Diabetes Mellitus

N123

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FALL 2017

TOPICS

- Pathophysiology
- Classifications
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  - Type II
  - Secondary
  - Gestational
- Clinical Manifestations
- Hyperglycemia
- Hypoglycemia
- Diagnosis & Testing
- Complications
  - Acute
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- DKA (Diabetic Ketoacidosis)
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Part I

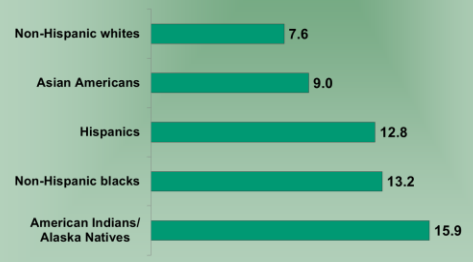
- Overview
- Statistics
- Definitions
- Pathophysiology
- Clinical Manifestations
- Diagnosis
- Classifications of DM
- Complications

The Silent Epidemic

(ADA: National Diabetes Data & Statistics, April 2016)

- 7th leading cause of death in U.S.
- 29.1 million Americans (9.3% of population) have DM
  - 21 million diagnosed, 8.1 million undiagnosed
- 86 million have prediabetes
- 1.4 million Americans aged 20 yrs or older are newly diagnosed with DM per year **(3,835/day, 1:23 seconds)**
- 1 in every 10 health care dollars spent on treating DM
- 1 in every 5 health care dollars spent caring for people with diabetes.
- Annual cost per year exceeds $245 billion dollars, with
  - $176 billion in direct medical costs
  - $69 billion in indirect medical costs **(disability, work loss, premature mortality).**

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.

Other STATISTICS

- In the US:
  - ~5% has Type I, ~90-95%, 1-5% has other rare type of DM
  - 1.25 million have type 1 diabetes
  - Up to 9.2% of pregnancies are affected by GDM, 70% lifetime risk of developing type 2
  - Approximately 6 million use insulin
  - 85% of type 2 diabetes are overweight or obese
  - 1 in 3 American adults will have DM by 2050 if present trends continue
  - Diabetes kills more Americans every year than AIDS and breast cancer combined.

Overview

- **Highest incidence of DM:**
  - American Indians & Alaska Natives (15.9%)
  - Major cause of death d.t. complications from DM
  - ESRD rates 6x higher in Native Americans
  - Amputation rates 3-4x higher in Native Americans
- **Highest rate of diabetics in the world:**
  - Pima Indians in Arizona (50% of adults)
- **Type 2 DM tends to affect younger-age population in non-whites than in whites**

Overview

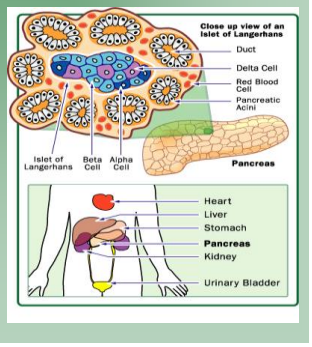
- **Leading Cause of~**
  - Adult Blindness
  - End Stage Renal Disease (ESRD)
  - Nontraumatic Lower Limb Amputations
- **Major Contributing Factor**
  - Heart Disease
  - Stroke
- **Theories link the cause to single/combination of these factors**
  - Genetic, Autoimmune, Viral, Environmental

What is Diabetes Mellitus?

- **"Running through of water"** (literal meaning)
- **"Diabetes"** =
  - "to siphon" (Greek word)
  - "honey sweet flow" (Latin word)
- **Diabetes Mellitus (DM)**
  - A disorder of glucose metabolism related to absent or insufficient insulin supply and/or poor utilization of the insulin that is available.

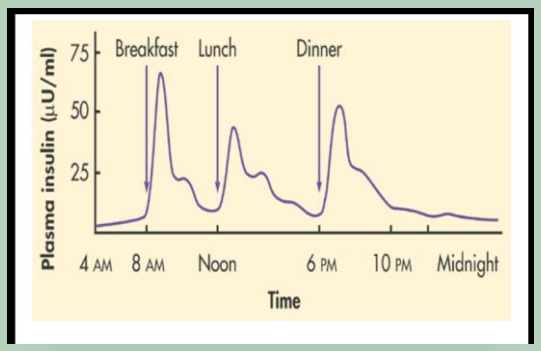
PATHOPHYSIOLOGY

- Primary organ involved? _____
- Pancreatic **beta cells** regulate the manufacture, storage and release of _____
- **Alpha cells** produce excess _____
- **Autoimmune reaction**: beta cells that produce insulin are destroyed



Normal Metabolism

- **Glucose**
  - Simple sugar provides energy to body cells
- **Glycogen**
  - Long chains of glucose
  - Produced when over production of glucose
  - Stored in the liver & muscles
- **Insulin**
  - An anabolic or storage hormone
  - Responsible for growth, repair & storage
  - Facilitates movement of amino acids into cells
  - Synthesis of protein
  - Storage of glucose as glycogen
  - Deposition of triglycerides and lipids as fat into adipose tissue
- **Glucagon**



Normal Endogenous Insulin Secretion

Counterregulatory Hormones

- **Works to increase the BG level**
- **Helps prevent hypoglycemia**
- **Four Counterregulatory Hormones:**
  - **Glucagon**
  - **Cortisol**
  - **Growth Hormones**
  - **Epinephrine**

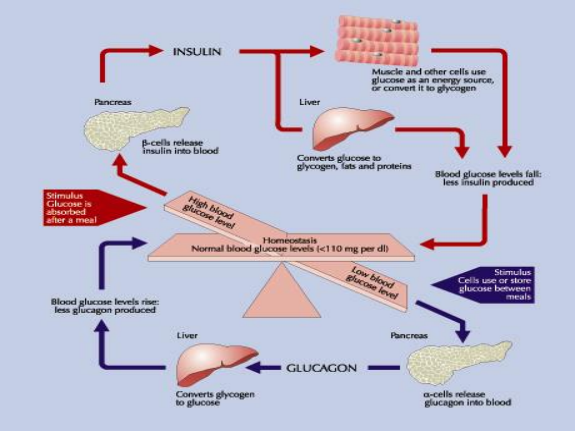
Glucagon

- ***A polypeptide hormone***
- Produced by **alpha** cells in the islets of Langerhans
- What happens when you do not eat?
- Physiological Effects:
  - Mobilizes glucose from stores inside the body
  - Increases glucose concentration in the bloodstream.
- Opposite effect with insulin:
  - Glycogenolysis
  - Gluconeogenesis

DEFINITIONS

Metabolic Process

- **Glucagon**- used for energy when glucose is depleted; "messenger"
- **Glycogen- stored glucose**
- **Glycolysis**- ATP production from glucose
- **Glycogenesis**- manufacture of glycogen from glucose
- **Glycogenolysis**- breakdown of glycogen into glucose
- **Gluconeogenesis**- glucose formation from noncarbohydrate sources (e.g., amino acids and lactate)



CLASSIFICATIONS

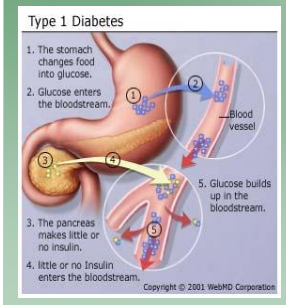
- Two Most Common Types:
  - Type 1 Diabetes (IDDM, JOD)
  - Type 2 Diabetes (NIDDM, AOD)
- Other Types:
  - Gestational Diabetes
  - Pre-diabetes (IGT, IFT)
  - Secondary Diabetes

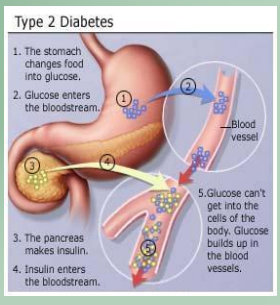
Major Classifications

- **Type 1 Diabetes (IDDM, JOD)**
  - Minimal or total absence of beta cell function.
  - *Idiopathic diabetes*
- **Type 2 Diabetes (NIDDM, AODM)**
  - At least 50% of beta cell mass is functional with adequate insulin secretion preventing diabetic ketoacidosis (DKA).

(Table 49-1, Chap.49,p.1154)

Difference between Type I & Type II Diabetes Mellitus





TYPE 1 DM

- **Age**: children and young adults, but possible at any age
- **Prevalence**: Accounts for 5-10% of all types
- **Environmental factors**: Virus, toxins
- **Primary defect**: Absent or minimal insulin production
- **Islet cell antibodies**: Often present at onset
- **Endogenous insulin**: Absent

Type 2 DM

- **Age**: Usually >35 y/o, but possible at any age. Increase incidence in children.
- **Prevalence**: Accounts for 90-95% of all types of diabetes
- **Environmental factors**: Obesity, lack of exercise
- **Primary defect**: Insulin resistance, decreased insulin production over time, & alteration in adipokines.
- **Islet cell antibodies**: Absent
- **Endogenous insulin**: Initially increased in response to insulin resistance. Secretion diminishes over time.

TYPE 1 DM

- **Nutritional status**: Thin, normal or obese
- **Symptoms**: Polydipsia, polyuria, polyphagia fatigue, weight loss
- **Ketosis**: Prone at onset or during insulin deficiency.
- **Nutritional therapy**: Essential
- **Insulin**: Required for all
- **Vascular & neurologic complications**: Frequent.

Type 2 DM

- **Nutritional status**: Frequently Overweight or obese
- **Symptoms**: Frequently none, fatigue, recurrent infections. May experience 3 P's
- **Ketosis**: Resistant except during infection or stress.
- **Nutritional therapy**: Essential
- **Insulin**: Required for some. Disease is progressive & insulin treatment need to be added to tx regimen.
- **Vascular & neurologic complications**: Frequent

4 Major Metabolic Abnormalities in Type 2

1. **Insulin Resistance**
2. **Pancreas' decreased ability to produce insulin**
3. **Inappropriate glucose production the liver**
4. **Alteration in production of hormones and adipokines**

PREDIABETES

- Individuals already at risk for development of Type 2 diabetes
- An intermediate stage between normal glucose homeostasis & diabetes where the BG levels are elevated, but not high enough to meet the diagnostic criteria for diabetes.
- Characterized as:
  - **Impaired fasting glucose (IFG):** Fasting glucose levels are 100 to 125 mg/dL
  - **Impaired glucose tolerance (IGT):** 2 hour plasma glucose levels are 140 and 199 mg/dL
  - **Hgb A1C** ranges 5.7% to 6.4%
- Usually no symptoms
- Develop Type 2 DM within 10 years

Conditions that Characterize Prediabetes

- Obesity
- Visceral Abdominal Fat Distribution
- Unhealthy Cholesterol Levels
- High Blood Pressure
- Insulin Resistance

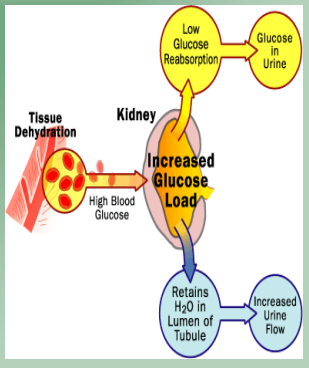
CLINICAL MANIFESTATIONS

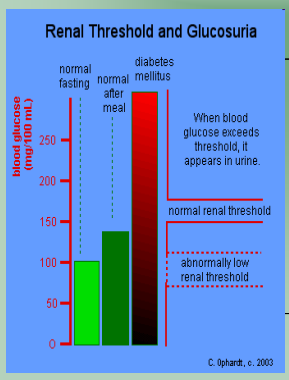
- Constant urination (polyuria)
- Abnormal thirst (polydipsia)
- Unusual hunger (polyphagia)
- The rapid weight loss
- Irritability
- Obvious weakness and fatigue
- Nausea and vomiting
- Drowsiness
- Itching
- A family hx of DM
- Blurred vision
- Excess weight
- Tingling, numbness, pain in extremities
- Easily fatigue
- Skin infections/slow healing

DM: Cardinal Symptoms

- **Polyuria:** Frequent urination
- **Polydipsia:** Excessive thirst
- **Polyphagia:** Excessive hunger
- **Weight loss:** body cannot get glucose
- **Glycosuria:** renal threshold for glucose

- **The high blood glucose in diabetes produces glucose in the urine and frequent urination through effects on the kidneys.**





- **GLUCOSURIA:**
  - Glucose in the urine
- **RENAL THRESHOLD**
  - A concentration level above which all glucose is not reabsorbed in the blood
  - The excess above the threshold level concentration remains in the urine
  - Normal: 150 – 180 mg/ 100ml

NURSING ASSESSMENT

- **Subjective data**:
  (1) History & P.E. (past medical hx, infections, trauma, stress), (2) Medications
- **Objective data**: Head to Toe
  - **-eyes:** sunken eyeballs, cataracts
  - **-integumentary:** dry, inelastic, ulcers, loss of hair
  - **-respiratory:** rapid
  - **-cardiovascular:** hypotension; weak, rapid pulse
  - **-gastrointestinal:** dry mouth, vomiting, fruity breath
  - **-neuro:** altered reflexes, restlessness,*confusion, stupor, coma
  - **-musculoskeletal:** muscle wasting
  - **-lab findings:** serum electrolyte abnormalities

HYPOGLYCEMIA

MANIFESTATIONS

- B.G. (<70 mg/dl)(<3.9mmol/L)
- Cold, clammy skin
- Numbness of fingers, toes, mouth
- Rapid heartbeat
- Emotional changes
- Headache
- Nervousness, tremors
- Faintness, dizziness
- Unsteady gait, slurred speech
- Hunger
- Change in vision
- Seizures, coma

CAUSES

- Alcohol intake w/out food
- Too little food – delayed, omitted, inadequate intake
- Too much diabetic meds
- Too much exercise w/out compensation
- Diabetes medication of food taken at wrong time
- Loss of weight w/out change in medication
- Use of B-blockers interfering with recognition of symptoms

HYPOGLYCEMIA

TREATMENT

- "Rule of 15"
- Check Blood Sugar
- Immediate ingestion of 15g of simple CHO; wait 15 min, then recheck BS
- Ingestion of another 15g of simple CHO in 15 min if no relief obtained
- Contacting of health care provider if no relief obtained
- Discussion with health care provider about medication dosage

PREVENTIVE MEASURES

- Take prescribed dose of med at proper time
- Accurately administer insulin/non insulin injectables/oral agents (OA)/
- Ingest all recommended foods at proper time
- Provide adequate food intake needed for calories for exercise
- Able to recognize & know symptoms,& treat them immediately
- Carry simple CHO
- Check BG as ordered
- Wearing diabetic ID (medical alert)
- Education of family, friends, fellow employees

HYPERGLYCEMIA

MANIFESTATIONS

- Elevated blood glucose
- Increase in urination
- Increase in appetite followed by lack of appetite
- Weakness, fatigue
- Blurred vision
- Headache
- Glycosuria
- Nausea & vomiting
- Abdominal cramps
- Progression to DKA or HHS

CAUSES

- Illness, infection
- Corticosteroids
- Too much food
- Too little or no diabetes medication
- Inactivity
- Emotional
- Physical stress
- Poor absorption of insulin

HYPERGLYCEMIA

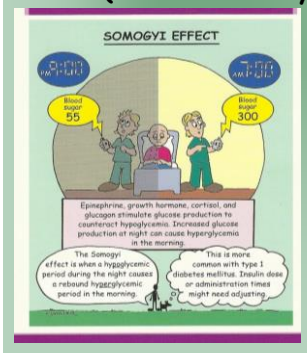
TREATMENT

- Get medical care
- Continue diabetes medication as ordered
- Check BG frequently
- Check urine for ketones
- Hourly drinking of fluids

PREVENTIVE MEASURES

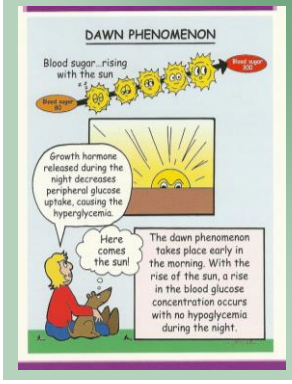
- Take prescribed dose of medication at proper time
- Accurately administer insulin/oral agents
- Maintain diet
- Maintain good personal hygiene
- Adhere to sick day rules when ill
- Check BG/ketonuria
- Wearing of diabetic ID

SOMOGYI EFFECT
(aka Rebound Hyperglycemia)



- **Diagnostics**: Levels of BS are evaluated by the patient or the nurse during the night (2am, 4am, 6am) to confirm hypoglycemia
- **S/S**: night sweats, HA, or nightmares, ketonuria
- **Correction**:
  - Increase complex CHO intake at bedtime.
  - Decrease simple CHO intake.

DAWN PHENOMENON



- **Diagnostics**:
  - Evaluate BS levels during the night. Document BS level at bedtime, 2am, 4am, & at morning fasting levels.
- **Correction**:
  - Increase the insulin or adjust the timing of the nighttime dose.
  - If predawn BS levels <60mg/dl, reduce insulin dose. If 2am & 4am glucose levels high, increase insulin dose.
  - Protein snack at bedtime.

DIAGNOSING DM

1. A1C ≥ 6.5%

or

2. Fasting plasma glucose (FPG) level ≥ 126 mg/dl (after an 8-hour fast)

or

3. Two-hour plasma glucose level level ≥ 200 mg/dl during an oral glucose tolerance test (OGTT) using a glucose load of 75 g

or

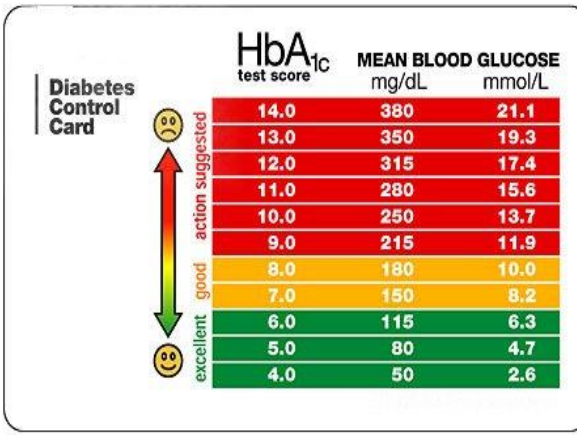
4. Random plasma glucose ≥ 200 mg/dL in a patient with classic symptoms of hyperglycemia

Other Diagnostic Tests

- Glycosylated hemoglobin (Hgb A1C)
- Lipid profile
- Blood urea nitrogen (BUN)
- Serum creatinine
- Electrolytes
- Thyroid-stimulating hormone (TSH)
- Urine for complete UA, glucose, acetone, and microalbuminuria
- Neurologic & fundoscopic exam
- ECG, blood pressure (BP), & weight monitoring
- Doppler Scan
- Foot (podiatric) examination

Hemoglobin A1C Test

- In 2010, recommended to be used as a diagnostic test
- Useful in determining glycemic levels over time
  - **Ideal Goal:** ADA <7.0%, American College of Endocrinology <6.5%
- Shows the amount of glucose attached to hemoglobin molecules over RBC lifespan
  - Approximately 120 days
- Regular assessments required
- **Normal A1C (4-6%)** reduces risks of retinopathy, nephropathy, and neuropathy.



Fructosamine (glycosylated protein)

- Less frequently used means of monitoring glycemic control
- Reflects blood glucose values over the previous 1 to 3 weeks
- Useful in situations when an A1C measurement is not reliable
- May show a change in glucose control before A1C does

Metabolic Syndrome

(Syndrome X, Insulin resistance, Dysmetabolic syndrome)

- Chronic, low grade inflammatory process
- Gives rise to diabetes type 2, ischemic heart disease, left ventricular hypertrophy (LVH)
- Group of disorders with insulin resistance as the main feature which includes:
  - Obesity especially around the waist & abdomen
  - Low levels of physical activity
  - Prothrombotic tendencies
  - Aging and hormonal imbalance
  - Genetic predispositions
- Changes in cholesterol levels
  - ↑ levels of triglycerides: ≥150 mg/dl
  - ↑ LDL: >100 mg/dl
  - ↓ HDL: <40 mg/dl (men) & <50 mg/dl (women)

(Lewis, 11th ed. Pg. 921)

CRITERIA for METABOLIC SYNDROME

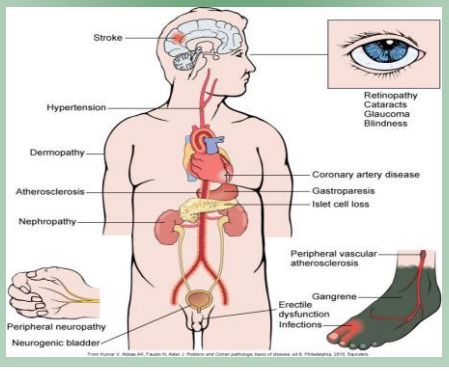
(Lewis, 9th edition , Table 41-10, p. 921)

- Waist circumference:
  ≥40 inches (men), ≥35 inches women
- Triglycerides:
  >150 mg/dL OR drug tx for ↑ triglycerides
- HDL cholesterol:
  <40 mg/dL (men), <50 mg/dL (women) OR drug tx for reduced HDL chol
- Blood Pressure: ≥130 mmHg syst BP OR ≥85 mmHg diast BP OR drug tx for HTN
- Fasting BG: ≥110mmHg OR drug tx for ↑ BS

SECONDARY DIABETES

- Caused by another medical condition or due to the treatment of a medical condition.
- **Medical Condition**
  - Pancreatitis, Pancreatic CA, Cushing's syndrome, Hyperthyroidism, Cystic Fibrosis
  - Use of parenteral nutrition
- **Medication**
  - Corticosteroids, phenytoin (Dilantin), Thiazide Diuretics, Epinephrine, atypical antipsychotics
- **Hormone treatment**
- **Antihypertensive**
  - Thiazide Diuretics

CHRONIC COMPLICATIONS



From Kumar V, Abbas AK, Fausto N, Aster J: Robbins and Cotran pathologic basis of disease, ed 8, Philadelphia, 2010, Saunders.

COMPLICATIONS OF DM

CHRONIC: ANGIOPATHY

❖ **MACROVASCULAR:**

caused by damage to the large and medium sized blood vessels

- CAD (Coronary Artery Dz)
- CVD (Cerebrovascular Dz)
- TIA (Transient Ischemic Attack)
- PVD (Peripheral Vascular Dz)

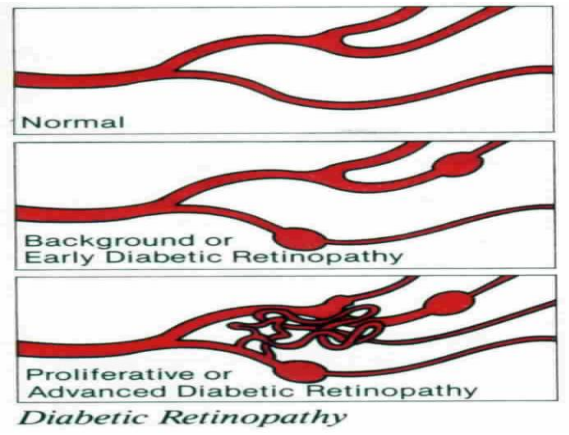
❖ **MICROVASCULAR:**

caused by damage of the small blood vessels.

- RETINOPATHY
- NEPHROPATHY
- SKIN CHANGES

(aka DERMOPATHY)

(ex: Acanthosis nigricans and/or necrobiosis lipoidica diabeticorum, Lewis, pg. 1184)



Necrobiosis Lipoidica Diabeticorum

From Chen SL, Lamb D. Clinical endocrinology and diabetes: an illustrated colour text. Edinburgh: 2000. Churchill Livingstone.

COMPLICATIONS OF DM

CHRONIC: ANGIOPATHY

- NEUROPATHY:
  caused by damage of the nerves.
  - Sensory neuropathy:
    Loss of protective sensations (LOPS)
    Numbness, tingling, pain, or loss of sensation in ext.
  - Autonomic neuropathy
- INFECTIONS

Neuropathy: Neurotrophic Ulceration

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Necrotic Toe Before & After Amputation

A. Before amputation

B. After amputation

From Chen YG, Lavalle D: Clinical endocrinology and diabetes: an illustrated review text. Edinburgh, 2006, Churchill Livingstone.

Diabetic Foot Ulcer

Diabetic Foot Ulcer

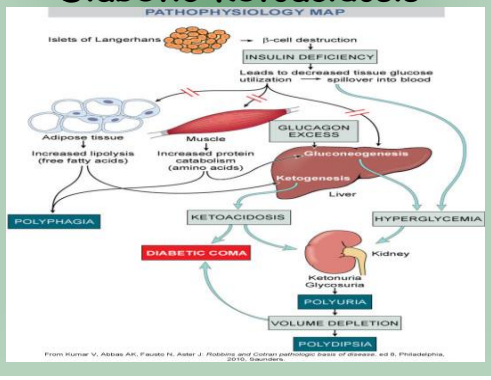
ACUTE COMPLICATIONS OF DM

- Diabetic Ketoacidosis (DKA)
- Hyperosmolar Hyperglycemia Syndrome (HHS)
- Hypoglycemia

ACUTE COMPLICATION OF DM
ACUTE: DKA

- Diabetic Ketoacidosis (DKA)
  - AKA Diabetic acidosis, Diabetic coma
  - caused by absolute insulin deficiency and an excess of insulin counterregulatory hormones causing an ↑glucose, ↑ketone bodies & metabolic acidosis
- Onset
  - May develop quickly or over several hours, days or weeks
- Precipitating Factors
  - Inadequate insulin dosage, Illness, Infection, Undiagnosed Type I DM, Poor self-management, and Neglect

Diabetic Ketoacidosis



MANIFESTATIONS OF DKA

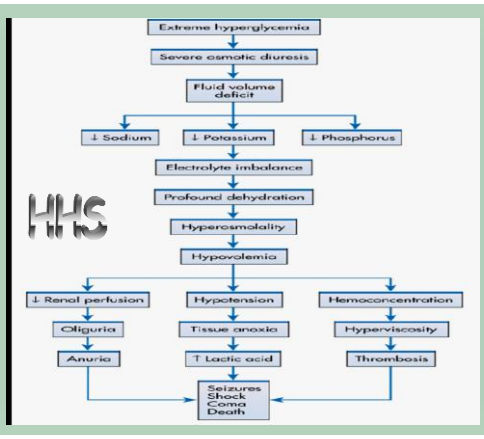
- Early signs
  - Dehydration
    - 3 P's
    - Poor skin turgor, dry mucous membranes, tachycardia, & orthostatic hypotension
    - Dry mouth, dry & loose skin
    - Lethargy, weakness
    - Fever, malaise, drowsiness
    - Eyeballs become soft & sunken
    - Abdominal pain accompanied by anorexia, nausea & vomiting, muscle cramps
- Late signs:
  - Kussmaul's respiration (deep rapid); fruity "acetone" breath; hypotension, weak pulse; confusion, renal failure, stupor, coma & death

CARDINAL LAB FINDINGS OF DKA

- Hyperglycemia
  - >300mg/dl BG levels; may be as high as 1,000 mg/dl
  - ↑ ketone levels (ketonemia) in the blood
  - ↑ ketonuria (mod to large ketones in the urine)
  - 4+ glycosuria
  - ABGs:
    - Arterial pH 6.8 - 7.3
    - HC03 12-20 mEq/L
    - CO2 15-25 mEq/L
  - Serum Na+ & K+ levels may be low, normal or high
  - ↑ BUN, creatinine, Hgb, and Hct

ACUTE COMPLICATION OF DM ACUTE: HHS

- **Hyperosmolar Hyperglycemia Syndrome (HHS)**
  - Where enough insulin is secreted to prevent DKA, but inadequate to control hyperglycemia, dehydration, hyperosmolarity, with little or no ketosis.
- Onset
  - Slow, hours to days to weeks
- Etiology
  - Usually a history of inadequate fluid intake, acute illness, medications, concentrated glucose solutions, other endocrine disorders



MANIFESTATION OF HHS

- **Early signs**
  - **Polyuria**
  - **Fatigue, malaise**
  - **Nausea, vomiting**
  - **Hyperglycemia**
  - **Severe dehydration**
- **Late signs**
  - **Hypothermia**
  - **Muscle weakness**
  - **Seizures, Stupor, Coma**
  - **Shock, Death**

CARDINAL LAB FINDINGS HHS

- Hyperglycemia
  - Blood Glucose >600mg/dl (can get as high as 600-3000 mg/dl)
  - ↑ Osmolarity > 350mOsm/kg
  - Ketones absent or minimal in both blood & urine
  - Serum Na+ & K+ may be elevated
  - ↑ BUN and creatinine
  - ↑ Urine specific gravity
  - ABGs
    - Ph 7.3-7.5
    - HCO3 20-26 mEq/L
    - CO2 30-40 mEq/L

DKA	HHS
Blood Sugar >300mg/dl	Blood Sugar >600mg/dl
Ketosis (positive serum)	No Ketosis (negative ketones or mild ketosis)
Serum Osmolality 300-350mOsm/L	Serum Osmolality >350mOsm/L
pH 6.8-7.3	pH 7.3-7.5
Elevated BUN and Creatinine	Elevated BUN and Creatinine
Serum electrolytes initially elevated, then decreased	
Urine glucose +/ Urine acetone +	Urine glucose +/Urine acetone -
Dehydration (fluid loss 6.5L or more)	Dehydration (fluid loss 9L or more)
Dry, flushed skin	Dry, flushed skin
Hypotension and tachycardia	Hypotension and tachycardia
Deep, rapid breathing (Kussmaul's respiration)	Shallow, rapid (tachypneic) breathing
Polyuria, polydipsia, polyphagia	Polyuria, polydipsia, polyphagia
Abdominal pain, nausea and vomiting	GI symptoms, if present, are < severe
Acetone breath	Acetone breath usually negative
Mental status changes: (from lethargy to coma r/t dehydration/metabolic acidosis)	Mental status changes: (from lethargy to coma r/t dehydration/possible lactic acidosis)

CHARACTERISTICS OF DKA & HHS

DKA	HHNK
Hyperglycemia	Hyperglycemia (severe)
Dehydration	Dehydration (severe) without significant acidosis or ketosis
Acidosis	
Ketosis	

MANAGEMENT OF DKA & HHS

Five Critical Interventions

- ❖Initially NS (if in hypovolemic shock); 0.45% NS (if not in shock or Na >145mEq/L)
- ❖Regular insulin (0.1 U/kg /hr)
  - -IV bolus and IV drip (Add dextrose when glucose reaches 250mg/dL)
- ❖Potassium/ Electrolyte replacement
  - -√ K+, Mg, Ca+, Phos
- ❖Determine and treat precipitating cause
- ❖Education to prevent future episodes

MANAGEMENT OF DKA & HHS

- ❖Stabilize VS
- ❖Assess renal and cardiopulmonary status
- ❖Continuous assessment of
  - ❖LOC, VS, IV, I&O, and labs
  - ❖Monitor for presence of kussmaul's resp.
  - ❖NOTE: HHS REQUIRES MORE FLUID REPLACEMENT THAN DKA

ACUTE COMPLICATION OF DM

ACUTE: HYPOGLYCEMIA

- **Low blood glucose**
- **Occurs when**
  - Too much insulin in proportion to glucose in the blood
  - Blood glucose level less than 70 mg/dL.
- **Common manifestation**
  - Confusion, Irritability, Diaphoresis, Tremors, Hunger, Weakness, Visual disturbances

ACUTE COMPLICATION OF DM
HYPOGLYCEMIA

- Causes
  - Mismatch in timing
    - Food intake & Peak action of insulin or oral hypoglycemic agents
- Hypoglycemic unawareness
  - Person does not experience warning signs/symptoms, increasing risk for decreased BG levels
    - Related to autonomic neuropathy
  - Who is at risk?

ACUTE COMPLICATION OF DM
HYPOGLYCEMIA

- At the FIRST SIGN
  - Check Blood Glucose
    - If <70 mg/dL, begin treatment
    - If >70 mg/dL, investigate further for cause of signs/symptoms
    - If monitoring equipment not available, treatment should be initiated.

HYPOGLYCEMIA: Treatment

- If ALERT enough to swallow
  - 15 to 20 g of a simple CHO
    - 4 to 6 oz fruit juice
    - Regular soft drink
  - Avoid foods with fat
    - Decrease absorption of sugar
  - Avoid overtreatment with large quantities of quick-acting CHO

HYPOGLYCEMIA: Treatment

- If ALERT enough to swallow
  - Recheck blood sugar 15 min after treatment
  - Repeat until blood sugar >70 mg/dL
  - Patient should eat regularly scheduled meal/snack to prevent rebound hypoglycemia
  - Check blood sugar again 45 min after treatment.

HYPOGLYCEMIA: Treatment

- Patient NOT ALERT enough to swallow
  - Administer 1 mg of glucagon IM or subcutaneously (SQ)
    - Side effect: Rebound hypoglycemia
  - Have patient ingest a complex CHO after recovery
  - In acute care settings:
    - 20 to 50 mL of 50% dextrose IV push

Gestational DM

- Incidence:
- Etiology:
- Treatment:
- Complications:

- Required Readings: McKinney: pp. 258,635-644

Gestational DM

- Develops during pregnancy
- Detected at 24 to 28 weeks of gestation
- Usually normal BG levels at 6 wks PP
- New ADA recommendation: Women at high risk screened @ 1st prenatal visit using standard diagnostic testing
- Increased risk for developing Type 2 in 5-10 years
- Therapy: 1st Nutritional, 2nd Insulin

Risk factors for GDM

- Obesity
- Age over 25 years
- Family hx. of DM
- Personal hx GDM in a previous pregnancy
- OB history of:
  - LGA baby (10 lb or more)
  - unexplained fetal or perinatal loss (still birth)
  - unexplained birth defects
- Member of a high-risk ethnic group
- History of abn. GTT

Laboratory Diagnosis for GDM
Oral Glucose Tolerance Test (OGTT)

- **1 Hour Screening Test**
  - No fasting is required,& No baseline BG needed
  - Patient is given a 50 gm load of glucose
  - Blood is drawn at 1 hour
  - If level is ≥ 140 mg/dL, proceed to 3 hr test.
- **3 Hour Confirmation Test**
  - 8-14 hour fasting required
  - Blood is drawn for fasting BG prior to glucose load
  - Patient is given a 100 gm load of glucose
  - Blood is drawn at 1, 2, and 3 hours
  - If level is ≥ 140 mg/dL, GDM is diagnosed.

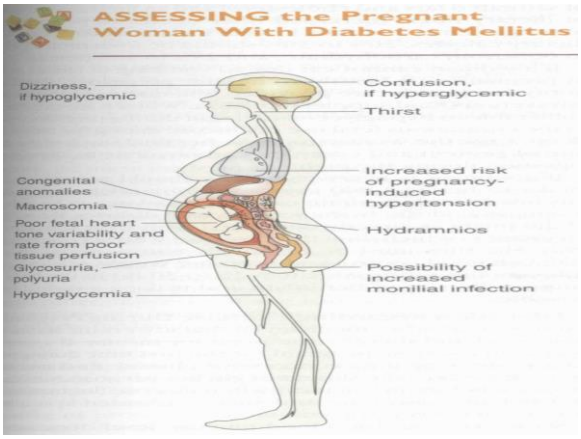
Pregnancy in Diabetes : Concerns

Maternal

- hydramnios
- PIH
- Ketoacidosis
- Dystocia
- Anemia
- UTI

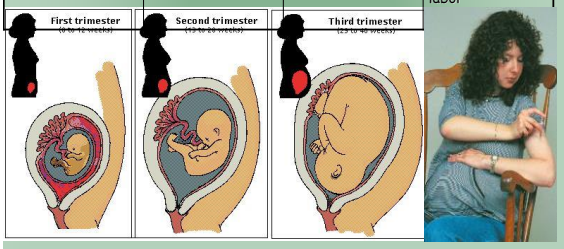
Fetal-neonatal

- increase still births, neonatal deaths,
- congenital defects
- macrosomia (>4000gm) LGA
- IUGR or SGA



Diabetes and Pregnancy

1st Δ Decrease insulin	2nd Δ Increase insulin	3rd Δ Increase insulin energy needs during labor	(abrupt) decrease insulin need after labor Increase energy needs during labor



Test for Management of GDM

- GTT
- Each trimester (GDM known)
  - Hb A1c
  - Urine cx
  - Creatinine clearance
  - Ophthalmic examination
- Alpha-fetoprotein level @ 15-17 weeks
- Ultrasound exam @ 18-20 weeks
- Weekly NST (sonography)
  @ weeks 28, 36-38

Table 1. Modified White Classification of Pregnant Diabetic Women

Class	Diabetes onset age(yr)	Duration	Type of Vascular DZ	Need Insulin
Gestational				
A1 (non-insulin)	Any	Pregnancy	None	None
A2 (insulin-dep.)	Any	Pregnancy	None	Yes
Pre-GDM				
B	20	<10	None	Yes
C	10-19 or	10-19	None	Yes
D	<10 or	20	Benign Retinopathy	Yes
F	Any	Any	Nephropathy	Yes
R	Any	Any	Prof. retinopathy	Yes
T	Any	Any	Renal Transplant	Yes
H	Any	Any Coronary DZ		www.endotext.org

QUESTIONS

Diabetes Mellitus

N123

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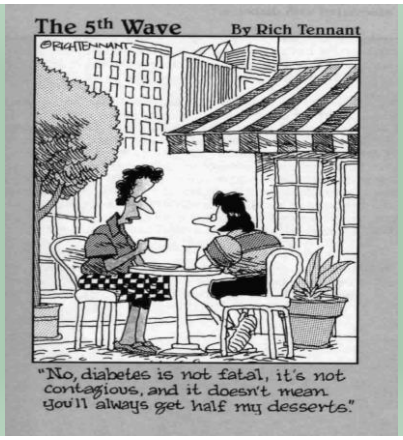
LAC College of Nursing & Allied Health

FALL 2017

Part II

- Management
  - Nutrition
  - Self-Monitoring
  - Medications
  - Activity/Exercise
  - Education
- Syndrome X
- Special Issues



Diabetes Mellitus
Collaborative Care

- **Goals of Diabetes Management**
  - Decrease symptoms
  - Promote well-being
  - Prevent acute complications
  - Delay onset and progression of long-term complications
  - Patient teaching: Self-monitoring of BG
  - Nutritional therapy
  - Drug therapy
  - Exercise

Diabetes Nutritional Therapy

- Cornerstone of care for DM patients
- Most challenging for many people
  - Recommended that Diabetes Nurse Educator & Registered Dietitian with diabetes experience should be members of team
- American Diabetes Association (ADA)
  - Guidelines that within context of an overall healthy eating plan, person with DM can eat same foods as person who does not have diabetes.

DM MANAGEMENT PLAN

- **NUTRITION**

  Eat according to a individualized meal plan per dietitian &/or nutritionist.
  - **Eat from all food groups.**
  - **Plan to eat meals no more than 4-5 hrs apart.**
  - **Eat meals at same time each day.**
  - **Type 1 may need to increase calorie intake.**
  - **Type 2 may need to reduce calorie intake.**
  - **A reduction of 500 calories/day will constitute a weight loss of 1 lb/wk.**

Diabetes Nutritional Therapy

- Type 1 Diabetes Mellitus
  - Meal plan is based on individual's usual food intake and is balanced with insulin & exercise patterns
  - Insulin regimen is managed day to day.
- Type 2 Diabetes Mellitus
  - Emphasis is based on achieving glucose, lipid, and blood pressure goals
  - Calorie reduction

Diabetes Nutritional Therapy

- **Carbohydrates**
  - Carbohydrate allowance 130 g/day
  - Fiber intake at 25-30 g/day
  - Nutritive & nonnutritive sweeteners are safe when consumed with FDA daily intake levels
  - **Glycemic Diet (GI)**
    - A term used to describe the rise in BG levels after CHO-containing food is consumed
    - May provide additional benefit

Diabetes Nutritional Therapy

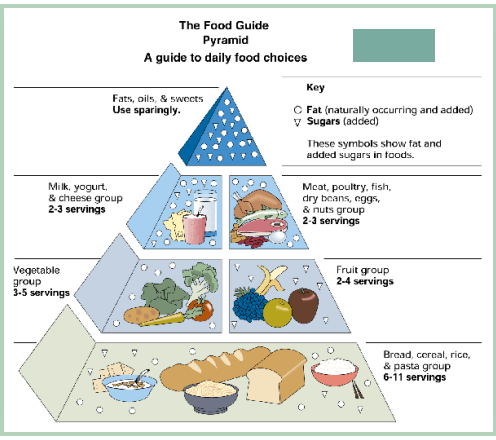
- **Fats**
  - Limit <7% from saturated fats
- **Protein**
  - Suggested protein intake is 15% to 20%
- **Alcohol**
  - Limit to moderate amount (maximum):
    - Women ~ 1 drink/day
    - Men ~ 2 drinks/day

Diabetes Nutritional Therapy

- Diet Teaching
  - Dietitian initially provides instruction
  - Carbohydrate counting
  - USDA MyPyramid guide
    - An appropriate basic teaching tool
  - Plate Method
    - Helps patient visualize the amounts of vegetable, starch, and meat that should fill a 9-inch plate

Consistent Carbohydrate Diet (CCD)

- ADA recommends eating 45-60 grams CHO with each meal
- Standard CCD provides a total 185 grams CHO each day (range of 180-200 grams)
  - CCD Low: 4 carbs/meal (1200-1600 calories)
  - CCD Medium: 5 carbs/meal (1600-2000 calories)
  - CCD High: 6 carbs/ meal (2000-2400 calories)
  - CCD Very High: 7 carbs/meal (2400-2800 calories)
- CHO Distribution is same each day
  - Breakfast: 65 Gm /Lunch: 60 Gm / Dinner: 60 Gm
- Snacks are not to exceed 15 grams.

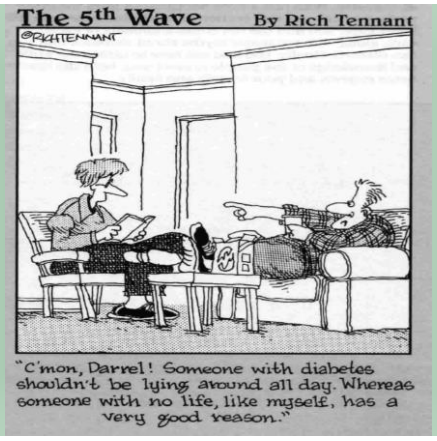


Meal Planning

- A review of diet history, lifestyle, and weight maintenance needs
- Initial education stresses:
  - consistent eating habits
  - relationship between food and insulin
  - providing an individualized meal plan
- Dietary management regarding
  - eating at restaurants, reading food labels, and adjusting meal plans for exercise, illness, and special occasions.
- Foods are organized into groups with common characteristics:
  - Number of calories, composition, effects on BG

Selected Sample Menus from Exchange Lists

EXCHANGES	Sample Lunch #1	Sample Lunch #2	Sample Lunch #3
2 starch	2 slices bread	Hamburger bun	1 cup cooked pasta
3 meat	2 oz.sliced turkey & 1 oz. Low-fat cheese	3-ounce lean beef patty	3 ounces boiled shrimp
1 vegetable	Lettuce, tomato, onion	Green salad	½ cup plum tomatoes
1 fat	1 tsp. mayonnaise	1 Tbsp. Salad drsg	1 tsp. Olive oil
1 fruit	1 medium apple	1¼ cup watermelon	1¼ cup fresh strawberries
"Free" items (Optional)	Unsweetened iced tea Mustard, pickle, hot pepper	Diet soda 1 Tbsp. Ketchup. Pickle, onions	Ice water with lemon Garlic, basil



EXERCISE

- **Therapeutic Effect of Regular Exercise**
  - A decreased need for diabetes medicines in order to reach target BG goals
- **Role of Exercise**
  - Improves uptake of glucose by the muscles
  - Reduces cardiovascular risk
  - Improves circulation and muscle tone
  - Lowers lipid blood concentration (triglyceride, cholesterol, LDL)
  - Increase HDL

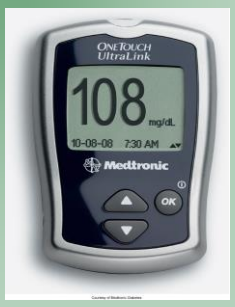
ACTIVITY/EXERCISE

- Regular exercise can decrease the need for insulin and facilitate wt. loss (if applicable).
- Must check BG level before, during and after exercise.
- Exercise plans should be (1) started after medical clearance, (2) started slowly with gradual progression, & (3) individualized.
- A balanced fitness program: 60-90-minutes after meals.
  - strength training (weight lifting)
  - endurance (walking or jogging 1 mile burns 100 calories)
  - flexibility (yoga or stretching).
- **Note:** A diabetic needs both adequate glucose to prevent exercise-induced hypoglycemia and adequate insulin.

SELF- MONITORING BLOOD GLUCOSE (SMBG)

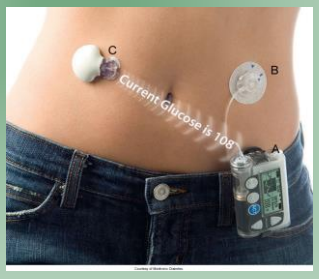
- The frequency of monitoring depends on the glycemic goals set by the patient and the health care provider.
- Recommended for all insulin-treated DM pts.
- **Blood Glucose**
  - is usually tested BID
- **Washing hands**
  - with warm H20 is adequate cleaning and promotes blood flow to the fingers.
- **Puncture site**
  - Use the side of the finger pad (less painful).
  - Should only be deep enough to obtain a sufficiently large drop of blood.

Blood Glucose Monitors



GlucoWatch

Continuous Glucose Monitor



The MiniMed Paradigm insulin pump *(A)* delivers insulin into a cannula *(B)* that sits under the skin. Continuous glucose monitoring occurs through a tiny sensor *(C)* inserted under the skin. Sensor data are sent continuously to the insulin pump through wireless technology.

DRUG THERAPY
Insulin

- Exogenous (injected) Insulin
  - Insulin from an outside source
  - Required for Type 1 Diabetes
  - Prescribed for Type 2 Diabetes patients who cannot control blood glucose by other means
    - May need 4 injections per day

MEDICATIONS
Insulin Management

- INSULIN may be used in conjunction with oral agents.
- Type 1 newly diagnosed persons must be made aware of the "**honeymoon period**"
- Not the cure to end all problems.
- Statements such as "I may eat whatever I want as long as I cover the calories with sufficient insulin."

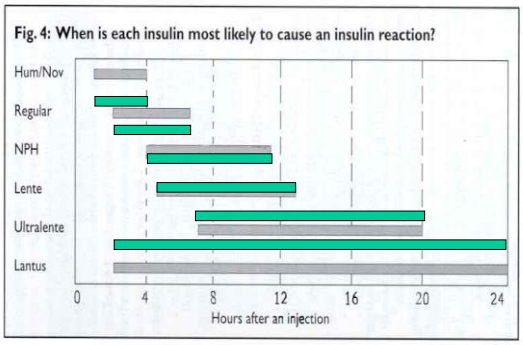
DRUG THERAPY
Insulin

- Types of Insulin
  - Human Insulin
    - Only type used today
    - Prepared through genetic engineering
- Insulins differ with regard to onset, peak action and duration
  - Characterized as rapid-acting, short-acting, intermediate-acting, long-acting
- Different types of insulin may be used for combination therapy.

CATEGORIES OF INSULIN

Time Course	Agent	Onset	Peak	Duration	Indications
Rapid-acting	Lispro (Humalog)	5-15 min	30-90 min	2-5 hours	Rapid reduction of BG; Treats postprandial hyperglycemia; Prevents nocturnal hypoglycemia
	Aspart (Novolog)	5-15 min	1-3 hours	3-5 hours	
Short-acting	Regular (CZI) Humulin R, Novolin R	30 min – 1 hour	2.5-5 hrs	6-8 hrs.	Usually administered 20-30 ac; May be taken alone or in combination with longer-acting insulin
Interme-diate acting	NPH or Lente Humulin N, Novolin N	1-2 hours	6-12 hours	18-24 hrs.	Usually taken after food
Long-acting (UL)	Ultralente (UL)	6-8 hours	12-16 hrs.	20-30 hrs.	Used primarily to control fasting glucose levels
Very long-acting	Lantus (Glargine)	1 hour	No peak (continuous)	24 hrs.	Used for a basal dose
Combination therapy (pre-mixed)	NPH/reg 70/30	30 min	4-8 hrs.	22-24 hrs.	Prevents hypoglycemia; Controls hyperglycemia
	75/25	5-15 min	30 min – 6 hrs.	20-24 hrs.	

Note: REGULAR INSULIN IS THE ONLY INSULIN THAT CAN BE GIVEN CONTINOUSLY & INTRAVENOUSLY



Calculating the unit amount for premixed insulin

The labeled numbers on the insulin vials (70/30) contain the percentage. The first # will always represent NPH, the 2nd # will always represent regular.

Ex: 70/30= 70 percent of NPH
30 percent of regular

To find out how much of each agent is in the percentage you take the ordered # of units to be administered and multiply it by the percentage of each number.

Ex: the physician orders 30 units of 70/30 NPH.
30 x .7=21 units of NPH
30 x .3= 9 units of regular
21 + 9= 30 units
Total = 30 units

DRUG THERAPY
Insulin

- Basal-Bolus Regimen:
  - Closely mimic endogenous insulin production (Table 49-4,p.1225)
    - Long-acting (basal) once a day
    - Rapid/short-acting (bolus) before meals
  - Intensive insulin therapy
  - Goal is to achieve a near-normal glucose level of 80 to 120 mg/dL before meals.

INSULIN (con't)

Lispro (Humalog)- Rapid acting onset 5-15 min.

vs.

Glargine (Lantus)- long acting- released steadily and continuously.

Exubera – Rapid acting onset 10 min. **Inhaled Insulin**, mimics the activity of biological insulin more closely than SQ injections

- 1 mg delivers approximately 3 units of insulin
- 3 mg delivers approximately 8 units of insulin

****NOTE:** glargine (Lantus) and detemir (Levemir): These are insulins that cannot be mixed with any other insulin.

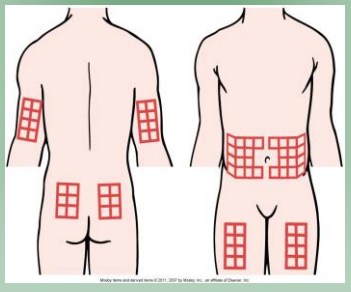
Drug Therapy
Insulin Storage

- Store in a cool place
- Do not heat / freeze
- In-use vials may be left at room temperature up to 4 weeks
- Extra insulin should be refrigerated
- Avoid exposure to direct sunlight

Drug Therapy
Insulin Administration

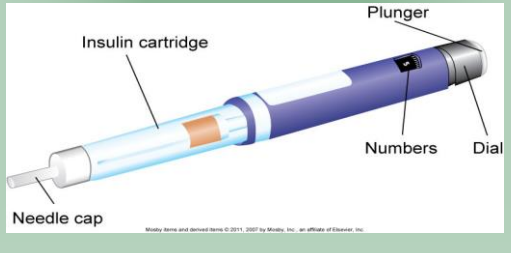
- Cannot be taken orally
- IV administration
- Subcutaneous (SQ) injection for self-administration
- Fastest absorption?
- Abdomen is the preferred site.
- Rotate injections within one particular site.
- Do not inject in site to be exercised.

Subcutaneous Insulin Sites



Insulin Pen

Insulin pen –a compact portable device
Functions same as the needle and syringe

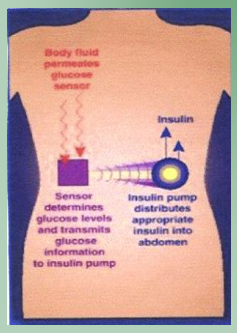


Insulin Pumps

Insulin pumps

*Continuous subcutaneous insulin infusion
* Insulin type can be rapid or short acting
* Worn on the belt or under clothing
* Insertion site changed q2-3 days
* Requires frequent finger sticks
* Battery operated

Internal Insulin Pumps



Insulin Pump

A. OmniPod Insulin Management System.
B. The Personal Diabetes Manager (PDM) wirelessly programs insulin delivery via the Pod.

Drug Therapy
Insulin

- **Problems with insulin therapy**
  - Hypoglycemia
  - Allergic reaction
  - Lipodystrophy
  - Somogyi effect
  - Dawn phenomenon

Drug Therapy
Insulin

- **Problems with insulin therapy**
  - **Somogyi effect**
    - Rebound effect in which an overdose of insulin causes hypoglycemia
    - Usually during hours of sleep
    - Counterregulatory hormones released
      - Rebound hyperglycemia and ketosis may occur.

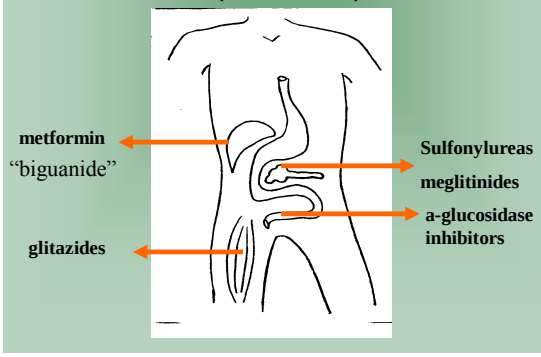
Drug Therapy
Insulin

- **Problems with insulin therapy**
  - Dawn phenomenon
    - Characterized by hyperglycemia present on awakening in the morning
      - Due to release of counterregulatory hormones in predawn hours
      - Growth hormone/cortisol possible factors

Drug Therapy
Oral Agents

- Works to improve mechanisms by which insulin and glucose are produced and used by the body.
- Works on three defects of type 2 DM
  - Insulin resistance
  - Decreased insulin production
  - Increased hepatic glucose production

MEDICATIONS
Sites of Action of OHA's



Drug Therapy
Oral Agents

- Sulfonylureas
- Meglitinides
- Biguanides
- a-Glucosidase inhibitors
- Thiazolidinediones

Drug Therapy
Oral Agents

- **Sulfonylureas**
  - ↑ insulin production from pancreas
  - ↓ chance of prolonged hypoglycemia
  - 10% experience decreased effectiveness after prolonged use.
  - Examples
    - **Glipizide (Glucotrol)**
    - **Glimepiride (Amaryl)**

Drug Therapy
Oral Agents

- **Meglitinides**
  - Increase insulin production from pancreas
  - Taken 30 minutes before each meal up to time of meal
  - Should not be taken if meal skipped
  - Examples
    - **Repaglinide (Prandin)**
    - **Nateglinide (Starlix)**

Drug Therapy
Oral Agents

- **Biguanides**
  - Reduce glucose production by liver
  - Enhance insulin sensitivity at tissues
  - Improve glucose transport into cells
  - Do not promote weight gain
  - Example:
    - **Metformin (Glucophage)**

Drug Therapy
Oral Agents

- **α-glucosidase inhibitors**
  - "Starch blockers"
    - Slow down absorption of carbohydrate in small intestine
  - Example
    - **Acarbose (Precose)**

Drug Therapy
Oral Agents

- **Thiazolidinediones**
  - Most effective in those with insulin resistance
  - Improve insulin sensitivity, transport, and utilization at target tissues
  - Examples
    - **Pioglitazone (Actos)**
    - **Rosiglitazone (Avandia)**

Drug Therapy
Oral Agents

- **Dipeptidyl peptidase-4 (DPP-4) inhibitor**
  - Slows the inactivation of incretin hormones
  - Potential for hypoglycemia
  - Examples
    - **Sitagliptin (Januvia)**
    - **Saxagliptin (Onglyza)**

Drug Therapy
Other Agents

- **Amylin analog**
  - Hormone secreted by β cells of pancreas
  - Co-secreted with insulin
  - Indicated for type 1 and type 2 diabetes
  - Administered subcutaneously (SQ)
    - Thigh or abdomen
  - Slows gastric emptying, reduces postprandial glucagon secretion, increases satiety
  - Example
    - **Pramlintide (Symlin)**

Drug Therapy

- **Glucagon-Like Peptide-Receptor Agonists**
  - ACTION:
    - Increase insulin synthesis & release from the pancreas
    - Inhibit glucagon secretion
    - Reduces food intake
    - Decrease gastric emptying
  - Subcutaneous injection in a pre-filled pen
  - Not to be used with insulin
  - Example: **Exenatide (Byetta)**
    Exenatide extended release (Bydureon)
    Liraglutide (Victoza)

Drug Therapy
Other Agents

- **β-adrenergic blockers**
  - Mask symptoms of hypoglycemia
  - Prolong hypoglycemic effects of insulin
- **Thiazide/loop diuretics**
  - Can potentiate hyperglycemia
    - By inducing potassium loss

SPECIAL ISSUES
Pediatric Considerations

Type 1 DM

Between 4-5yr can help with injection
6-7yr can tell you if foods have sugar
8-10yr can give own injection & testing with supervision
11-13yr can measure own insulin
14+ can do mixture of insulin

Reward kids but without foods.
Let child know DM is not their fault.

SPECIAL ISSUES
Geriatric Consideration

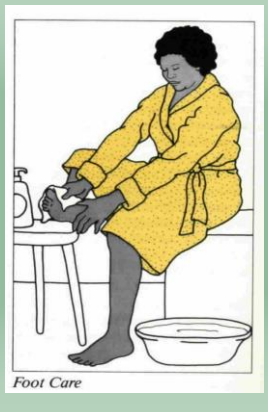
- Prevalence of DM increases with age
- Undiagnosed & untreated DM more common
- "Hypoglycemic unawareness"
- Patient Education Issues?
- With aging:
  - Delayed psychomotor function
  - Decline in cognitive function
  - Functional limitations
    - Visual acuity
    - Manual dexterity

Geriatric Consideration

- Must consider patient's own desire for treatment and coexisting medical problems
- Recognize limitations in physical activity, manual dexterity, and visual acuity
- Education based on individual's needs, using slower pace

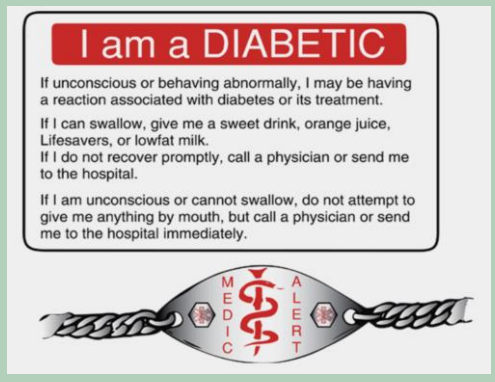
EDUCATION

- **Major goal:** To teach the patient about the disease and promote self-management with guidance only from health care providers
- **DM is a lifelong process**
- **Lifestyle management issues:**
  - During minor illnesses, patients with diabetes should continue drug therapy and food intake
  - Achieve and maintain reasonable body weight
  - Personal hygiene
  - Skin integrity
  - Dental care
  - Activity
  - Patient to learn own most reliable symptoms
  - Foot care (Lewis,p. 1287)


Foot Care

EDUCATION: TRAVELING

- People with diabetes can travel just like everyone else.
- **To have a problem free trip, be sure:**
  - Your BG is in good control before you leave.
  - Check you diabetes supplies.
  - Make sure you take enough for the entire trip:
    - Syringes
    - BG test equipment
    - Glucose tablets
    - Urine test strips for ketones
    - A card or Medic Alert bracelet that identifies you
    - A case to protect insulin from freezing or extreme heat
    - Emergency food supply in case your meal is delayed
    - Contact Number for Emergencies/Assistance
    - Traveling by air, contact the airline 24hrs in advance to arrange for any special meals.



EDUCATION

Prevent Diabetic Complications

Keep BG as close to normal as is safely possible.

Do Not SMOKE

***Have REGULAR EYE EXAMS as directed by the physician

Keep APPOINTMENTS * AND KEEP TRACK OF health status reports.

HgbA1c (target ≤7%), BP (<130/80), Blood fats (cholesterol <200mg%, triglycerides <180mg%, HDL>45mg%, LDL< 100mg%)

REPORT SYMPTOMS of complications promptly.

Maintain current knowledge of diabetes & see your Diabetic Educator regularly.

Alcohol beverages in moderation (preferably none)

Yearly flu shots

Diabetes Bariatric Surgery

- Considered for pts with Type 2 DM who have a BMI >35kg/m2
- Need lifelong support & monitoring
- Conclusions from EBP Research, 2012:
  - Decreases BMI
  - Improves glycemic control
  - Increases remission from Type 2 DM more than medical therapy in severely obese pts.

Diabetes
Pancreas Transplantation

- **Used for patients with Type 1 diabetes who also ~**
  - Have end-stage renal disease (ESRD)
  - Had, or plan to have, a kidney transplant
- Pancreas transplants alone are rare
  - Usually kidney & pancreas transplants done together
- Eliminates the need for exogenous insulin
- Can also eliminate hypoglycemia and hyperglycemia

Diabetes
Pancreas Islet Cell Transplantation

- Islets are harvested from the pancreas of a deceased organ donor
- Pain and recovery time are diminished
- Currently, experimental here in US
- Research is continuing to investigate the best ways to ~
  - Implant the islet cells
  - Prevent their rejection

Nursing Management
ASSESSMENT

- Past health history
  - Viral infections
  - Medications
  - Recent surgery
- Positive health history
- Obesity
- Weight loss
- Thirst
- Hunger
- Poor Healing
- Kussmaul respirations

NURSING DIAGNOSIS

- Ineffective self-health management
- Powerlessness
- Imbalanced nutrition: More than body requirements
- Risk for unstable blood sugar
- Risk for injury
- Risk for infection

NURSING DIAGNOSIS

- Fluid volume deficit related to effects of osmotic diuresis as manifested by ……
- Electrolyte imbalance related to diuresis as manifested by ……
- Ineffective management of therapeutic regimen related to lack of knowledge manifested by ……
- Risk for injury related to neuropathy
- Alteration in tissue perfusion related to angiopathy as manifested by ……
- Risk for infection related to hyperglycemia

Nursing Management PLANNING

- Overall goals
  - Active patient participation
  - Few or no episodes of acute hyperglycemic emergencies or hypoglycemia
  - Maintain normal blood glucose levels.
  - Prevent or delay chronic complications.
  - Lifestyle adjustments with minimal stress

Nursing Management IMPLEMENTATION

- Health promotion
  - Identify those at risk.
  - Provide routine screening for overweight adults over age 45.
    - FPG is preferred method in clinical settings.

Nursing Management
Implementation

- **Acute intervention**
  - Hypoglycemia
  - Diabetic ketoacidosis
  - Hyperosmolar hyperglycemic nonketotic syndrome

Nursing Management
Implementation

- Acute intervention (cont'd)
  - Stress of illness and surgery
    - ↑ blood glucose level
    - Continue regular meal plan.
    - ↑ intake of noncaloric fluids
    - Continue taking oral agents and insulin.
    - Frequent monitoring of blood glucose
      - Ketone testing if glucose >240 mg/dL

DM Sick Day Management Plan

Sick day Patient Guideline	Reasons to call the MD	IMMEDIATE TREATMENT needed
Continue meals, may need insulin more than the usual	Vomiting (emesis) more than once	Persistent emesis and unable to keep down any fluids
Test glucose q 3-4hr around the clock	Diarrhea >5X's or >24hr	Persistent diarrhea with weakness
Maintain hydration	Difficulty breathing	Labored or difficulty breathing
Need at least 150gms of CHO. BG ≥ 240mg/dl, check urine for ketones	BG ≥300mg/dl on 2 consecutive readings Positive Ketones in urine	Positive urine ketones after 12-24 hr of tx
Evaluate OTC meds	Changes in mental status	Changes in mental status

Nursing Management
Implementation

- Acute intervention (cont'd)
  - Stress of illness and surgery
    - Patients undergoing surgery or radiologic procedures requiring contrast medium should hold their **metformin** on day of surgery and to 48 hours.
      - Begun after serum creatinine has been checked and is normal

Nursing Management
Implementation

- **Ambulatory and home care**
  - Overall goal is to enable patient or caregiver to reach an optimal level of independence.
  - Insulin therapy and oral agents
  - Personal hygiene

Nursing Management
Implementation

- **Ambulatory and home care (cont'd)**
  - Medical identification and travel card
    - Must carry identification indicating diagnosis of diabetes
  - Patient and family teaching
    - Educate on disease process, physical activity, medications, monitoring blood glucose, diet, resources.
    - Enable patient to become most active participant in his/her care.

Nursing Management
EVALUATION

- Knowledge
- Balance of nutrition
- Immune status
- Health benefits
- No injuries

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WEBSITE REFERENCES:

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QUESTIONS

Question

Ideally, what is the goal of patient diabetes education?

1. Make all patients responsible for the management of their disease.
2. Involve the patient's family and significant others in the care of the patient.
3. Enable the patient to become the most active participant in the management of the diabetes.
4. Provide the patient with as much information as soon as possible to prevent complications of diabetes.

Question

A patient with type 1 diabetes calls the clinic with complaints of nausea, vomiting, and diarrhea. It is most important that the nurse advise the patient to:

1. Hold the regular dose of insulin.
2. Drink cool fluids with high glucose content.
3. Check the blood glucose level every 2 to 4 hours.
4. Use a less strenuous form of exercise than usual until the illness resolves.

Case Study

- 52-year-old woman was diagnosed with type 2 diabetes 6 years ago.
- Did not follow up with recommendations for care
- Complaining of weakness in her right foot
  - Began 1 month ago
  - Difficult to dorsiflex and feels numb

Case Study

- Also complains of an itching rash in her groin area
  - Has had rash on and off for many years
  - Worse when weather is warm
- Increased thirst and frequent nighttime urination
- Denies other weakness, numbness, changes in vision

Case Study

- She works as a banking executive and gets little exercise.
- She has gained 18 pounds over the past year and eats a high-fat diet.
- BP 162/98
- Sensory exam to light touch, priopriocepion, and vibration slightly diminished on both feet
- Erythematous scaling rash in both inguinal areas and in axillae

Case Study

- Random glucose test 253 mg/dL
- Hb A1C 9.1%
- Urine dipstick positive for glucose and negative for protein
- Wet prep of smear from rash consistent with *Candida albicans*
- ECG with evidence of early ventricular hypertrophy by voltage

Discussion Questions

1. She wants to know why all of these changes have been happening to her body. How would you explain this to her?
2. What is the priority nursing intervention?
3. What teaching should be done with her?

The End !!!