Type 1 Diabetes in Women: from Menarche to Menopause

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Learning Objectives

• Identify at least 3 health challenges faced by women with Type 1 diabetes
• Describe at least 3 strategies the diabetes educator can employ to assist women with Type 1 diabetes overcome these challenges
• Compare statistics regarding at least 3 of these health challenges between women without diabetes as well as men with men who have type 1 diabetes

Women with T1 DM

• ~1.25 million Americans living with T1 DM
  – ~193,000 under the age of 20
  – ~40,000 new diagnoses annually
  – Average age at diagnosis is 8-10 years
  – Fairly equal rates of diagnosis between girls and boys
• Psychologic and physiologic burden higher for women
  – Less likely to achieve A1C < 7%
  – Higher rates of nocturnal hypoglycemia
  – More likely to have anxiety and depression

Meet Sienna

- Sienna is a 14 year old girl diagnosed with type 1 diabetes at the age of 8
  - She presents to your office for follow up diabetes education
  - Sienna reports she got her first period last week
  - She states her numbers have been “crazy” since her last appointment 2 months ago
  - She is accompanied by her mother

Common Issues During Puberty

- Excessive weight gain or weight loss
  - Often related to hormonal changes & body image
- Difficult to regulate glucose
  - Often related to hormonal changes; growth & development
- Struggles with self-management
  - Prioritizing DM

Puberty

- Young women with Type 1 typically experience
  - Later menarche
  - Fewer pregnancies
  - Increased stillbirths
- Two-fold increase in menstrual problems before age 30
  - Longer cycles
  - Heavy mensturation

Schweiger, et al. (2011) Menarche delay and menstrual irregularities persist in adolescents with type 1 diabetes. Reproductive Biology and Endocrinology. 9(61):6-8
Menarche

- Typically delayed for women with T1 DM
  - Girls diagnosed with T1 DM before age 10 years had a significant delay in menses
  - Girls with T1 DM diagnosed after age 10 years had less of a delay

- Potential causes
  - Period of weight loss and physiologic stress prior to diagnosis
  - Chronic disease typically associated with menses delay
  - Weight loss associated with altered metabolism

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Age of Menarche in T1DM Compared to General Population

- Data from Schweiger, et al. (2011) Menarche delay and menstrual irregularities persist in adolescents with type 1 diabetes. Reproductive Biology and Endocrinology. 9(61):6-8

- Menarche age negatively associated with BMI
  - Higher BMI associated with earlier menses

- Level of A1C not associated with delayed menarche

- Despite improvement in diabetes treatment, menarche delay and menstrual irregularity continue to be a concern among women with T1 DM

- Women diagnosed after menarche do not seem to be impacted by these irregularities
**Menses**

- Characteristics of T1 DM menstrual cycle differs by age
  - Age < 20 & 20-29 years
    - Duration typically > 6 days
    - Heavy menstruation
    - Cycle > 31 days
  - Age 30-49 years
    - No significant difference among women with T1 DM compared to women without DM

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**Polycystic Ovarian Syndrome**

- Most common endocrine disorder among women of child bearing age
  - Prevalence in women with T1 DM ~24%
  - Prevalence in general population ~6-15%
- Most common cause of anovulation
- Symptoms include
  - Oligomenorrhea
  - Elevated androgen levels
  - Hirsutism and acne
  - Decreased fertility

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**Collaborating with the Diabetes Educator**

- Gain trust in order to establish a working relationship
- Shared decision making rather than interventions
- Establish patient centered goals, allowing her to prioritize what is most important
What’s in the Toolbox?

• Basal adjustments for hormonal variations
• Educate on growth and development and the impact on T1 DM
  – Taking ownership of self care
  – Hormonal fluctuations
  – Psychological impact
  – Insulin resistance
• Discuss treatment options: pump, CGM
• Increase touch points in between visits

Sienna

• Sienna is struggling
  – She is now 18 y/o
  – Her A1C is 10% and has been >9% for the past few years
    • She admits to not checking routinely & omitting insulin doses
  – Her microalbumin creatinine ratio is elevated (confirmed x 2)
  – Her period is irregular
  – She has a boyfriend
    • Her mom is worried and thinks she has been drinking
    • She smells cigarette smoke on her clothing

Sex, Drugs and Rock & Roll

• Late teens into 20s begins another struggle for control
  – Emerging adulthood
• Often the time when many young women drift and wander
• Often only communicating with health care team in time of crisis or when in need of prescriptions
Sex, Drugs and Rock and Roll

- Body image disturbances
- Increased independence
  - Social, self care, financial
- Access to drugs and alcohol
- Increased sexual experimentation
- Psychological impact
  - Anxiety, depression

Behavioral Disorders & Addiction

- Anxiety and depression
  - Self care burden
  - Glycemic control directly related
  - Chronic disease increased risk for depression
- Addiction issues
  - Dangerous in the presence of insulin

Eating Disorders

- Adolescents and young women with T1 DM are at high risk
  - Pressure of constant food “restriction”
  - Weight management
  - Altered body image
  - Control issues
- Incidence
  - Pre-adolescence: 2%
  - Adolescence: 11-15 %
  - Young women: 30-40%
Eating Disorders

- **Diabulimia**
  - Term to define when a person restricts or omits insulin in order to control weight
  - Once appropriate insulin dosing is resumed, weight re-gain occurs
  - The cycle then re-starts
- **Anorexia**
  - Increased risk for hypoglycemia

Collaborating with the Diabetes Educator

- Remain supportive rather than judgmental
- Motivational interviewing
  - Employ open ended questions
- Address safe alcohol consumption versus binging
- Impact of drugs and alcohol on glucose
  - Hypoglycemia, DKA
- Smoking
  - Cigarettes, juules

What's in the Toolbox?

- Depression/emotional issues
  - Open ended statements- weight/appearance changes
  - Networking with peers with T1DM
- Discuss options for contraception
  - Progesterone, estrogen, abstinence
- Ask about weekend plans
Sienna

- Sienna is now 26 y/o
  - She got married last year and wants to start a family
  - Her A1C is 7.9%
  - She is on basal/bolus
  - She remains on oral contraception and an ACE inhibitor
  - She continues to smoke

Pregnancy

- Pre-conception counseling & planning
  - Associated with better outcomes
  - Preconception A1C target < 6.5%
- Women with T1DM have higher rates of
  - Miscarriage, pre-eclampsia, pre-term delivery, c-section, mortality
    - Increased risk for retinopathy & nephropathy
- Neonates have higher rates of
  - Hypoglycemia, macrosomia, weight abnormalities, congenital malformations


Pregnancy: risk for adverse outcomes


Pregnancy Glycemic Targets

A1C
- A1C – < 6-6.5%
- Looser target if hypoglycemia risk is great
- Rely more on daily glucose checking due to increased red blood cell turnover

Daily
- Blood Glucose
  - Fasting < 95 mg/dl
  - 1 hour post prandial < 140 mg/dl
  - 2 hour post prandial < 120 mg/dl


Preconception Collaboration with the Diabetes Educator

- A1C target – ≤ 6.5%
- Insulin delivery
  - consider a pump and a CGM
- Other medications
  - Stop all potentially teratogenic medications; the ACE-i
- Smoking cessation
- Other screenings
  - Dilated eye exam
  - Dietitian
  - Labs
Pregnancy Challenges: what's in the Toolbox?

**Challenges**
- **1st trimester**
  - Nausea and vomiting
  - Hypoglycemia
- **2nd trimester**
  - Insulin resistance
  - Weight gain
- **3rd trimester**
  - Hypertension, pre-eclampsia
  - Insulin sensitivity in the few weeks preceding delivery

**Collaborative Plan**
- **1st trimester**
  - Micro boluses
  - Review use of glucagon
- **2nd trimester**
  - Frequent increases in insulin, especially carb ratio
  - Follow up with the RD
- **3rd trimester**
  - Use of labetalol for BP, aspirin 81 mg
  - Potential need for insulin dose reductions

Postpartum Challenges: what’s in the Toolbox?

**Challenges**
- Increased insulin sensitivity immediately after delivery
- Hypoglycemia related to breastfeeding
- Glycemic variability related to sleep deprivation and remembering to bolus

**Collaborative plan**
- Reduce insulin doses
  - ~75% reduction in insulin
  - Set up a basal profile
- Snacking prior to breastfeeding
  - Snack; no bolus
  - Meal; reduced bolus ~25%
- Ask for help
  - Family, friends
  - Reminders on phone
  - Smart technology

Sienna

- Two successful pregnancies
- Resumed smoking
- Now 45 y/o
  - Fractured her foot last year; tripped over the curb
- Busy working mom
  - A1C 7.8%
  - BMI 29, waist circumference 37
  - BP 148/90
  - LDL 130
  - Mild background diabetic retinopathy & diabetic nephropathy
  - Irregular menses, night sweats
Cardiovascular Disease in T1 DM

- Rates of CVD (coronary heart disease and peripheral arterial disease) are ~10 x higher than the general population
  - Increased endothelial dysfunction
  - Increased inflammatory markers
    - Acute hypoglycemia and hyperglycemia are associated with complex vascular events leading to inflammation
  - Increased coronary artery calcification
    - Associated with atherosclerosis


Cardiovascular Disease in T1 DM

- Heart disease occurs 10-15 years earlier than in the general population, but disease generally more advanced by the time of diagnosis
  - Impact of cardiovascular autonomic neuropathy; may affect up to 40% of people with T1 DM
    - Impaired heart rate variability
    - Orthostatic hypotension
    - Exercise intolerance


Cardiovascular Disease T1 DM: Men vs. Women

Cardiovascular disease in T1 DM Women

• Young adult women with T1 DM
  – Develop CVD earlier than age-matched women without DM
  – Are at higher risk of CVD than male counterparts with T1 DM
• Duration of DM >15 years is associated with higher mortality in women with CVD
  – are at greater risk for mortality related to CVD and renal disease then men with T1 DM
  – Have 2x higher risk of vascular events then men with T1 DM


Cardiovascular Disease in T1 DM Women

• Women often experience atypical symptoms
  – Nausea, reflux, abdominal pain
• Women are often dismissed and thought to have anxiety
  – Higher rates of macrovascular disease than male counterparts
  – Higher rates of all cause mortality, especially young adult women


Urological Complications

• 65% of women report at least 1 urological complication
• Female Sexual Dysfunction
  – Associated with psychological variables, chronic disease management, poor glycemic regulation, lead to depression and dysfunction
  – Affects ~42% of women with T1 DM
  – Often overlooked in women
  * Embarrassment, body image issues
• Urinary Tract Infections and Urinary Incontinence
  – Impacts ~17% and 31% of women with T1 DM respectively
  – Can result in significant hyperglycemia
  – Asymptomatic, propensity for diabetic ketoacidosis

Menopause

- Age of menopause
  - Conflicting data
    - Presence of microvascular complications may be associated with earlier menopause, otherwise no different than women without diabetes
  - Fewer fertile years
- Symptoms of menopause
  - May overlap with symptoms of hypoglycemia & autonomic neuropathy
- Treatment of menopause
  - Consider HRT on an individual basis


Collaborating with the Diabetes Educator

- Optimize A1C, BP and lipids to mitigate progression of microvascular complications
  - Weight management & exercise
  - Escalate ACE‐i, may need 2nd agent
- Smoking cessation counseling at every visit
- CVD
  - Statin therapy; high intensity, assess adherence
  - Assess for cardiovascular autonomic neuropathy
- Menopause
  - HRT? (not if still smoking)
  - Ability to differentiate symptoms of hypoglycemia, impact on quality of life

Sienna

- Now 65 years old
- Microvascular complications
  - Retinopathy and nephropathy: stable
- Hyperlipidemia
  - Controlled, on a high intensity statin
- Hypertension
  - Controlled, on an ACE‐i
- First DEXA
  - Osteopenia of the hip
  - FRAX score: 3% for hip, 20% for major osteoporotic fractures
    - Personal history of fracture, smoker, mother with history of hip fracture
Osteoporosis

- Often considered a complication of T1 DM
  - ~ 50% of T1 DM have bone loss
  - ~ 20% aged 20-56 have osteoporosis
- Lower BMD
  - Impact of hyperglycemia & microvascular complications
  - Duration of DM
  - A1C
- Higher rates of hip fracture
  - 12 x higher risk
  - Associated with microvascular complications


Collaborating with the Diabetes Educator

- Osteoporosis
  - Dietary intake of calcium & vitamin D
  - Regular exercise
    - In particular strength training and weight bearing
  - Safety mechanisms for fall prevention
  - Screening with DEXA every 2 years
  - Medication therapy
    - Bisphosphonate, estrogen, denosumab, teriparatide

Sienna……success

- Retires to Boca
- Lives out the rest of her life, happy and healthy
  - Thanks to continued guidance from a Diabetes Educator !!!
References


