

# Nursing Care of the Clients with Diabetes Mellitus

Chapter 36



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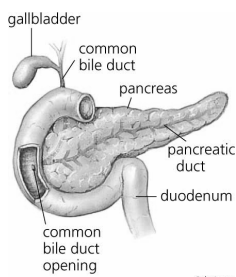
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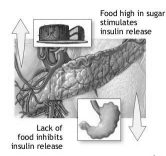
## Anatomy and Role of the Pancreas



Alpha - glucagon - glucogen - glucose

Beta - insulin

Delta - stomatostatin, balance



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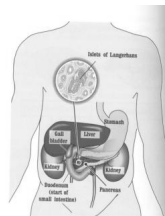
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## Diabetes Mellitus

- Definition: Lack of or resistance to Insulin
- Classifications
  - Type 1 Diabetes
  - Type 2 Diabetes
  - Gestational



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## Impact of Diabetes

- 6th leading cause of death
- leading cause of renal failure
- major cause of blindness
- most frequent cause of non-trauma amputations
- affects 17 million
- increasing prevalence of type 2

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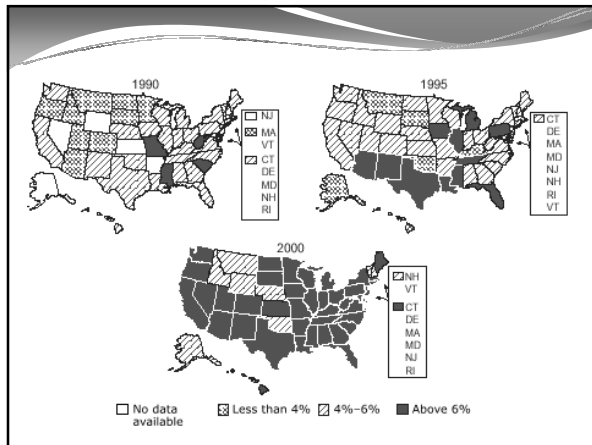
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## Historical Facts

- Diabetes is from the Greek word "to siphon"
- Mellitus is from Latin word "sweet"
  - Usually died within 2-3 years from starvation
- 1921 - Insulin discovery
  - increased life span
  - experiencing long term effects of diabetes
- 1979 - self monitoring with glucometers



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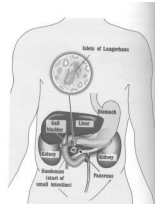
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## Diabetes Mellitus - Historical

- Children died of starvation



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## Diabetes and your nursing practice

- Impact?
- Opportunity?
  - Teaching
  - Follow-up
- Future?



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## Diabetes Type 1

- Beta cells no longer produce insulin
  - hyperglycemia
  - fats and protein are broken down
  - development of ketosis
- accounts for 10-15% of all cases
- occurs in childhood or adolescence
  - juvenile onset or insulin dependent diabetes

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## Type 1 Diabetes



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## Clinical Manifestations

- Hyperglycemia leads to
  - polyuria
  - glycosuria
  - polydipsia
  - polyphagia
  - weight loss
  - malaise and fatigue
  - blurred vision



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## Diabetic Ketoacidosis DKA

- Results from a breakdown of fat
- occurs when undiagnosed or known diabetic has an increased energy need
- blood sugar  $>250\text{mg/dL}$
- $\text{pH} < 7.3$
- ketones and glucose in the blood and urine

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## DKA - Treatment

- Regular insulin - sub q or IV
- Restore fluid balance - .9NS IV
- Correct electrolyte imbalances - K+



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## Diabetes Type 2

- Definition - when fasting hyperglycemia occurs despite endogenous insulin
- also known as adult onset diabetes
- Risk Factors
  - family history
  - obesity
  - race - African American, Hispanic or Am. Indian
  - Women - gestational diabetes, birth wt > 9lbs

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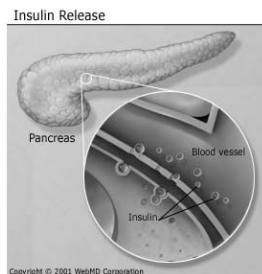
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## Diabetes Type 2 - Patho

Cellular Resistance  
Not enough insulin



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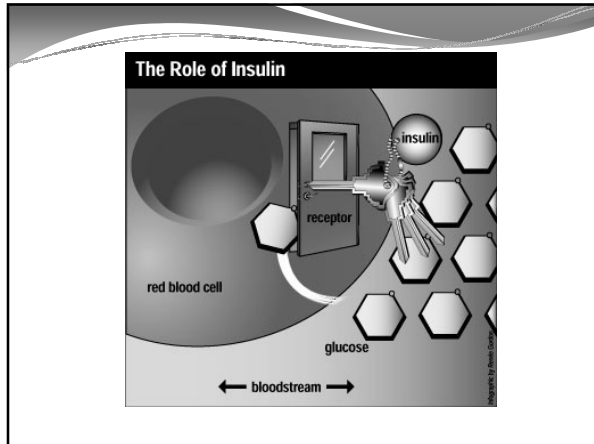
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### Type 2 Diabetes - Clinical Manifestations

- Client - usually unaware, doesn't experience wt. loss
- hyperglycemia
- polyuria, polydipsia, blurred vision
- fatigue
- paresthesias
- skin infections

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### Hyperosmolar Hyperglycemia State - HHS

- Life threatening complication of type 2
- Characterized by increase in plasma osmolarity, blood glucose and ALC
- Precipitating factors
  - infection, therapeutic agent/procedure, acute or chronic illness
  - slow onset




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**HHS**

- Clinical Manifestations
  - altered level of consciousness
  - neurological
    - hyperthermia, motor/sensory impairment, seizure
  - dehydration
- Treatment
  - ICU, correct fluid and electrolyte imbalances, regular insulin

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**Complications of Diabetes**

- Hyperglycemia
  - DKA - associated with Diabetes Type 1
  - HHN - associated with Diabetes Type 2
  - Dawn phenomenon - rise in b.s. 4-8am
  - Somogyi effect - hypoglycemia at night with re-bound morning hyperglycemia

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**Complications of Diabetes**

- Hypoglycemia - b.s. 45-60mg/dL
- Manifestations
  - early signs - cool clammy skin, rapid heart beat, hunger, nervousness, tremor, faintness, dizziness
  - late signs - unsteady gait, incoherent, vision changes, seizures, coma

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## Hypoglycemia

- Treatment
  - 15gms of rapid acting sugar (1/2 cup of fruit juice, 8oz skim milk, 3 glucose tablets, 3 life savers)
  - 15/15 rule, if still low, repeat 15 grams of sugar
  - IV - 25-50% of glucose

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- Why do you need to know about diabetes?
- How would you feel if diagnosed with Diabetes today?



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- Tell us about Diabetes Type 1

- patho
- incidence
- clinical manifestations
- DKA?



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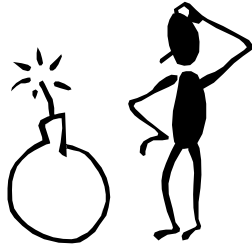
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• Tell us about Type 2 Diabetes

- risk factors
- clinical manifestations
- hyperosmolar hyperglycemia state?



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• Tell us about complications, signs and symptoms and treatment

- hyperglycemia
- hypoglycemia



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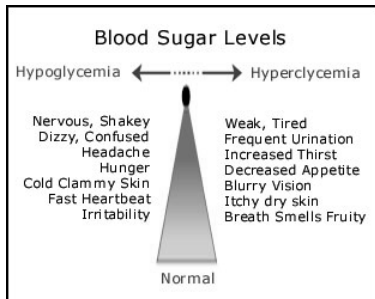
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### Hypoglycemia verses Hyperglycemia



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## Complications of Diabetes

- Coronary Artery Disease
- Hypertension
- Stroke
- Peripheral Vascular Disease
- Diabetic Retinopathy
  - retinal ischemia
  - leading cause of blindness ages 25-74



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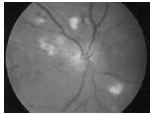
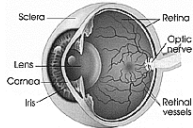
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## Diabetic Retinopathy



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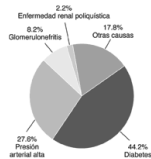
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## Complications of Diabetes

- Diabetic nephropathy
- glomerular changes in kidneys
  - leading to impaired renal function
    - microalbuminuria
  - most common cause ESRD in America

Diagnósticos/causas principales de insuficiencia renal (2003)



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## Renal Involvement

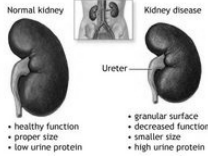


Fig 23

### KIDNEY

Watch for protein in urine and/or increase in blood pressure.



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## Complications of Diabetes

- Peripheral and Autonomic Nervous System
  - changes in the blood vessels that supply nerves and result in impaired nerve conduction
  - peripheral neuropathies
    - distal paresthesias - numbness/ tingling in toes/feet
    - pain, aching, burning feelings of cold
    - impaired sensation
  - visceral neuropathies
    - sweating
    - G.I.



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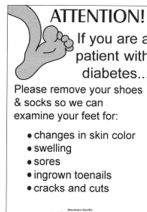
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## Other Complications from D.M.

- Increased susceptibility to infection
  - inflammatory response is diminished
  - slower than normal healing
- Periodontal disease
- Foot ulcer and infections



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## Diabetic foot ulcer



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## What will you document?



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## Collaborative Care

- Keeping blood glucose levels close to normal
  - medications
  - dietary management
  - exercise
- Future
  - pancreatic transplant, beta cell transplant



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## Diagnostic Tests

- 1. Symptoms of diabetes and random b.s. >200mg/dL
- 2. fasting glucose >126mg/dL
- 3. Oral glucose tolerance test - OGTT
  - after 2 hrs glucose is >200mg/dL
- 4. Glycosylated hemoglobin - Hemoglobin A1C
  - average glucose over 2-3 months
  
- Routine accu checks for management
  - Type 1 3x/day, Type 2 prn to reach glucose goal

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What can you tell us about this?

- Type
- Action
- Administration
- Nursing Care



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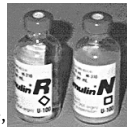
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## Medications

- Insulin
  - all type 1, some type 2, gestational diabetics, those on TPN
- Terms describing insulin
  - onset, peak, duration
- Types
  - rapid acting, short acting, intermediate, combinations



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## Types of Insulin

- Short acting – Regular
  - onset 30 min to 1 hr
  - peak 2-3 hrs
  - duration 4-6 hrs
- Intermediate acting – NPH
  - onset 1-2 hrs
  - peak 6-14 hrs
  - duration 16-24 hrs
- Long acting – Lantus
  - onset 2 hrs, peak not defined
  - Duration 24 hours

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## Insulin Administration

- Equipment
  - syringe
  - calibrated for U 100
  - insulin pump
- Route
  - parenterally only
  - nasal spray recently approved for use
  - research into oral forms



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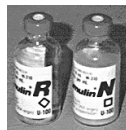
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## Insulin Administration

- Storage?
- Gently roll
- withdraw without air bubbles
- clear to cloudy
- Administration
  - subcutaneous tissue differs in absorption rates
  - 90 degree angle, no massage, avoid scars



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## Insulin Sites

- Abdomen – most rapid absorption site
- Arms
- Thighs
- Buttocks

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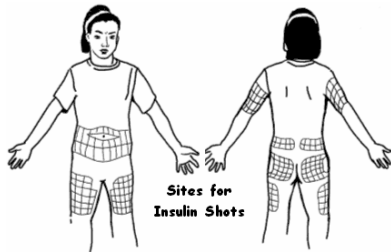
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## Injection sites



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## Insulin Administration

- Best site for injection



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## Oral Hypoglycemic Agents

- Used to treat Type 2
- Combination with prescribed diet and exercise
- Many combinations of insulin and hypoglycemic agents
  - glucotrol, glucophage
- Aspirin therapy



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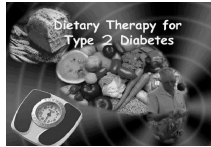
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## Diet Management

- Goals
  - near-normal glucose levels
  - optimal lipid levels
  - adequate calories to maintain reasonable wt.
- Meal planning
  - consistent-carbohydrate plan
  - exchange list



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## Diet Management

- Specifically for type 1
  - correlate eating with insulin onset
  - adjust according to self-monitoring
- Specifically for type 2
  - includes weight loss plan
  - 3 meals spaced 4-5 hours apart
- "Sick Day Management Plan"

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## DM - Weight Loss

- Plays important role



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## Exercise

- Increase uptake of glucose by muscle cells
- Decrease cholesterol and triglyceride levels
- ADA Recommendations
  - proper footwear, inspect feet
  - avoid temperature extremes
  - avoid during times of poor glucose control



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## Diabetic Surgical Clients

- Monitor for increased risk of
  - postoperative infections
  - delayed wound healing
  - fluid and electrolyte imbalances
  - hypoglycemia
  - DKA



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## Diabetic Surgical Clients

- Preop Care
  - insulin - may receive usual dose or 1/2 of the usual dose
  - early morning surgery
- Post op Care
  - b.s. fluctuate depending on NPO, gastric suctioning
  - monitor at set intervals

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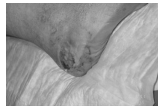
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## Nursing Diagnoses

- Risk for Impaired skin integrity: Proper foot care
  - 1. Daily inspection of the feet
  - 2. Checking temperature of any water before washing feet
  - 3. Need for lubricating cream after drying but not between toes
  - 4. Quit smoking



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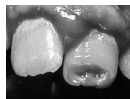
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## Nursing Diagnoses

- Risk for Infection
  - 1. Frequent hand washing
  - 2. Early recognition of signs of infection and seeking treatment
  - 3. Meticulous skin care
  - 4. Regular dental examinations and consistent oral hygiene care



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## Nursing Diagnoses

- Risk for Injury: Prevention of accidents, falls and burns



- Sexual dysfunction
  - 1. Effects of high blood sugar on sexual functioning
  - 2. Resources for treatment of impotence, sexual dysfunction

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## Nursing Diagnoses

- Ineffective coping
  - 1. Assisting with problem solving strategies
  - 2. Providing information about diabetic resources
    - community education program
    - support groups
  - 3. Use all client contact as an opportunity to reinforce management, help coping and prevent complications

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## The Nursing Process

working together



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