Diabetes Across the Life Span

CHALLENGES IN PEDIATRICS
Disclosures

- I have nothing to disclose
Objectives

- Identify challenges in the management of type I diabetes in children
- Formulate a plan of care for children with diabetes
Diabetes Management in the Pediatric Setting

- Acute complications such as DKA and Hypoglycemia are the primary concerns in the pediatric population.
- The management of children with diabetes focuses on glycemic control and is not as concerned with the secondary complications that are more commonly seen in the adult population.
Diabetes

Classifications

- **Type I** - characterized by insulin deficiency often associated with autoimmunity. Still remains the most common type of diabetes in the pediatric patient.
- **Type 2** - characterized by insulin resistance, often associated with obesity and family history. Less common, but the incidence in pediatrics is on the rise.

The cause of type I diabetes is not known.

The current theory is that there is a genetic predisposition in people that is activated by a trigger leading to an autoimmune response that results in the destruction of the pancreatic beta cells which leads eventually to an insulin deficiency.

- Reuter-Rice; Pediatric Acute Care: A Guide for Interprofessional Practice 2012
Almost 30 million children and adults in the United States have diabetes.

About 208,000 people younger than 20 years of age have diabetes (Type I or Type II). This represents about 0.25% of this age group or approximately 1 in 400.

18,436 youth are newly diagnosed with type 1 diabetes annually.

5,089 youth are newly diagnosed with type 2 diabetes annually.

Many children might present in the outpatient setting with the classic symptoms of polydipsia, polyuria, and weight loss.

- The classic symptom of polyuria sometimes are difficult to assess in the pediatric patient but may become more apparent with further questioning regarding bedwetting, daytime incontinence, unusually wet diapers, or nocturia.
- Weight loss might be the presenting symptom in about half of children.
- DKA may be the presenting symptom in approximately 30% of children.
- Younger children and those from lower socioeconomic backgrounds are more likely to present with DKA.
- About half of children less than 3 years present with DKA.

Initial Presentation

“A child is not a miniature adult”

- Infants and toddlers in DKA are more likely to be misdiagnosed. It is more difficult to obtain the classic history of polydipsia, polyuria and weight loss.
- Adolescents are more likely to present in DKA due to omission of insulin.
- Delay in treatment from lack of recognition leads to more severe dehydration related to the DKA process.
- Young children are more vulnerable to dehydration, and the large surface area to body mass in children requires greater care and precision in delivering fluids and electrolytes.
- Auto regulatory mechanisms are not as well developed in children so they may be more predisposed to cerebral edema.

Inpatient Plan of Care

- Team approach
  - Inpatient: nursing, physician, social service, psychology, nutrition
- Depends on the emotional and physical readiness of the child and family to learn
- All caregivers need to be present
- Start with survival skills
  - Checking blood sugars
  - Drawing up insulin
  - Giving shots
  - Managing hypoglycemia
- At discharge newly diagnosed patients are referred to outpatient clinics for further education and reinforcement of teaching.

http://www.ucdenver.edu/academics/colleges/medicalschool/centers/BarbaraDavis/OnlinereBooks/books/Pages/UnderstandingDiabetes.aspx
Age Based Care

- The management plan needs to consider:
  - Child’s age
  - Cognitive ability
  - Emotional maturity
- Goals need to be individualized
Infants/Toddlers Age Related Responsibilities and Traits

(Recopied from Chase, P. Understanding Diabetes: A Handbook for people who are living with diabetes)

- Infants <1 year have the highest risk of hypoglycemia
  - It is difficult to detect
  - Unable to communicate symptoms
  - Frequent Feeding schedule is a challenge
- Toddlers (1-3 years)
  - Issues are similar to infants
  - Parents must learn to recognize hypoglycemia
  - Erratic food intake and activity levels
  - Need for frequent blood sugar monitoring

Diabetes Related

- Parents are responsible for all care
- Acceptance of diabetes care as part of normal life
- Often give shots or pump boluses after a meal to see what has been eaten
Preschool (3-4 years) and Early School Age (5-7 years)

- Parents are still primarily responsible for all care
- Some 5-7 year old children may be able to start to participate in their own care
  - Child is learning to be more cooperative with blood sugar checks and insulin shots
  - Child is still inconsistent with food choices and shots are still usually given after meals
  - Gradually learning to recognize hypoglycemia
  - Undeveloped concept of time
- Childcare providers and school nurses need to be involved in care
School Aged (8-12 years)

- Child may start to assume some of the daily tasks and management but still needs to be closely supervised by an adult
  - Can learn to do their own blood sugar monitoring
  - By age 10-11 can draw up own insulin and give shots – still need to have adult supervision
  - Can make food choices and learn carb counting
  - Can recognize and treat hypoglycemia
- At this age it is important to facilitate the development of peer relationships
- Participation in school activities is important
- Diabetes “camps” can be helpful activities
Adolescents Ages 13-18 years

- Teens are gradually developing independence and their own identity.
- This age group is very variable between wanting independence and needing supervision.
- Capable of doing the majority of shots or insulin and pump management and blood sugar checks.
- Knows carb counting and diet.
- Gradually recognizes the importance of optimal blood sugar control to prevent later complications.
- More time is spent with peers.
- Fitting in and body image are major concerns.
- Some research has shown the use of internet educational programs has improved outcomes of adolescents with Type 1 Diabetes.
Outpatient Management

- Care Team Should include:
  - Endocrinologist
  - Registered Dietician
  - Diabetes Educator
  - Social Worker
  - Mental Health Professional
  - School Nurse
  - Family
Outpatient Management
Glycemic Control

- Glycemic Control
  - Current recommendation from the ADA on A1C goal for pediatric patients across all age groups is < 7.5%
  - Current recommendations support individualizing the target to as close to normal as possible with avoidance of repeated episodes of severe hypoglycemia
  - This is a change from previous tradition of recommending higher A1C targets for young children

Type 1 Diabetes Through the Life Span: A Position Statement of the American Diabetes Association; Diabetes Care; 2014
Outpatient Management Glucose Monitoring

- **Glucose Monitoring**
  - Self monitoring of blood glucose is an important part of outpatient management
  - Studies have shown lower A1C levels with increased frequency of self monitoring
  - It is important to regularly evaluate technique and ability
  - Children should have additional blood glucose checks if the parent/caregiver is concerned a change in behavior may be the result of low/high blood glucose levels
- Continuous glucose monitoring is available across age groups
Outpatient Management Nutrition

Nutrition Therapy is an important part of the treatment plan for all individuals with Type 1 Diabetes

- Focus should be on maintaining a healthy body weight at all ages
- Education should focus on the effect of food on blood glucose levels
- Education on how to apply the food plan in different situations in order to prevent hyper and hypoglycemia
- Monitor carbohydrate intake (carb counting)
- Use snacks to prevent insulin reactions
- Balance carb intake and insulin carefully
Basic Recommendation for Type I diabetics is the same as for all children and adults

- Children should be encouraged to have 60 minutes of physical activity daily
- There are challenges associated with this because exercise does increase the risk for hypo and hyperglycemia
  - ADA recommends that the blood glucose level should be at least 100 mg/dl or higher prior to exercise
  - School plans should include written plans of care for exercise, especially student athletes
  - Simple carb sources should be available before, during and after exercise
Extra Foods to Cover Exercise

Recopied from Chase, P. Understanding Diabetes: A Handbook for people who are living with diabetes

- **Short (15-30 minutes) length of exercise**
  - BSR < 80 - 8 oz sports drink or 4-6 oz juice
  - BSR 80-150 - fresh fruit or any 15gms carb
- **Longer (30-120 minutes)**
  - BSR < 80 - 8 oz sports drink or 4-6 oz juice + ½ sandwich
  - BSR 80-150 - 8 oz sports drink or milk + fresh fruit
  - BSR > 150 - ½ sandwich
- **Longest (2-4 hours)**
  - BSR < 80 - 8 oz sports drink or 4 oz juice + whole sandwich
  - BSR 80-150 - Fruit, whole sandwich
  - BSR > 150 - whole sandwich
Children and Adolescent Clinical Evaluation  

<table>
<thead>
<tr>
<th>Clinical Evaluation</th>
<th>Initial Exam</th>
<th>Annual</th>
<th>Quarterly Follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ht, Wt, BMI, BP</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>General Physical Exam</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Thyroid Exam</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Comprehensive foot exam</td>
<td>If needed based on age</td>
<td>Older teens w/ dx since childhood</td>
<td></td>
</tr>
<tr>
<td>Visual Foot Exam</td>
<td></td>
<td>x</td>
<td>If needed for high risk</td>
</tr>
<tr>
<td>Retinal Exam by specialist</td>
<td>x</td>
<td>x or every 2 years</td>
<td></td>
</tr>
<tr>
<td>Psychosocial Assessments</td>
<td>Initial</td>
<td>Annual</td>
<td>Quarterly Follow up</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------</td>
<td>--------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Depression screen</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Diabetes self management skills</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Physical activity</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Nutrition knowledge</td>
<td>x</td>
<td>x</td>
<td>As needed</td>
</tr>
<tr>
<td>Hypoglycemia assessment</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
## Children and Adolescent Clinical Evaluation

ADA 2014 Recommendations

<table>
<thead>
<tr>
<th>Lab assessments</th>
<th>Initial</th>
<th>Annual</th>
<th>Quarterly Follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1C</td>
<td>x</td>
<td>x</td>
<td>Every 3 months</td>
</tr>
<tr>
<td>Creatinine clearance/estimated GFR</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Lipid Panel</td>
<td>When glycemia stable</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>TSH</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Anti thyroid ab’s</td>
<td>x</td>
<td>If sx present</td>
<td></td>
</tr>
<tr>
<td>Celiac ab panel</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Islet cell ab’s GADA/IA2A/IAA/ZnT8</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urine albumin to creatinine ratio</td>
<td>Starting 5 years after dx</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>
Role of The School Nurse

- According to the American Association of Diabetic Educators (AADE) Position Statement Management of the Children with Diabetes in the School setting (August 2012)
  - There are federal laws and protections to students with diabetes. Diabetes is considered a disability.
    - Section 504 of the Rehabilitation Act of 1973
    - The American with Disabilities Act
    - The Individuals with Disabilities Education Act
  - “A written plan is essential to foster understanding and a standard of care”
Written Plans for Schools

- The Diabetes Medical Management Plan (DMMP)- This document is developed by the child’s health care provider and is signed by the parents. It is the provider’s order that describes the type and frequency of care that is required, it should also include a written description of the student’s ability to self manage care as well as emergency contact information.

- The DMMP serves as an addendum on the child’s Individual Health Care Plan (IHP).

- The 504 accommodation plan sets out services needed by eligible students to allow for full access to all school activities while meeting the student's health care needs.
Resources

- School advisory tool kits available- http://jdrf.org/get-support/t1d-toolkits/
Special Thanks!!

- Augustine Chikezie, MD, Pediatric Endocrinologist
- Monika Black, RN, Certified Diabetes Educator
References:

- Type 1 Diabetes Through the Life Span: A Position Statement of the American Diabetes Association Diabetes Care 2014;37:2034–2054 | DOI: 10.2337/dc14-1140
- Reuter-Rice, K & Bolick, B; Pediatric Acute Care; A Guide for Interprofessional Practice; 2012
- Internet Psycho-Education Programs Improve Outcomes in for Youth With Type 1 Diabetes Grey, M, et al 2013 by the American Diabetes Association