

42. DIABETES MELLITUS IN CHILDREN

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Related conditions considered in other Chapters

Diabetes Mellitus in Adults

Chapter 17

42.2 Introduction

42.2.1 Diabetes mellitus results from the failure of a gland (the pancreas) to produce sufficient amounts of a hormone (insulin) which enables the body to use sugar. It can develop at any age but the earlier this is the more serious its effects are likely to be. It occurs in 2 per 1000 children with peak presentations at around 7 years and 12 years of age. Its onset is usually sudden, and causes profound upset for the child and family, not least because of the implications for the child's future health and welfare. This type of diabetes mellitus always needs treatment with insulin injections. This is called insulin-dependent diabetes.

42.3 General

42.3.1 The use and handling of sugar (present in foods) is essential for the health and normal functioning of all the systems of the body. The use of sugar by the body also varies in different situations, such as when exercise is undertaken, or when an infection is present. In healthy children these variations are dealt with as a matter of normal functioning of the body, but in those with insulin-dependent diabetes a careful balance of sugar and insulin can only be achieved by various combinations of control of diet, injections of insulin, and modification of bodily activity and lifestyle.

42.3.2 Management of the condition involves the provision of a prescribed diet, the injection of insulin and the testing of blood and urine to monitor sugar levels, all of which need to be done accurately and at the appropriate times. It is extremely important to maintain the best possible control of blood sugar levels as this will reduce the development of complications in later life. Management also involves the prevention, recognition and treatment of primary complications such as low blood sugar (hypoglycaemia), accumulation of toxic substances in the blood because of the inability to utilise blood sugar (ketoacidosis), and infections.

42.3.3 Blood tests are usually performed about twice a day. If the child has an

infection, or the blood sugar is high or unstable, or there is unaccustomed physical activity, they will be done more often and the urine may also be tested. Additional injections, or changes in the dosages of insulin may also be needed in these circumstances. Difficulty may be encountered, in some cases, in establishing an ideal routine and the frequency and type of monitoring may be tailored to the individual child.

42.4 Hypoglycaemia

42.4.1 Hypoglycaemia is a condition in which the concentration of sugar in the blood is lower than normal. It is, together with ketoacidosis [see para 42.5], one of the primary complications of diabetes, and potentially dangerous, requiring prompt recognition and treatment to avoid potentially life-threatening situations. It may be caused by such things as too much insulin being given, not enough food being taken, delay in taking a meal, food being vomited, too much exercise or indeed anything else which affects the balance of sugar to insulin in favour of an excess of insulin. It is not uncommon in children with diabetes, particularly in younger children who have unpredictable levels of activity, when blood sugar content may vary greatly. In such children satisfactory control may be difficult to achieve.

42.4.2 The warning symptoms of hypoglycaemia are very variable, and may include hunger pains, sweating, trembling, blurred vision, poor concentration, irritability, bad temper and confusion. It may occur suddenly and unpredictably, and young children may not recognise the significance of the warning symptoms in the way that older children and adults are likely to. However, even some older children or adults may have difficulty in recognising its onset.

42.5 Ketoacidosis

42.5.1 Ketones are toxic substances which accumulate in the blood when the blood sugar levels are too high (hyperglycaemia), causing a condition called ketoacidosis. This is the opposite of hypoglycaemia [see para. 42.4], and is the other primary complication of diabetes. It is extremely dangerous, also requiring prompt recognition and treatment to avoid life threatening situations. It is caused frequently by the presence of an infection, which increases the need for insulin, but also by such things as too little insulin being given, too much food being taken, blood sugar being used at a low rate, or anything else which affects the balance of sugar to insulin in favour of an excess of sugar. Like hypoglycaemia, it is not uncommon in children with diabetes, as infections are common in childhood, and particularly in younger children whose unpredictable levels of activity lead to great variation in blood sugar content. This may make it difficult to achieve satisfactory control of their condition.

42.5.2 Ketoacidosis may occur unpredictably and its onset may be rapid, over a period of a few hours, but not so rapid as is often the case with hypoglycaemia. Warning symptoms and signs are variable, but may include fatigue, thirst, abdominal discomfort and vomiting. Young children may not

recognise the significance of the warning symptoms in the way that older children and adults are likely to. Parents of children with diabetes have almost always been made aware of these warning symptoms and signs by the health care professionals involved with the management of the affected child.

42.6 Care Needs

42.6.1 The prescribed diet has to be measured and its consumption ensured by an adult. Food must be taken at regular intervals, and meals cannot be missed or delayed. A degree of vigilance may also be required to ensure that the child adheres to the diet and does not eat extra foods that raise the blood sugar level, outside the regular meal plan. The correct dose of insulin is critical and must be measured accurately. It is usually given twice during the day, but may be needed more often. The testing of blood or urine with a kit is required usually twice, and often several times, in the day. Sometimes this is also required during the night, and particularly in young children whose sleep requirement leads to a long overnight fast. This poses a problem in terms of getting good control without running the risk of overnight hypoglycaemia.

42.6.2 Because younger children will have neither the skill nor the understanding to administer insulin, test blood or urine, or manage their own diet, these tasks have to be undertaken by an adult. Because they are seldom able to recognise the warning signs of hypoglycaemia or ketoacidosis they need an adult to be on the lookout for these and to take appropriate action to prevent the development of a life-threatening situation. Until the child reaches an age when these various tasks can be safely and reliably carried out without assistance from an adult the care needs by day are many and may take up a considerable amount of time.

42.6.3 An important "care need" is the judgement as to when an adjustment needs to be made to treatment, either independently by the child and family, or with telephone advice from the specialist nurse or doctor, or by attending the doctor in general practice or hospital. Such a judgement is often difficult for carers to make, but is a very important one. The child or adolescent may well not be able to make that decision for themselves.

42.6.4 At night the needs are not so great except where there is regular overnight hypoglycaemia. For older children, night alarms can be set to go off through the night waking them, to check their blood sugar level and eat something, if necessary, to prevent hypoglycaemia. For younger children with regular overnight hypoglycaemia the use of night alarms may be impractical, and it may be reasonable for an adult to check on the child at intervals throughout the night.

42.7 Mobility Considerations

42.7.1 Children with diabetes are very unlikely to have any mobility needs as a result of their condition.

42.8 Duration of Needs

- 42.8.1** The age at which a child attains reliable independence from adult assistance is variable, as the management of this condition is complex. Blood sugar levels are rarely static, their constant fluctuation depending on factors such as food intake, exercise, temperature, general health, emotional state and others, not yet well understood.
- 42.8.2** Good management depends on teamwork between parents and children. As they grow older and develop understanding of the condition, children begin to take a more active part in its management. When they become more independent, often in early adolescence, many children may be able to give themselves the correct dose of insulin, test blood and urine and avoid inappropriate foods, but others have problems coping with the complexities of their condition and may need help for much longer. If supervision or assistance is still required with the administration of insulin, this may be for no more than a few minutes to check the dose is correct each time an injection is given. By the time this stage is reached, they may also be better able to recognise the warning symptoms of hypoglycaemia and take appropriate action.
- 42.8.3** These considerations would not normally apply to a child who has been first diagnosed as having diabetes around the time of puberty or in early adolescence. In such a case the needs will be similar to those of a younger child, and are likely to continue for about two years before they may be able to deal with their diabetes unaided.
- 42.8.4** In some cases, even though children in their teens have had diabetes for some time, the evidence may suggest that control has still not been properly achieved, because frequent episodes of hypoglycaemia occur, or they have suffered from ketoacidosis on more than one occasion since being diagnosed, or because their diabetes is said to be "unstable". When hypoglycaemia attacks or episodes of ketoacidosis continue to occur by day and/or by night, the need for supervision and/or watching over is likely to continue, even in those who have reached the age at which independence would normally be expected. The response of these episodes to treatment varies in each individual case but the likelihood is that the condition will stabilise after a period (commonly not more than two years) of careful monitoring, with adjustment of treatment and day-to-day activities.
- 42.8.5** With the onset of puberty, control of diabetes may become difficult for a time, even if it has previously been stable. Also, the child may become resentful about the condition and less co-operative in its management. In these circumstances, the need for supervision may continue for a further year or two.
- 42.8.6** In some affected individuals control may fluctuate for inexplicable reasons, periods of stability up to six months at a time being followed by similar periods of instability. Such a pattern developing in childhood is likely to persist to

young adulthood.

42.9 Further Evidence

- 42.9.1** If information already available is inadequate for assessing the child's needs, then a factual report from the hospital may provide extra detail. This will be especially helpful if completed by the diabetic specialist nurse, who is likely to be visiting the home and providing the first line of help in case of difficulty.
- 42.9.2** Some parents deal effectively with hypoglycaemia without help, and are given kits to use when attacks are too severe for the child to be able to swallow a sweet or sugary drink. A glucose gel may be squeezed into the space between the teeth and the inside of the cheek, where it is rapidly absorbed, or an injection of a substance called Glucagon may be necessary to restore the blood sugar level. A report from the GP or hospital on the frequency of prescription of either of these substances may help to determine their incidence. In some instances, especially where control appears poor, a consultant report may be helpful in establishing the nature, frequency and severity of hypoglycaemic attacks.