Issues in Caring for Children and Adolescents with Diabetes

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Objectives

- Differentiate b/t Type 1 and Type 2 diabetes in children and their treatment modalities
- Be familiar with relationship b/t IR, Obesity and T2D risk in youth
- State treatment goals for children with T1D based on age.
- Discuss family and developmental factors related to successful diabetes management

INSULIN RESISTANCE IN YOUTH

Insulin Resistance(IR)

- Can occur 10-20 years before diagnosis
- Best predictor of risk of diabetes
- IR causes B-cell to hyper-secrete which influences progressive failure of B-cell ⟹ T2D
- Obesity is most important cause in dev of IR
  - Fat partitioning is important
  - Phenotype-increased intramyocellular lipid content (IMCL)
  - Increased visceral fat/decrease subcutaneous fat

D'Adamo, E & Caprio, S. Type 2 Diabetes in Youth: Epidemiology and Pathophysiology. Diabetes Care, 34, (2) ppgs S161-165. May 2011

Screening Children at Risk for T2DM

Who is at risk?

- BMI > 85% or weight >120% ideal [AND]

Two of the following

- Family history T2DM in 1st or 2nd degree relative
- At-Risk Race/ethnicity
- Signs of insulin resistance or conditions associated with IR
  - Acanthosis Nigricans
  - Hypertension
  - Dyslipidemia
  - PCOS
  - Small for SGA birth weight
  - Maternal history of diabetes or GDM

When/how to screen

- Screen at age 10 years or with earlier puberty
- Every 3 years
- FPG is preferred
- Consider A1c or OGTT

Diabetes Care 2014

Diabetes in Children and Adults

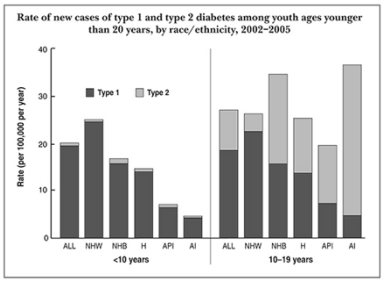
TIDM

- Most common presentation in children and adolescents
- northern European descent
- Autoimmune
- 1 of 350 children
- 3-5% risk in siblings
- 30% for identical twins
- Risk of DKA
- Dependence on insulin for survival
- Related autoimmune disorders
  - Thyroid- up to 15%
  - Celiac -5%
- Approximately 50% new-onset < age 20
- Peak incidence
  - Puberty for boys and girls

T2DM

- > 30% of children > 10 presenting with T2DM (at-risk populations)
- Insulin Resistance
- Obesity
- NAFLD
- PCOS
- Increasing prevalence
- [+] family history
- Ketosis can be present
- MNT, life style mod, Glucophage, insulin
- Elements of Metabolic Syndrome
  - HTN
  - Acanthosis Nigracans
  - Dyslipidemia
  - Microalbuminuria

Type 1 and Type 2 Diabetes in Youth SEARCH data



T2DM IN YOUTH

Pathophysiology: T2DM

- At diagnosis, 80% of Beta Cell function is reduced or lost
- Beta cell mass and secretory capacity
  - Genetic factors
  - Environmental factors
- Gradual fall in B-cell function within a background of insulin resistance
- As insulin sensitivity decreases, insulin secretion increases for glucose tolerance to remain NL

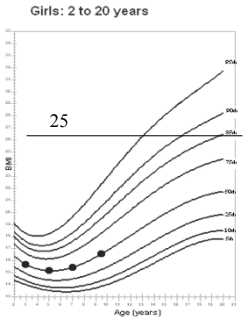
D'Adamo, E & Caprio, S. Type 2 Diabetes in Youth: Epidemiology and Pathophysiology. Diabetes Care, 34, (2) pgs S161-165. May 2011

Type 2 Diabetes in Youth

- > 75% have a 1st or 2nd degree relative
- Second decade of life coinciding with pubertal insulin resistance
- Early onset type 2 diabetes may be (IS) associated with an increase risk of morbidity and morality
- Microvascular complicaton may be(IS) more progressive than youth with T1D

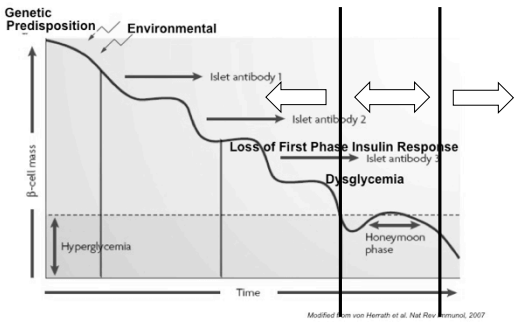
D'Adamo, E & Caprio, S. Type 2 Diabetes in Youth: Epidemiology and Pathophysiology. Diabetes Care, 34, (2) ppgs S161-165. May 2011

BODY MASS INDEX

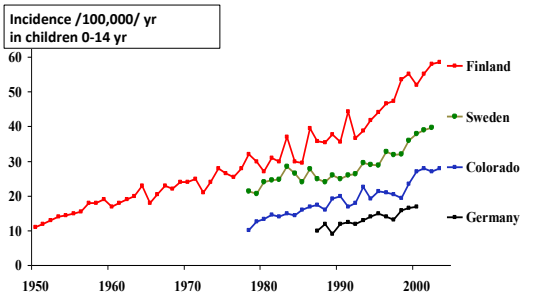


T1DM IN YOUTH

Type 1 ***Type 1 Diabetes – a progressive disease that develops over years***



Increasing Incidence of T1DM



Rewers M. Ann NYAS 2008

TREATMENT GOALS IN T1DM YOUTH

American Diabetes Association
BG and A1c goals for T1DM by Age

Age	Before Meals	Bedtime/ Overnight	HbA1c
< 6 years	100-180	110-200	7.5-8.5%
6-12 years	90-180	100-180	< 8 %
13-19 years	90-130	90-150	< 7.5 %

Diabetes Care, 2005

TREATMENT OPTIONS IN TYPE 2 DIABETES IN ADOLESCENTS AND YOUTH (TODAY)

Primary Aim and Outcome

- To compare three treatment regimens on time to loss of glycemic control
  - Metformin
  - Metformin + rosiglitazone
  - Metformin + intensive lifestyle
- Primary Outcome
  - HbA1c ≥ 8.0% for at least 165 days (5½ months) or ended TODAY ≥ 10%
  - Inability to wean from temporary insulin therapy due to metabolic decompensation (forced wean by algorithm)

(Pediatr diabetes 8:74-87, 2007)

TODAY-Characteristics of the youth with recent-onset diabetes

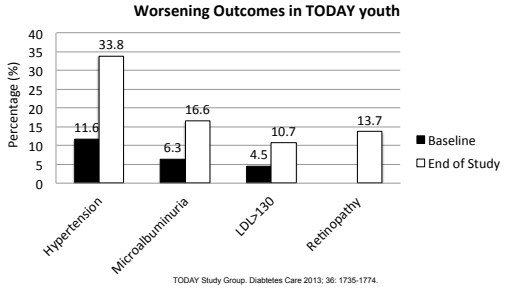
- N=699, age 10-17 (MA 14) with T2D < 2 years (Mean Duration of Diabetes- 7.8 months. BMI > 85th % Recruited from 2004-2009
  - Followed for average of 3.9 years
  - **89.4% had family history of diabetes**
  - 64.7 % girls
  - 41% Hispanic
  - 31.5% Non-Hispanic Black
  - 38.8% were living with both biological parents
  - 41.5% had household income less than 25K
  - 26% had a highest education level of parent/guardian less than HS degree
  - 26% had a BP > 90th%
  - 13% had mc-alb
  - 79.8% had a low HDL level
  - 10% had high Tg

Copeland et al. J Clin Endocinol Metab, Jan 2011 96 (1) 159-167 Characteristics of Adolescents and Youth with Recent-Onset Type 2 Diabetes: The TODAY Cohort at Baseline

Summary and Implications

- **Metformin monotherapy is inadequate** for half of youth with type 2 diabetes
- The role of intensive lifestyle interventions in youth with type 2 diabetes is uncertain
- **Youth with type 2 diabetes have high and increasing rates of hypertension, microalbuminuria, and dyslipidemia, as well as evidence for end organ cardiac damage**
- Youth with type 2 diabetes have high rates of depression and come from **families challenged by poverty, poor education and widespread poor health**
- There are important race/ethnicity differences among youth with type 2 diabetes in the US

TODAY: Risk Factor Control and Emerging Microvascular Disease



TODAY Study Group. Diabtetes Care 2013; 36: 1735-1774.

TREATMENT GOALS IN T2DM YOUTH

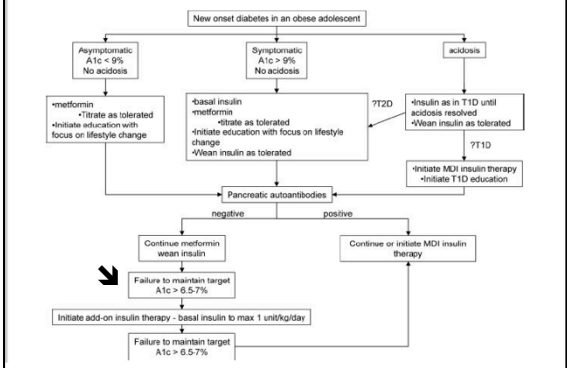


FIG. 2. Approach to the treatment of the obese adolescent with diabetes. MDI, Multiple daily injection.

Zeitler (2010) J Clin Endo Metab

DEVELOPMENTAL FACTORS IN YOUTH WITH DIABETES

Toddler

- 2 year old new onset female. Only child, both parents at visit. Mom is a lawyer for major soda company. Dad also has FT career.
- **What are the issues?**

Diabetes in Toddlers

- First 2 years of life:
  - Estab mutually strong and trusting emotional attachment b/t infant and caregiver
    - Mothers report "constant vigilance"
    - Difficulty finding caregivers
    - Chronic stress and lack of social support may put mothers at risk for physical and emotional problems

Toddler

- Issues
  - Patient characteristics
    - Behavior
    - Adjustment to diagnosis (fearful)
    - Eating
    - Hypoglycemia awareness
    - language
  - Mom and Dad
    - Work FT
    - Childcare
    - Understanding of complications

Toddlers/Preschoolers

Non-diabetes related

- Develop autonomy and sense of mastery
- Explore and master world outside home
- Imaginative
- Concrete thinkers
- Self-centered
- Takes initiative

Diabetes-related

- Parent supervision of all tasks
- Adapts to finger sticks and injections
- Meal time/food issues
- Little concept of schdule/ time
- Increase parental stress
- Parents worried about hypos

Age-Adjusted Goals of Therapy

- "hypo unawareness" associated with young age (< 7 years old)
- < age 5 child may develop permanent cognitive impairment associated with severe hypoglycemia and asymptomatic repetitive hypoglycemia
- Increase frequency of hypoglycemic seizures in children diagnosed before age 4

Northam EA, Anderson PJ,Werther, GA,Warne GL, Adler RG, Andrewes D. Neuropsychological complications of IDDM in children 2 years after diseaseonset. Diabetes Care 1998;21:379–384

Age-Adjusted Goals of Therapy

- **Infant/Toddler/Preschooler**
  - CAN NOT identify HYPOGLYCEMIA

Age	Before Meals	Bedtime/ Overnight	HbA1c
< 6 years	100-180	110-200	7.5-8.5%

School age

- 4th grader with diabetes for several years. Mom usually the only parent at visit. Dad is involved. Child likes new meter. Has adapted very well to checking glucose and likes to give herself shots once in awhile. Usually checks sugar without being reminded. She has been asking to spend the night at her friend's house since the beginning of the school year.
- **What are the issues?**

School age Issues

- This age child needs to feel included in management of his/her diabetes without "relying" on them for any decision making
- School RN and patient have good relationship
  - Too independent ?
- Spending the night at friends
  - Dad thinks it is OK
  - Mom fearful

School age

Non-diabetes related

- Concrete thinkers
  - More logical and rational
- Industrious/goal-oriented in activities
- Adj. from home to school
- Forming positive sense of self
- Forming close same-sex friendships

Diabetes-related

- **May want to do all BG checks and draw and inject; ongoing close supervision**
- Can make food choices
- Better recognition of hypoglycemia
- Wants to spend the night at friend's home
- Fear of dying (die-abetes)
- Fear complications
- Don't like being different from their peers
- ***Can gain Self-Esteem from diabetes management***

Age-Adjusted Goals of Therapy

- **School Age**

Age	Before Meals	Bedtime/ Overnight	HbA1c
6-12 years	90-180	100-180	< 8%

Case study-Adolescence

- 15 year old teenager with T1D x 8 years
- All self-management tasks mastered
- 4.0 GPA
- Plays sports
- Very self-reliant
- Hba1c at 10% for almost one year
- Tired of diabetes

What are the issues?

Case study-adolescent

- 15 year old is "burnt out"
  - Cries at most visits
  - Doesn't want mom to come b/c she gets too emotional
  - Does not want diabetes anymore
  - Rule out depression and other co-morbidities
    - Fear of hypoglycemia
    - GAD
    - **Eating Disorders**
- Parents
  - Want to help, but don't know how

Differentiation of self from parents may lie in direct conflict of diabetes goals.

Age-Adjusted Goals of Therapy

Adolescence: A time of biological, moral, cognitive, and social growth. A central developmental task is differentiation of self.

Age	Before Meals	Bedtime/ Overnight	HbA1c
13-19 years	90-130	90-150	< 7.5%

Early adolescent

Non-diabetes

- Group identification over family
  - Peer group - "uniform"
  - Mostly same-sex groups
- Self-consciousness increases in response to the somatic changes of puberty
- **"Black and White" thinking**
- Belonging is "all-important"

Diabetes

- **Can handle the task of SBGM and injection but not decision making; ongoing supervision needed**
- Understands CHO counting
- **Disconnected from the diabetes big picture**
- First signs of puberty can cause increase insulin needs
- Establish clear expectations

Middle Adolescence

Non-diabetes

- Question and analyze extensively
- Increased flexibility of thought
- Personal code of ethics
- **Puberty often results in strained adolescent/parent relationships**
- differentiation

Diabetes

- Still need supervision but often independent in school setting
- Parent needs to remain involved by reviewing meter/ pump
- **Desire for autonomy may strain teen/parent relationship**
- Maintain clear expectations
- Ongoing increased insulin resistance related to puberty

Late Adolescence

Non-diabetes

- Cognition is less self-centered
- Often idealistic but sometimes absolutist and intolerant
- More stable body image
- Intimate relationships play more important role

Diabetes

- **Much less supervision**
- Usually independent at school
- Driving-parents need to reinforce established safety to maintain privilege
- **Parents/teen/diabetes team continuing negotiating "team" approach**

Improving Diabetes Management in Teens: Homework for Parents & Caregivers

- ***Myth:*** A pre-teen/teen should be able to check blood sugar and give insulin without constant reminders.
- ***Fact:*** Teens are developmentally NOT READY TO MANAGE diabetes on a day-to-day basis and need the support of peers, school, and most importantly, FAMILY.
- ***Avoid the use of judgmental language when referring to your child's numbers.*** Refer to blood sugars as "in target" or "above target" rather than using value-laden adjectives such as "good blood sugars" or "bad sugars". Judging blood sugars as "good" or "bad" will increase the likelihood of your teen faking numbers. Similarly, avoid praising numbers that are in the desirable range. Do not punish numbers that are elevated. PLEASE AVOID THREATS RE: LONGTERM COMPLICATIONS-IT DOES NOT MOTIVATE THEM AND CAN EVEN DE-MOTIVATE THEM.
- ***Observe your child/teen as much as possible***. Watch them check sugar or give insulin. If you are only asking, it gives them the opportunity to mislead you. Diabetes tasks should be "public" at home. If they are insisting on privacy, they may be hiding numbers or not doing them.
- ***Check the pump/meter frequently***. Be sure to accurately set the date and time so that the numbers can be interpreted and insulin can be adjusted. COMMUNICATE with your diabetes team when sugars have a pattern of highs or lows.
- ***Hold your child/teen accountable to a measurable goal.*** Be clear about what is expected. For example, 'Check blood sugar four times/day', 'take insulin for meals and high blood sugar'. Consider rewards if your teen has improved a behavior.
- ***Thank your child for checking his or her blood sugars each time they do it***. The simple act of thanking them acknowledges that diabetes is not easy. It is a very kind and compassionate way to reinforce a very important and necessary task.
- ***Take on diabetes for a day.*** Mimic all the things that your teen has to do for one day. Check your blood sugar before every meal, count your carbs and give "insulin" with a empty syringe or with saline for what you eat. This empathetic act will gain favor with your teen.

"Positively reinforce the actual self care behaviors NOT the results!"

Family Protective Factors in Chronic Illness

- Family emotional closeness or connectedness
- Caregiver (parental) coping skills
- Mutually supportive relationships
- Clear family organization & decision-making
- Direct communication about the illness

Weihs, Fisher & Baird, 2005; Fisher & Weihs, 2000

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Family Risk Factors in Chronic Illness

- Conflict or criticism
- Psychological trauma related to the disease
- Stressors external to the family
- Family isolation
- Disruption of developmental tasks by the disease
- Family rigidity or perfectionism

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family findings

- Optimal diabetes management and lower A1c values associated with:
  - Parents remaining involved in diabetes care
  - Not transferring responsibility until child is developmentally ready
  - Better family communication
  - Low levels of diabetes-specific family conflict
- Similar findings in couples

stay involved

Supported by studies from Harris, Wysocki, Anderson, Laffel, and Weissberg-Benchell

Strategies:

1. Adapt involvement over time
2. Stay involved in different ways – words and actions
3. Don't transfer responsibility until ready

communicate effectively

Supported by studies from Harris, Jaser, Anderson, Wiebe, Ellis, and Cameron

Strategies:

1. Engage in Active Listening
2. Ask about other things before diabetes
3. Make concrete plans for sharing responsibilities

reduce family conflict

Supported by studies from Rubin, Wysocki, Hood, Laffel, Grey, Berg, and Jacobson

Strategies:

1. Use alternative ways of communicating other than words
2. Refrain from "blame and shame"
3. Use general parenting strategies

matter-of-fact style

Principle and applications supported by decades of research with children

Strategies specific to diabetes:

1. Think of blood sugars as information
2. Do not react (as hard as it sounds)
3. Increase likelihood diabetes tasks will happen again by positive reinforcement
4. Don't be afraid to ignore

SCHOOL ISSUES

School Preparation

- Annual parent conference
- 504 plan
- Diabetes management plan
- Emergency plan

LAWS : Protecting Students

Rehabilitation Act of 1973: Section 504
http://www.hhs.gov/ocr/civilrights/resources/factsheets/504.pdf

Americans with Disabilities Act (ADA)

Individuals with Disabilities Education Act (IDEA)

ADA: Americans with Disabilities Act

- January 1, 2009 - ADAAA passed
- AADA - Americans with Disability Act Amendments Act
- Story of Stephen Orr (pharmacist) who was fired because of taking lunch break. Employer argued that he was so well-controlled that his diabetes could not be defined as disability. His case was thrown out of court.
- He testified several times before congress to help to get the amendment to the ADA passed.

IDEA-Individuals With Disability Education Act

- IDEA is a federal law that requires states to provide a "free, appropriate public education" to children with disabilities so they can be educated to the greatest extent possible along with all other children
- If qualified, entitled to special education and related services at no cost
- Child must show that s/he needs special education
- An evaluation must show that because of the diabetes or other disability, the child has a limited strength, vitality, or alertness that adversely affects the child's educational performance
- Usually reserved for children with diabetes and other disability or very poor metabolic control