THE IMPORTANCE OF FAMILY PARTICIPATION IN THE TREATMENT OF ADOLESCENTS WITH TYPE 2 DIABETES

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The Importance of Family Participation in the Treatment of Adolescents with Type 2 Diabetes

Abstract

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Children and adolescents are being diagnosed with type 2 diabetes in near epidemic proportions. There are no other chronic diseases where so much of the daily disease management responsibly rests with clients and their families. Adolescents with type 2 diabetes often have immediate family members with the disease as well.

The purpose of this paper is to analyze factors related to the barriers, facilitators, and motivators of good self-management among adolescents. Cox’s Interaction Model of Client Health Behavior (IMCHB) provides a theoretical framework to help describe the multiple interacting circumstances of health-protective and risk-taking behavior and to identify provider behaviors that affect health outcomes. The review of literature demonstrates the importance of the family in the treatment of type 2 diabetes. Some of the barriers to successful treatment include; high-risk lifestyle in family members, lack of data regarding optimal treatment, and cultural/language barriers. Family nurse practitioners (FNPs) must stress the importance of the clients’ role in self-management and daily decision-making, and assist clients with goal setting. One of the roles of the FNP is to help clients make informed decisions to reach their goals and overcome barriers. Implications for practice are discussed as well as implications for further research.
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The Importance of Family Participation in the Treatment of Adolescents with Type 2 Diabetes

Introduction

There are more than 18 million Americans who currently have diabetes mellitus (DM), approximately 6.3% of the U.S. population (Centers for Disease Control and Prevention Primary Prevention Working Group [CDC], 2004). The majority, 90 to 95%, of all cases of diabetes is type 2. Type 2 diabetes, formerly characterized as adult-onset, is on the rise and children and adolescents are being diagnosed in near epidemic proportions (Ward, 2002). Approximately 20% of new pediatric cases are type 2 (Ward). Obesity, which has reached staggering proportions in developed countries around the globe, is a serious risk factor for type 2 DM. Type 2 DM is mediated by insulin resistance often present in obese individuals (Huang & Goran, 2003). The prevalence of obesity in young people aged 6-11 increased by 54% from 1976 to 1987 (Huang & Goran). As of 2004 it is reported that at least 12% of adolescents are defined as overweight (BMI above the 95th percentile for age and sex) (Willi, Datko, Martin & Brant, 2004). If the projected increase in incidence and prevalence cannot be reversed, the burden of DM and its complications will affect many more people than currently anticipated (American Diabetes Association [ADA], 2000). Diabetes is a chronic disease necessitating lifelong maintenance, resulting in an enormous economic burden on individuals and families. It is also an enormous economic burden on the health care system (Huang & Goran).

Epidemiology

Beginning in the 1970's pediatric diabetologists and other health care professionals have recognized an emerging epidemic of type 2 diabetes among youth, especially minorities (Rosenbloom, Young, Jones & Winter, 1999). Between ages twelve to fourteen is the average age of type 2 diabetes diagnosis (Huang & Goran, 2003). There is a higher prevalence of type 2
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DM among African-American, Hispanics, and Native Americans. The Pima Indians of Arizona have the highest documented prevalence of type 2 DM in the world (Callahan & Mansfield, 2000). Pima youth in the age range 5-14 years have an incidence rate of type 2 diabetes of 1 in 1000 person-years and the 15-24 year age group have an incidence rate of 9 in 1000 person-years (Callahan & Mansfield). Previously, only 2-3% of all diabetes in children was type 2. In 1996, Cincinnati pediatric endocrinologists reported a ten-fold increase in the diagnosis of type 2 diabetes in their referral center between 1982 and 1994. Other centers have reported an increase in the incidence of type 2 diabetes in children and adolescents as well (Callahan & Mansfield). The number of people with diabetes has tripled since 1985, youth and adults alike. In 2004, between 8 and 45% of recently diagnosed diabetes in the U.S. youth is type 2 (Alberti et al., 2004). Information on type 2 diabetes incidence and prevalence in children and adolescence is much less than that for adults. A lack of consistency in data collection, follow-up, and case definition results in misclassification (Alberti et al.).

Risk Factors/Genetics

A strong family history of type 2 diabetes is common among adolescents with the disease (Alberti et al., 2004). Even though a genetic pre-disposition exists, associated variables such as obesity, sedentary lifestyle and a high fat/low fiber diet are also important determinates in the development of type 2 diabetes (Callahan & Mansfield, 2000). In healthy young people increased adipose tissue is associated with increased fasting serum insulin levels and decreased insulin sensitivity, suggesting that body fat may be related to risk of type 2 diabetes (Huang & Goran, 2003). Type 2 diabetes has a female predominance with many large centers reporting a female-to-male ratio of 2:1. The presence of polycystic ovarian syndrome (PCOS) also places a
woman at risk (Ward, 2002). Approximately 30% of adolescent girls with PCOS have impaired glucose tolerance and 4% have type 2 DM (Alberti et al.).

Pathophysiology

Knowledge of the pathophysiology of type 2 DM in the young is sparse, which necessitates extrapolation from adults (Alberti et al., 2004). The primary abnormality early in the course of type 2 diabetes is peripheral insulin resistance (Libman & Arslanian, 1999). The three major physiological abnormalities that contribute to the development of hyperglycemia are: peripheral insulin resistance, excessive hepatic glucose production and impaired insulin secretion (Huang & Goran, 2003). A major role in the development of type 2 diabetes in children appears to be puberty (ADA, 2000). Puberty is a time when rapid and dynamic changes occur in a variety of metabolic systems, including hormonal regulation, body fat and fat distribution, and insulin resistance (Huang & Goran). Mid-puberty appears to be the time of greatest risk when insulin resistance worsens and further increases the risk of developing type 2 diabetes (Huang & Goran).

Diagnosis

The ADA and American Academy of Pediatrics (AAP) published guidelines for the diagnosis and treatment of type 2 DM in 2000 (Ward, 2002). The diagnostic criteria include symptoms of diabetes, plus a plasma glucose concentration $\geq 200$ mg/dl measured without regard to the last meal or fasting plasma glucose $\geq 126$ mg/dl (ADA, 2000). The classic symptoms of diabetes include polyuria, polydipsia, and unexplained weight loss (ADA). Once the diagnosis of DM has been established, additional testing is needed to distinguish which type the client has (Ward).
Screening

As with screening for adults, the ADA recommends that only children at substantial risk for the development of type 2 DM should be tested (ADA, 2000). The Consensus Panel of the ADA recommends testing every 2 years beginning at age 10, or at the onset of puberty if puberty occurs earlier than age 10, if an individual is overweight (BMI > 85th percentile) and has any two other risk factors including family history of type 2 DM in a first or second degree relative, membership in certain race/ethnic groups considered to be at high risk, and/or signs of insulin resistance (ADA). The fasting plasma glucose is preferred over the oral glucose tolerance test because of convenience and lower cost (Callahan & Mansfield, 2000). After the diagnosis of DM has been made screening for retinopathy, nephropathy, and dyslipidemia are important (Callahan & Mansfield). A comprehensive dilated eye exam should be performed annually by an ophthalmologist or optometrist (Abbate, 2003). At least annually clients should be screened for microalbuminuria, thyroid disease, and dyslipidemia.

Treatment

Treatment programs for adolescents must be designed to comprehensively address the lifestyle and health habits of the entire family (Pinhas-Hamiel et al., 2003). The goals of treatment in children and adolescents are to achieve: physical well-being, long-term metabolic control, prevention of microvascular and macrovascular complications and diseases, and psychological well-being (Alberti et al., 2004). A proposed therapy algorithm for asymptomatic children with type 2 DM is to begin with lifestyle intervention approaches to diet and exercise, then add monotherapy, especially the use of metformin. If adequate glycemic control is not achieved with monotherapy then use combinations of two oral medications. If glycemic control remains poor add insulin. Sulfonylureas and thiazolidinediones have not been fully studied in
the pediatric age group (Bloomgarden, 2004). Metformin is the medication most often
prescribed as monotherapy or in conjunction with insulin for type 2 DM in children and
adolescents (Ward, 2002).

Diabetes affects the entire family (Solowiejczyk, 2004). Family relationships are often
strained when a family member has a chronic disease (Tubiana-Rufi, Moret & Czemichow,
1998). Families with high levels of conflict demonstrate low levels of child adherence to the
diabetes treatment regimen (Anderson, 2004). The encouragement and support needed for youth
to adhere to treatment can be provided by positive family relations (Hanson, Schinkel, DeGuire
& Kolterman, 1995). More family oriented interventions need to be developed to address those
aspects of family relations and life stress that can hinder optimal health outcomes in chronic
illness (Tubiana-Rufi et al).

The purpose of this paper is to analyze factors related to the barriers, facilitators, and
motivators of good self-management among adolescents. The goal of this paper is to propose
interventions that family nurse practitioners can use to promote better self-management among
adolescents with type 2 diabetes. Much of the research on the topic of adolescents and diabetes
is related to type 1 DM. This paper helps discover areas where additional research is needed
about type 2 DM in adolescents and their families to meet current and future needs.

Significance to Nursing

With the continued increase in the number of adolescents diagnosed with type 2 diabetes
in the United States and other developed countries, it has become an emerging worldwide public
health problem (Pinhas-Hamiel et al, 1999). Diabetes affects the entire family. There are no
other chronic diseases where so much of the daily disease management responsibility rests with
clients and their families (Solowiejczyk, 2004). Type 2 diabetes diagnosed in young adults
appears to be a more aggressive disease from a cardiovascular risk standpoint (Hillier & Pedula, 2003). Young adults with early-onset type 2 DM have a much higher risk of cardiovascular disease in adulthood, especially myocardial infarction when compared with matched control subjects (Hillier & Pedula). Good metabolic control is crucial during adolescence as the predicted long-term duration of the disease raises the chance for significant lifetime risk of complications and co-morbidity. Many adolescents with type 2 DM have family members that share many high-risk features. These high risk factors include central obesity, high fat/low fiber diets, and exercising fewer than five, thirty minute sessions per week (Pinhas-Hamiel et al.). Families of chronically ill children, including those with diabetes, develop unique ways of coping to help meet the needs of its members; this balance is best achieved when emotional and physical support is available (Gravelle, 1997).

Framework and Theory

The theoretical framework used to guide this literature synthesis is based on Cox’s Interactive Model of Client Health Behavior (IMCHB) (Cox, 1982). See Figure 1 for an example of the IMCHB (Cox). The IMCHB identifies background, cognitive, affective, motivational, and contextual variables that explain health-related behaviors. The model was developed to help describe the multiple interacting circumstances of health-protective and risk-taking behavior and to identify provider behaviors that affect health outcomes. A fundamental tenet of the model is the assumption that clients are capable of making informed, independent and competent choices about their health care behavior, and that those choices are affected by various aspects of the client’s background and by aspects of the client-provider relationship (Cox). Another assumption of this model is that clients should be given the maximum amount of control within the boundaries of their internal and external environments in determining the
quality of their state of health and the actions taken to preserve that state. This model focuses largely on clients' internalization of responsibility for positive health care behaviors. Therefore the model's greatest usefulness is in situations where client personal responsibility and control of the health problem or health promotion effort is vital. Using this model the role of the health professional becomes more of a teacher and counselor, and less of a decision maker (Cox).

The model comprises three elements: client singularity, client-professional interaction, and health outcomes. Client singularity refers to the configuration of the client's background variables, expression of motivation, cognitive appraisal of the health care concern, and the affective response to that concern (Cox, 1982). Background variables include the client's demographics, influence of social group, including family, socioeconomic status, previous health care experiences, and environmental resources. Motivation is an important element within the IMCHB. It identifies choice, desire, and the need for competency and self-determinism as underlying factors in the behaviors exhibited. Feeling competent and self-determining provides clients an intrinsic reward and is a requirement for physical and psychological well-being and serves to strengthen the motivation to continue to engage in the behavior. A client's motivation to participate in a certain behavior may be decreased due to certain sociocultural influences, an increased affective response, or an unreliable cognitive appraisal. The intervention therefore should be directed at the source of the decreased motivation. Cognitive appraisal is the client's interpretation of an existing health state, the behavior choice that will influence that health state, either positively or negatively, and the nature of the relationship with a health care provider. This model supports the view that clients act in accordance with their perceptions of reality. Background variables directly affect the individual's and a family's cognitive appraisal. Emotional needs must be viewed concurrently with cognitive appraisal. Emotions such as
anxiety, fear, anger, guilt and sadness can interfere with the cognitive representation of an issue. Likewise, a cognitive appraisal can generate emotional stimulation (Cox).

In the IMCHB model the client-professional interaction is identified as having a major influence on health care behavior. There are four components to this element: Provision of health information, affective support, decisional control and professional-technical competencies. Provision of health information involves sharing knowledge with clients about their health problem and what can and cannot be done to manage the health concern. This knowledge can then be used to prepare goals for action, reduce negative emotions, and provide feedback about one's sense of competency and self-determinism. In order for this to occur the information provided to clients should be neither too small nor too great and the nature of the information should have meaning to the client. Information and knowledge are necessary for effecting positive health behaviors. However, they alone are not sufficient to change behavior. The relationship the client has with the provider, the amount of control the client perceives themselves to have in the health care setting, and aspects of the client's singularity all influence what health information is processed and how that client and family will use the information (Cox, 1982).

Affective support in this model refers to attending to the client's emotional needs. If the affective response of the client predominates over the cognitive appraisal of health concern, then the intervention must be aimed at reducing the degree of emotional arousal to a level in which the cognitive appraisal might be altered, i.e. providing information that facilitates coping and helps the client to develop a more accurate perception of the problem; which will in turn help to further reduce the level of emotional arousal (Cox, 1982).
Decisional control refers to the individual's expectations of having the power to participate in decision making to achieve desirable consequences. Decisional control increases the client's sense of self-efficacy and facilitates commitment to health-relevant behaviors. Decisional control is related to the cognitive representation of the problem, the motivational status of the client and the informational and affective factors of the interaction (Cox, 1982).

Professional-technical competencies are related to the other factors that define the client-provider interaction. As the client's need for technical skills from the provider increases, i.e. homodynamic monitoring and intravenous infusions, there is less need for decisional control. As the need for technical intervention decreases, the client's own abilities and competencies should be utilized to try and increase their sense of decisional control and self-determinism (Cox, 1982).

This model includes five variables for health outcome measurement: utilization of health care services, clinical health-status indicators, severity of health care problem, adherence to the recommended care regimen, and satisfaction with care. The outcome measures will vary as to its meaning in accordance with the objectives of the study. Positive health behaviors in this model refer to those conditions that maintain or promote the health state of the patient (Cox, 1982).

This model can be adapted to families as well as individuals. When providing family-centered care the family is the unit that is being cared for. The family's interpretation of their family member's health care state, their previous health care experiences, lifestyle, and other background variables all affect decision making, motivation, and problem solving. Adolescents should have the power to participate in decision making as appropriate as this increases their sense of self-efficacy. Parents of adolescents should maintain appropriate involvement in decision making as research has shown those adolescents whose parents maintained some guidance in diabetes management had better metabolic control (Grey, 1998).
Lifestyle Interventions

Lifestyle interventions such as appropriate diet, exercise and weight control are the cornerstone of diabetes management, and if successful will likely benefit blood pressure and lipids as well as glycemia (Alberti et al. 2004). Weight loss is an important goal for anyone who is overweight (BMI 25.0-29.9 kg/m\(^2\)) or obese (BMI ≥ 30.0 kg/m\(^2\)) or who is at risk for developing or have type 2 diabetes (Klein et al., 2004). Weight loss improves glycemic control. A 5% reduction in body weight can improve insulin action, decrease fasting blood glucose, and reduce the need for diabetic medications (Klein et al.). It is important that the goal set for weight loss is both achievable and maintainable in a mutually agreeable time frame (Klein et al.).

Physical activity is important for weight loss, as well as maintaining weight loss. Regular exercise helps to improve insulin sensitivity and glycemic control, and may decrease overall mortality in those individuals who have type 2 DM (Klein et al., 2004). It is becoming more apparent that exercise may be a therapeutic tool in a variety of clients with, or at risk for diabetes (ADA, 2002). Children and adolescents are more likely to agree to fitness goals when they are framed in terms of feeling better, looking better, and doing more (Gahagen & Silverstein, 2003). Physical activity recommendations initially should be modest, based on the client’s willingness and ability, and gradually increase in duration and frequency to 30-45 minutes of moderate aerobic activity 3-5 days a week when possible (Klein et al.). Moderate-intensity physical activity can reduce HbA1c by 0.6% in adults with type 2 DM. This decrease in HbA1c is sufficient to reduce the risk of microvascular complications by 22% (Nelson, Reiber & Boyko, 2002).

The Dance Dance Revolution (DDR) is helping children and adolescents lose weight while having fun (Kreimer, 2004). The DDR is an active video game that plays music while
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players step on a “dance pad” to the direction of colored arrows on the screen. DDR has been very effective because kids enjoy playing video games and this integrates physical activity into the games. DDR gives kids a full body workout. Schools and fitness centers such as the YMCA are beginning to incorporate DDR into their programs (Kreimer). Research is underway to evaluate the use and effectiveness of DDR and its effect on with loss and biological markers such as glucose and insulin (Kreimer).

The American Diabetes Association and the American Heart Association (Klein et al., 2004) recommend that people consume a variety of fruits, vegetables, grains, low-fat or nonfat dairy products, fish, legumes, poultry and lean meats. They also recommend limiting foods that are high in saturated fat, trans-fatty acids, and cholesterol. Sodium should be limited to 2400 mg per day. These recommendations are based on current research regarding the effects of dietary intervention to reduce many coronary heart disease risk factors including hypertension and elevated LDL cholesterol which is important in clients with type 2 diabetes because of their increased risk of cardiovascular disease (Klein et al.).

There are many goals for medical nutrition therapy for all people with diabetes. One of the goals is to maintain blood glucose levels in the normal range, or close to normal to prevent or reduce risk for complications of diabetes. To help reduce the risk for microvascular and macrovascular disease, blood pressure and lipid profiles should be at a healthy level. Another goal of medical nutrition therapy is to improve health through healthy food choices. Individual nutritional needs should be addressed by considering personal and cultural preferences and lifestyle (ADA, 2002).

A ketogenic very-low-calorie diet (VLCD) has been found to be effective in helping adolescents achieve weight loss, lower blood pressure and blood glucose, achieve a normal
HbA1c, and decrease antidiabetic medications (Willi et al., 2004). Willi et al. performed a chart review of 20 children with a mean age of 14.5 years with type 2 diabetes who followed a ketogenic VLCD for an average of 60 days. Many response variables, i.e. BMI, blood pressure, HbA1c, blood glucose, and treatment regimens were examined before, during and up to two years after the diet and compared to the matched control group. By the completion of the VLCD none of the participants remained hypertensive, all but one patient was able to discontinue all antidiabetic therapy, and all lost weight, an average of 11.4 kg (Willi et al.) This was not a prospective, randomized control trial, and used a small sample size. Prospective studies using the VLCD in adolescents with type 2 diabetes are needed to determine optimal dietary protocols and long-term clinical outcomes (Willi et al.).

However VLCDs may have limited usefulness in the treatment of type 2 DM. They are best used only for the short-term, to achieve significant weight loss and rapid improvements in glycemia and lipemia (ADA, 2002). Once the VLCD is stopped and self-selected meals are reintroduced weight gain is common (ADA).

Parental support is a very important factor in the child-fitness equation (McAllister, 2003). One of the best ways to motivate children to participate in physical activity is for the parents to get involved (McAllister). Children learn by watching. If they see their parents leading a sedentary lifestyle that is what they will likely want to do as well (McAllister). Parents who exercise on a regular basis with their family help their children develop a positive self-image, handle everyday stress better, and develop a healthy habit of exercise at a young age (Omaha Boys Town Pediatrics, 2004). Behavior modification strategies should be considered to help decrease high-energy high-fat food intake while encouraging healthy eating habits and regular exercise for the entire family (ADA, 2002).
Motivation is an important element in the IMCHB. A client’s motivation to participate in a certain behavior may be decreased due to certain sociocultural influences, an increased affective response, or an unreliable cognitive appraisal. Interventions to help motivate adolescents to participate in the lifestyle modifications necessary for the treatment of type 2 DM should be aimed at the entire family as children and adolescents whose parents are active are more likely to be physically active themselves.

Barriers to treatment

Healthcare providers need to begin identifying the barriers to successful intervention in order to improve the treatment of type 2 DM (Pinhas-Hamiel & Zeitler, 2003). Perceived barriers to successful treatment of type 2 DM in adolescents include: high-risk lifestyle in family members, a lack of immediate risk to life decreases motivation, lack of data regarding optimal treatment, and cultural/language barriers (Pinhas-Hamiel & Zeitler). Some cultural and socioeconomic barriers that may cause difficulty for some minority youth to follow the recommended diet include; ability to obtain recommended foods, cost of preferred food items and lack of familiarity with suggested foods in one’s diet (Rosenbloom et al., 1999). Many young people diagnosed with type 2 DM are already obese, which can make it difficult to engage in vigorous physical activity (Rosenbloom et al.). The relatively small number of people with type 2 DM versus type 1 DM constitutes a financial burden to designing education specifically for younger clients with type 2 DM (Pinhas-Hamiel & Zeitler).

Adolescents/Social Network

Developmental tasks of the early-to-mid adolescent period include striving to be comfortable with a rapidly maturing body, defining an identity, establishing a new role in the family and gaining acceptance by peers (Anderson, 2001). More current research has
demonstrated that the adolescent period is a time for movement away from dependence on the family, and toward interdependence rather than independence (Anderson). Interdependence necessitates a re-organization where family members renegotiate roles and responsibilities, rather than the adolescent distancing themselves emotionally from parents (Anderson).

There is an abundance of literature related to the topics of adolescents with type 1 diabetes and how families cope when a member has a chronic disease. There is significantly less literature on the topic of adolescents with type 2 diabetes and family functioning. Adolescents with type 1 diabetes face numerous challenges. Management of adolescents with diabetes can be problematic since they face hormonal changes that further complicate metabolic control and have few incentives to adhere to long-term therapy (Pinhas-Hamiel & Zeitler, 2003). The daily management of diabetes can be stressful for adolescents and their families. Research studies have been performed that have evaluated adolescents’ overall psychosocial well being, adjustment, and coping with type 1 diabetes (Grey, Bolyai, Boland, Tamborlane & Yu, 1998). Research has been conducted that has evaluated family characteristics and behaviors associated with poor metabolic control during adolescence (Frey, Ellis, Naar-King, & Greger, 2004).

Adolescents are at high risk for poor metabolic control, and eventually developing long-term complications from diabetes attributable to psychosocial factors such as stressors and coping styles often associated with neglect of self-monitoring, dietary recommendations, and insulin injections (Grey et al.). An important influence on the effectiveness of therapy is how individuals cope with the burdens of a long-term illness (Grey et al.).

The study by Grey et al. (1998) used the stress adaptation model as a framework to evaluate adolescents’ adjustment to chronic illness and quality of life. The study included 52 adolescents with type 1 diabetes, 47 white, 3 Hispanic, and 2 African-American, and relied on
self-reports of stress and adaptation. The inclusion criteria were: attended the Yale Children’s Diabetes Program, were between ages 12-20, had no other major health problems, were treated with insulin for at least one year, had a recent HbA1c between 7.0 and 14.0%, and had no severe hypoglycemic events within the past six months. The limitations of this study include a small sample size (n=52) and small percentage of minorities (9.6%). This study evaluated adolescents’ perceptions of their ability to manage and cope with their illness. The results indicated that overall adolescents perceived their quality of life as good, had a high satisfaction with life, and that diabetes had a moderate impact on their quality of life. They felt diabetes was difficult to deal with, but felt confident in their ability to manage diabetes. The coping strategies utilized were rebellion and ventilating as opposed to more constructive behaviors. The adolescents in the study who were depressed were more likely to report poorer quality of life. Quality of life was not associated with metabolic control. Those adolescents whose parents maintain some guidance and control in the management of diabetes had better metabolic control.

The cognitive appraisal component of the client singularity element in the IMCHB refers to the client’s interpretation of their health status (Cox, 1982). Clients act in accordance with their perceptions of reality. Feelings of depression, guilt, anxiety and fear can interfere with the cognitive representation of an issue. A client’s motivation to participate in self-monitoring behaviors may be decreased due to an increased affective response. Therefore, an appropriate intervention would be identification and treatment of depression in adolescents with diabetes.

The results of the Diabetes Control and Complications Trial (DCCT) suggest that most people with type 1 diabetes should receive intensive treatment designed to lower glucose and HbA1c as much as safely possible to reduce the risks of microvascular and neuropathic complications (Diabetes Control and Complications Trial Research Group, 1993). The UK
A prospective diabetes study (UKPDS) clinical trial showed that intensive treatments to improve glucose control and lower HbA1c in type 2 diabetes reduces the risk of complications. Each 1% decrease in HbA1c was associated with a 37% reduction in risk for microvascular complications and a 21% decrease in the risk of any end point or death related to diabetes (Stratton et al., 2000). Intensive treatment places an additional burden on clients and their families (Grey et al., 1998). Cross-sectional and longitudinal investigations have discovered that poor treatment adherence and poor metabolic control are associated with family conflict among youths with type 1 DM (Wysocki, Bubb, Greco, White, & Harris, 2001). Characteristics of families related to poor metabolic control included frequent arguments about diabetes, dysfunctional family interaction patterns, lack of conflict resolution and marginal knowledge about diabetes and its management (Frey et al., 2004).

The client-professional interaction in the IMCHB has a major influence on health care behavior. A client’s ability and motivation to adhere to the recommended care regimen is affected by many variables. The health care professional must assess clients’ need for affective support. A client may need to have information that helps the family with coping and conflict resolution. Knowledge regarding the health care problem and ways to help with management need to be provided by the health care professional.

Type 2 diabetes differs from type 1 diabetes in many ways. Adolescents with type 2 diabetes often have immediate family members with the disease as well. Poor eating habits appear to be characteristic of families where at least one member has DM (Pinhas-Hamiel et al., 1999). A few studies have found that binge eating is present in about one-third of clients seeking weight control treatment. Approximately 14% of clients with type 2 DM reported occasional episodes of binge eating. This finding is significant because of an apparent association between
disordered eating behavior and diabetic retinopathy in adolescent girls with type 1 DM (Pinhas-Hamiel et al.). In one study, the mothers of the adolescent participants had poor type 2 diabetes control themselves, making it even more difficult for the adolescent to control his or her diabetes (Pinhas-Hamiel et al.). Many of the families had adults previously diagnosed with type 2 DM that had attended nutrition education themselves. This study found that families had a good understanding of the desired diet but had been unable to carry it out (Pinhas-Hamiel, et al.).

Good metabolic control in adolescents with type 2 diabetes is difficult to achieve (Pinhas-Hamiel & Zeitler, 2003). Type 2 diabetes presents unique challenges since successful treatment requires modification of well-established, likely poor, lifestyle habits to have brought about the development of type 2 diabetes in the first place (Pinhas-Hamiel & Zeitler). There are a number of perceived barriers to the treatment of adolescents with type 2 diabetes that have been identified. These include prevalence of high-risk lifestyle in family members, lack of immediate risk to life decreases motivation, lack of data regarding the best possible treatments, prevalence of eating disorders and depression, and cultural and language barriers (Pinhas-Hamiel & Zeitler).

Implications for practice

Family nurse practitioners (FNPs) are valuable members of the health care team. Research has shown that nurse practitioners provide high-quality, cost-effective, and individualized care (Valentine, Dulkarni & Hinnen, 2003). As primary care providers of patients across the lifespan FNPs have many responsibilities regarding the diagnosis and management of type 2 diabetes.

The management of diabetes involves teaching clients the skills of self-monitoring, meal planning, medication administration, and the importance of physical activity. Clients should be referred to diabetes self-management classes that meet national standards. Proper management
of diabetes necessitates ordering appropriate diagnostic testing and medications. However, the
daily management of diabetes is in the hands of clients and their families. The choices made
each day by clients as they care for their diabetes have a greater impact on their outcomes than
those made by health professionals (Funnell & Anderson, 2004). Clients are in control of which
health care recommendations they choose to implement or ignore (Funnell & Anderson). The
consequences of these decisions directly affect clients, they have the right and the responsibility
to manage diabetes in the manner that is best suited to their life.

In traditional client education, the healthcare provider is the expert and clients are
expected to follow the recommendations of their providers. When clients fail to follow the
treatment regimen they are often labeled as non-compliant. The prevailing goal of client
education should be to support the client’s autonomous decision-making, not to get clients to
follow orders from health care providers (Redman, 2004). As chronic illness became more
prevalent an approach was needed that recognized that clients are in control of and are
responsible for the numerous daily decisions regarding disease management. To be effective a
self-management plan had to fit clients’ goals, priorities, and lifestyle as well as their diabetes
(Funnell & Anderson, 2004). In the 1990s more theoretically based client-centered models,
sometimes known as patient empowerment models, evolved from the primarily didactic

A complement to traditional client education is self-management education. Self-
management education allows clients to identify their problems, teaches problem solving skills
and provides techniques to help patients make decisions, take appropriate action, and modify
actions as they encounter changes in the disease (Bodenheimer, Lorig, Holman, & Grumbach,
2002). A key feature of self-management education is the client generated short-term action
plan. The action plan should be realistic, and clients should feel confident that they could accomplish the behavior. Asking clients to rate their confidence on a 0 to 10 scale is a useful tool. "On a scale of 0 to 10, how sure are you that you can walk around the block after school on Monday, Tuesday, and Thursday?" If the answer is 7 or higher, the action plan is likely to be accomplished, if the answer is below 7, the action plan should be revised to be more realistic in order to avoid failure (Bodenheimer et al.). These short-term action plans should help clients to reach their long-term goals.

Another important element of self-management education is that clients learn problem-solving skills that are useful for identifying problems from their own point of view. Allowing clients to define their problems can be enlightening. Asking clients "what is your main problem?" can reveal some unexpected answers. A client having difficulty in school, or caring for an ill family member may define their situations much differently than the health care provider (Bodenheimer et al., 2002). Adherence is more likely if clients and their provider agree on which medical problems are important and how to evaluate therapeutic success. Discussion of treatment goals and specific strategies is important and is associated with improved self-efficacy and self-management (Redman, 2004).

Diabetes management is challenging. Families need a great deal of support in helping to implement lifestyle changes. It is difficult to provide families with all of the education and support needed during a primary care visit. Multidisciplinary team management is highly recommended for youth with type 2 DM (Gahagen & Silverstien, 2003). Integrating lifestyle interventions into practice will require that healthcare providers have access to effective programs and providers of lifestyle programs by referral (CDC, 2004). The interventions that are provided must be linked to the community, its culture, and its values (CDC). FNPs are
successful teachers because they bring strong interpersonal skills and an understanding of the importance of communication. Teaching requires the development of positive relationships with clients and their families (Joel, 2004).

The majority of adolescents with type 2 DM are obese, therefore lifestyle changes that incorporate dietary and activity intervention for with control should be initiated (Libman & Arslanian, 1999). Dietary and activity interventions should focus on the entire family since type 2 diabetes is associated with a strong family history (Libman & Arslanian). Lifestyle changes are the most successful when the entire family is motivated to engage in the changes (Huang & Goran, 2003). Diabetes management must take into consideration clients' age, growth and development issues, cognitive functioning and family dynamics (Solowiejczyk, 2004).

FNPs need to encourage families to be physically active. Discussing ways in which families can be active together is helpful. There are many ways families can participate in activities together. Discuss with family what activities interest them. Encourage the children to choose activities the entire family can participate in. Families can dance to music at home, perform aerobic exercises, play outdoors, go for walks, go swimming, or play tennis. In addition to encouraging physical activity FNPs need to assist the family in setting goals that are achievable and maintainable. All clients should be assessed for level of fitness and recommendations should be based on the client's needs and current condition (Gahagen & Silverstein, 2003). The recommendations should be culturally appropriate and designed to fit the family’s lifestyle.

To help implement self-management in practice healthcare providers should stress the importance of the clients’ role in self-management and daily decision-making, acknowledge the clients’ right and responsibility to make choices, and describe our role as a partner in the process.
The beginning of each visit should start with an assessment of clients' concerns, questions and progress toward goals. The care plans should be reviewed and revised as needed based on the patients' and providers' assessment of its effectiveness. We should assist clients in choosing one area of self-management on which to concentrate that can be reinforced by all of the team members (Funnell & Anderson, 2004).

In a review of chronic disease care the authors (Norris et al., 2001) concluded that effective programs in chronic disease management include collaborative problem definition, goal setting, planning, continued self-management training, and sustained follow-up. Chronic illness programs emphasize the importance of responding to clients' individual needs, readiness to change and self-efficacy. The authors also noted that effective diabetes management programs must be uncomplicated, individualized to a person's lifestyle, and reinforced over time, they must value an individual's habits and routines and incorporate social support (Norris et al.). Few of the studies in the review of self-management education in diabetes contained interventions where clients learn problem-solving skills and develop action plans; most involved the teaching of diabetes information and technical skills (Norris et al.). Collaborative education produced more favorable results than didactic education (Bodenheimer, et al., 2002). No firm conclusions can be made about the impact of self-management education on clinical outcomes in diabetes at this time (Bodenheimer, et al.).

Some of the barriers that impede widespread implementation of self-management education include: a lack of trained personnel makes self-management courses unavailable in many primary care settings, people with chronic illnesses have been socialized into the medical model, which encourages dependence on professionals, rather than a client-provider partnership, this barrier prevents recruitment of some clients into self-management programs, and Medicare,
Medicaid, and most private health insurance companies do not reimburse self-management education (Bodenheimer, 2002).

The IMCHB provides an excellent framework for using self-management education in practice. The client-professional interaction element supports many of the concepts of self-management education. The provision of health information component refers to giving clients the knowledge about the danger of their health care problem as well as ways to deal with the problem. This knowledge can then be used to develop goals for action, reduce negative emotional arousal, and provide feedback about one's sense of competency and self-determinism (Cox, 1982). Asking clients to define their problems in their own terms helps provide affective support to patients. To deny affective support to a client for whom that need is vital will result in poor client satisfaction.

The decisional control component of the IMCHB refers to the client's expectations of having the ability to participate in making decisions to obtain desirable outcomes (Cox, 1982). Decisional control increases the client's sense of self-efficacy and facilitates commitment to adhere to health recommendations. An important concept in self-management is self-efficacy. The theory of self-efficacy is that successful achievement of the action plan is more important than the plan itself (Bodenheimer et al., 2002). Action plans are formulated by clients as something they want to achieve. Action plans are not provided for them. The purpose of action plans is to give clients confidence in managing their disease, which fuels internal motivation. Improved personal attitudes and motivations are more effective than knowledge in improving glycemic control (Norris et al., 2001).

Patient empowerment is not a technique, it is a vision that guides each interaction with our clients and necessitates new roles for both clients and providers (Funnell & Anderson, 2004).
Empowerment helps clients discover and develop their own ability to be responsible for their lives. The role of the client is to be a well-informed active partner in his or her own care. The role of the FNP is to help clients make informed decisions to reach their goals and overcome barriers through education, appropriate recommendations, expert advice, and support. A collaborative relationship between FNPs and clients becomes collaboration between equals; professionals bring knowledge and expertise about diabetes and its management, and clients bring expertise on their lives and what will work for them (Funnell & Anderson, 2004).

Using the IMCHB the variables most useful for evaluating health outcomes would be adherence to the recommended care regimen and satisfaction with care (Cox, 1982). Using self-management education clients are more likely to adhere to recommendations from healthcare providers and use action plans that allow them to achieve goals to obtain desired outcomes. Satisfaction with care is likely to increase as clients are empowered to participate in their care and have better communication with providers.

Implications for further research

A large population-based study of the etiology and treatment of type 2 diabetes is greatly desirable (Pinhas-Hamiel et al., 1999). Exploration is needed about how youths diagnosed with type 2 diabetes understand their disease and rational for the prescribed lifestyle and behavioral changes (Rosenbloom et al., 1999). Research is needed to examine which specific educational interventions have the greatest impact on diabetes outcomes (Bodenheimer, et al., 2002). Further research is necessary to develop training modules for health care professionals to learn how to integrate a family approach into their clinical practice (Sołowiejczyk, 2004). Studies are needed on how to best implement lifestyle intervention into current health care systems. Who will be responsible for administration of lifestyle intervention? A new category of health interventionist
may be required to deliver and sustain lifestyle intervention for the large number of people who will need these services. Studies are also needed to evaluate the economics involved with lifestyle interventions (CDC, 2004). Healthcare providers need to begin identifying some of the barriers to successful intervention in order to improve the treatment of type 2 DM (Pinhas-Hamiel & Zeitler, 2003). Analysis of socio-cultural health beliefs and behaviors as well as the knowledge level about the disease is necessary in order to develop culturally relevant prevention programs (Rosenbloom et al). Research on how people learn best across cultures would be very beneficial (Pinhas-Hamiel & Zeitler).

Summary

The review of literature demonstrates the importance of the family in the treatment of diabetes. Type 2 diabetes is on the rise in children and adolescents. Research has shown these young people often live with family members who share many risk factors for the development of type 2 DM. Lifestyle interventions are crucial in the treatment of diabetes. Interventions that involve the entire family are necessary for successful treatments. Using the IMCHB nurse practitioners can help clients learn about the danger of their health care problem, ways to deal with the problem, develop goals for action, and reduce negative emotions. Collaboration with clients offers the best opportunity to achieve treatment goals and client satisfaction.
References


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Fig 1. Interaction model of client health behavior

- **Elements of Client Singularity**
  - Background variables
    - 1. Demographic characteristics
    - 2. Social influence
    - 3. Previous health care experience
    - 4. Environmental resources

- **Elements of Client-Professional Interaction**
  - Intrinsic motivation
  - Cognitive appraisal
  - Affective response

- **Elements of Health Outcome**
  1. Utilization of health care services
  2. Clinical health status indicators
  3. Severity of health care problem
  4. Adherence to the recommended care regimen
  5. Satisfaction with care

- Nonrecursive block