Diabetes Fundamentals—Class 6
Hypo, Sick Days, Monitoring, Foot Care and Spiritual Aspects
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www.DiabetesEd.net

Objectives—Hypo, Monitoring, Sick Days, Lower Extremities

- Discuss risk and prevention of hypoglycemia
- Strategies to get the most out of blood glucose monitoring
- Review sick day management, from hospital to home
- Lower extremity assessment
- Spiritual aspects of diabetes care
- Graduation

Hypoglycemia - The limiting factor
Hypoglycemia – “Limiting Factor”

- Glucose of 70 mg/dl or below
- 50% of episodes occur during night
- Mortality with severe hypoglycemia secondary to sulfonylureas
  - Especially (glyburide) Micronase®, Diabeta®
- Blood glucose levels don’t describe severity, response is individual

Hypoglycemia: Clinical Risk Factors

- Diabetes medications
- Intensive insulin therapies
- Impaired kidney or liver function
- Advanced age, poor nutrition
- Near normal A1c
- History of frequent hypoglycemic episodes
- Neuropathy

Hypoglycemia Symptoms

- Autonomic
  - Anxiety
  - Palpitations
  - Sweating
  - Tingling
  - Trembling
  - Hypoglycemic Unawareness
- Neuroglycopenia
  - Irritability
  - Drowsiness
  - Dizziness
  - Blurred Vision
  - Difficulty with speech
  - Confusion
  - Feeling faint
### Glycemic Threshold Values

**John White, PharmD, Diabetes Spectrum, 2007**

<table>
<thead>
<tr>
<th>Classification</th>
<th>BG</th>
<th>Physical Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower euglycemia</td>
<td>80-90’s</td>
<td>Endogenous insulin</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>70’s</td>
<td>Glucagon, adrenaline</td>
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<tr>
<td>Symptoms</td>
<td>60’s</td>
<td>Growth hormone, cortisol</td>
</tr>
<tr>
<td>Neuroglycopenia</td>
<td>40’s</td>
<td>Cognitive deterioration</td>
</tr>
<tr>
<td>Severe neuroglycopenia</td>
<td>10</td>
<td>Coma, seizures</td>
</tr>
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(Shortage of glucose in the brain affects function of the neurons)

### Hypoglycemia (Glucose) Alert Values

- **BG <70mg/dl – Level 1**
  - Follow 15/15 rule and contact provider to make needed changes

- **BG < 54mg/dl – Level 2**
  - Indicates serious hypo. Contact provider for med change. Glucagon Emergency Kit

- **Severe Hypoglycemia – Level 3**
  - Requires external assistance – no threshold

### Treatment of Hypoglycemia

- If blood glucose **70mg/dl** or below:
  - 10-15 gms of carb to raise BG 30 - 45mg/dl
  - Retest in 15 minutes, if still low, treat again, even without symptoms
  - Follow with usual meal or snack
  - If BG less than 40, allow recovery time
15 - 20 Gms Carb Sources
- 4 ounces apple juice
- 3 - 4 Glucose Tablets
- 8 - 10 Lifesavers candy
- 8 - 10 Hard candies
- 2 Tablespoons Raisins
- 4 - 6 oz’s Nondiet soda
- 4 - 6 oz’s Fruit Juice
- 8 oz Milk (non fat)

Tx of Severe Hypoglycemia
- If can swallow w/out risk of aspiration, try gel, honey, etc. inside cheek
- If unable to swallow, D50 IV or Glucagon
- Glucagon injection – teach support person
  - Dosing:
    - Adults 1mg
    - Children <20kg 0.5mg
  - Glycemic effect 20 - 30mg, short lived
  - Must intake carb as soon as able
  - Need prescription, check exp. date
Glucagon Emergency Kit

Store 68-77 degrees prior to reconstitution
single use only

Nocturnal Hypoglycemia

- Signs include:
  - Vivid dreams
  - Waking up with headache
  - Night sweats
  - Waking up hungry
  - Elevated (rebound) or low morning blood glucose

Hypoglycemia Considerations

- Assess pts at each visit about hypoglycemic episodes
- Review appropriate treatment
- For individuals with significant hypo (<54), get Glucagon ER Kit.
  - Inform and instruct school personnel, family, coworkers of hypo signs and appropriate action
  - Review medication for needed adjustment
- Ind’s with hypoglycemic unawareness should be instructed to increase BG thresholds
- Assess cognitive function and safety
Hypoglycemia UNAwareness

- Autonomic symptoms adrenergically based (stress hormones)
- After 2-5 yrs of type 1 dm,
  - glucagon secretion impaired
  - epinephrine secretion becomes primary mechanism to restore BG levels
- Over time, epinephrine response diminished or delayed
- decreases awareness of hypo symptoms = danger

Learn Their Own, Most Reliable Symptoms - BGAT

- Symptom diary to identify their unique response
  - Alcohol can increase risk
- Beta blockers may mask early signs
  - (Perspiration not masked)
- BGAT - blood glucose awareness training
- Log each hypo event and try to identify symptoms and pre-event associated behavior

ADA Guidelines

- Ask those at risk for hypo, about frequency and symptoms at each visit
- Glucagon prescription for those at risk of hypo.
  - Instruct family and caregivers on safe use
- Hypoglycemia unawareness or 1 event of severe hypo indicates regimen adjustment needed.
  - Raise glycemic targets for several weeks
- SMBG or CGM are essential tools
Preventing Hypoglycemia

Nocturnal Lows
- If bedtime glucose <110, eat snack and decrease meds
- If increased daytime activity, may need extra hs snack
- Eval pre-dinner insulin/meds

Other
- Monitor kidney function / wt loss
- Monitor BG trends
- Too much meds?
- Skipped /delayed meals?
- Plan ahead
- Alcohol precautions

If on insulin or sulfonylurea – special precautions required
- Carb source on person, car, by bed at all times
- Identification
  - Phone (ICE)
  - Wallet Card
  - Bracelet
- If pattern of lows, med adjustment required

Pre-meal target
- 80-130
- Post meal
- Less than 180
- Bedtime
- 110 - 180

Life Studies
- Patient on insulin tells you, “I feel funny when my blood sugars go down to 140”
- Pt on insulin tells you, “I only feel hypoglycemic when my blood sugar goes below 50”
Poll Question 1

1. Patient on insulin - I feel funny when my blood sugars are 140. Why?
   a. Her blood sugars are running lower than normal
   b. Her meter must be broken
   c. She is eating too much processed foods
   d. Her blood sugars chronically run high.

Poll Question 2

Pt on insulin tells you, I only feel symptoms when my BG is less than 50.
   a. He has successfully adjusted to his diabetes
   b. He has hypoglycemia unawareness
   c. He needs review of the symptoms of hypoglycemia
   d. He needs to do quality control on his meter

Monitoring, sick day management and Hospital goals

Objectives:
1. Identify barriers to monitoring and strategies to overcome them.
2. Discuss sick day management
3. State glucose goals during hospitalization.
Self-Monitoring
Why Should I do it?

- Feel better everyday – sense of control
- Avoid hospital admissions
- Fewer missed work/school days
- Avoid hypoglycemia situations - safety
- Avoid unwanted weight gain
- Enhanced athletic performance

How will it help me?

- See if your treatment plan is working
- Make decisions regarding food and/or med adjustment when exercising
- Find out how that pizza affected your BG
- Find patterns
- Manage illness

How Often Should I Check?

- Be realistic!!
- Type 2 on orals – Medicare covers 100 strips for 3 months
- Based on individual - Consider:
  - Types and timing of meds
  - Goals
  - Ability (physical and emotional)
  - Finances / Insurance
Is Routine Glucose Monitoring Always Necessary for type 2s on orals?

- “In people with type 2 diabetes not using insulin, routine SMBG may be of limited use”.
- In a one year trial of once-daily SMBG plus enhanced feedback, there was no significant improvement in A1c
- SMBG alone, does not lower BG.
- The BG results must be integrated into the clinical plan

Blood Glucose Meter Accuracy

- It is assumed that personal glucose meters are accurate if they are FDA cleared, but often that is not the case.
- The 2016 current rules called for +/-20% accuracy for most blood sugar ranges.
- The FDA is currently reviewing and updating the guidelines for glucose meter accuracy.
- Advocacy groups appealed to the FDA to demand better accuracy since treatment decisions are based on these readings and can dramatically impact outcomes.
- A research study by The Diabetes Technology Society Blood Glucose System Surveillance Program, found that in a recent analysis, only 6 of the top 18 glucose meters met the accuracy standards.

The Diabetes Technology Society Blood Glucose System Surveillance Program
Continuous Glucose Monitoring (CGM)

- Lowers A1c ~0.26% (compared to SMBG)
- CGM should be considered in children to adults
- Useful tool in those frequent hypoglycemia or hypoglycemia unawareness (alarm features)
- Measures percent of time in, above and below range
- Given variable adherence to CGM, assess ind readiness

ADA Guidelines – Insulin or Intensive Therapy

- Self monitoring before: meals, snacks, bedtime
- Occasional postprandial and before exercise
- When suspect hypo and keep checking until BG in safe zone.
- Before critical tasks such as driving
- May need to test more depending on activity level, frequency of eating, med regimen.
- Be practical, no two patients or two days are alike

Pt with new diagnosed diabetes

- 62 year old
- Came in for treatment for her Urinary Tract Infection
- Now finds out she has diabetes
- Her A1c is 6.7% - How often does she need to check?
- Her A1c is 10.4% - How often does she need to check
Poll Question 3
Pt with new diabetes. If her A1c is 6.7%, how often should she check her BG?
- a. once a day
- b. twice a day
- c. 2-3 times a day
- d. 4 times a day

Poll Question 4
Pt with longstanding diabetes and is having difficulty with self-management. If her A1c is 10.4%, how often should she check her BG?
- a. once a day
- b. twice a day
- c. 2-3 times a day
- d. as often as she agrees to

Alternate Site Testing?
- Yes
  - Finger fatigue
  - No risk of hypo
  - Stable BG Levels
  - If BG < 90, recheck on finger
- No
  - Pregnant
  - On intensive insulin therapy
  - During hypoglycemia
  - During illness
  - Not as accurate during glucose fluctuations
Glucose Monitoring Baseline Learning

- Care for meter and test strips
- Perform quality control
- Proper disposal of lancets
- Identify BG target and when to test
- Recording and interpreting data
- 800 number
- Adequate sample
- **User Error most common reason for inaccurate results**

Poll Question 5

Pt brings in log book and you notice all the results end in 0. IE 100, 110, 140. What do you suspect?

- a. Patient is writing numbers to please provider
- b. Patient is non-compliant and cheating
- c. Patient is covering up high blood sugars or not checking
- d. Patients meter is broken

Participant Situation

- JL left the last office visit 6 weeks ago with:
  - a prescription to start glipizide 10mg every morning and a
  - SMART goal of checking blood glucose 3 times a week in the morning, and 4 times a week after dinner.
- When JL returns, the log book has readings for morning, but none for evening.
- JL has held the glipizide in the morning if BG levels are less than 90.
Running into Roadblocks?

- **HUG Patients**
  - Help with
  - Unconditional
  - Guidance and Support
    - Anne Peters, MD, CDE
    - ADA Post Grad

Unconditional Positive Regard – involves showing complete support and acceptance of a person no matter what that person says or does. Carl Rogers

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No one is Unmotivated

- .... to lead and long and healthy life
- **These are the 3 usual Critical Barriers**
  - Perceived worthlessness
  - Too many personal obstacles
  - Absence of support and resources

Bill Polonsky, PhD, CDE

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Monitoring Issues

- “Monitor Talk”
  - avoid judging glucose levels as good and bad
  - Say stuff like...
    - I am impressed that you are checking your blood sugar at least once a day and writing it down.
    - I am curious to learn what is helping you succeed with blood sugar testing.
    - I am interested to see that you are skipping some days, can you share more about that?
Overcoming barriers

- Confront the key misbelief.
- Offer pts evidence-based hope message
- Frequent contact
- Paired glucose testing (Match BG to activity foods)
- Ask pt, “Tell me 1 thing that is driving you crazy about your diabetes”
- Discuss medication beliefs

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JR gets the flu – He is 43, healthy

- Suddenly, his BG levels are in the 200s
- He is not hungry
- Nausea and diarrhea, some fever
- On Metformin
  - How often should he check his BG?
  - When should he call the doctor?
  - Should he keep taking his metformin?

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Sick Day Patient Guidelines

- Continue to take diabetes medication, may need adjust dose down or up*
- Test glucose at least every 4 hrs
- Drink plenty of liquids
- Rest
- Contact physician
- Plan ahead
- Check urine ketones, if BG >240 & ill

*If at risk of dehydration, hold metformin
Sick Day Guidelines
Reasons to Call MD

- Vomiting more than once
- Diarrhea > than 5x’s or for > 24 hrs
- Difficulty breathing
- Blood glucose > than 300mg/dl on 2 consecutive readings
- Temperature > 101 F.
- Positive ketones in urine.

JR gets the flu

- BG levels are in the 200s
- He is not hungry – drink sugary fluids
- Nausea and diarrhea, some fever
- On Metformin
  - How often should he check his BG?
  - 2-4 times a day
  - When should he call the doctor – not better in 24 hours
  - Should he keep taking his metformin? Hold if he is at risk for dehydration

Hospitals and Hyperglycemia-
What’s the Big Deal?

- Hyperglycemia is associated with increased morbidity and mortality in hospital settings.
  - Acute Myocardial Infarction
  - Stroke
  - Cardiac Surgery
  - Infection
  - Longer lengths of stay
BG Above Normal = Trouble

- Hyperglycemia in Hospital
- BG 140 or greater
- Requires adjustment of therapy
- If BG 180 + (persistent), start insulin therapy
- Check A1c on all pts admitted with hyperglycemia or not checked in past 3 months
- If A1c 6.5% or above, indicates preexisting diabetes

WHAT SHOULD WE AIM FOR?

Critically Ill pts BG Goal
- 140-180
- 110-140 may be appropriate for selected patients
- Utilize basal bolus or insulin drips

Non Critically Ill patients BG Goals
- Premeal <140
- Post meal <180

Getting to BG Target in Hospital

- Basal or Basal + Bolus Insulin therapy preferred treatment
- Sole use of sliding scale strongly discouraged
- In certain situations, it may be appropriate to continue home regimens, including oral therapy (with caution.
- If oral meds are stopped in hospital, they should be resumed 1-2 days before discharge
Hospital Hypoglycemia Prevention

- Develop Hypoglycemia protocol
  - Include treatment and Prevention strategies
- Common causes of hypo:
  - Too much basal insulin (am hypo)
  - Insulin correction scale mismatch
  - Frail, older person with reduced appetite and low GFR
  - Pt is improving – needs less insulin
- Action required when hypoglycemic
  - Determine cause
  - Reduce insulin dose

PZ is having gallbladder surgery

- On glyburide 10mg BID
- 20 units of Lantus at HS
  - BG levels 100-150 or
  - BG levels 250-300s
- NPO after midnight
  - What adjustments in insulin?
  - What adjustments in glyburide?

Preparation for Surgery

- Try to schedule surgery in am, resume meds/insulin when eating and stable.
- Target perioperative glucose target
  - 80-180
- Hold metformin day of surgery
- Hold any other glycemic meds morning of surgery
- Basal insulin injection or pump:
  - NPH – cut dose by 50%
  - Long acting insulin analog or pump- cut dose by 60 - 80%
    (individualize)
- Bolus insulin:
  - Monitor BG every 4-6 hours while NPO
  - Use mild insulin bolus coverage as needed
Poll Question 6

- PZ is having gallbladder surgery. BG levels 100-150. On 20 units Lantus at hs and glyburide 10mg BID.
  - a. Give 50% hs Lantus dose and hold am glyburide.
  - b. Give 100% of Lantus dose and hold am glyburide.
  - c. Give 100% of Lantus and hold pm and am glyburide.
  - d. Hold insulin all together

Poll Question 7

- On 20 units Lantus and Glyburide. BG 250-300s. Surgery in am. What action?
  - a. Give 50% hs Lantus dose and hold am glyburide.
  - b. Give 100% of Lantus dose and am glyburide.
  - c. Give 100% of Lantus and hold am glyburide.
  - d. Hold insulin all together

Hospitalization, DKA and HHS

- Visit our Level 2 Online Series for detailed coverage of these topics!
Lower Extremities

- Lift the Sheets and Look at the Feet

Vascular Risk Factors

- Nonmodifiable
  - Duration of diabetes – longer = more risk
  - Age – older increased risk
  - Gender – women have more CV protection pre-menopause
  - Race – risk varies
  - Genetics – family history

- Modifiable
  - Blood Pressure
  - Lipids
  - Smoking
  - Obesity
  - Other factors – lack of exercise, Type A personality, dietary habits
Peripheral Vascular Disease – Venous Disease

- **On exam**
  - Skin brownish, reddish, mottled
  - Skin warm to touch, may be edematous
  - May have stasis ulcers on lower leg
  - Pulses difficult to locate due to edema

- **Treatment**
  - Support hose
  - Elevate feet
  - Avoid constriction
  - Shoes that can accommodate feet

Peripheral Arterial Disease (PAD)

- Affects 30% of people w/ diabetes over age 50
- Inadequate blood & oxygen to lower extremities
- Signifies ↑ risk of stroke, HTN, sudden death
- Pain w/ walking, relieved by rest “intermittent claudication”
- Pt c/o pain, cramping in calves, thighs, buttocks
- PAD + Neuropathy = increased amputation risk

Peripheral Arterial Disease
Intermittent Claudication

- Physical Exam – Skin
  - Pale or blue, purple
  - Dependent rubor, blanching when elevated
  - Cool to touch, loss of hair, nonhealing wounds, gangrenous
  - Diminished pulses

- Treatment = Protect feet
  - Avoid constriction, increase walking, stop smoking, medications and/or surgery
Foot Care Standards ADA
- Provide foot care education to pts w/diabetes
- High risk pts – use multidisciplinary approach
  - Wound specialist, Vascular specialist, Pedorthist etc.
- Refer to foot care specialists for lifelong surveillance if:
  - smoke, loss of protective sensation, structural abnormalities, hx of lower extremity complications
- Initial screen for PAD includes:
  - Assess for intermittent claudication and pedal pulses.
  - Refer high risk pts for further vascular assess and consider exercise, meds, surgical options.

Profile of a High Risk Foot ADA
- Previous amputation
- Previous foot ulcer history
- Peripheral neuropathy
- Foot deformity
- Peripheral vascular disease
- Vision impairment
- Diabetic neuropathy (esp if on dialysis)
- Poor glycemic control
- Cigarette smoking

Diabetes and Amputations
- Diabetes = 8 fold risk of amputations
- Highest rate in those over 75
- 50% of amputations can be avoided through self-care skill education and early intervention
- Rate declined by 65% from 1996-2008
  - From 11.2 per 1000 to 3.9 per 1000
  - Stats from CDC 2012
**Healthy Foot**

- Nerves
- Blood vessels
- Bones
- Joints

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**Foot Deformities**

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**LR Life Study**

- Diabetes Type 2 for 8 years
- On Januvia 100mg daily
- A1c 8.7%
- Doesn’t know how to check blood glucose
- Smokes pack per day
- Has calluses on his feet that he trims with a razor
No Bathroom Surgery

Poll question 8
- Which of the following patient behaviors can save feet?
  - a. Inspect feet daily
  - b. Trim calluses gently with razor blade
  - c. Soak feet daily in Epsom salts
  - d. Cut nails short and close to the quick.

You Can Make A Difference
- Assess
  - Nail condition, nail care, in between the toes
  - Who trims your nails
  - Have you ever cut your self?
  - Shoes – type and how often
  - Socks
  - Skin/skin care and vascular health
  - Ability to inspect
  - Loss of protective sensation
**Lower Extremities**

- "Every time you see your doctor, take off your shoes and socks and show your feet!"
- For those at high risk for foot complications
- All patients with loss of protective sensation, foot deformities, or a history of foot ulcers
- Thorough annual inspection

**5.07 monofilament delivers 10gms linear pressure**

Free Monofilaments
http://www.hrsa.gov/leap/

10 Free Monofilaments
www.hrsa.gov/hansensdisease/leap
Three Most Important Foot Care Tips

- Inspect and apply lotion to your feet every night before you go to bed.
- Do NOT go barefoot, even in your house. Always wear shoes!
- Every time you see your doctor, take off your shoes and show your feet. Report any foot problems right away!

Lower Extremity Assessment

- Complete and detailed course in Level 2
Setting Goals

- Specific
- Measurable
- Attainable
- Realistic
- Timely

Goal – Drink one less soda a day for one month
Goal – Count and document carb intake at each meal for 3 days.
Goal – Lift weights on M, W, Friday for 15 minutes.
Goal – Inspect feet and apply lotion M-Friday.

Spiritual Care

“The highest form of wisdom is kindness.”
The Talmud

How many times has a person arrived in my office disheartened and beating themselves up for their weight, their blood sugars, what they eat and what they don’t eat?

This moment of discouragement and despair provides us the opportunity to help them recognize how hard they are being on themselves. We can remind them that having diabetes is not their fault and no one can do it perfectly. By modeling kindness and understanding, we can encourage them to be a kinder self-coach from this day forward.
Give the gift of Non-Judgment

- People with diabetes often feel judged by others, including providers, family, friends and even sometimes by diabetes educators.

When we provide the gift of “non-judgment” we can help open unexpected doors of insight and understanding.

- Meeting them in the field of understanding and compassion can provide them with the courage and belief that they can start rewriting their journey.

Diabetes - a Self-Managed Condition

- What is their motivating spark? Is it to make healthier life choices so they can be actively involved with their grandchildren, wanting to maintain independence, or making it to their nieces’ wedding?

- “Our job is to help discover the spark that motivates people to move toward health through our sincere curiosity and thoughtful questions

- Once the spark is discovered, only one person can ignite it. We stand close by holding the match.

Diabetes Vacations

- No one saves us but our self. No one can and no one may. We ourselves must walk the path” – Buddha

- When they arrive back at our office or call us up after one of these “falls”, they are trusting that we will help them back up with a kind and gentle hand.

- Embark on a process of discovery. Look for barriers to self care and try and find work-arounds.

- Give space for the emotions swirling around their diabetes.

- Make one small goal that signifies their commitment to try and get back on track. This goal has to be absolutely achievable. It’s purpose is to remind them that they can succeed.
Congratulations – You made it!

Thank You – What’s next?

- Sign-up for Level 2 Series Bundle and Boot Camp
- Attend Diabetes Educator Course in Carmel or San Diego
- Follow us on FaceBook