetic Association).

Medical help is likely to be sought only when hypoglycaemia is severe and the patient is unconscious, agitated, or uncooperative. These are genuine emergencies as prolonged hypoglycaemia can be damaging. Ideally, the diagnosis should be confirmed before treatment, and this can be done with capillary blood glucose test sticks. Although an unconscious patient is likely to have biochemical hypoglycaemia (blood glucose concentration <3.0 mmol/l), the relation between symptomatic and biochemical hypoglycaemia may be poor, with one study showing biochemical confirmation in less than a third of symptomatic patients.⁴ Ultimately, the diagnosis must therefore be clinical.

These patients should be treated parenterally because attempted oral treatment may be hazardous.⁵ The choice of treatment is between intravenous 50% dextrose (usually 50 ml) and subcutaneous, intramuscular, or intravenous glucagon (0.5 mg in children and 1 mg in adults); intranasal glucagon is also effective.⁶ Both treatments produce a good response, though dextrose acts almost immediately and glucagon takes one to two minutes.⁷ This time difference may be outweighed by the need to secure intravenous access for

dextrose—a serious disadvantage in agitated patients because extravasation of dextrose may cause considerable pain and tissue necrosis.

Glucagon has few side effects, with headache and gastrointestinal upset being occasionally reported.⁸ It is ineffective in hypoglycaemia induced by alcohol, in which liver glycogen is already depleted.¹ When patients recover after being given glucagon, oral glucose or carbohydrate should be given to replenish glycogen stores and prevent recurrent hypoglycaemia.⁹ If there is no response to glucagon after 10 minutes intravenous dextrose should be given.⁹ In most cases glucagon is very effective and, being easier to give, is suitable for self administration or to be given by relatives.

Dextrose has been successfully used by trained ambulance staff,¹⁰ as has glucagon with or without a glucose drink.² Another study has confirmed the safety and effectiveness of glucagon as prehospital treatment for hypoglycaemia.⁷ A prepacked 1 mg glucagon unit is convenient to carry, unlike dextrose, which is bulky and needs more protection. Many general practitioners will know the unpleasant effect that a broken phial of dextrose has on the inside of a medical bag.

Glucagon has a shorter shelf life (30 months) and costs more

(£4.62 net per unit) than dextrose, which has a shelf life of 36 months and costs £2.10 for a 50 ml phial.¹⁰ Its convenience and ease of use, however, together with its lack of serious side effects, should encourage use of glucagon as the first line treatment for hypoglycaemia.

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Non-medical use of ketamine

Dissociative states in unprotected settings may be harmful

Several reports have recently appeared of the use of ketamine ("vitamin K," "super K") at "rave" parties and night clubs.^{1,2} As ketamine is a powerful anaesthetic its uncontrolled use in social settings is a cause for concern, although there is little documented evidence, as yet, that its non-medical use has greatly increased as suggested by media reports. These reports suggested that ketamine was initially introduced as an adulterant in 3,4-methylenedioxymethamphetamine ("ecstasy") tablets and is now sold in its pure form.²

As an anaesthetic agent, ketamine has a good safety profile.³ Unlike most other anaesthetics it is a cardiorespiratory stimulant rather than a depressant, and its wide margin of physical safety has resulted in the drug's use in paediatrics and as a battlefield "buddy drug."³ Its main problem is that it can cause psychological dissociation, resulting in hallucinations and phenomena which may include subjective experiences of being out of the body or states similar to the near death experience.^{3,6,9} (These states differ from those produced by hallucinogens such as LSD and emotional enhancers such as 3,4-methylenedioxymethamphetamine.) Although these phenomena may frighten some patients, others find them tolerable or pleasant.^{3,9} There may also be effects on movement such as stereotypies (persistent repetition of acts or words), a severe loss of coordination, and pronounced analgesia.³

The psychological effects are brief, depending on dosage and route of administration, but usually last about 30 minutes. The doses used for surgical anaesthesia vary between 2 and 10 mg/kg. Psychological dissociation, however, is produced by much smaller doses—for example, 50 mg by intravenous injection can produce a pronounced dissociative state.^{3,4} In current social usage the drug is taken intranasally or orally.

As ketamine has a good physical safety profile and an established place in medicine within current indications what are the reasons for concern about its non-medical use? The first and most important reason is that ketamine can readily induce a state of virtual helplessness, within the dose range

normally taken by users, to a far greater extent than most other substances of abuse. The dissociation can be very dramatic, such that awareness of the environment is completely lost while the user experiences a "separate reality," a marked reduction in sensory input in all modalities, and difficulty with movement. This is almost never the case with substances such as 3,4-methylenedioxymethamphetamine. The helplessness of the dissociative state may not be a problem for a patient in a protected setting, but at a large social gathering the chances that a disconnected person experiencing incoordination and analgesia may come to harm are substantially increased.

A further cause for concern is that ketamine can sometimes result in a state where the users are unconcerned whether they live or die. This is not a depressive or suicidal phenomenon but is related to the particular effect of the dissociative state upon the mind: "If you have a full-blown experience of K, you can never believe there is death, or that death can possibly influence who you are."⁷ Again, this may not be a problem in a protected setting but is cause for concern in a public place.

In some people ketamine has the potential for compulsive, repeated use; cases of self administered injections several times daily over prolonged periods have been reported.^{4,8,9} Long term use of high doses of ketamine has the potential to interfere with memory, learning, and attentional mechanisms due to blockade of the N-methyl-D-aspartate receptor, although there is no clear evidence of this at present.^{4,8,10} Ketamine has been associated with recurring phenomena ("flashbacks"),^{4,8,11,12} although whether these result from drug induced physiological changes or are a functional response to anxiety in predisposed personalities is still unclear. (In these cases flashbacks may involve little more than a "graininess" of vision under anxiety provoking circumstances.⁸)

People coming to medical attention under the influence of ketamine are best placed in a quiet, darkened room until they recover. Diazepam may be given for unresponsive panic attacks.