Stress Adaptation in School Aged Children Hospitalized with Type I Diabetes

The Ohio State University

Kristin Blair
“A person suffering from a chronic illness is shaken to one’s foundations,” according to Delmar, Boie, Dylmer, Forup, Jacobsen, Moller, Sonder and Pedersen (2005). Chronic illness spans all aspects of a person's life. Its effects can reach into an individual's physical, sensory, psychiatric, learning, and cognitive functions. These effects from chronic illness have been tied to negative psychosocial adaptations such as anxiety, depression, denial, and anger (Livneh, Lott, & Antonak, 2004). Type I Diabetes Mellitus (DM) is such a chronic disease. It impacts nearly every aspect of the individual’s life. Common concerns include eating and exercise patterns, recognition of complications related to diabetes, and administration of insulin to maintain proper blood glucose levels (Melville, 2005). Approximately 206,000 youth under the age of 20 years have DM. One in 400 to 500 youth have Type I (Berry, Urban, & Grey, 2005). With the connection between chronic illness and depression, children with diabetes should be screened for psychosocial disorders. The benefits of screening children for such problems include early diagnosis, treatment planning, monitoring, and evaluation (Klein, Dougherty, & Olino, 2005). The aim of this study is to describe the level of stress adaptation manifested by children hospitalized with Type I DM.

Theoretical Framework

The stress adaptation and resilience model (Emery & Forehand, 1996) was used as the basis of this study (see Figure below). The stressor in this study is hospitalization with Type I diabetes. Appraisal of the stressor and stressor effects are moderated by stable characteristics of the child such as age, gender and genetic predispositions. Mediating variables are characteristics of the child and environment that are changeable with interventions, such as coping strategies and family environment. Adaptation to the stressor of being hospitalized with Type I diabetes was measured by scores on anxiety, depression and quality of life instruments. Resilient adaptation was defined as scores
within the normal range; negative adaptation was defined as scores in the high risk or clinical range.

Review of Literature

Type I Diabetes Mellitus

Type I DM is considered a chronic autoimmune disease. It is an endocrinological disorder characterized by abnormal glucose metabolism related to abnormal production and/or the utilization of the hormone insulin. Insulin is required by the body to metabolize glucose in the blood stream. Diabetes is characterized by the presence of an elevation in the blood glucose concentration. In Type I DM, destruction of the insulin producing pancreatic β cells results in complete insulin insufficiency. Because of the lack of insulin production, it has also been termed insulin-dependent DM and juvenile-onset DM. Type I accounts for 10% to 20% of all diabetes cases. Genetic susceptibility and environmental factors may play a role in the development of Type I. The exact pathogenesis, however, is unknown (Melville, 2005).
Complications of Type I DM

Compared to adults, youth with Type I DM have a shorter duration of symptoms prior to diagnosis. They present with polydipsia, polyuria, and/or polyphagia which are all related to the elevated blood glucose level. At the time of diagnosis, 30% to 40% are in diabetic ketoacidosis and are hospitalized for diagnosis and treatment (Berry, Urban, & Grey, 2006). Hospitalization is a stressful time for children and parents, as they learn the diagnosis and its long-term implication. Prior to discharge, children and parents are given education about Type I DM and training in insulin injections. Regular out-patient clinic appointments are scheduled for long-term management of this chronic condition.

Long term complications associated with DM involve vascular damage to many organs. Microvascular disease affects the eyes, kidneys, and nerves. Retinopathy is the leading cause of adult blindness. It can be detected in 50% of diabetic patients by 10 years. Nephropathy develops in 35% to 45% of patients. It progresses from microalbuminuria to complete end-stage renal disease. Third, neuropathy is common in diabetic patients. Most commonly, sensory nerve damage affects sensations of pain, proprioception, light touch, and vibration. These losses in perception may lead to unnoticed lesions and potentially infections. Finally, diabetic patients experience 2 to 4 times the coronary artery disease compared to those without. Peripheral vascular disease increases 30-fold. Incidences of cerebrovascular disease increase 2 to 6 times. The risk of these complications can be decreased with glucose management and intensive insulin therapy (Melville, 2005).

Management of Type I Diabetes Mellitus

The Diabetes Control and Complications Trial Research Group (1993) reported a statistically significant delay of the progression of DM when near normal blood glucose levels were maintained. In the DCCT, approximately 60% of patients in an intensive insulin treatment group experienced a reduction in retinopathy, nephropathy, and
neuropathy. This is important because the implementation of an intensive insulin therapy regimen greatly affects the patient. First, the patient must understand correct administration and dosing of insulin as well as its effects on diet and exercise management. Meals must be matched with the administration of subcutaneous insulin. Patients must eat “by the clock” as opposed to when they are hungry. Also, the content of the meals must be examined. Carbohydrates increase blood glucose levels, thus ‘carbohydrate counting’ is implemented in order to make the necessary insulin adjustments. Activity must be monitored because it decreases blood glucose levels in most cases. With so many effects on blood glucose concentrations, concerns of hypoglycemia and hyperglycemia are constant (Melville, 2005).

Hypoglycemia is defined as a blood glucose concentration of less than 50 mg/dL. The pathophysiology of hypoglycemia is characterized by the release of epinephrine and the lack of glucose to fuel the nervous system. The epinephrine provokes sweating, tremors, a sensation of hunger, and anxiety. The nervous system triggers headache, mental dullness, and fatigue. Severe hypoglycemia progresses to confusion, mental disturbances, unconsciousness, seizures, and death. For these reasons, individuals with Type I diabetes should carry snacks high in carbohydrates at all times (Melville, 2005). Self-monitoring is a must. Glucose levels should be checked each morning upon awakening, potentially 1 hour before and after each meal, and before bedtime (Melville, 2005). Patients should carry a glucometer and necessary testing supplies with them.

The rigors of diabetes management are obvious. Barriers to the ideal glycemic control include diet, irregular schedules, lack of parental involvement, peer pressure, drugs and alcohol, fear of hypoglycemia, and finances. Anxiety and stress is demonstrated in the DAWN study. Approximately half of type I diabetics questioned feared the worsening of their condition. An equal proportion was ‘very worried’ by their risk for hypoglycemic events. A sense of ‘success’ or ‘failure’ from self glucose
monitoring can affect the Type I DM. This can also lead to feelings of guilt and anxiety (Davies, 2004).

Depression and Anxiety in Children with Type I Diabetes

Grey, Whittemore and Tamborlane (2002) conducted a synthesis of the literature on the natural history and correlates of comorbid diabetes and depression in children and adolescents. They found that “children with diabetes have a two-fold greater prevalence of depression, and adolescents up to three-fold greater, than youth without diabetes” (p. 907). Depression and anxiety are both characterized by a high level of distress. The difference is that depression is characterized by a high level of anhedonia, whereas anxiety is characterized by a high level of physiological hyperarousal.

Anhedonia is the inability to experience pleasure from activities that would be usually pleasurable. Depressive disorders are relatively uncommon in children but are more frequent in adolescents. In community samples, the six month prevalence of depression disorders is 1% to 3% in school-age children. In the clinical settings, rates of 8% to 15% are estimated in children. Depressive disorders are a concern because they are associated with significantly poorer psychosocial functioning in children and adolescents. They exhibit impairment in family, school, and peer functioning (Klein, Dougherty, & Olino, 2005).

Research Questions

In a group of children hospitalized with Type I diabetes:

1. What psychological, physical, and social manifestations of stress adaptation do they report?

2. Are there differences in psychological, physical, and social manifestations of stress adaptation according to age, sex or number of previous hospitalizations?
Methods

Design.

This cross-sectional descriptive study was conducted by obtaining information from hospitalized children with Type I diabetes about their stress-related symptoms, and their immediate physical, psychological and social quality of life status.

Participants

The target population was children who were hospitalized in a large regional children’s hospital related to their diagnosis of Type I diabetes. Inclusion criteria were children ages 6 to 18, in age-appropriate grades in school, speak and understand English, have parental permission to participate, and assent to participate themselves. Otherwise, there were no other exclusion criteria. The sample was obtained from a larger study of hospitalized children’s perceptions of the quality of their nursing care (Principal Investigator: Nancy Ryan-Wenger; funded by the Robert Wood Johnson Foundation). Institutional Review Board approval of this protocol was obtained from The Ohio State University and Nationwide Children’s Hospital before the study began. The appropriate parental consents and HIPAA releases, and child assents were obtained before any data were collected. Children and their parents were informed that they do not have to participate in this study and that their participation would not influence their quality of care. Children could decide to drop out of the study at any time during the process, and could choose not to answer all questions.

No power analysis was conducted because this was a single group descriptive study in which no inferential statistics were used. The total number of children who met the inclusion criteria was 19. Their demographics were:

- Age: 9 to 18 years, mean = 13.7
- Gender: 9 (47.4%) male and 10 (52.6%) female
- Race: 13 (68.4%) white, 6 (31.6%) Black
Instruments

1. Child’s Demographic Form

Demographic data such as age, sex, grade in school, race/ethnicity and zipcode (as a proxy for socioeconomic status) were used to describe the sample.

2. PedsQL Present Functioning Scales (PedsQL-PF)

The PedsQL-PF (Sherman 2006) is a brief instrument designed as an “ecological momentary assessment” of children’s and adolescents’ “present, at-the-moment functioning” (p. 1). The 6 items measure anxiety, sadness, anger, worry, fatigue and pain on a scale of 0 to 3. The total score is an average of the 6 item scores, and represents a ratio level of measurement. High scores reflect greater emotional distress. An Emotional Distress Summary Score is derived from the average of the anxiety, sadness, anger and worry items. In a study of 70 hospitalized children ages 5-17 years, Cronbach alpha reliability of the self-report version of the instrument ranged from 0.72 to 0.84 upon admission and two hours later. Construct validity was supported by moderate to large correlations between Emotional Distress scores and Pain scores.

3. Revised Children’s Anxiety and Depression Scale (RCADS)

The RCADS assesses the anxiety and depression in children through a 47 item screen (Chorpita, et al., 2000). The items are scored on a scale from “never” to “always” represented as a score of 0 to 3. The total scoring covers 6 subscales: social phobia, panic, major depressive, generalized anxiety, separation anxiety, and obsessive-compulsive disorder. Reliability of the RCADS was supported by total and subscale Cronbach alphas of 0.71 to 0.85. Validity was supported by Pearson correlations of 0.65 to 0.80 with the Children’s Depression Inventory 0.65 to 0.82 with Spence’s Children’s Anxiety Scale.
Results

Research question #1 was: What psychological, physical, and social manifestations of stress adaptation do children hospitalized with Type I diabetes report? The figure below shows the percentage of children with anxiety and depression scores in the normal (resilient), high risk, and clinical range (negative adaptation).

![Pie chart showing percentage of children with anxiety and depression scores]

- **Normal range:** 90%
- **High risk range:** 6%
- **Clinical range:** 4%

The graph below shows the distribution of children’s responses to each item in the Quality of Life-Present Functioning Scale.

![Bar chart showing distribution of children’s responses]

Research question #2 was: Are there differences in psychological, physical, and social manifestations of stress adaptation according to age, sex or number of previous hospitalizations? There were no significant differences between boys and girls in QOL, anxiety or depression scores, nor significant relationships among age or total number of previous hospitalizations and QOL, anxiety or depression scores.
Post hoc analyses showed that even with this small sample there were significant relationships between QOL (high scores mean lower quality of life) and Separation Anxiety ($r = 0.484, p = 0.036$) and QOL and Depression ($r = 0.462, p. = 0.046$).

Discussion

Ninety percent of the children were within normal range for anxiety, depression, and quality of life scores which suggests that even during hospitalization they were adapting well. We did note that 65% of the children were a little bit or somewhat worried. Nurses should initiate conversations about what children may be concerned about and reassure them when possible and give them accurate information if they have unrealistic worries. A total of 80% of the children stated they were “tired” which is a common symptom of the disease that also influences daily management practices.

Because undiagnosed depression is prevalent among children, early and periodic screening for psychological disorders are recommended among school children with or without chronic illnesses. Benefits of early and periodic screening include early diagnosis, treatment planning, monitoring, and evaluation of depression. The six item PedsQL-PF may be a useful screening tool because of the significant relationship between this instrument and anxiety and depression scores on a larger instrument that measures anxiety and depression.
References


