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INSULIN-DEPENDENT DIABETES MELLITUS: EDUCATIONAL IMPLICATIONS

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ABSTRACT

This article provides an overview of the educational implications of diabetes in children. A major focus of the article is that teachers should treat children with diabetes as essentially normal learners, without ignoring their unique needs or becoming over-concerned. Major points discussed include: (a) nature of diabetes, (b) factors associated with educational performance, and (c) teacher's key roles in meeting the educational needs of children with diabetes.

Under Public Law 94-142, the Education for All Handicapped Children Act of 1975, children with diabetes are eligible for special education and related services. The implication is that diabetes not only presents medical problems, but may affect educational, psychological, and social development as well. Yet, while medical and psychosocial aspects of diabetes have received considerable attention, the educational programming needs of children with diabetes have not received adequate attention by educational researchers and practitioners. Many teachers simply lack sufficient information about diabetes mellitus or regard it as a health problem the management of which is the sole responsibility of the medical community. The major theme of this article is that education of children with diabetes should involve joint efforts by the teaching staff, health professionals, and families. This article: (a) presents basic information about diabetes in children, (b) discusses its influences on educational performance, and (c) illustrates the teacher's role in meeting the needs of children with diabetes.

DEFINITION AND CLINICAL MANIFESTATIONS

Insulin-dependent diabetes is a chronic metabolic disorder characterized by inability to properly utilize glucose (sugar), the major source of energy to the body. Glucose cannot enter the cells leading to an abnormally high level of blood sugar, a condition known as hyperglycemia (Christiansen, 1975). As a result, the kidneys try to eliminate excess sugar and that leads to glucose in the urine and the appear-

ance of what is usually the first clinical sign of diabetes, the production of excessive urine (polyuria). The child may compensate by drinking large amounts of liquids (polydipsia). Since the main source of energy cannot be used normally, fats are broken down to create energy. Consequently, the child experiences excessive hunger and may begin to eat large amounts of food (polyphagia). At this point, the child loses weight and complains of weakness and tiredness (Garner, 1981). When the body continues to break down fats for energy, ketone bodies may be produced in large quantities leading to a dangerous condition known as ketoacidosis which, if untreated, can lead to diabetic coma and, eventually, to death.

Children with diabetes often have a severe form, insulin-dependent diabetes in which the pancreas fails to produce insulin, leaving children dependent upon insulin injections for the rest of their lives (Garner, 1981; Mullins, 1979). This type is currently termed insulin-dependent diabetes mellitus (IDDM) to distinguish it from non-insulin-dependent diabetes mellitus (NIDDM), the other major type of diabetes which usually affects adults. NIDDM is milder than IDDM, develops more slowly, and its treatment usually involves dietary control (Garner, 1981).

ETIOLOGY AND PREVALENCE

Insulin-dependent diabetes mellitus is an inherited disorder, but the exact mechanism of inheritance remains unknown (Christiansen, 1975). Garner (1981) noted that diabetes has been referred to as the "geneticist's nightmare." In addition, emotional factors are considered as occasionally precipitating the onset of the disorder (Garner, 1981), and viral infection appears to play a role.

Obtaining an accurate estimate of the prevalence of diabetes mellitus is no easy matter due to the heterogeneity of the disorder and since as many as 50 percent of persons with mild diabetes are unidentified (Garner, 1981). Nevertheless, insulin-dependent diabetes mellitus is the most common endocrine disorder of childhood, affecting approximately 1 out of every 1,000 school-age children (Katz, 1975).

TREATMENT

Treatment of insulin-dependent diabetes involves maintaining a balance between insulin and exercise, and food. Food makes the glucose level rise; exercise and insulin make the glucose level fall. Insulin type is determined by the physician on an individual basis. There are three major types of insulin (Christiansen 1975; Mullins, 1979): (1) regular insulin which is the fastest and short-acting type, (2) NPH insulin is slower in action, but works for a much longer duration, and (3) Lente insulin is even much slower, but works for a longer duration than the other two types. NPH insulin and Lente insulin have usually been preferred because they are given once daily rather than four times a day; however, some recent information

suggests that frequent administration of smaller doses of insulin reduces side effects of diabetes. To determine the action of insulin, capillary blood from finger-pricking must be tested daily for sugar and acetone (one type of ketone bodies formed when fats are broken down).

Regularity of diet, both in terms of times and amount of eating, is an essential component in the management of diabetes. Although the type of diet depends on the philosophy of the physician, the exchange diet is the most commonly recommended dietary system. In this system, the child is taught to substitute foods for others on a specified list (Mullins, 1979).

Regularity in exercise is also an important element in diabetic control. In this case, regularity means equivalent amounts of exercise daily, if possible, and compensating for energy expenditure by eating a snack after exercising to prevent the development of low blood sugar.

Since control of diabetes is a never-ending process, children are expected to assume responsibility for their own physical well-being.. They are taught to assume responsibility for insulin injections, blood testing, dietary management, and physical exercise. Garner (1981) and Mullins (1979) note that children who are eleven or twelve years old and even younger can undertake responsibility for their own care.

FACTORS ASSOCIATED WITH EDUCATIONAL PERFORMANCE

PSYCHOSOCIAL ADJUSTMENT

Childhood diabetes may have adverse effects upon educational performance by hindering psychosocial adaptation. Since diabetes affects the basic bodily processes and since its control demands that children assume complex therapeutic roles, it often presents special challenges to their psychosocial adjustment (Holmes, 1986; Johnson, 1980; Kimball, 1971; Tarnow & Tomlinson, 1978). Garner (1981) stated that children with diabetes may "develop dependence, rebel against authority, or succumb, figuratively or literally, to futility and depression" (p.39).

Several studies have indicated that dependency is a major problem among children with diabetes (Hauser, Jacobson, Noam, & Powers, 1983; Holmes, 1986; Swift & Seidman, 1964). Parents and teachers may add to the limitations imposed by diabetes itself through overprotection and more than necessary allowances, thus hindering affected children's acquisition of the necessary skills for autonomy and leading them to assume passive rather than active roles (Calhoun & Hawisher, 1979; Hallahan & Kauffman, 1978; McDowell, Coven, & Eash, 1979).

Although diabetes is a "hidden" impairment, it has been documented that it has adverse effects on self-concept (Barron, 1978; Muldoon, 1978; Richardson, Hastorf, & Dornbusch, 1964; Sullivan, 1979; Swift, Seidman; & Stein, 1967). For

example, Muldoon (1978) observes that "diabetes is a catastrophic insult to the psyche or self-concept which establishes once and for all the person's vulnerability" (p. 351). Major factors associated with self-concept among children with diabetes include: attitudes of parents, teachers, and peers; premorbid personality; and understanding and awareness of illness (Garner; 1981 Kauffman & Hersher, 1971; McDowell et al., 1979; Power & Dell Orto, 1980).

However, it should not be concluded that childhood diabetes automatically leads to psychosocial difficulties or that there is a typical diabetic personality (Dunn & Turtle, 1981). While many studies found that children with diabetes do face more difficulties with psychosocial adjustment than do healthy children or even other chronically ill children, other studies found no significant differences (e.g., Kovacs, Brent, Steinberg, Paulauskas, & Reid, 1986). In a recent article, Jacobson (1986) stated that "psychosocial impact studies present no firm evidence that diabetes mellitus causes major alterations in personality or increased risk of psychiatric illness before the onset of major complications" (p. 546). Thus, generalizations about psychosocial reactions of children with diabetes are unwarranted, and the literature has consistently indicated the presence of marked individual differences in type and level of psychosocial adaptation to chronic illness (Hamburg & Inoff, 1983; Shontz, 1970).

Parental Attitudes and Expectations

The educational performance of children with diabetes is also influenced by the reactions and expectations of their parents and other family members. It is well recognized now that families of children with diabetes, like other families of chronically ill children, may go through various stages of adjustment which include: Shock, mourning, denial, guilt, anger, depression, rejection or overprotection, and adaptation (Garner, 1981; Koski, 1969; Londsdown, 1980; Swift et al., 1967).

Control of diabetes often demands a disproportionate amount of the family's resources and may lead to conflicts. Furthermore, children with diabetes may use their illness to control significant others (McCord, McCord, & Verdon, 1960). Accordingly, diabetes may lead to adjustment problems among siblings (Power & Dell Orto, 1980). Brothers and sisters may interpret the special attention given by parents to the sibling with diabetes as evidence of unfair partiality (Garner, 1981).

School Absences

Another factor which may be a hindrance to the academic performance of children with any chronic illness is school absenteeism (O'Neil, Barysh, & Setear, 1985; Richards, 1986). In a study of 336 chronically ill school-age children, it was found that the mean percent of days absent from school was 9.4% (Cook, Schaller, & Krischer, 1985). Children with diabetes, especially those prone to hyperglycemia, may miss school often (Melamed & Johnson, 1981). Such an increased rate of school absenteeism may have adverse effects on children's educational and social development.

Intellectual Functioning

Unless diabetes occurs very early in life or the child suffers repeated episodes of insulin reaction, the intellectual functioning of children with diabetes, on the average, does not differ from that of non-diabetic children (Ack & Weil, 1961; Garner, 1981). Hypoglycemic episodes are common in children with diabetes (Holmes, 1986). Several studies have recently demonstrated a connection between recurrent and prolonged episodes of hypoglycemia and neuropsychological impairment (Aird, Masland, & Woodbury, 1984; Ryan, Vega, & Drash, 1985). Such an impairment may have a negative impact upon cognitive functioning and academic performance.

MANAGING DIABETES IN SCHOOL

In discussing the educational implications of diabetes mellitus, Christiansen (1975), and Mullins (1979) stated that children with diabetes generally function in normal educational settings and that teachers must treat them as other children.

They neither require a modification in the curriculum nor special teaching methods. However, the teacher must appreciate any special needs which the child may have. As Mullins (1979) noted, children with diabetes "have every expectation of fitting into the regular school society and community with ease. However, they are what will be termed here susceptible children. They must learn to adhere more closely than others to the healthy life, with regular routines, good food, and rest" (p.232).

Appropriate educational intervention dictates that a comprehensive evaluation of the child's educational and psychosocial characteristics be conducted. Such an evaluation should include general intellectual functioning, emotional development, adaptive behavior, and academic achievement. Although some difficulties are frequently found among children with diabetes, generalizations about learning and behavioral characteristics of these children should be avoided. Effective educational intervention can only be provided based upon careful consideration of the unique needs of the individual child.

The unique needs of children with diabetes dictate that an interdisciplinary team approach be used. The medical, intellectual, psychosocial, and educational needs of these children are often complex. Accordingly, a team approach to planning an education has a special significance (Heward & Orlansky, 1980). The

team should work toward the fulfillment of the following major goals: (a) physical independence, (b) self-awareness and social maturation, (c) academic growth, and (d) career education (Sirvis, 1978). To achieve these goals, teachers and other school personnel must become educated about the medical nature of diabetes, and school physicians and nurses should be aware and sensitive to the educational and psychological implications of the disorder.

Teachers can also be very helpful in promoting good behavioral and emotional adjustment in children with diabetes and encouraging them to be as independent as possible and have as normal an experience in school as possible.

Providing children with more than necessary allowances and overprotectiveness are to be avoided since they may lead to development of sickness behavior.

As Melamed and Johnson (1980) observe "youngsters with diabetes are frequently permitted to leave the classroom whenever they feel ill. The child may begin to miss more and more school and to fall farther behind academically. The child's academic deficits may further increase school-avoidant sickness behavior" (p.564). Thus, it is important that teachers communicate with affected children, their families, and professionals offering services to them. Specifically, teachers can play a key role in this communication process by: (a) providing the child with support and guidance and direct teaching of personal and social skills, (b) promoting helpful parental attitudes and realistic expectations, (c) helping the child and family get needed psychological support, and (d) providing helpful feedback to other school personnel.

Teachers should also be cognizant of the warning signs and symptoms of high blood sugar (hyperglycemia) and low blood sugar (hypoglycemia) so that proper treatment be administered (see Table 1).

Table 1. Symptoms, Causes, and Treatment of High Blood Sugar and Low Blood Sugar*

	High Blood Sugar (Hyperglycemia)	Low Blood Sugar (Hypoglycemia)
Symptoms:	(1) develop slowly (2) malaise (3) fatigue (4) warm and dry skin (5) deep breathing (6) sweet or fruity odor to breath (7) drowsiness (8) excessive thirst (9) coma	(1) develop very rapidly (2) headache (3) sudden changes in behavior (4) nausea and vomiting (5) blurred vision (6) restlessness (7) pallor (8) profuse sweating (9) excessive hunger (10) cold hands and feet (11) convulsions (12) coma
Causes:	insufficient insulin or coexisting disease	excessive insulin, strenuous energy output, or insufficient food
Treatment:	insulin injection	concentrated sugar (e.g., candy, honey, fruit, juice)

*Information in this table is based on Christiansen (1975) and Katz (1975).

As mentioned earlier, physical activities represent an important element in diabetes' control. However, there are some special considerations in planning physical education for children with diabetes. French and Jansma (1982) offer the following suggestions:

(1) Participation in physical education activities should be determined through communication with the child's physician and family;
(2) Physical activities must be balanced with food intake and insulin injections, and it is recommended that physical activities be scheduled immediately after a snack, and that insulin amount be adjusted;
(3) Since children with diabetes are prone to infections, injuries must be treated immediately;
(4) To avoid circulatory restrictions tight clothes should not be worn;
(5) Proper weight control should be achieved;
(6) Competitive and extremely exciting physical activities are not encouraged since they may cause psychological stress.

Finally, school physicians and nurses also can have a key role in the educational process. Jones (1980) has summarized the functions of medical practitioners in

relation to educational intervention for children with chronic health impairments as follows:

(a) identifying children with various medical problems that may limit the child's learning abilities;
(b) relating children's needs to the demands of educational programming;
(c) serving as consultants to professionals offering educational services to the child.

CONCLUSION

The primary purpose of this article was to help educators become more knowledgeable about educational implications of insulin-dependent diabetes. The major focus of the article was that while children with diabetes should be treated as normal learners, inappropriate management of this health impairment and its psychosocial ramifications may adversely affect school work. The article outlined the following major roles for teachers: (1) understanding diabetes mellitus and appraising the real limitations it imposes on the child, (2) encouraging the child to develop self-sufficiency and autonomy, (3) maintaining effective communication with the child's family, and (4) working as part of an interdisciplinary team.

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