Welcome to Diabetes in the 21st Century

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www.DiabetesEd.net

Diabetes in the 21st Century:
A Clinical and Educational Update

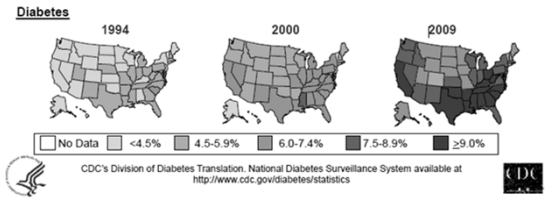
1. Describe impact of diabetes
2. Discuss prevention, management strategies
3. Discuss different types of diabetes
4. Describe insulin therapy
5. Review glucose patterns and determine how to adjust therapy to improve glucose.
6. Discuss medical nutrition therapy
7. Gain understanding of Type 2 Meds.
8. Demonstrate successful teaching strategies

Foundations of Care

- Education
- Nutrition
- Monitoring
- Physical Activity
- Psychosocial Care
- Medications
- Reducing Risk
- Getting to Best Possible Health

Diabetes in America 2015

- 29 million or > 9.3%
- 27% don't know they have it
- 37% of US adults have pre diabetes (86 mil)



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CDC Announces

35% of Americans will have Diabetes by 2050

Boyle, Thompson, Barker, Williamson
2010, Oct 22:8(1)29
www.pophealthmetrics.com

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Type 2 in Kids

- 7 fold increase 1990
- 1 in 6 overwt kids (age 12- 19) have prediabetes.
- ~2,500 to 3,700 new cases in U.S. annually.
- Highest risk: very obese, minority, female, low socioeconomic status, limited education
- In age range 12-19, less than 1% have Type 2 – NHANES
- Environmental changes to urgently needed

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Global Epidemic

- Every 10 seconds
  - 1 person dies with diabetes
  - 2 people develop diabetes
- Every year
  - 3 million deaths
  - 6 million new cases
- World Diabetes Day is November 14
- March is ADA Sound the Alert Day "find people w/ undetected diabetes"

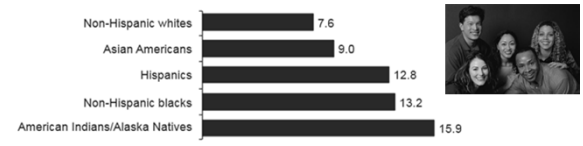
World Diabetes Day

November 14

Age-adjusted Diabetes Prevalence

20 yrs or older, by race/ethnicity— U.S. 20014

Age-adjusted* percentage of people aged 20 years or older with diagnosed diabetes, by race/ethnicity, United States, 2010–2012



*Based on the 2000 U.S. standard population.
Source: 2010–2012 National Health Interview Survey and 2012 Indian Health Service's National Patient Information Reporting System.

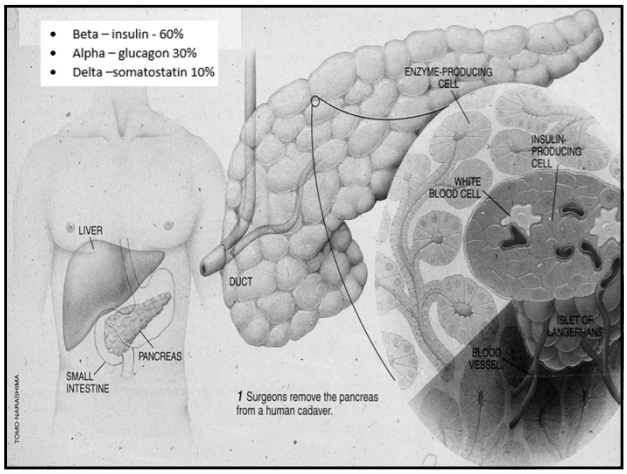
- Among Hispanic adults, the age-adjusted rate of diagnosed diabetes was 8.5% for Central and South Americans, 9.3% for Cubans, 13.9% for Mexican Americans, and 14.8% for Puerto Ricans.
- Among Asian American adults, the age-adjusted rate of diagnosed diabetes was 4.4% for Chinese, 11.3% for Filipinos, 13.0% for Asian Indians, and 8.8% for other Asians.
- Among American Indian and Alaska Native adults, the age-adjusted rate of diagnosed diabetes varied by region from 6.0% among Alaska Natives to 24.1% among American Indians in southern Arizona.

Why Should Zip Code Determine Life Expectancy?

California Endowment – look up your zip code at www.measureofamerica.org

Free Live Webinars and Live Seminars at DiabetesEd.net

- Free Webinars
  - Preparing to take CDE
  - New Frontiers
  - New Medications
  - BC-ADM



Role of the Pancreas Endocrine Functions

Beta Cells - Insulin

Anabolic hormone - helps store glucose as glycogen in muscle, liver

- secreted in response to elevated glucose
- halts breakdown of glycogen in liver
- increases protein synthesis, fat storage
- powerful hypoglycemic

Beta Cells - Amylin

- secreted in 1:1 ratio with insulin
- Causes satiety
- Lowers post-prandial glucagon response
- Slows gastric emptying
- Type 1 make none
- Type 2 make less than normal amounts

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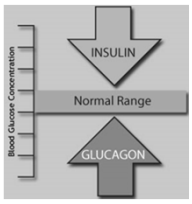
Role of the Pancreas Endocrine Functions



Alpha cells - Glucagon

Opposes action of insulin at the liver

- stimulated in response to low glucose levels
- stimulates liver to convert glycogen to glucose
- inhibits liver from glucose uptake
- causes hyperglycemia

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Hormones Effect on Glucose

Hormone	Effect
Glucagon (pancreas)	↑
Stress hormones (kidney)	↑
Epinephrine (kidney)	↑
Insulin (pancreas)	↓
Amylin (pancreas)	↓
Gut hormones - incretins (GLP-1) released by L cells of intestinal mucosa, beta cell has receptors)	↓

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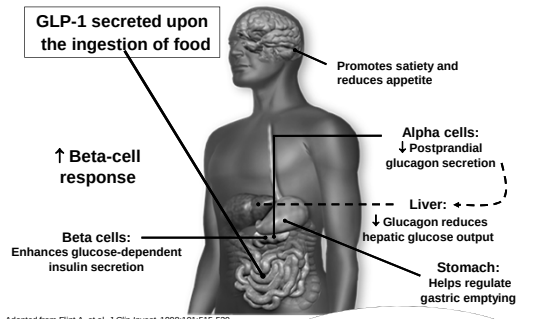
GLP-1 Effects in Humans
Understanding the Natural Role of Incretins



Adapted from Flint A, et al. *J Clin Invest*. 1998;101:515-520
Adapted from Larsson H, et al. *Acta Physiol Scand*. 1997;160:413-422
Adapted from Nauck MA, et al. *Diabetologia*. 1996;39:1546-1553
Adapted from Drucker DJ. *Diabetes*. 1998;47:159-169

GLP-1 degraded by DPP-4 w/in minutes

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Incretin Mimetics
Byetta, Bydureon, Trulicity, Tanzeum

- **Action (synthetic gut hormone)**
  - Insulin release in response to meal
  - Slows gastric emptying
  - Causes Satiety – promotes wt loss
  - Preserves Beta Cells
- **Details:**
  - Daily and long acting version - 1x week injection
  - **Efficacy:** Decreases A1c by 0.5 – 1.6%, wt by 3lbs +
- **Benefits/Issues** – wt loss, no hyp. Expensive, N/V
  - □ Pancreatitis Warning – report signs immediately

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Bariatric Surgery

- Consider on diabetes pts w/ BMI >35, esp with comorbidities
- Remission (BG normalized)
  - rates range from 40 – 95%
  - Better results with newer diabetes (more beta cell mass)
  - Due to increase incretins (gut hormones)
- Still researching long term benefits, cost effectiveness and risk

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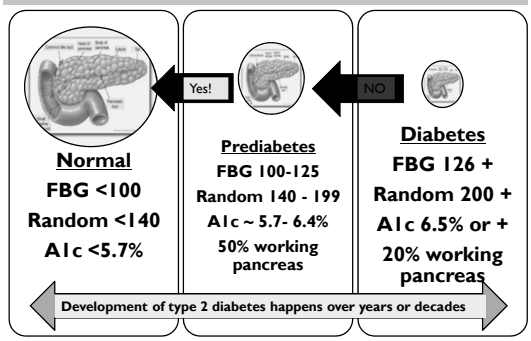
Natural History of Diabetes



Signs of Diabetes

- Polyuria
- Polydipsia
- Polyphasia
- Weight loss
- Fatigue
- Skin and other infections
- Blurry vision

- Glycosuria, H_2O losses
- Dehydration
- Fuel Depletion
- Loss of body tissue, H_2O
- Poor energy utilization
- Hyperglycemia increases incidence of infection
- Osmotic changes

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Diabetes Classifications

- Type 1
- Type 2
- Gestational
- Secondary

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Case Study

1. Pt profile: 5'8", 192 lb male

Diabetes 12 years, on insulin 3 yrs

What type of DM and how do you know?

2. Pt profile: 5'6", 108 lb female

On insulin 3u Novolog before meals,

10u Lantus at bedtime

What type of DM and how do you know?

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Type 1 Rates Increasing Globally

- 23% rise in type 1 diabetes incidence from 2001-2009
- Why?
  - Autoimmune disease rates increasing over all
  - Changes in environmental exposure and gut bacteria?
  - Hygiene hypothesis
  - Obesity?

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Incidence of Type 1 in Youth

- **General Pop 0.3%**
- **Sibling 4%**
- **Mother 2-3%**
- **Father 6-8%**
- Rate doubling every 20 yrs
- Many trials underway to detect and prevent (Trial Net)

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Type 1 – 10% of all Diabetes
Genetics and Risk Factors

- Auto-immune pancreatic beta cells destruction
- Most commonly expressed at age 10-14
- Insulin sensitive (require 0.5 - 1.0 units/kg/day)

- Combo of genes and environment:
  - Autoimmunity tends to run in families
  - Higher rates in non breastfed infants
  - Viral triggers: congenital rubella, coxsackie virus B, cytomegalovirus, adenovirus and mumps.

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Autoantibodies Assoc w/ Type 1

Panel of autoantibodies –

- GAD65 - Glutamic acid decarboxylase –
- ICA - Islet Cell Cytoplasmic Autoantibodies
- IAA - Insulin Autoantibodies

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Type 1 Diabetes Associated with other immune conditions

- Celiac disease (gluten intolerance)
- Thyroid disease
- Addison's Disease
- Rheumatoid arthritis
- Other

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Type 1 Summary

- Autoimmune
- Complete pancreatic destruction
- Need insulin shots
- Often first present in DKA

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Type 1 in Hospital

- 43 yr old admitted to evaluate angina.
- Morning blood sugar is 92.
- Based on Regular insulin sliding scale, no insulin required.
- Breakfast tray shows up and patient says, I need my insulin shot before I eat.

What do you say?

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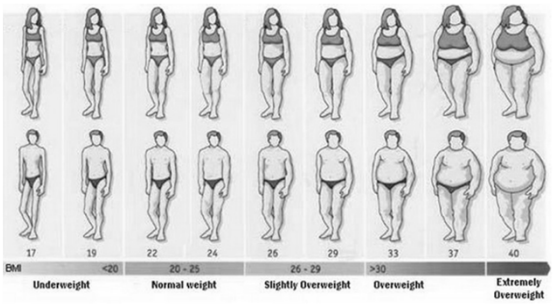
BMI Categories



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Diabetes 2 - Who is at Risk?

(ADA Clinical Practice Guidelines)

1. Testing should be considered in all adults who are overweight (BMI ≥ 25) and have additional **risk factors**:

- First-degree relative w/ diabetes
- Member of a high-risk ethnic population
- Habitual physical inactivity
- PreDiabetes
- History of heart disease

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Diabetes 2 - Who is at Risk?

(ADA Clinical Practice Guidelines)

Risk factors cont'd

- HTN - BP > 140/90
- HDL < 35 or triglycerides > 250
- baby >9 lb or history of Gestational Diabetes Mellitus (GDM
- Polycystic ovary syndrome (PCOS)
- Other conditions assoc w/ insulin resistance:
  - Severe obesity, acanthosis nigricans (AN)

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Acanthosis Nigricans (AN)

- Signals high insulin levels in bloodstream
- Patches of darkened skin over parts of body that bend or rub against each other
  - Neck, underarm, waistline, groin, knuckles, elbows, toes
  - Skin tags on neck and darkened areas around eyes, nose and cheeks.
- No cure, lesions regress with treatment of insulin resistance

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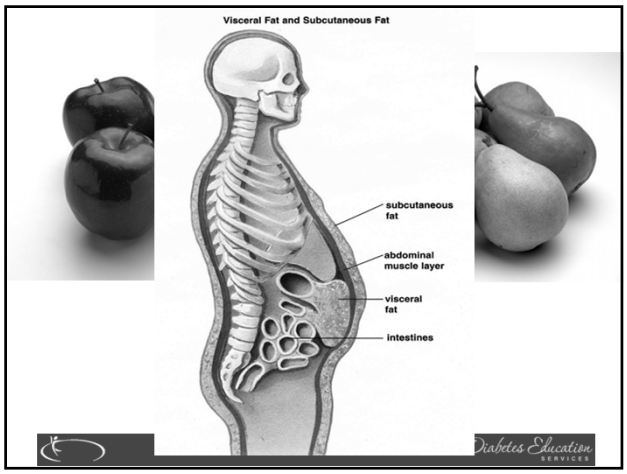
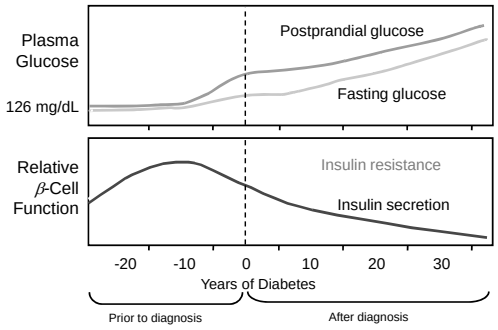


Natural Progression of Type 2 Diabetes



Adapted from Bergenstal et al. 2000; International Diabetes Center.

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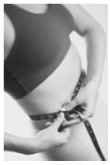
Cardio Metabolic Risk - 5 Hypers -



- Hyperinsulinemia (resistance)
- Hyperglycemia
- Hyperlipidemia
- Hypertension
- Hyper"waistline"emia (35" women, 40" men)

Manifestations of Insulin Resistance

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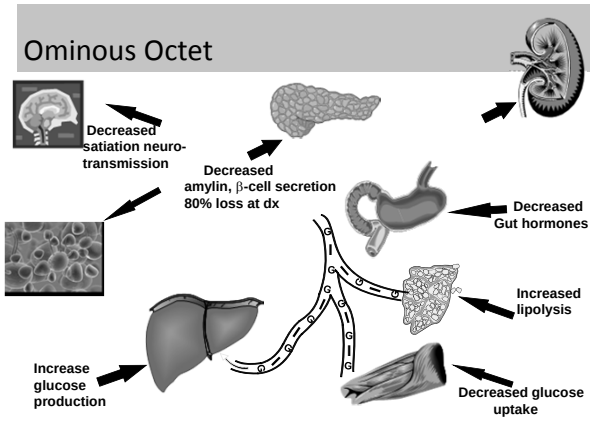
Diabetes Detectives Needed

- On average – takes 6.5 years to diagnose diabetes
- 1/4 of all people with diabetes don't know they have it

Ominous Octet



SGLT2 Inhibitors- "Glucoretics"

- **Action**: "Glucoretic" decreases renal reabsorption in the proximal tubule of the kidneys (reset renal threshold and increase glycosuria)

SGLT2 Inhibitors • Decrease glucose reabsorption in kidneys • "glucoretic."	Canagliflozin (Invokana) Dapagliflozin (Farxiga) Empagliflozin (Jardiance)	100–300 mg once daily 5–10 mg once daily 10–25 mg once daily

- Benefits: Lowers A1c 0.7 – 1.5%, lowers wt 1-3 lbs, no hypo
- Issues: Can initially lower GFR, monitor kidney function and lytes. Watch for hypotension/ GU infections. Expensive

Comparison of Type 1 and Type 2

	Type 1	Type 2
Obesity	x	xxx
Insulin dependence	xxx	30%
Respond to oral agents	0	xxx
Ketosis	xxx	x
Antibodies present	xxx	0
Typical Age of onset	teens	adult
Insulin Resistance	0	xxx

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Gestational DM ~ 7% of all Pregnancies

- GDM prevalence increased by
  - ~10–100% during the past 20 yrs
- Native Americans, Asians, Hispanics, African-American women at highest risk
- Immediately after pregnancy, 5% to 10% of GDM diagnosed with type 2 diabetes
- Within 5 years, 50% chance of developing DM in next 5 years.

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Postnatal Health: Maternal Behavior

- Encourage breastfeeding for one year
  - (25% of women achieving this goal)
- Screening 6-12 weeks post partum using non-pregnant OGTT criteria (50%)
- Repeat at 3 yr intervals or signs of DM
- Encourage weight control and exercise
- Make sure connected with health care
- Preconception counseling

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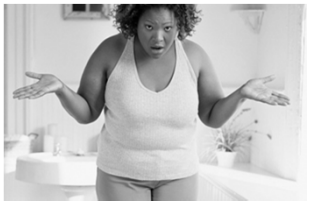
Start Metformin therapy

- For women with PreDiabetes and History of GDM



Metformin – 1st agent of choice

- **Action:** decrease hepatic glucose (glycogen)
- Metformin (Glucophage)
  - Starting dose: 500 BID, max 2500mg daily
  - Metformin XR - extended release – less GI upset
- **Efficacy:**
  - Decrease fasting plasma glucose 60-70 mg/dl
  - Reduce A1C 1.0-2.0%
- Benefits / Issues
  - Cheap, no weight gain; some lose weight, lowers LDL, no hypo
  - Not indicated if creat > 1.4-1.5 or GFR < 60 (cleared by kidney)

Other Causes of Hyperglycemia

- Steroids
- Agent Orange
- Tube feedings / TPN
- Transplant medications
- Cystic Fibrosis

Regardless of cause, requires treatment
- Insulin always works
- Sign of pancreatic malfunction

Diabetes is also associated with:

- Fatty liver disease
- Obstructive sleep apnea
- Cancer; pancreas, liver, breast
- Alzheimer's
- Depression

DiaBingo

~~B~~ Frequent skin and yeast infections
B A BMI of ____ or greater is considered overweight
B To reduce complications, control **A**1c, **B**lood pressure, **C**holesterol
B PreDiabetes – fasting glucose level of ___ to ____
B Erectile dysfunction indicates greater risk for ____
B Diabetes – fasting glucose level____ or greater
B Type 1 diabetes is best described as an _____ disease
B People with diabetes are _____ times more likely to die of heart dx
B Elevated triglycerides, < HDL, smaller dense LDL
B Each percentage point of A1c = _____ mg/dl glucose
B At dx of type 2, about __% of the beta cell function is lost
B Diabetes – random glucose ____ or greater

Life Study – Mrs. Jones

Mrs. Jones is 62 years old, overweight and complaining of feeling tired and urinating several times a night. She is admitted with a urinary tract Infection. Her WBC is 12.3, glucose 237. She is hypertensive with a history of gestational diabetes. No ketones in urine.

- What are her risk factors, signs of diabetes
- What type of diabetes does she have?
- Does she have insulin resistance?

Strategies – One Step at a Time, Focus on Survival Skills

Look for
"teaching moment"
opportunities

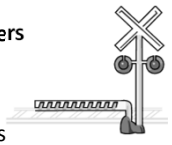
What Do You Say? Mrs. Jones asks you

- What is type 2 diabetes?
- Will this go away?
- Will I get complications?
- Will I need to take diabetes medication for the rest of my life?
- How come I got diabetes?
- Do I have to check my blood sugars?

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

Overcoming barriers

- Confront the key misbelief. Ask the question, does dm cause complications?
- Offer pts evidence based hope message –
- Frequent contact
- Paired glucose testing
- Ask pt, "Tell me 1 thing that is driving you crazy about your diabetes"
- Discuss medication beliefs
- To improve outcomes, see pts more often

Bill Polonsky, PhD, CDE

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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

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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
- Avoid unwanted weight gain
- Enhanced athletic performance
- Find patterns
- Manage illness

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"The highest form of wisdom is kindness."
The Talmud

How many times has a person arrived disheartened?

This moment of discouragement and despair provides us an opportunity.

By modeling kindness and understanding, we can encourage them to be a kinder self-coach from this day forward.

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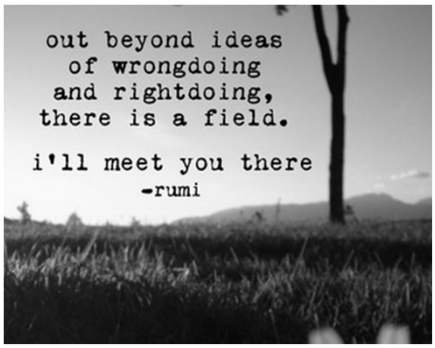
Give the gift of Non-Judgment



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"Getting diabetes saved my life."
~ Sherri Sheperd

Sherri Shepard decided to embrace diabetes and use it as a motivator to improve her health.

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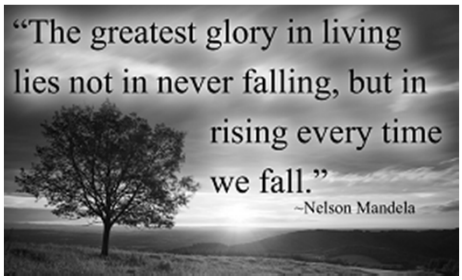
Diabetes Vacations



80 /20 Rule – Perfect Not Required

- Words of wisdom from my diabetes educator:

"You don't have to be perfect, Mom!"

Certified diabetes educator (and daughter!): Beverly Thomassian, RN, MPH, CDE, BC-ADM, president of Diabetes Education Services, Chico, CA

Patient (and mom!): Becky Dyck, 73

Resident: Chico, CA

Complications - Why?

- Degree of hyperglycemia "glucose toxicity"
- Duration of hyperglycemia
- Genes
- Multiple risk factors: smoking, vascular disease, dyslipidemia, hypertension, other

Diabetes Complications

- Heart disease leading cause of death.
- CAD death rates are about 2 -4x's as high as adults without diabetes (it's not getting better)
- Risk of stroke is 2 - 4 times higher
- 60% - 65% of people with DM have HTN.
- DM accounts for 40% of new cases of ESRD
- 60 - 70% have mild - severe forms of neuropathy
- Diabetes is the leading cause of blindness
- Accounts for 50% of lower limb amputations

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Control Matters

- **Trials**
- **Practice Recommendations**

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Financial Advisor

- Mid 30s, friendly, he smiles to greet you and you notice his gums are inflamed. You'd guess a BMI of 26 or so, with most of the extra weight in the waist area.
- If you could give him some health related suggestions, what would they be?

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Preventing Pre Diabetes

Can Type 2 be Prevented in Older Adults?

- Physical activity (30 mins a day)
- Dietary score (higher fiber intake, low saturated fat and *trans*-fat , lower mean glycemic index)
- Not Smoking
- Alcohol use (up to 2 drinks a day);
- BMI <25 and waist circumference

Dariush Mozaffarian, MD,
Arch Intern Med. 2009;169(8):798-807.

Overall, 9 of 10 new cases of diabetes attributable to these 5 lifestyle factors.

89% risk reduction when all at goal.

35% rel risk reduction for each additional

Can we stop pre diabetes from progressing?

3, 234 people w/ Pre-Diabetes randomized:

- Placebo
- Diet/Exercise or
- Metformin

over a three year period

Diabetes Prevention Program (DPP) 2001

Diabetes Prevention Program

- Standard Group - 29% developed DM
- Lifestyle Results - 14% developed DM
  - 58% (71% for 60yrs +) Risk reduction
    - 30 mins daily activity
    - 5-7% of body wt loss
- Metformin 850 BID - 22% developed DM
  - 31% risk reduction (less effective with elderly and thinner pt's)

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Weight loss and Prevention

- For every 2.2 pounds of weight loss, risk of type 2 diabetes was reduced by 13%.

NATIONAL Diabetes PREVENTION PROGRAM

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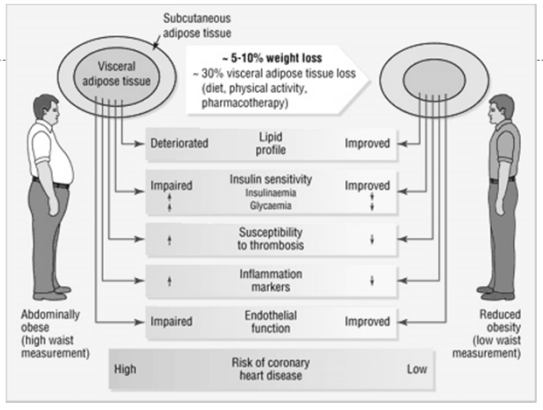

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ABCs of Diabetes –

- A1c less than 7% (avg 3 month BG)
  - Pre-meal BG 80-130
  - Post meal BG <180
- Blood Pressure < 140/90
- Cholesterol
  - DM and 40 yrs, start statin
  - HDL >40
  - Triglyceride < 150
- E xercise, Education
- H ealthy Eating

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Glucose and BP Control Matter

- 1% decrease in A_1c reduces microvascular complications by 35%
- 1% decrease in A_1c reduces diabetes related deaths by 25%
- B/P control (144/82) reduced risk of:
  - Heart failure (56%)
  - Stroke (44%)
  - Death from diabetes (32%)

Lancet 352: 837-865, 1998

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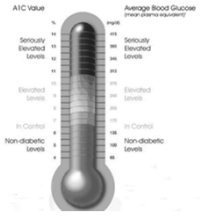
6. Glycemic Targets

- **Adult non pregnant A1c goals**
  - **A1c < 7%** - a reasonable goal for adults.
  - **A1c < 6.5%** - may be appropriate for those without significant risk of hypoglycemia or other adverse effects of treatment.
  - **A1c < 8%** - may be appropriate for patients with history of hypoglycemia, limited life expectancy, or those with longstanding diabetes and vascular complications.



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A1c and Estimated Avg Glucose (eAG) 2008

A1c (%)	eAG
5	97
6	126
7	154
8	183
9	212
10	240
11	269
12	298

Order teaching tool kit free at diabetes.org

eAG = 28.7 x A1c-46.7 ~ 29 pts per 1%

Translating the A1c Assay Into Estimated Average Glucose Values – ADAG Study

Diabetes Care: 31, #8, August 2008

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"Legacy Effect"

- For participants of DCCT and UKPDS
  - long lasting benefit of early intensive BG control prevents
    - microvascular complications
    - Macrovascular complications (15-55% decrease)
  - Even though their BG levels increased over time
  - Message – Catch early and Treat aggressively

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Exercise Recommendations

- **Activity update –Don't sit more than 90 minutes**
- Evidence supports that everyone, including with diabetes should be encouraged to reduce sedentary time, by not sitting for more than 90 minutes at a time.

- It is recommended that people with pre diabetes and diabetes engage in 150 minutes of activity a week and at **least 2 weekly sessions of resistance exercise.**

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Good Exercise Info / Quotes

- 20 % of people walk 30 mins a day
- Exercise decrease A1c 0.7%
- No change in body wt, but 48% loss in visceral fat
  - ADA PostGrad 2010

- "If you don't have time for exercise, you better make time for disease."

"I don't have time to exercise, I MAKE time."

Mike Huckabee

Vaccinations- Immunizations

- Flu vaccine
  - every year starting 6 months
- Pneumococcal starting at 2 years.
  - One time Revaccination for those over 64 and had first vaccine >5 years prior
- Hepatitis B Vaccine
  - For diabetes pts age 19 – 59 (not previously vaccinated)
  - Double risk of Hep B due to lancing devices/ glucose meter exposure

Pneumonia Vaccination Update

- Pneumonia polysaccharide PPSV23 vaccine to all patients starting at age 2
- **Adults ≥ 65 years of age**, if not previously vaccinated, should receive pneumococcal conjugate vaccine 13 (PCV13), followed by PPSV23 6-12 months after initial vaccination.
- **Adults ≥ 65 years of age**, if previously vaccinated with PPSV23 should receive a follow-up ≥ 12 months with PCV13.

DiaBingo- G

G ADA goal for A1c is less than ____%

G People with DM need to see their provider at least every month

G Blood pressure goal is less than

G People with DM should see eye doctor (ophthalmologist) at least

G The goal for triglyceride level is less than

G Goal for my HDL cholesterol is more than

G The goal for blood sugars 1-2 hours after a meal is less than:

G People with DM should get this shot every year

G People with DM need to get urine tested yearly for _____

G Periodontal disease indicates increased risk for heart disease

G The goal for blood sugar levels before meals is:

G The activity goal is to do ___ minutes on most days

Diabetes Education SERVICES

Mr. Jones - What are Your Recommendations?

Patient Profile

71 yr old with type 2 for 11 yrs. Hx of CVD. Takes glyburide 10mg BID.

Labs:

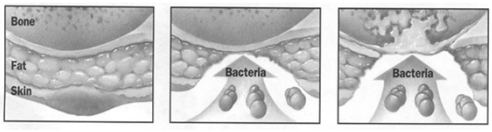
- A1c 7.6%
- HDL 37 mg/dl
- Triglyceride 260mg/dl
- Proteinuria - neg
- B/P 152/94

Self-Care Skills

- Walks dog around block 3 x's a week
- Bowls every Friday
- 3 beers daily
- *What meds?*
- *Tells you I get shaky a lot.*
- *My foot hurts*

Diabetes Education SERVICES

Foot Wounds



Blisters
Calluses

Ulcers

Bone infection

Diabetes Education SERVICES

Mr. Jones is admitted to Hospital

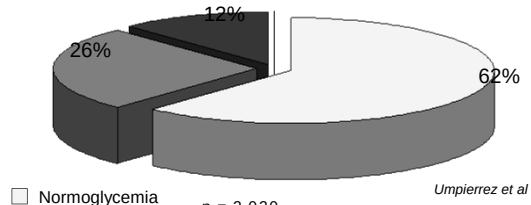
- How would we manage his BG in hospital?
- What are our teaching priorities?

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

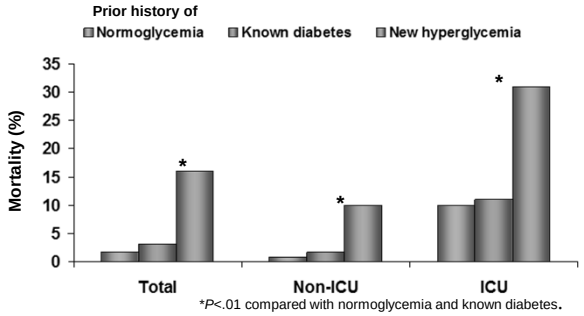
Hyperglycemia*: A Common Comorbidity in Medical-Surgical Patients in a Community Hospital

Umpierrez G et al, J Clin Endocrinol Metabol 87:978, 2002



* Hyperglycemia: Fasting BG ≥ 126 mg/dl or Random BG ≥ 200 mg/dl X 2

Effect of Hyperglycemia on Hospital Mortality



*P<.01 compared with normoglycemia and known diabetes.

Umpierrez GE et al. *J Clin Endocrinol Metab*. 2002;87:978-982.

WHAT SHOULD WE AIM FOR?

Critically Ill pts

- BG > 180- Start insulin
- BG goal 140-180

Non Critically Ill patients BG Goals

- Premeal <140
- Post meal <180

•Insulin therapy preferred treatment

Consensus: Inpt Hyperglycemia, Endocr Pract. 2009;15 (No.4)

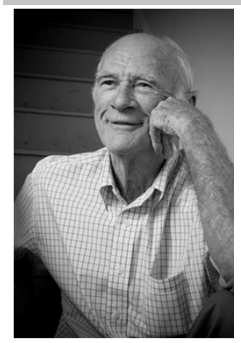
Management of Hyperglycemia and Diabetes

- Stop oral agents (ie) metformin & sulfonylurea on admission
- "The sole use of Sliding Scale insulin is discouraged" – ADA 2014
- For discharge, oral meds can be resumed

Start Basal/bolus therapy

- NPH and Regular insulin
- Long-acting and rapid-acting insulin
- Premixed insulin

Mr. Jones Clinical Picture
How Much Insulin Needed?



- Creatinine 1.6
- 71 years old
- Not very hungry
- BMI 24
- Weighs 80kg
- Glyburide 10mg BID at home
- A1c 7.6%

Diabetes Education SERVICES

Sulfonylureas - Squirts

- Action: Increase endogenous insulin secretion throughout day
- Efficacy:
  - Decrease FPG 60-70 mg/dl
  - Reduce A1C by 1.0-2.0%
- Side Effects:
  - Weight gain, hypoglycemia
- Benefits:
  - Cheap, effective

Diabetes Education SERVICES

How Much Insulin Does a Patient Need?

- It depends, based on:
  - Body weight
    - Overwt, normal wt, or thin
  - Frail, elderly
  - Eating status
    - Normal, poor intake or NPO
  - Renal or hepatic insufficiency
  - Type of Diabetes
  - Current meds; steroids, insulin, oral dm agents
  - Infected or Septic

Diabetes Education SERVICES

Calculate Daily Insulin Needs

- Based on unique characteristics of pt, where would you start?
  - Body wt in Kg x _____ = total daily dose
  - May need more or less based on clinical presentation

Less 0.3 u/kg 0.5u/kg More 1.0 u/kg

Thin, elderly, ↓ creat Heavy, infection, steroids

Calculate Insulin Needs Basal/ insulin carb/ correct

- Body wt in Kg x 0.3
- 80kg x 0.3 = 24 units daily

- Basal = 12 units (50%)
- Bolus = 12 units / 3 meals = 4 units each meal
- What if he is nauseated?

Mr. Rs Pattern
4 unit meal bolus + 12 unit Lantus hs

	Break	Lunch	Dinner	HS
Day 1	admit	219	143	179
Day 2	58	97	84	95 -NPO
Day 3	67 - OR	nausea	119 clear liquids	104
Day 4	74	81	Start tube feeds	

BG Running Low?

- Possible Causes
  - Too much insulin
    - Premeal bolus
    - HS basal
  - Glucose toxicity improving
  - Infection improving
  - Stopped/lowered steroids
  - Poor kidney function
  - Skipped meal, poor PO intake
  - Not eating enough carbs

Diabetes Education SERVICES

BG Too Low? Insulin Adjustment Guidelines

- Before meal Blood glucose <70?
  - Implement hypoglycemia protocol
  - Evaluate cause and make needed adjustments
    - Missed meal?
    - Too much insulin?
- Morning blood glucose < 90?
  - Decrease evening Lantus by 10%
- Evaluate trends, provide feedback

Diabetes Education SERVICES

Preparation for Surgery

- Try to schedule surgery in am, resume meds/insulin when eating and stable.
- **Oral medications**: In am, hold all diabetes oral medications
- **Basal Insulin**: Night before
  - type 2s, may need to adjust basal dose
  - type 1s give up to 100% of basal dose.
- **Bolus insulin**: may need mild insulin bolus coverage for type 1 and type 2's
- Have D5 or D10 IV bags available in case of hypo

Diabetes Education SERVICES

Now What?

- Nurse had an emergency and pt already ate lunch?

- Nurse administered insulin and pt only ate a few bites of turkey and drank non sugar tea?
- You just gave 3 units of Aspart and patient needs to go to OR NOW!

3 days poor intake, pt started on Tube Feeding

- If on continuous tube feeding, how would this change his insulin regimen?
- If on intermittent tube feeding, how would this change his insulin regimen?
- If patients tube feeding is interrupted, what precautions would you take?

Diabetes Education SERVICES

Glycemic Management During Enteral Nutrition

Continuous enteral nutrition (EN)

- Basal insulin: once or twice daily
- Prandial bolus insulin: to match the feeding or 70/30 mix BID

Cycled enteral nutrition: Based on situation:

- Basal insulin
- Bolus insulin administered q4 to 6 hours
- Correctional insulin given for BG above goal

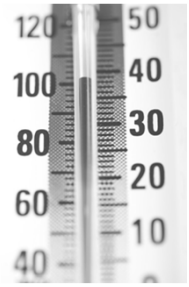
Bolus enteral nutrition

- Rapid acting analog or short acting insulin given prior to each bolus
- May also need basal on board

If tube pulled out, consider hanging IV D10%

Diabetes Education SERVICES

BG Running High?



- Possible Causes
  - Glucose Toxic
  - Infection
  - Started on steroids
  - Physical stress
  - Insulin dose too low

Diabetes Education SERVICES

Intensify Insulin therapy or start insulin Drip

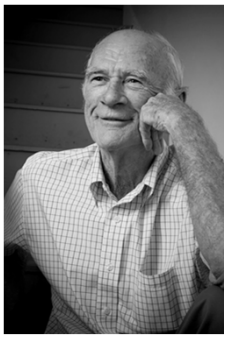
- 100 units insulin in 100 cc NS Bag
- 1 cc = 1unit of insulin

Society of Hospital Medicine listing of sample Insulin Drip Protocols

Special Considerations During Hospital Stay

- Hypoglycemia –
  - treat with 15 gms carb and recheck every 15-30 minutes until BG stable
  - Notify MD to change insulin orders
- Contact Diabetes Ed Team if patient admitted with insulin pump.
- IV Insulin – look carefully at insulin sensitivity and adjust insulin drip rate based on BG Trends
- Give basal insulin, even if pt isn't eating. Dose may need adjustment.

Mr. Jones Clinical Picture – What discharge plan?

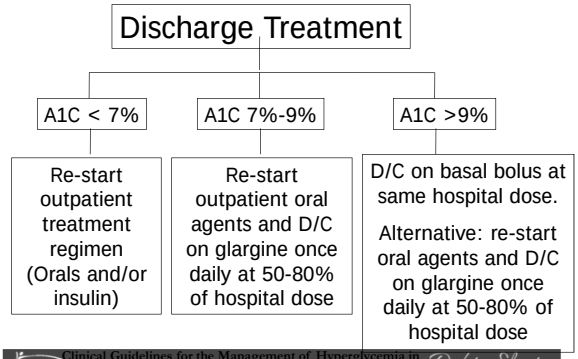


- Creatinine 1.6
- 71 years old
- Not very hungry
- BMI 24
- Lives alone
- Non weight bearing R foot
- A1c 7.6%

Discharge Teaching

- What diabetes management plan?
- What supplies will he need?
- What top 5 things do we need to teach him?
- What referrals?

Discharge insulin Algorithm



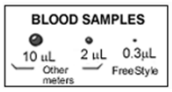
Clinical Guidelines for the Management of Hyperglycemia in Hospitalized Patients in a Non-Critical Care Setting

Mr Jones – Teaching Priorities

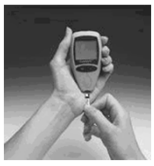
- Foot Care
- How to use meter
- Insulin Injections
- Signs of Hypo/Hyper
- When and who to call for help
- Follow-up Care

Diabetes Education SERVICES

New Meters – a little goes a long way



- 0.3 microliters of blood
- minimal pain

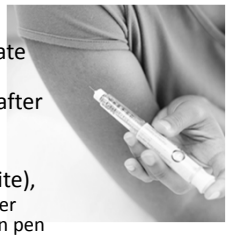


Customer Service (toll-free): Look for 800 number

Diabetes Education SERVICES

Insulin Pens

- Instructions
  - Prime needle to assure accurate insulin dose given
  - Hold needle in for 5 seconds after injection
  - Roll 70/30 pens
  - Replace large needle cap (white),
    - Unscrew and remove needle after injection. Do not leave needle on pen



Remember that inpatient safety pen needles are different than home pen needles.

Diabetes Education SERVICES

When to Call Provider?*

- Blood glucose <70
- Blood glucose > 250 twice in a day (adults)
- Blood glucose >240 x 3
- *When sick with fever

**Individualize based on pt/provider*

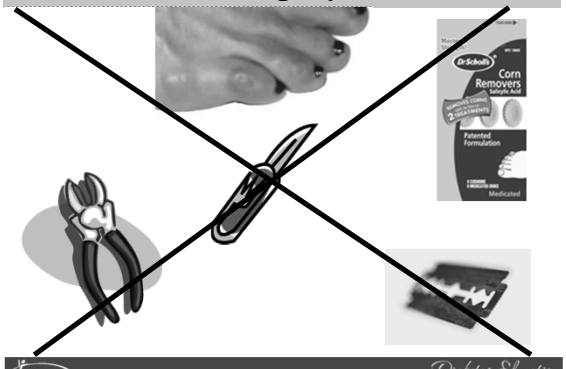
Diabetes Education SERVICES

Foot Care

Lift the sheets and look at the Feets!

Diabetes Education SERVICES

No Bathroom Surgery



Diabetes Education SERVICES

A Quick Foot Assessment

- Ask - What do you do to take care of your feet?
- Look - texture, toenails, structural deformities, lesions, corns
- Assess sensation
- Assess risk factors
- Teach, teach, teach

Diabetes Education SERVICES

5.07 monofilament = 10gms linear pressure
If pt can't feel pressure = neuropathy

Diabetes Education SERVICES

3 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.

Diabetes Education SERVICES

Bottom Line

- 30-40% of hospitalized patients have diabetes
  - 10% aren't officially diagnosed
- Cardiovascular disease is the leading cause of hospitalization for people with diabetes
- Look for patients with hyperglycemia and cardiometabolic risk factors: smokers, HTN, central obesity, abnormal lipids, Acanthosis.
- Provide education and promote self-advocacy

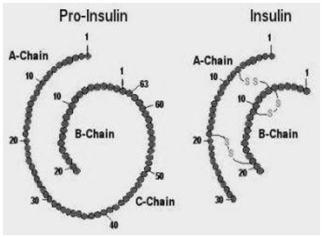
Diabetes Education SERVICES

Insulin – the Ultimate Hormone Replacement Therapy

Objectives:

•Discuss the actions of different insulins

•Describe using pattern management as an insulin adjustment tool.



Diabetes Education SERVICES

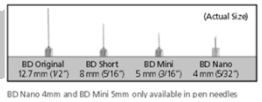
Psychological Insulin Resistance (PIR)

- 50% of providers in study threatened pts "with the needle".
- Less than 50% of providers realized insulins' positive effect on type 2 dm
- Most pts don't believe that insulin would "better help them manage their diabetes".
- Solutions: Find the root of PIR and address it, use more insulin pens

Diabetes Attitudes, Wishes, Needs Study - Rubin

Diabetes Education SERVICES

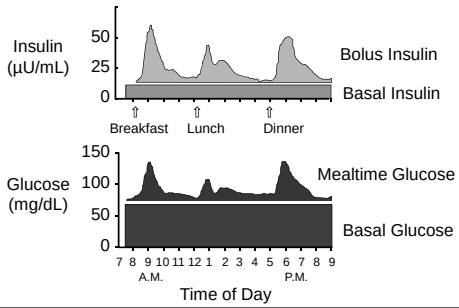
Needle Size often a Barrier Size *Does* Matter



- Use more short needles – 4 mm
- Effective for pts with BMI of 24- 49
- Keeps it subq
- If pt thin, inject at angle
- To avoid leakage, count to 10 before withdrawing needle
- ½ the patients who could benefit from insulin are not using it due to needle phobias
- Consider inhaled insulin

Diabetes Education SERVICES

Physiologic Insulin Secretion: 24-Hour Profile



Diabetes Education SERVICES

Insulin Action Teams

- Bolus: lowers after meal glucose levels
  - Rapid Acting
    - Aspart, Lispro, Glulisine
  - Short Acting
    - Regular
  - Afrezza - Inhaled
- Basal: controls glucose between meals, hs
  - Intermediate
    - NPH
  - Long Acting
    - Detemir (Levemir)
    - Glargine (Lantus)

Diabetes Education SERVICES

Case Study

- 70 yr old, weighs 100kg
- History of CABG, tobacco
- A1c – 11.3%, BG 400-500 for past weeks
- Insulin – 100+ units Lantus at hs (solostar)
- Oral Meds: Metformin, Invokana
- What is a better insulin dosing strategy?
- Pt can't afford insulin pen – what other option
- Diabetes Meds on a Budget - 2014 - provides practical and affordable strategies to manage hyperglycemia

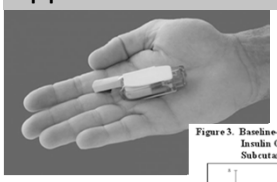
Cost Per Vial in Northern CA

Per vial cost	Walmart	Walgreens	Costco
Regular Insulin	$25*	$92	$99
NPH	$25*	$92	$99
70/30	$25*	$92	$101
Humalog	$200	$220	$178
Novolog	$197	$217	$178
Apidra	$180	$246	$178
Levemir	$300	$300	$300
Lantus	$226	$221	$206

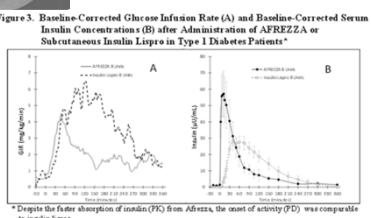
Bolus Insulins
(½ of total daily dose ÷ meals)

Name	Onset	Peak Action
Lispro (Humalog)	15-30 min	1-1.5 hrs
Aspart (NovoLog)		
Glulisine (Apidra)		
Afrezza (Inhaled)		
Regular	30 mins	2-4 hrs

Afrezza – Inhaled Insulin – Approved 2014



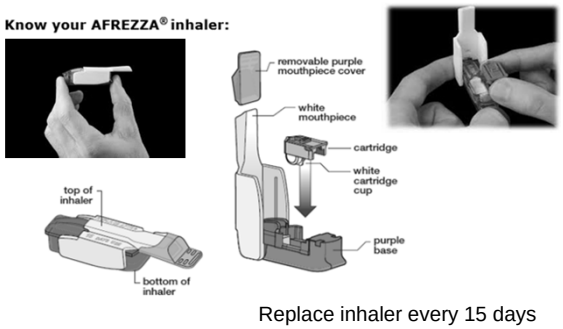
For adults over 18
Not indicated for pregnancy, while breastfeeding



Afrezza Dosing and Considerations

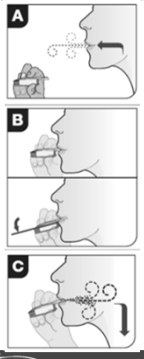
- Bolus regular insulin – inhaled before meals
- Dosing: 4 and 8 unit cartridges
  - Convert with 1:1 ratio to existing insulin dose
- Lung function test before start (incentive spiro)
  - Not for pts w/ chronic lung issues
    - Asthma, COPD, history of lung cancer, smokers
    - Can cause acute bronchospasm
- Side effects:
  - Hypoglycemia, sore throat, cough

Afrezza Inhaler



Replace inhaler every 15 days

Afrezza – Proper Inhale Technique



- Exhale
- Position inhaler in mouth (take off cover)
- Tilt inhaler down toward chin, keep head leveo
- Inhale deeply and hold breath for as long as comfortable
- Remove cartridge
- Replace cover

Diabetes Education SERVICES

Bolus Insulin Summary

- Regular, Novolog, Humalog, Apidra, Afrezza
- Starts working fast (15-30 mins)
- Gets out fast (3-6 hours)
- Post meal BG reflects effectiveness
- Should comprise about ½ total daily dose
- Covers food or hyperglycemia.
- 1 unit
  - Covers ≈ 10 -15 gms of carb
  - Lowers BG ≈ 30 – 50 points

Diabetes Education SERVICES

Bolus Insulin Timing

- How is the effectiveness of bolus insulin determined?
  - 2 hour post meal (if you can get it)
  - Before next meal blood glucose
- Glucose goals (ADA) – may be modified by provider/pt
  - 1-2 hours post meal <180
  - Before next meal – 80 - 130

Diabetes Education SERVICES

Pattern Management

- Safety 1st!! - Evaluate 3 day patterns
- **Hypo:** eval 1st and fix:
  - If possible, decrease medication dose
  - Timing of meals, exercise, medications
- **Hyperglycemia:** evaluate 2nd
  - Identify patterns
  - Before increase insulin, make sure not missing something (carbs, exercise, omission)

Type 2 – BMI 32. New diagnosis, No meds. What Patterns? Recommendations? Meds?

	Break	Lunch	Dinner	HS
Day 1	164			181
Day 2		124	106	195
Day 3	149		102	242
Day 4	151	81		211

Bolus – Insulin Sliding Scale

Starts at 150, 2 units for every 50 mg/dl >150

	Break	Lunch	Dinner	HS
Day 1	94 no insulin	212 4 uR	148 no insulin	254 6 uR
Day 2	243 4uR	254 6 uR	201 4uR	199 no insulin
Day 3	189 2uR	243 4uR	162 2uR	244 4uR
Day 4	66 No insulin	287 6uR	144 none	272 6uR

Basal Insulins
(½ of total daily dose)

Intermediate Acting	Peak Action	Duration
NPH	4-12 hrs	12-24

Long Acting	Peak Action	Duration
Detemir (Levemir)	peakless	20 hrs
Glargine (Lantus)	No peak	24 hrs

Fasting BG reflects efficacy of basal

Diabetes Education SERVICES

Basal Insulin Summary

- NPH, Levemir, Lantus
- Covers in between meals, through night
- Starts working slow (4 hours)
- Stays in long (12-24 hours)
  - NPH/ Lente 12 hrs
  - Levemir, Lantus 20-24 hrs

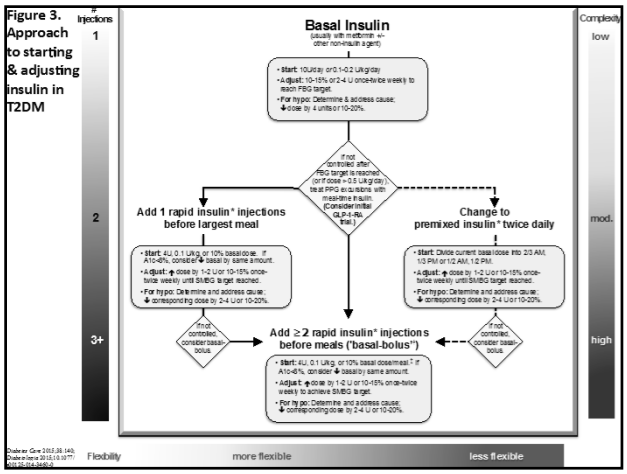
- Fasting blood glucose reflects effectiveness

Diabetes Education SERVICES

Basal + Metformin
Type 2, 80kg – A1c 8.7%

	Break	Lunch	Dinner	HS
Mo 1	170s			298 10uLan
Mo 2	160s			233 20uLan
Mo 4	140s	283	265	206 40uLan

Diabetes Education SERVICES



Next Steps

- At max basal dose
  - 80 x 0.5 = 40 units
- Don't add sulfonylurea to insulin (increases mortality)
- Consider Adding a SGLT-2 Inhibitor
- Consider a GLP-1 Agonist
- Start bolus insulin at largest meal
- Or switch to 70/30 Insulin

Diabetes Education SERVICES

Combo Sub-Q Insulin

Insulin Type	Onset	Peak
Humalog Mix 75/25: 75% NPL, 25% lispro 50/50: 50% NPL, 50% lispro	0.25 - 0.5 hr	0.5-6.5 hrs
NovoLog Mix 70/30: 70% NPA, 30% aspart	0.25 - 0.5 hr	1 – 4 hrs
NPH + Reg Combo 70/30: 70%N /30%R 50/50: 50%N /50%R	0.5 – 1.0 hr	2 - 16 hrs

Considerations:

- Pre-mixed, difficult to fine tune therapy

Diabetes Education SERVICES

Next Steps – Switch from 40 units basal to 70/30 Insulin

- Switch to 70/30 Insulin
- Take current dose and give 2/3 in am and 1/3 in pm.
  - 2/3 of basal in am
    - 40 units x 0.6 = 24 units 70/30
  - 1/3 of basal in *pm
    - 40 units x 0.4 = 16 units 70/30
  - *pm = before dinner

Diabetes Education SERVICES

24u 70/30 am, 16 u 70/30 pm Patterns? Changes needed?

	Break	Lunch	Dinner	HS
Day 1	102	63	92	181
Day 2	112	67	106	195
Day 3	98	56	112	201
Day 4	99	71	132	211

Diabetes Education SERVICES

Type 2 – Amaryl 4mg AM, 10u Lantus pm

	Break	Lunch	Dinner	HS
Day 1	164	94	66	162
Day 2	169		59	195
Day 3		84	81	242
Day 4	159		43	211

Diabetes Education SERVICES

What Medications Cause Hypoglycemia?

- Insulin
- Sulfonylureas
- Meglitinides
- Or any combo medication that includes these

Hypoglycemia = "Limiting Factor"

- Defined as glucose of 70mg/dl or below
- 50% of episodes occur during the night
- Higher mortality rate with severe hypoglycemia secondary to sulfonylureas
  - Especially (glyburide) Micronase®, Diabeta®
- Blood glucose levels don't describe severity, response is individual

Hypoglycemic Symptoms

- Autonomic
  - Anxiety
  - Palpitations
  - Sweating
  - Tingling
  - Trembling
  - Hypoglycemic Unawareness

- Neuroglycopenia
  - Irritability
  - Drowsiness
  - Dizziness
  - Blurred Vision
  - Difficulty with speech
  - Confusion
  - Feeling faint

Treatment of Hypoglycemia

- If blood glucose **70**mg/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

Diabetes Education SERVICES

15 - 20 Gms Carb Sources

- 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)

Diabetes Education SERVICES

Basal Bolus – What Adjustments? Pt weighs 80kg

	Break	Lunch	Dinner	HS
Day 1	69 7H	79 5H	245 8H	190 22u Det
Day 2	81 7H	87 5H	170 8H	133 22u Det
Day 3	73 7H	94 5H	194 8H	110 22u Det
Day 4	62 7H	83 5H	211 8H	127 22u Det

Diabetes Education SERVICES

Intensive Diabetes Therapy
Insulin Dosing Strategy

50/50 Rule

- 0.5-1.0 units/kg day
- Basal = 50% of total
  - Glargine QD
  - NPH or Detemir BID
- Bolus = 50% of total
  - usually divided into 3 meals

Example

- Wt 50kg x 0.5 = 25 units of insulin/day
- Basal dose: 13 units
  - Glargine 13 units QD
  - NPH/Detemir 6u BID
- Bolus dose: 12 units
  - 4 units NovoLog, Apidra Humalog, Regular each meal

Diabetes Education SERVICES

Intensive Diabetes Therapy
Insulin Dosing Strategy

50/50 Rule

- 0.5-1.0 units/kg day
- Basal = 50% of total
  - Glargine QD
  - NPH or Detemir BID
- Bolus = 50% of total
  - usually divided into 3 meals

Example – You Try

- Wt 60 kg x 0.5 = ___ units of insulin/day
- Basal dose: ____ units
  - Glargine ____ QD
  - NPH/Detemir __ BID
- Bolus dose: ____ units

____units NovoLog, Apidra Humalog, Reg each meal

Diabetes Education SERVICES

Intensive Diabetes Therapy
Insulin Dosing Strategy

50/50 Rule

- 0.5-1.0 units/kg day
- Basal = 50% of total
  - Glargine QD
  - NPH or Detemir BID
- Bolus = 50% of total
  - usually divided into 3 meals

Example – You Try

- Wt 60kg x 0.5 = 30 units of insulin/day
- Basal dose: 15 units
  - Glargine **15** QD or
  - NPH/Detemir **7u** BID
- Bolus dose: 15 units
  - **5** NovoLog, Apidra, Humalog, Reg each meal

Diabetes Education SERVICES

Basal Bolus – Using 50/50 Rule – Pt weighs 80kg

	Break	Lunch	Dinner	HS
Day 1	84 6H	89 7H	145 7H	190 20 u Det
Day 2	81 6H	97 7H	107 7H	133 20u Det
Day 3	79 6H	104 7H	124 7H	110 20u Det
Day 4	69 6H	103 7H	208 7H	193 20u Det

Diabetes Education SERVICES

Insulin Teaching Keys

- Bolus insulin with meals
- Basal 1-2xs daily
- Abdomen preferred injection site
- Stay 1" away from previous site
- Don't re-use ultra fine syringes
- Keep unopened insulin in refrigerator
- Toss opened insulin vial after 28 days
- Proper disposal
- Review patients ability to withdraw and inject.
- Side effects include hypoglycemia/wt gain
- Insulin pens –
  - Prime needle to assure accurate insulin dose given
  - Hold needle in for 5 seconds after injection
  - Roll 70/30 pens

Diabetes Education SERVICES

Sharps Disposal: Product and Info

- Look in the Government section white pages for a household hazardous waste listing for your city or county.
- Call 1-800-CLEANUP (1-800-253-2687)
- Search for collection centers on the California Integrated Waste Management Board (CIWMB) Web site: http://www.ciwmb.ca.gov/HHW/HealthCare/Collection/
-

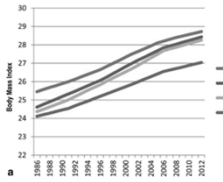
Diabetes Education SERVICES

DiaBingo - I

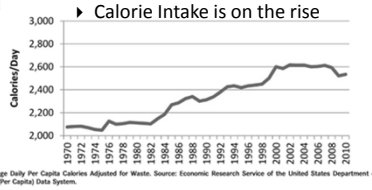
- I Inhaled insulin
- I Glargine, Detemir, NPH are types of
- I Breakdown of glycogen into glucose
- I Anabolic hormone
- I Insulin is released when glucose levels are low
- I Once opened, insulin vials are good for one _____
- I Elevated post-prandial glucose indicate need for pre-meal
- I Epinephrine increases insulin resistance
- I Creation of glucose from amino acids and lactate
- I Decreasing renal function for people on insulin can cause
- I Bolus insulins
- I A hormone that increases blood glucose levels

Diabetes Education SERVICES

U.S. Weight - 68% overweight or obese



- ~~34% BMI 25-29~~
- 34% BMI 30 +
  - 1/3 of all overwt people don't get diabetes
  - We burn 100 cals less a day at work
  - Overall, food costs ~ 10-15% of income
  - Calorie Intake is on the rise



Average Daily Per Capita Calories Adjusted for Waste. Source: Economic Research Service of the United States Department ... ility (Per Capita) Data System.

Diabetes Education SERVICES

Average American Consumes 25 teaspoons of sugar a day (400 cals)

- Warning label on sodas proposed
- One soda has 12 teaspoons soda
- On avg, 1 person consumes 40 gallons of soda each year
- ADA guidelines "limit sodas and beverages with sugar, High Fructose Corn Syrup, (HFCS)

Diabetes Education SERVICES

Medical Nutrition Therapy – ADA 2014 Updates

- No ideal percentage of calories from protein, carbohydrate and fat for people with diabetes.
- Macronutrient distribution should be based on an *individualized assessment* of eating patterns, preferences and metabolic goals.

Diabetes Education SERVICES

Approach Depends on Patient

- New Type 2
  - Portion Control
  - Plate Method
  - Record Keeping
  - Education
- On Insulin?
  - Carb counting
  - Post prandial checks

Diabetes Education SERVICES

Medical Nutrition Therapy – ADA

- Focus on the Individual
- Maintain pleasure of eating
- Provide positive messages about food
- Limit food choices only when backed by science
- Provide practical tools
- Refer to a RD and Diabetes Education – Lowers A1c by 1-2%

Diabetes Education SERVICES

What are next steps?

- 72 yr old, thin, lives alone, A1c 7.3%. History of MI, stroke. DM for 12 yrs, "diet controlled". Creat 1.4.
- Limited income.
- Good insurance

Diabetes Education SERVICES

DPP-4 Inhibitors – "Incretin Enhancers"

Januvia (sitagliptin) – Tradjenta (linagliptin)
Onglyza (saxagliptin) Nesina (alogliptin)

- **Action:**
  - Increase insulin release w/ meals
  - Suppress glucagon
- **Dosing**: Januvia – 100mg a day
  Onglyza – up to 5mg a day
  Tradjenta – 5mg a day
  Nesina – up to 25 mg a day
- **Efficacy:** Decreases A1c by 0.6 -0.8%
- **Benefits/ Issues**: weight neutral, no hypo, few side effects. Expensive

Diabetes Education SERVICES

Losing 2-8kg Early in diagnosis Type 2 Helpful

ADA 2014

- Weight Loss –
  - *The optimal macronutrient intake to lose weight not known*
  - *The literature does not support one particular nutrition therapy to reduce weight, but rather a spectrum of eating patterns that result in reduced energy intake*.

- To lose one pound – avoid 3,500 cals
  - Decrease intake 250-500 cals daily + exercise

Diabetes Education SERVICES

Successful weight loss strategies include

- Weekly self-weighing
- Eat breakfast
- Reduce fast food intake.
- Decrease portion size
- Increase physical activity
- Use meal replacements
- Eat healthy foods

Diabetes Education SERVICES

Diabetes Prevention Program Focus on fat = wt loss success

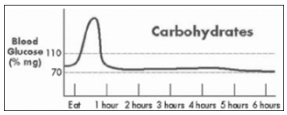
To help you lose weight and improve your health, stay as close as possible to your fat and calorie goals.
Find your starting weight below. Your fat and calorie goals are in the same row. Circle your fat and calorie goals.

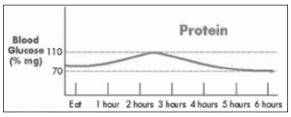
Weight (lb)	Fat Goal (grams)	Calorie Goal
120-174	33	1,200
175-219	42	1,500
220-249	50	1,800
>250	55	2,000

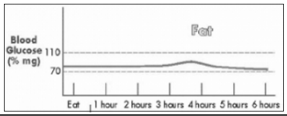
http://www.cdc.gov/diabetes/prevention/recognition/curriculum.htm

Diabetes Education SERVICES

How nutrients affect blood sugar







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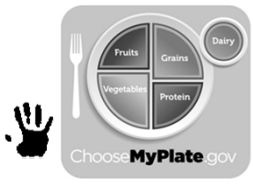
Teaching About Eating Healthy

Major food groups
"Handy Diet"
Plate Method
Exchange Lists
Food Diaries / Glucose Records
Carbohydrate Counting

Assess what is best for the situation.



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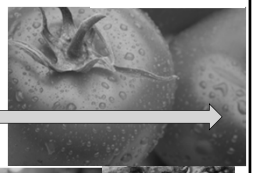
Move toward the Tomato



ADA recommendation
Eat Less Junk Food & Sugary Drinks –

- Less Processed Foods
- Less Sugary Beverages
  - increase visceral adiposity
  - With sugar or
  - High fructose corn syrup

- Soda Tax?
- Junk Food Tax?
- 12 teaspoons sugar in one soda

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10 Superfoods

- Beans
- Dark Green Leafy Vegs
- Citrus Fruit
- Sweet Potatoes
- Berries

- Tomatoes
- Fish High in Omega-3 Fatty Acids
- Whole Grains
- Nuts
- Fat-Free Milk and Yogurt

Diabetes Education SERVICES

USDA Plate Method www.myplate.gov

Balancing Calories

- Enjoy your food, but eat less.
- Avoid oversized portions.

Foods to Increase

- Make half your plate fruits and vegetables.
- Make at least half your grains whole grains.
- Switch to fat-free or low-fat (1%) milk.

Foods to Reduce

- Compare sodium in foods like soup, bread, and frozen meals — and choose the foods with lower numbers.
- Drink water instead of sugary drinks.

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Another plate example

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Mindful Eating

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Nutrition Facts

Serving Size 1/2 cup (114 g)
Servings Per Container 4

Amount Per Serving	
Calories 90	Calories from Fat 30
	% Daily Value*
Total Fat 3g	5%
Saturated Fat 0g	0%
Cholesterol 0g	0%
Sodium 300mg	13%
Total Carbohydrate 13g	4%
Dietary Fiber 3g	12%
Sugars 3g	
Protein 3g	
Vitamin A 80% * **Vitamin C** 60%	
Calcium 4% * **Iron** 4%	

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2000	2500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Fiber		25g	30g

Calories per gram: Fat 9 Carbohydrates 4 Protein 4

1 tsp sugar ⇒ =4 gms

Fooducate App – gives grade and nutrition info.

Fooducate
eat a bit better™

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Carbs affect Post meal Blood Glucose

- Starch
- Fruit
- Milk
- Desserts

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Choose Healthy Carbs

- Carbs have fiber, vitamins, minerals and phytonutrients
- 25 gms of fiber a day
- Power Carbs include:
  - Beans
  - Veggies
  - Fruits
  - Whole grain foods

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Carbohydrate Needs for Most Adults

	Grams	Servings
Each Meal	45-60 gm	3 - 4
Snacks	15-30 gm	1- 2

Carbs affect Post Meal Blood Glucose

Diabetes Education SERVICES

Handy Meal Plan

- Per Meal Serving
  - Each finger = 15 gms carb (can have 3-4 servings/meal)
  - Palm of hand = 3 oz's protein
  - Thumbnail = 1 tsp fat serving

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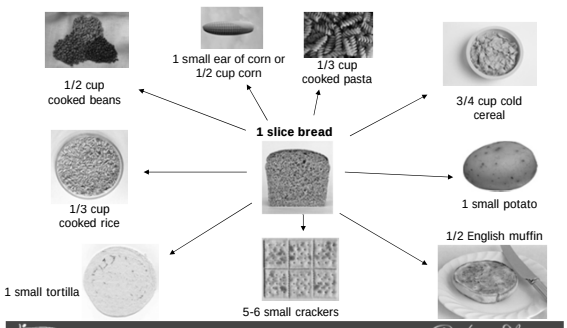
Carb Counting - Starch

Each Food has:
80 Calories
15 grams carb



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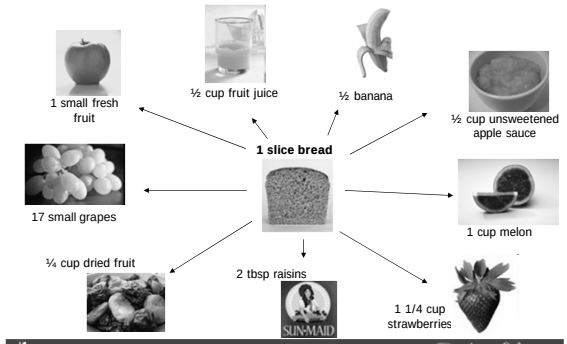
Carb counting- fruit

Each Food has:
60 Calories
15 grams carb



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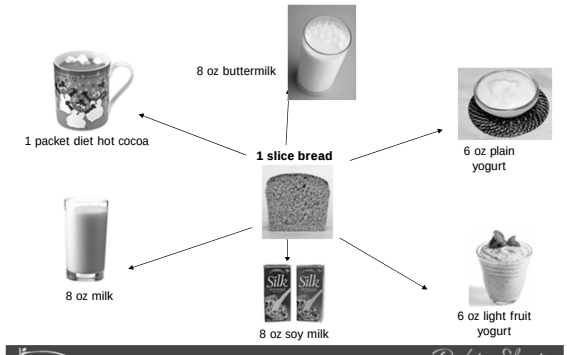
Carb Counting - Milk

Each Food has:
90-150 calories
12-15 grams carb



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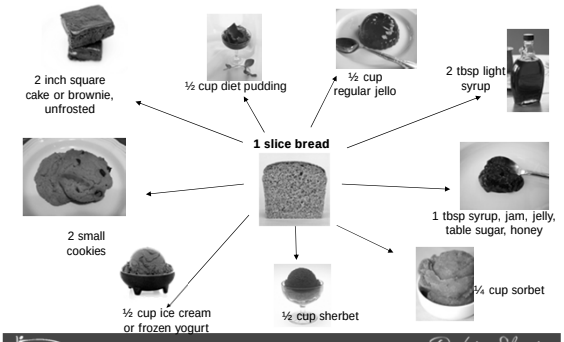
Carb Counting - Sweets

Each Food has:
Calories vary
15 grams carb



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Using Alcohol Safely

- Women- 1 or fewer alcoholic drinks a day
- Men 2 or fewer alcoholic drinks a day
  - 1 alcoholic drink equals
    - 12 oz beer, 5 oz glass of wine, or 1.5 oz distilled spirits (vodka, gin etc)
- If drink, limit amount and drink w/ food.
- Ask HCP if safe for you to drink. Tell them your usual quantity and frequency.
- Can cause hypo and worsen neuropathy

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Ms. Gonzales' Daily Meal plan

Break	Lunch	Dinner	Night
5 corn tortillas, 1/2 c. beans, salsa, peppers, egg beaters	Sandwich, low fat potato chips, 1c. juice, 2-4 lowfat cookies	Lg bowl low salt soup, 1c. rice, BBQ meat, salad & cooked vegs 1 glass wine	1 bowl of cereal
Avg BG 120's	**Avg BG 200's**	**Avg BG 200's**	**Avg BG 180's**

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DiaBingo - N

N DPP demonstrated that exercise and diet reduced risk of DM by ___%
N An _____a day can help prevent heart attack and stroke
N Rebound hyperglycemia
N Scare tactics are effective at motivating patients to change behavior
N Losing ___ % of body weight, can improve blood glucose, BP, lipids
N Drugs that can cause hyperglycemia
N 2/3 cups of rice equals _____ serving carbohydrate
N A1c of 7% equals glucose of
N One % drop in A1c reduces risk of complications by ___ %
N 1 gm of fat equal _____kilo/calories

N Metabolic syndrome = hyperglycemia, hyperlipidemia, hypertension

N Average American consumes 25 teaspoons of sugar a day.

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Thank You

- Questions?
- Email bev@diabetesed.net
- Web www.DiabetesEd.net

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