The Patient as His Own Doctor: Diabetes

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Education of the diabetic patient is the most important aspect of management. It begins with the first visit when a continuing education programme should be foreshadowed

The more involved the diabetic is in his own management, the greater his understanding and the more individualised and effective will his treatment be. Patient involvement is not to be interpreted as neuroticism. The lot of the health team attending him will also be easier when its members assume a more consultative and less authoritarian role.

Understanding Diabetes

There is a core of information with which every diabetic should be familiar (table I). He will compare himself with other diabetics and need to have a general idea of the variety of causes, approaches to management and complications. This will avoid fear and misunderstanding, and engender trust in his medical adviser. An educational check list could be incorporated into the patient's records. Depending on facilities available, the various facets could be dealt with by the family doctor, consultant diabetologist, diabetic sister/health worker, dietitian, obstetrician or paediatrician. Educational objectives can be pursued by way of literature, tape-slide programmes, video programmes, discussion groups, or the local diabetic association.

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Environmental Security

To inspire confidence in self management, the diabetic requires an accessible local doctor who works in close consultation with the diabetic physician. Relatives, friends, and workmates need to be aware of his problem, able to recognise hypoglycaemia, and prepared to take appropriate action (table II). To be quite sure of appropriate aid, the patient should wear a disc or bracelet indicating that he is a diabetic. Newer devices, such as the 'SOS bracelet', allow a fold-out strip to contain more extensive information about management.

Diet

The patient's daily energy requirements must first be assessed and the proportion of carbohydrate decided. Generally, this will be about 40%. This carbohydrate intake will be spread evenly across the day so as to minimise substantial rises in blood glucose. In the case of the insulin-dependent diabetic, the insulin is then tailored to meet this pattern, although some dietary adjustments may still be necessary. Dietary concepts which the patient will require are shown in table III.

Crisis Anticipation

The avoidance of hypoglycaemia depends largely on the regularisation of meal and snack times, and the ingestion of extra carbohydrate at times of increased physical exertion. Occasionally, incorrect insulin dosage can be a factor because of a change in syringe or poor vision.

To avoid ketoacidosis, the patient should check the urine for ketones whenever heavy glycosuria is detected, or when he feels unwell. The attending doctor should be notified if ketones are present.

Control Criteria

Body weight remains one of the best indexes of overall control of the diabetic state.

Carbohydrate metabolism: There is increasing evidence that adequacy of control of carbohydrate metabolism relates to the occurrence of microvascular disease, whilst lipid abnormalities predispose to atherosclerotic vascular disease. Recent developments will probably allow better definition of carbohydrate control. The glycosylated minor haemoglobin A_{Ic} correlates well with 24-hour urinary glucose outputs and with blood sugar determinations of the preceding month (table IV).

24-hour glucose output: Patients can learn to assess their own 24-hour urinary glucose output from time to time. The collected urine can be weighed to give the volume (e.g. 2,000ml). An aliquot can be taken and tested with 'Clinitest' or 'Diastix' to give the glucose concentration in g/100ml (e.g. 1% = 1g/100ml, or 5.6 mmol/L). The 24-hour urinary glucose output in g/24 hours is volume

Points in Brief

TABLE I. Check list for education of the diabetic

1. Cause of the diabetes
2. General metabolic effects of insulin
3. Place of diet, oral agents and insulin
4. Time course of insulins or oral agents
5. Injection technique
6. Acute complications
   a) Hypoglycaemia
   b) Ketoacidosis
   'Wear a disc or bracelet'
7. Procedure when ill
8. Long-term complications
9. Criteria of control
10. Urinalysis
    a) Technique for glucose and ketones
    b) Concept of renal threshold
11. Foot care
12. Exercise
13. Employment
14. Having a family
15. Life insurance

TABLE II. Approach to hypoglycaemia by lay personnel

State of patient	Action to be taken
Conscious	A sweet drink or sweet to suck
Confused	Honey inside mouth
Deteriorating conscious state	Glucagon injection subcutaneously (1mg)
	Oral carbohydrate on improvement
Unconscious	As for above
	Call doctor or transfer directly to hospital

TABLE III. Dietary concepts

1. Energy value of food
2. Food composition (carbohydrate, fat, protein, fibre, vitamins and minerals)
3. Eating out
4. Modification in exercise
5. Modification in illness
6. 'Special foods'

(x100ml/24 hours) x concentration (g/100ml) e.g. 2,000ml urine testing 1% = 2,000/100 x 1 = 20g in 24 hours.

If the concentration is 2% then, since this is the upper limit of the test scale, the urine must be diluted, retested and the dilution factor applied. Satisfactory control is generally associated with urinary carbohydrate output of less than 5% of the carbohydrate intake, or less than about 10g/24 hours. This semi-quantitative approach gives the physician and patient an improved understanding of the carbohydrate problem.

Single urine specimens are tested using the double-voiding technique. The second specimen represents events in the blood over the preceding half hour if this is the time since the first specimen. A single specimen, positive for glucose, clearly indicates that the blood glucose was, at that time, above the renal threshold, generally about 10mmol/L. In non-diabetics blood values of 7 to 10mmol/L would nevertheless be unusual and would, theoretically, reflect less than optimal control. The limitation of the single urinalysis is that it is a measure of urinary glucose concentration and, as such, is influenced by urine and glucose output per unit time. Therefore, at the end of the night when urine is concentrated, it does not mean the same as it does during the day. Changes in urinary concentration are a particular problem in illness, irrespective of carbohydrate status.

Patients on diet alone, or oral agents, generally test their urine in the fasting state and 1 or 2 hours after a meal. This assesses the activity of nocturnal gluconeogenesis and the effect of an oral glucose load. Insulin-dependent diabetics test at least before meals and, ideally, after one meal as well (table V). The tests should be recorded for discussion with the diabetic physician.

Blood lipids should in most patients be checked annually and appropriate dietary modification made.

Insulin Adjustment

For a diabetic to be well-equipped to alter his own insulin dosage, he needs to understand the significance of urine tests at different times of the day (table V) and the time-courses of action of the insulins he uses. Some diabetics still have the mistaken idea that they can 'feel' how much insulin they need.

Insulin dosage should be adjusted for the next day on the basis of what has happened in the previous day. Of course, it is best to look back over the pattern of several days before dose adjustment. In general, a combination of medium-acting (isophane, 'Lente' or 'Rapitard') and short-acting (regular, 'Semi-Lente' or 'Actrapid') insulins will be used. If there has been pre-evening meal glycosuria, the next morning's medium-acting insulin can be increased. If there has been pre-lunch glycosuria, short-acting insulin can be added or increased in the morning. If there has been

TABLE IV. Indexes of control

Carbohydrate
- Blood glucose
- Urinary glucose
  - a) Single specimen
  - b) Timed (e.g. 24-hour)
- Haemoglobin A_{Ic}

Lipid
- Plasma cholesterol
- Fasting plasma triglycerides

TABLE V. Urinalyses for glucose

Nature of specimen	Interpretation
1. Timed specimen (usually 24-hour)	Index of overall control
2. Single specimens	
Fasting	Nocturnal Gluconeogenesis
Before lunch	Adequacy of first phase of medium-acting insulin and need for short-acting insulin
Before evening meal	Assessment of peak action of medium-acting insulin
2-hours postprandial	Effect of a meal

fasting glycosuria, an evening dose of medium-acting insulin should be given. This latter innovation may reduce daytime insulin requirements by effective control of gluconeogenesis. In general, the evening dose of medium-acting insulin required is much less than the morning dose since it is gluconeogenesis rather than glucose uptake which is the problem. When increments in insulin dosage are made, it is preferable that they are small and of the order of 4 units at a time, as this avoids the problems associated with hypoglycaemia.

It cannot be stressed too strongly that, because of factors such as diurnal variation, insulin dosage should not be altered during a 24-hour period on the basis of what has gone before in that 24-hour period. The exception would be that short-acting insulin could be given before an expected glucose load because, in this circumstance, the risk of hypoglycaemia would be minimised.

On-Going Education

Just as the medical practitioner requires constant re-education, so also must the diabetic patient be aware of developments and have his basic diabetic education reinforced. Attendance at a well-run diabetic clinic and involvement in a diabetic association should allow these objectives to be realised. Every opportunity should be taken to allay the diabetic's fears and to make him relatively independent. His life should be as complete as that of a non-diabetic. □