Physiologic Integrity and Therapeutic Nursing Interventions for Patients with Endocrine Disorders

What do the following people have in common?

Charles Marion Russell
George, Barbara and Millie Bush

Carl Lewis

Jane Austen
They all have/had endocrine disorders

Endocrine System

- Endocrine glands secrete a hormone that is carried by the blood to act on a target tissue.
- Endocrine glands are distributed throughout the body.
Endocrine System

- Consists of
  - Hypothalamus
  - Pituitary gland
  - Thyroid gland
  - Parathyroid glands
  - Endocrine pancreas
  - Adrenal glands
  - Gonad

Endocrine System

- Hormone classification
  - Steroids – derived from cholesterol and are poorly soluble in water
  - Peptides, proteins and polypeptides – synthesized from endoplasmic reticulum and secreted in vesicles
  - Amino acid derivatives – derived from tyrosine

Hypothalamus and Pituitary

- Hypothalamus
  - Some axons terminate in pituitary and secrete hormones rather than neurotransmitters
  - Secretes a variety and inhibiting and releasing factors that regulate secretion of anterior pituitary hormones
Hypothalamus and Pituitary

- Hypothalamus regulates secretion of:
  - Growth hormone
  - Prolactin
  - ADH
  - Oxytocin

- This is accomplished through secretion of 5 releasing hormones and 2 inhibiting hormones

Hypothalamus and Pituitary

- Pituitary:
  - Connected to hypothalamus by a small extension on the dorsal surface
  - 3 sections:
    - Anterior - glandular tissue
    - Posterior - neural tissue containing glial cells and the terminal axons from cells of the hypothalamus
    - Pars intermedia - no significance in humans
Hypothalamus and Pituitary

Pituitary gland is referred to as master gland because it regulates the function of the other glands. Under the influence of the hypothalamus, the anterior pituitary releases or excretes 7 hormones which influence secretion of hormones by other endocrine glands and influence somatic growth and sexual development.

Anterior Pituitary Hormones
- Growth hormone (GH)
- Prolactin
- Thyroid stimulating hormone (TSH)
- Adrenocorticotropic hormone (ACTH)
- Follicle Stimulating Hormone (FSH)
- Lutenizing hormone (LH)
- Melanocyte stimulating hormone (MS)

The posterior pituitary secretes 2 other hormones.
- Oxytocin
- ADH

Dysfunction in the endocrine system may be a result of a problem with the hypothalamus, the pituitary gland or a problem with the gland or organ the hormone acts upon.
Hypothalamus and Pituitary

- Growth hormone
  - Regulates growth in all body tissues increasing both cell size and cell number
  - Increases anabolism and decreases catabolism of protein
  - Increases plasma glucose levels while protecting amino acid pools
  - Insulin potentiates growth hormone mediated growth
    - Facilitates entry of glucose and amino acids into cell

Hypothalamus and Pituitary

- Prolactin
  - Normally hypothalamus secretes inhibiting factor
  - Controls milk production

- TSH
  - Controls secretion of thyroid hormone by thyroid gland

Hypothalamus and Pituitary

- ACTH
  - Controls secretion of mineralocorticoids, glucocorticoids and androgens

- ADH
  - Formed in hypothalamus and secreted by pituitary
  - Secreted in response to increased plasma osmolarity or decreased blood pressure

- Oxytocin
  - Formed in hypothalamus and secreted by pituitary
  - Promotes uterine contraction and milk ejection
Thyroid and Parathyroid Glands

- Thyroid gland
  - Located in anterior neck
- Parathyroid glands
  - 4 small glands near, attached to or embedded in thyroid gland

Thyroid Gland

- Produces thyroid hormone (T3 & T4)
- Thyroid hormone
  - Increases metabolism
  - Assists in acclimatization to cold environments by increasing metabolic rate
  - Increases DNA translation and transcription
  - Increased protein synthesis but can have protein catabolic effects
  - Promotes growth
  - Permissive effect of increasing other endocrine secretions
Parathyroid Glands

- Parathyroid hormone
  - Released in response to decreased serum calcium levels
  - Action on bone, GI tract and kidneys to increase circulating levels of calcium

Pancreas

- Endocrine pancreas
  - Islet cells secrete 3 hormones that regulate blood glucose
    - Glucagons – alpha cells
      - Purpose is to elevate plasma glucose
    - Insulin – beta cells
    - Somatostatin – delta cells
      - Released after meals and inhibits release of both insulin and glucagon

Pancreas

- Insulin
  - Decreases plasma glucose
    - Enhances uptake, use and storage of glucose in hepatic, muscle and adipose tissue
    - Enhances amino acid transport into cells
    - Synergistic effect with growth hormone
Adrenal Glands

- Adrenal glands
  - Located on superior pole of kidneys
  - 2 sections
    - Outer cortex
      - Secretes mineralocorticoids, aldosterone and corticosterone
    - Inner medulla
      - Catecholamines and androgens

Adrenal Glands

- Aldosterone
  - Secreted by adrenal cortex
  - Regulated primarily by plasma potassium concentration
  - Increased K caused secretion
  - Angiotensin II may promote synthesis and release
  - ACTH has permissive effect

Adrenal Glands

- Cortisol
  - Secreted by adrenal cortex
  - Increases plasma glucose levels
  - Promotes use of alternate metabolic substrates for energy
  - Stimulates appetite and increases deposition of fat in central adipose tissue
  - Regulated by hypothalamus-pituitary-adrenal cascade
    - Hypothalamus secretes releasing factor that leads to ACTH release
Endocrine System

- Regulation occurs primarily through negative feedback
- Regulation is integrated with the nervous system

Assessment

- Take a careful history, manifestations may appear in numerous systems

Assessment

- Integumentary
  - Poor healing, pigmentation changes, changes in head, hands, feet or face, delayed growth, changes in hair, non-pitting edema

- Cardiovascular
  - Nose bleeds, easy bruising, edema, changes in temperature and pulse rate, hypertension, dehydration, water retention, flushing, Kussmaul's respirations
Assessment

- Neurologic
  - Weakness, depression or mood changes, drowsiness, tremors, loss of sensation
- Ophthalmic
  - Exophthalmos, blurred or diminished vision
- Gastrointestinal
  - Glossitis, weight loss or gain, changes in appetite, polydipsia, diarrhea or constipation

Assessment

- Genitourinary
  - Polyuria, menstrual irregularities, loss of libido, impotence, infertility, renal problems, renal stones
- Other
  - Intolerance to ETOH and medications, fatigue, malaise, dehydration, bone and joint pain, fractures, muscle cramps

Assessment

- Past history
  - Growth patterns, previous metabolic disorders, hair distribution
  - Trauma to head or neck or history of radiation or surgery to head or neck
  - Metastatic disease to head or neck, chemotherapy
  - Previous or current use of steroids, hormones, anabolic steroids, alternative therapies
  - Iodine or shellfish allergy
Assessment

- Family history
  - Family history of endocrine disorder
  - Family history of cancer
- Psychosocial
  - Occupation, geographic location, environment, exercise, nutrition habits
- Review of systems
  - Complete ROS

Assessment

- Requires a careful physical assessment of the entire body

Assessment

- Diagnostic tests
  - Multiple lab studies depending on disorder suspected (p1166-1177) (look at test specific to disorders we discuss as we discuss them.)
  - Do not memorize norms unless told to do so.
  - Ultrasound, MRI and CT will give us information about size and shape of organs, as well as positioning and function
Assessment

- **Diagnostic testing**
  - **Radioiodine uptake**
    - Radioactive iodine is administered and is taken up by thyroid
    - Amount of radioiodine present in thyroid is assessed after 24 hours
    - Cannot have taken iodine containing medications in last 30 days
    - Diets high in seafood may lead to falsely low readings
    - Estrogens may lead to false elevations

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**Thyroid Dysfunction**

- Thyroid produces thyroid hormone (T3 & T4) and thyrocalcitonin.
- Secretion is controlled by release of TSH from pituitary gland when TH levels fall.
- Function of thyroid is to regulate metabolic rate and control the process of growth and tissue differentiation.
Goiter

- Enlargement of thyroid gland
- May be seen with hypothyroidism & hyperthyroidism
- Results from lack of iodine, inflammation, or benign or malignant tumors

Goiter

- 2 forms
  - Endemic
    - Occurs primarily due to nutritional deficiency of iodine in geographic areas
    - Iodized salt has decreased this
    - More prevalent in fall and winter and in women
    - May see during growth spurts
  - Sporadic
    - Caused by genetic effects, goitrogenic foods or goitrogenic medications (cabbage, soybeans, strawberries, glucocorticoids, lithium, rifampin, etc.)

Goiter

- Pathophysiology
  - Lack of iodine or suppression of thyroid hormone production leads to enlargement of thyroid gland in an attempt to compensate for deficiency
Goiter

- Manifestations
  - Gland is enlarged
  - Can see hypo or hyperthyroid but often patient is euthyroid
Goiter

- Management
  - If related to lack of iodine, patient is to receive iodine preparation
  - May give levothyroxine to shrink gland
  - Surgery may be required for very large goiters, those that do not respond to treatment or those that are putting too much pressure on other structures in the neck.

Hypothyroidism

- Deficiency of thyroid hormone
- Can be related to dysfunction of thyroid, pituitary or hypothalamus
- More common in women (4:1)
- 95% are primary hypothyroidism
- Pituitary or hypothalamic causes account for the remaining cases. (TSH will be low)

Hypothyroidism

- Thyroid gland fails to synthesize enough TH
- Overall slowing of metabolic rate
- Decreased production of HCl and decreased GI motility, bradycardia, slowed neurologic functioning and decreased heat production result
- Increased production of cholesterol and triglycerides leads to atherosclerosis and CHD
- Anemia occurs from decreased RBC production
- Myxedema may occur
Hypothyroidism

- Manifestations
  - Mild
    - May be asymptomatic or have vague complaints
    - Cold intolerance, lethargy, dry skin or hair, forgetfulness, depression and weight gain
    - Coarse, dry, sparse hair
    - Dry, flakey, inelastic skin
    - Decreased temperature
    - Constipation
    - Increased sensitivity to infection
    - Heart rate may be slow and BP may be normal to slightly elevated

- Manifestations
  - More severe
    - Enlargement of gland may be significant
    - Respiratory distress from enlargement
    - Worsening of other symptoms
    - Dysphagia

- Manifestations
  - Myxedema (severe hypothyroidism)
    - May occur in untreated cases or with under treatment and stress (physical or emotional)
    - Dry, waxy swelling with deposits of mucin in skin and other tissue
    - Non-pitting edema in pretibial and facial areas
    - Untreated is associated with severe atherosclerosis
    - May occur in the untreated or under treated patient who experiences stress
Hypothyroidism

- Manifestations
  - Myxedema coma
    - Rare complication
    - Mortality rate near 100%
    - Metabolic rate decrease is so drastic that hypoventilation leads to respiratory acidosis
    - Hypothermia and hypotension also occur due to decreased metabolic rate
    - Hyponatremia, hypercalcemia, secondary adrenal insufficiency, hypoglycemia and water intoxication are complications

Myxedema

In this patient with advanced preclinical myxedema, these striking skin changes are due to accumulations of mucopolysaccharides ("myxedema"). These changes are reversible with thyroid hormone.
Hypothyroidism

Management
- Diagnosis is usually made when patient seeks treatment for another problem
- Manage with oral TH replacement
  - Titrate dose to effect
  - Levothyroxine is preferred drug
  - Smaller doses in the elderly
- Requires lifelong treatment
- Regular monitoring of serum thyroid levels
  - Expect T4 51-154 nmol/L for male and 64-154 nmol/L for female

Hypothyroidism

Management of myxedema and myxedema coma
- Maintain temperature and airway
- Oxygen
- Fluid replacement
- Vasopressors may be necessary to maintain perfusion
- Administer TH
- Watch for problems when giving TH to patients with heart disease
- Levothyroxine, glucose and corticosteroids are given IV

Nursing Management of Hypothyroidism

Assessment
- Careful history, patient often seeks treatment for other causes
- Note other medical problems
- Careful physical assessment
- Watch for periorbital edema, facial edema, blank facial expression, thick tongue, and slowing of movements
Nursing Management of Hypothyroidism

- Altered nutrition: more than body requirements r/t slowed metabolism
  - Return to normal weight AEB weight loss of 2 lb per week
    - Teach patient re diet
      - Low calorie diet until weight returns to normal
    - Increased activity should also help
      - Should feel better and have more energy as TH levels return to normal

Nursing Management of Hypothyroidism

- Activity intolerance r/t weakness and apathy secondary to slowed metabolic rate
  - Patient will develop increased activity tolerance AEB a return to pre-illness activity levels
    - TH supplement should help return of energy level

Nursing Management of Hypothyroidism

- Constipation r/t decreased peristalsis secondary to slowed metabolic rate
  - Return to normal, pre-illness bowel pattern AEB a bowel movement at least every other day
    - Increased activity
    - Increased fluid intake
    - High fiber diet
    - Stool softener if necessary
Nursing Management of Myxedema

- Decreased cardiac output r/t bradycardia
  - Maintain normal cardiac output and be free from failure aeb
    normal heart rate, normal perfusion, absence of edema and
    urine output of at least 0.5ml/kg/hr
  - Monitor I&O, daily weight
  - Assist patient to conserve energy
  - Watch for cardiac manifestations and notify MD if they occur
  - Watch for signs of thyrotoxiosis
    - Tachycardia, increased appetite, diarrhea, sweating, agitation,
      tremor, palpitations and SOB

Nursing Management of Myxedema

- Hypothermia r/t slowed metabolism
  - Body temperature will return to normal
  - Provide comfortable, warm environment
  - Supply warm clothing and blankets as needed
  - Dress warmly and avoid extreme cold
  - Warming blanket if needed

Nursing Management of Myxedema

- Risk for injury: myxedema coma r/t
  anesthetics, sedatives, and narcotics
  secondary to decreased metabolic rate
  - Patient will not receive the usual doses of
    anesthetics, sedatives and opioids so that
    development of myxedema coma is avoided
  - No sedative or narcotics unless absolutely
    necessary and then at 1/3 to 1/2 the usual dose
  - Watch for respiratory depression and decreased
    level of consciousness
Nursing Management of Myxedema

- Risk for impaired skin integrity r/t edema and dryness secondary to infiltration of fluid into interstitial spaces
  - Skin will remain intact
    - Monitor skin condition
    - Strict turning schedule
    - Pressure reduction mattress

Nursing Management of Hypothyroidism

- Evaluation
  - Patients will see improvement in symptoms in 3-12 weeks.
  - Anemia and changes in hair and skin may take many months to resolve
  - If condition does not reverse, assess compliance with therapy

Self-Care for Hypothyroidism

- Teach manifestations of both hypo and hyperthyroidism
- Teach need to follow medication regimen and diet and when to seek further assistance
- Monitor weight
- Iodized salt, sufficient fluid intake, and high fiber diet, adequate physical activity
- Monitor T4 routinely until level stabilizes then continue regular checks
Modifications for the Elderly

- Often vague symptoms in elderly
- Subclinical hypothyroidism occurs
  - TSH may be slightly elevated with normal or slightly decreased T4
  - May be asymptomatic or have mild complaints
  - If vague generalized complaints may benefit from low dose therapy if so then it is not really subclinical
- T4 in a person with heart disease may lead to ischemic heart disease and angina

Hyperthyroidism

- Excessive levels of TH
- May be due to over functioning of gland, adenomas or over treatment of myxedema
- More common in women
- Most common form is Graves’ disease

Graves’ Disease

- Hallmarks
  - Hyperthyroidism
  - Goiter
  - Exophthalmos
Graves' Disease

- May be due to excess stimulation of adrenergic nervous system or excessive levels of TH
- Normal control of TH secretion is lost and hypermetabolism results
- Tachycardia and increased cardiac output, stroke volume, adrenergic responsiveness and peripheral blood flow occur
- Metabolism increases leading to negative nitrogen balance, lipid depletion, nutritional deficiency and weight loss result
- Also leads to altered secretion and metabolism of hypothalamic, pituitary and gonadal hormones

Graves' Disease

- Manifestations
  - Opposite of hypothyroidism
  - Agitation, irritability, and tremor at rest
  - Ravenous appetite with weight loss
  - Loose bowel movements, heat intolerance, diaphoresis, tachycardia and incoordination
  - Warm, smooth skin, thin, soft hair
  - Mood swings from euphoria to hyperactivity to delirium followed by fatigue and depression
  - Enlarged thyroid gland
  - Protruding eyes with fixed stare and possible inability to close eyes
  - Thyroid hormones elevated, cholesterol levels usually low

Graves' Disease

- Complications
  - Exophthalmos (seems to be autoimmune)
    - May not regress with treatment
    - Diuretics and steroids may help
    - Radiation therapy in severe cases
    - Eye drops for lubrication
    - Surgery in severe cases when other measures have failed
  - Heart disease
    - Tachycardia, atrial fibrillation and heart failure may occur
    - Propranolol drug of choice, but contraindicated if asthma or heart failure are pre-existing
Graves' Disease

Complications
- Thyrotoxicosis (Thyroid storm)
  - Potentially fatal but rare
  - Diagnosed clinically
  - Acute episode of thyroid hyperactivity
  - Characterized by high fever, tachycardia, delirium, dehydration, & extreme irritability
  - Can be caused by under treatment, numerous stressors or inadequate preparation for thyroid surgery

Management
- Curtail excessive secretion of TH
  - Anti-thyroid medications
    - Recommended for those under 18 and pregnant women
    - Propylthiouracil is most common
    - May take 4-8 weeks to see benefits
    - May take several months for symptoms to completely resolve
    - Most serious side effect is agranulocytosis
      - Monitor WBC before giving
      - Report signs of infection immediately (fever, rash or sore throat)

- Methimazole (Tapazole) is also used
  - Agranulocytosis may occur

- Iodine preparations
  - Decrease vascularity of gland pre-operatively for 10-14 days. Lose benefit after that time.
  - To treat thyroid storm by decreasing amount of TH released into circulation by increasing the amount stored in the gland
Graves’ Disease

Management

- Curtail excessive secretion of TH (cont)
  - Radioiodine therapy
    - For middle aged and older patients
    - Simple, economical, done on outpatient basis
    - Given orally
    - Radioactive iodine destroys cells that concentrate iodine to make T4 which leads to decreased T4 production
    - 6-12 weeks for manifestations to resolve
    - Possible complication is hypothyroidism

Graves’ Disease

Management

- Prevent and treat complications
  - Adrenergic blocking agents lessen manifestations
  - Dietary therapy
    - Needs 4000-5000 calories with high protein levels
  - Treat thyroid storm
    - Hypothermia blanket
    - Fluids
    - Iodides block TH release
    - Beta blockers control SNS effects to treat tachycardia
    - Glucocorticoids and propylthiouracil

Nursing Management of Graves’ Disease

Assessment

- Complete history
- Note weight, appetite, activity, heat intolerance and bowel activity
- Ask about mood alterations
Nursing Management of Graves’ Disease

Altered nutrition: less than body requirements r/t accelerated metabolic rate
- Weight loss will end
  - Well balanced, high calorie diet
  - Six full meals daily
  - Discourage foods that may increase peristalsis
  - Daily weight and report losses >2kg (4.4lb)
  - Supplemental vitamins may be needed

Nursing Management of Graves’ Disease

Activity intolerance r/t exhaustion secondary to hypermetabolic state
- Pt will engage in normal activity level aeb ability to maintain a balance of rest and activity
  - Restful environment
  - Private room

Nursing Management of Graves’ Disease

Risk for injury: corneal ulcerations, infection and possible blindness r/t inability to close eyelids secondary to exophthalmos
- Patient will not experience corneal injury
  - Artificial tears
  - Eye patches
  - Wear dark sunglasses
  - Avoid getting dust in eyes
  - If eyes do not close, wear a sleeping mask or tape eyes shut to sleep
  - Elevate HOB
  - Restrict salt intake
Nursing Management of Graves’ Disease

- Hyperthermia r/t accelerated metabolism
  - No hyperthermia aeb return to normal body temperature
    - Cool environment
    - Light weight clothing and single sheet
    - Freshen clothing and bedding as needed
    - Encourage not to overexert

- Impaired social interaction r/t agitation, hyperactivity and mood swings
  - Patient will not suffer from impaired interaction aeb ability to interact without difficulty, agitation, hyperactivity or mood swings
    - Explain to others that bizarre behavior is temporary and should improve with treatment
    - Quiet and understanding manner when dealing with patient
    - Occupational therapy may help to distract patient
    - Sedatives may be needed
    - Adrenergic blocking agents

Surgical Management of Graves’ Disease

- Thyroidectomy may be needed
  - Done for those that are young and free of conditions that would make them a poor operative risk i.e. diabetes, heart disease
  - Patient must be euthyroid prior to surgery
    - Antithyroid medications and iodine preparations are given for several weeks prior to surgery
    - May take 2-3 months to have patient ready for surgery
Surgical Management of Graves' Disease

- Complications
  - Hemorrhage
  - Infection
  - Thyroid storm
  - Tetany
  - Respiratory obstruction
  - Laryngeal edema
  - Vocal cord injury

Nursing Management of the Surgical Patient with Graves' Disease

- Assessment
  - Note findings that indicate hypermetabolic state

Nursing Management of the Surgical Patient with Graves' Disease

- Risk for injury (thyroid storm, hypocalcemia or hemorrhage) r/t surgical procedure and not being in a euthyroid state
  - Thyroid storm, hypocalcemia and hemorrhage will be prevented or detected early
    - Preoperatively
      - Ensure patient is euthyroid prior to surgery
Nursing Management of the Surgical Patient with Graves' Disease

- Risk for injury (thyroid storm, hypocalcemia or hemorrhage) r/t surgical procedure and not being in a euthyroid state
  - After surgery
    - Maintain airway
    - Minimize strain on suture line
    - Relieve discomfort related to sore throat
    - Prevent pooling of respiratory secretions
    - Monitor for decreased parathyroid function

- Monitor for post op complications
  - Calcium gluconate and resuscitative equipment should be at bedside

- Promote voice rest
  - Monitor for changes in voice that may indicate damage to laryngeal nerve
  - If hoarseness or voice weakness are present they usually subside in a few days

- Monitor and treat hypocalcemia
  - Occurs 1-7 days post op
  - Watch for tetany and signs of hypocalcemia
    - Chvostek's sign
    - Trousseau's sign
    - Numbness or tingling around mouth, fingertips or toes
    - Muscle spasms and twitching
Nursing Management of the Surgical Patient with Graves’ Disease

- **Evaluation**
  - Pt should be discharged within several days of surgery
  - Wound should heal in 6 weeks

Self-Care and Graves’ Disease

- **Neck exercises**
  - Support neck and head when moving beginning 1st post op day
  - ROM beginning 2nd post op day
- **Medications**
  - Teach regarding medications and need for lifelong therapy
- **Follow-up**
  - Schedule follow up before discharge
  - Must have follow up twice a year (minimum) to monitor therapy
- **Promote wound healing**
  - Wound care instructions

Hyperthyroidism and the Elderly

- Atypical or minimal manifestation
- Weight loss, normal sized gland and lack of ocular findings are common
- Many are apathetic instead of hyperactive
- Cardiac anomalies may be related to hyperthyroidism and it may exacerbate pre-existing conditions
- Lack of tachycardia is present in about 40% of patients
Thyroiditis

- 3 basic forms
  - Acute suppurative
  - Subacute thyroiditis
    - Granulomatous
    - Lymphocytic
  - Chronic thyroiditis
    - Hashimoto’s disease

Acute Suppurative Thyroiditis

- Uncommon disease caused by bacterial infiltration of gland
- Streptococcus pyogenes, Staph aureus and Pneumococcus pneumoniae are most common
- Usually affects females between 20-40

Acute Suppurative Thyroiditis

- Acute state of infection and inflammation
- Usually affects one lobe more than the other
- Abscesses form
### Acute Suppurative Thyroiditis

**Manifestations**
- Abrupt onset of unilateral anterior neck pain with radiation to the ear or mandible on affected side
- Fever, diaphoresis and other manifestations of bacterial toxicity

**Management**
- Antibiotic therapy
- I&D of abscess if it does not respond to antibiotics

### Subacute Thyroiditis

- Subacute granulomatous is a self limiting inflammatory condition
  - No specific etiology
  - Frequently follows respiratory infection
  - May have viral etiology but not sure
  - 80% of cases are females between 40-50 yrs
- Genetic predisposition for both granulomatous and lymphocytic
Subacute Thyroiditis

- 3 phases
  - Phase 1
    - 3-4 week prodromal viral illness with fever, malaise precede the onset of a tender goiter
    - Thyroid may be 2-3 times normal size
    - Mild hyperthyroidism may be present
  - Phase 2
    - Mild hypothyroidism occurs due to incomplete recovery of injured gland and exhaustion of stored hormones
    - Hypothyroidism is rarely permanent
  - Phase 3
    - Recovery phase begins 2-4 months after onset

- Manifestations of viral illness such as fever, myalgia and sore throat
- Granulomatous
  - Anterior unilateral neck pain with an abrupt onset usually following a viral illness, pain may radiate to ear
  - Manifestation of viral illness like myalgia, low grade fever and sore throat
  - Approximately 50% of patients present with thyrotoxicosis
- Lymphocytic
  - Not painful
  - Characterized by hyperthyroidism and painless goiter

- Granulomatous
  - Supportive care with salicylates, NSAID's and glucocorticoids
- Lymphocytic
  - Beta blockers to relieve the manifestations of hyperthyroidism with beta blockers
Hashimoto’s Disease

- Most common form of thyroiditis
- Affects women more than men
- Most common between 20-50
- Long term inflammatory disorder
- Most commonly caused by autoimmune destruction of thyroid gland

Hashimoto’s Disease

- Enlarged thyroid gland
- Most patients are euthyroid
- Patient may be hypothyroid if gland is destroyed by immune system (20%)
- About 5% will be hyperthyroid and the rest are euthyroid

Hashimoto’s Disease

- Manifestations
  - Painless, asymmetrical enlargement of the gland
  - May put pressure on surrounding structures leading to dysphagia and respiratory distress
Hashimoto’s Disease

- Management
  - 1/3 of patients will become hypothyroid due to gland destruction
  - Some experience spontaneous remission
  - Nursing care is supportive until diagnosis is made then focused on teaching regarding medication and monitoring

Hyperparathyroidism

- Caused by over activity of parathyroid gland(s)
- Usually occurs in those over 60
- Affects women more than men
Hyperparathyroidism

- Primary
  - No identifying injury
  - Normal regulatory relationship between serum calcium and PTH is disrupted (adenoma)
- Secondary
  - Occurs due to malfunction of another organ system
    - EX: renal failure, bone cancer, Paget’s disease
- Tertiary
  - PTH production is irrepressible in patients with normal or low serum calcium

Hyperparathyroidism

- Normal function of PTH is to increase bone resorption and maintain the proper balance between calcium and phosphorus
- Excess PTH leads to bone damage, hypercalcemia and kidney damage

Hyperparathyroidism

- Pathophysiology
  - Primary
    - Excess PTH stimulates transport of calcium into the blood from the intestine, kidney and bone
    - Kidney stones and bone resorption may occur
    - Muscle atrophy, myalgia, proximal muscle weakness, hypergastrinemia, abdominal pain and peptic ulcer disease
  - Secondary
    - Chronic renal failure leads to increased serum phosphorous which caused a decreased serum calcium
    - Low serum calcium causes secretion of PTH and decreased renal tubular absorption of phosphorous
Hyperparathyroidism

- Manifestations
  - Some patients are asymptomatic
  - Bone disease
    - Backache, joint pain, pathologic fractures, bone deformities
  - Renal involvement
    - Polyuria, polydipsia, sand, gravel or stones in urine, azotemia, hypertension and renal insufficiency that may progress to renal hypertension and uremia
  - GI disorders
    - Thirst, nausea, anorexia, constipation, ileus, and abdominal pain, peptic ulcer and GI bleeding
  - Neurologic abnormalities
    - Decreased neuromuscular irritability, psychiatric manifestations, listlessness, paranoia, calcification in eyes impairing vision

- A way to remember manifestations
  - “Painful bones, renal stone, abdominal groans and psychic moans”
  - Borrowed from UAMS
Hyperparathyroidism

- Complications
  - Manifestations of hypercalcemia
  - Manifestations from treatment such as dehydration, hypocalcemia and GI problems

Hyperparathyroidism

- Medical Management
  - Lower elevated calcium levels
  - Hydration
  - Lasix to promote calciuria
  - No thiazide diuretics because they promote retention of calcium in urine
  - Glucocorticoids decrease absorption in gut

- Antiresorption agents
  - Drugs to inhibit bone resorption
    - Picamycin
    - Gallium nitrate
    - Etidronate
    - Calcitonin

Hyperparathyroidism

- Nursing management
  - Assess for manifestations of hypercalcemia
  - Risk for injury r/t demineralization of bones
    - Patient will remain free from injury aeb absence of pathologic fracture
    - Protect from accidents
      - Bed in low position with side rails up
      - Assist with activities
Hyperparathyroidism

- Impaired urinary elimination r/t renal involvement secondary to hypercalcemia and hyperphosphaturia
  - Resume normal urinary output aeb output of 0.5mL/kg/hr
    - Encourage fluids
    - Prevent urolithiasis
      - Cranberry or prune juice to acidify urine
      - Strain urine for stones

- Prevent urolithiasis

Hyperparathyroidism

- Altered nutrition: less than body requirements r/t anorexia and nausea
  - Patient will have adequate intake aeb absence of nausea, return to or maintenance of normal body weight
    - Low calcium diet
    - Avoiding milk and milk products may relieve GI symptoms
    - Antacids or H-2 receptor blockers
    - Adequate calories

Hyperparathyroidism

- Constipation r/t adverse effects of hypercalcemia on the GI tract
  - Patient will maintain normal bowel patterns aeb daily soft, formed bowel movement
    - Maintain activity
    - Increase fluid intake and fiber
    - Stool softener
Hyperparathyroidism

- **Surgical management**
  - Parathyroidectomy may be needed
  - Parathyroid transplant for certain forms

- **Complications**
  - Hypocalcemia, respiratory distress, hemorrhage, laryngeal nerve damage

- **Outcomes**
  - Cure rate is 95% with surgery

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**Hyperparathyroidism**

- **Nursing management of surgical patient**
  - **Assessment**
    - Monitor for complications
    - Monitor renal function

---

**Hyperparathyroidism**

- **Risk for injury r/t preoperative drug sensitivities and postoperative complications**
  - Patient will not suffer injury aeb absence of respiratory distress, hemorrhage and hypocalcemia
  - Administer digitals with caution (patients with hypercalcemia are hypersensitive to digitals)
  - Monitor for post op complications
  - **Airway, laryngeal nerve damage, tetany**
  - **Prevent osteoporosis**
    - High calcium diet post op
    - Calcium supplements until bone rebuild
Hypoparathyroidism

- Hyposecretion of parathyroid hormone leads to
  - Abnormally low serum calcium levels
  - Elevated serum phosphorous levels
  - Neuromuscular irritability

Hypoparathyroidism

- May be iatrogenic or idiopathic
- Most common iatrogenic cause is accidental removal of glands during thyroidectomy (Whoops)
- Idiopathic may be autoimmune dysfunction

Hypoparathyroidism

- Decreased PTH secretion leads to decreased bone resorption.
- Serum calcium falls
- Neuromuscular irritability results
- Calcification may occur in organs such as the eyes and basal ganglia
- Fewer phosphate ions are excreted by the kidneys and phosphate levels rise
- Patients may fully recover if diagnosed early but cataracts and brain calcification are irreversible
Hypoparathyroidism

- Clinical manifestations
  - Result from low serum calcium levels
  - More severe if pH is elevated
  - Acute
    - Greatly increased neuromuscular irritability
    - Muscle spasms, paresthesias, laryngospasm and dysrhythmias (Chvostek's sign and Trousseau's sign), hyperactive deep tendon reflexes
  - Chronic
    - Lethargy, thin, patchy hair, brittle nails, scaly skin, personality changes, calcifications in eyes and basal ganglia, psychosis, convulsions, dysrhythmias, heart failure

Hypoparathyroidism

- Diagnosis
  - Based on signs of hypocalcemia
    - + Chvostek's and Trousseau's, Hyperactive DTR, circumoral paresthesia
  - Diagnostic findings
    - Low serum calcium, low PTH, deceased urine calcium and high phosphorous
    - Radiographic studies showing calcification of head
    - Calcification of ocular lens

Hypoparathyroidism

- Complications
  - Death from respiratory obstruction secondary to tetany or laryngospasm
  - Calcifications of eye and basal ganglia
Hypoparathyroidism

- Medical management
  - Elevate serum calcium for acute situations
    - 10% calcium gluconate IV
    - Breath into paper bag to cause mild acidosis which will increase ionized calcium in blood
  - Oral calcium supplements
  - Vitamin D
  - PTH supplement is ideal treatment
  - High calcium, low phosphate diet
  - Treat seizures and laryngospasm

- Nursing management
  - Assessment
    - Careful assessment
    - Assess for manifestations of hypocalcemia
    - Assess for physical changes congruent with chronic hypoparathyroidism

- Risk for injury: muscle tetany r/t decreased serum calcium levels
  - Patient will remain free from injury
    - Prevent respiratory arrest
    - Monitor and prevent tetany
Primary Adrenal Insufficiency

- Addison’s disease
- Rare disorder
- Idiopathic atrophy or destruction of adrenal gland
- Autoimmune disorder in 75% of cases
- TB, AID’s, tumor, adrenalectomy and infarction of adrenal gland are other possible causes

Addison’s Disease

- Lymphocytes infiltrate the adrenal cortex
- Gradual destruction of cortical tissue leads to insufficiency
- There is a deficiency of mineralocorticoids (aldosterone) and androgens as well as glucocorticoids

Addison’s Disease

- Onset is usually insidious
- Mild fatigue, languor, irritability, weight loss, nausea, vomiting, hyperpigmentation and postural hypotension
- May occur for months before diagnosis is confirmed
- As disease progresses, symptoms become worse
- Cortisol levels are low and ACTH levels will be elevated
Addison’s Disease

- Diagnosis based on
  - Low serum cortisol
  - Elevated ACTH levels
- Electrolytes (Na and K) may be altered
- Glucose may be low
- Anemia may be present
Addison’s Disease

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Addisonian Crisis

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- Addisonian crisis is an emergency

- Otherwise the patient can be managed on an outpatient basis

Addisonian Crisis

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- Causes include hemorrhage into the gland, infection and abrupt withdrawal of glucocorticoids or failure to increase exogenous steroids during times of stress.

- Severity of symptoms varies with degree of hormone deficiency

- Fatal if not treated
Addisonian Crisis

- Manifestations
  - Electrolyte disturbances
  - Sudden penetrating pain in back, abdomen or legs
  - Depressed or changed mentation
  - Volume depletion
  - Hypotension
  - Loss of consciousness
  - Shock

Management of Addisonian Crisis

- Correct fluid and electrolyte imbalances
  - Rehydration
  - Vasopressors and volume expanders
  - Kayexalate
  - Oxygen
- Correct hypoglycemia
  - Glucose
- Replace steroids
  - Hydrocortisone 100mg bolus followed by 100mg q 8 hours for 24 hours, then taper based on condition and resume oral supplements

Management of Addison’s Disease

- Requires adequate glucocorticoid replacement daily and extra medication for stress with fever, vomiting, injury, surgery or severe emotional stress
  - Normally secrete about 20 mg per day
  - In times of stress may secrete 200-300 mg per day
- Use steroids with caution
- Watch for symptoms of hypercortisolism
- Osteoporosis is a potential complication
Nursing Management of Addison’s Disease

Assessment

- Monitor vital signs closely
- Monitor physical vitality and emotional well-being
- Monitor condition of bone prominences in immobilized patients
- Monitor exposure to cold and infection
- Report evidence of infection immediately
- Monitor fluid and electrolyte status

Risk for injury: Addisonian crisis r/t adrenal insufficiency

- Patient will not exhibit injury
  - Monitor for manifestations of crisis
    - Watch of abdominal, back and leg pain, hyperpyrexia, hyperthermia, hypotension, coma, renal shutdown and death
  - Correct fluid, electrolyte and steroid imbalances
    - Rehydration, glucocorticoid supplement, glucose, kayexalate, plasma, vasopressors, and oxygen
  - Prevent future crisis
    - Medic alert tag
    - Emergency kit with hydrocortisone or dexamethasone

Self care

- Must take steroids correctly
  - May need to give IM if vomiting is present
- Must increase steroids in times of stress
  - General rule is to double dosage for 1 week
  - Also will cut mineralocorticoid by 50% to minimize salt retention and hypertension
- Know signs of crisis and over dosage
- Know when to notify health care provider
Secondary Adrenal Insufficiency

- Results from dysfunction of hypothalamic-pituitary-adrenal axis
- Most common cause is chronic treatment with steroids for non-endocrine uses
  - Use steroids with caution
- Other
  - Hypopituitarism, pituitary tumor or infarction, radiation, exogenous steroids or adrenal tumor

Secondary Adrenal Insufficiency

- Characterized by low cortisol and low ACTH
- Aldosterone is present in sufficient amounts
- Will not have manifestations unless steroid therapy is withdrawn or tumor is resected
- Taper steroid to allow adrenal function to return to normal

Cushing’s Syndrome

- Caused by excess cortisol resulting from excess ACTH, adrenal hypersecretion or exogenous steroids
- Occurs mainly in women 20-40 years of age
- Iatrogenic is most common cause
Cushing's Syndrome

- Forms
  - Pituitary hypersecretion and pituitary tumors account for 70%
  - Ectopic secretion of ACTH from source outside the pituitary gland
  - Iatrogenic (exogenous)

Cushing's Syndrome

- Manifestations:
  - Persistent hyperglycemia
  - Protein tissue wasting, muscle wasting and weakness, capillary fragility resulting in ecchymosis and osteoporosis leading to compression fractures in spine, kyphosis and loss of height
  - Potassium depletion leading to hypokalemia, dysrhythmia, muscle weakness and renal disorders
  - Sodium and water retention leading to edema and hypertension which then leads to left ventricular hypertrophy, heart failure and CVA

Cushing's Syndrome

- Manifestations (cont)
  - Abnormal fat distribution leading to central obesity with thin limbs, moon face and buffalo hump
  - Increase susceptibility to infection and lowered resistance to stress
  - Increased production of androgen is possible leading acne, thinning of scalp hair and hirsutism
  - Mental changes including memory loss, poor concentration and cognition, euphoria, and depression, frank psychosis
Cushing's Syndrome

- Manifestations (cont)
  - WBC's may be elevated
  - Lymphocytes may be less than 20%
  - Urine and blood cortisol levels may be elevated
  - ACTH will be elevated except in iatrogenic

Cushing's Syndrome

- Management
  - Removal of ectopic tumors that secrete ACTH
  - Adrenalectomy
    - Must be done with caution in an adrenal tumor because remaining gland may have atrophied and stopped producing hormones and may take time to begin secreting adequate hormone
    - After removal of both adrenals patient will require lifelong supplementation of glucocorticoids and mineralocorticoids

Cushing's Syndrome
Cushing's Syndrome

**Management**
- Removal of pituitary tumor
  - Transsphenoidal hypophysectomy
  - 85-90% cure rate
  - Probably develop insufficiency after surgery since HPA has been suppressed
    - Will take 12-24 months to return to normal function
    - Will need supplemental steroids during this time

Nursing Management of Cushing's Syndrome

**Assessment**
- Preoperative
  - Careful history and physical
  - Management of hypertension, edema, heart disease, diabetes, increased susceptibility to infection, decreased resistance to stress and emotional lability
- Postoperative
  - Watch for shock, addisonian crisis and renal shutdown
  - Assess ability of patient to care for self at home
  - Monitor incision

Nursing Management of Cushing’s Syndrome

**Pre-operative**
- Risk for injury: fractures, hypertension, or diabetes
  - Patient will not experience injury
  - Prevent injury
  - Monitor for hypertension and diabetes

**Knowledge deficit**
- Patient will understand disease, surgery and diet
  - Explain disease and treatment
  - Provide adequate nutrition
    - Low calorie, low carb and low sodium diet
    - Adequate protein and potassium
Nursing Management of Cushing's Syndrome

- Post-operatively
  - Risk for injury
    - Patient will not experience injury
    - Glucocorticoid prior to surgery
    - Watch for signs of insufficiency
  - Risk for infection
    - Patient will not develop infection
    - Turn, cough and deep breath
    - Sterile technique with wound care
    - Protect from exposure to infection
    - Remember manifestation of infection may be mild due to excess glucocorticoids

Nursing Management of Cushing's Syndrome

- Activity intolerance
  - Patient will balance rest and activity
  - Provide rest
  - Minimize stress
- Impaired skin integrity
  - Patient will maintain intact skin
  - Monitor for breakdown
  - Avoid tape and other irritants
- Altered thought processes
  - Patient will not experience memory loss, cognitive impairment or mood swings
  - Anticipate mood swings and distress regarding appearance
  - Reassure that appearance should return to normal

Medical Management of Cushing's Syndrome

- Radiation therapy to destroy tumor
- Adrenal blocking agents to interfere with production of ACTH or adrenal synthesis of cortisol
- ACTH reducing agents interfere with ACTH production
Cushing’s Syndrome

- Self care
  - Bilateral adrenalectomy will need glucocorticoid replacement for life
  - If only one gland is removed the patient may need supplements until the remaining gland functions normally (6-12 months)
  - Needs instruction on medications and injection technique before discharge

Hyperaldosteronism

- Aldosterone is the most powerful mineralcorticoid
  - Acts to conserve sodium and promote potassium excretion
  - Affects women twice as often as men
  - More frequent in the middle aged

Hyperaldosteronism

- Primary hyperaldosteronism
  - Hypersecretion due to adrenal lesion
  - Produces hypertension, hypokalemia, and hypernatremia (Conn’s syndrome)
- Secondary hyperaldosteronism
  - Results from other conditions that cause overproduction of aldosterone like sodium wasting renal disease, laxative or diuretic abuse, dehydration, cirrhosis or heart failure
Hyperaldosteronism

- Pathophysiology of primary hyperaldosteronism
  - Sodium and water are absorbed in renal tubules and potassium and hydrogen ions are excreted
  - Hypernatremia, hypervolemia, hypokalemia and metabolic alkalosis result
  - BP increases and renin production is suppressed
  - Cerebral infarcts and renal damage may occur

Hyperaldosteronism

- Pathophysiology of secondary hyperaldosteronism
  - Continuous secretion of aldosterone occurs secondary to high levels of angiotensin II due to high plasma renin activity
  - Underlying cause is decreased renal perfusion from a variety of causes

Hyperaldosteronism

- Manifestations are related to water and sodium retention and potassium and hydrogen ion loss
  - Hypertension, hypernatremia, hypokalemia
  - Muscle weakness, paralysis and dysrhythmias
  - Rarely develop overt edema; excess water is normally excreted
  - Without intervention, complications of chronic hypertension occur, visual disturbances, heart failure, renal damage and stroke
  - Hypokalemia leads to metabolic alkalosis which leads to decreased serum Ca levels, tetany and respiratory depression
Hyperaldosteronism

- Diagnosis based on
  - Low serum potassium
  - Acidosis
  - Elevated urine or plasma aldosterone levels with low plasma renin levels

- Management
  - Surgery is treatment of choice
    - Bilateral or unilateral adrenalectomy
    - Unilateral will need temporary glucocorticoid supplementation
    - Bilateral will require permanent replacement of glucocorticoids
    - Glucocorticoids pre-operatively to prevent adrenal hypofunction
    - In 2/3 of cases removal of aldosterone secreting tumor completely resolves symptoms and patients have normal BP readings by 3rd month

- Nursing management of surgical patient
  - Prepare for diagnostic tests
  - Administer medications
  - Care is similar to preoperative care of hypercortisolism
Hyperaldosteronism

- Medical management
  - If patient is not good surgical candidate
  - Aldactone increases sodium excretion in urine
  - May take 4-8 weeks to correct hypertension
  - Watch potassium levels

Pheochromocytoma

- Tumor that secretes catecholamines
- It is usually found in the adrenal medulla (85-95%) but can be located elsewhere
- Most are benign
- Incidence is 0.1% in patients with diastolic hypertension
- Cause is unknown

Pheochromocytoma

- Pathophysiology
  - Catecholamine release is paroxysmal
  - May be stimulated by smoking, micturition, activities that increase abdominal pressure or displace organs, drugs such as histamines, anesthetics, atropine, opiates, fentanyl, steroids and glucagon
  - Without intervention the patient is at risk for CVA and heart failure
Pheochromocytoma

- Manifestations are related to increased production of catecholamines and mimic other disorders like hyperthyroidism and diabetes.
  - Hypertension is principal manifestation and can be persistent, fluctuating, intermittent or paroxysmal
  - Typically patient has periods of elevated BP accompanied by a pounding headache
  - Tachycardia, palpitations, decreased GI motility, nausea, vomiting, constipation, weight loss, hyperglycemia, polyuria, polydipsia, hyperventilation, nervousness, heat intolerance and diaphoreses, apprehension, nausea and vomiting, dilated pupils and cold extremities
  - May see signs of congestive failure in severe cases.

Pheochromocytoma

- Diagnosis
  - Chemical tests of urinary catecholamines
  - Serum catecholamines
  - History
  - Imaging to locate tumor

Pheochromocytoma

- Management
  - Removal of tumor
    - Can have an excessive release of catecholamines during induction of anesthesia
    - BP may fall precipitously after resection of tumor
  - Alpha adrenergic blockers preoperatively
  - May give beta blockers only after alpha blockers have been started
  - Manage hypertension
Pheochromocytoma

Nursing Management Preoperatively

- Assessment
  - Monitor BP and neurologic status
- Risk for injury r/t excessive release of catecholamines
  - Patient will not experience injury
    - Promote rest and relief from stress
    - Administer sedative as prescribed
    - Diet high in calories, vitamin and minerals
    - Monitor VS
    - No caffeine
  - Do not palpate mass, it may precipitate release of catecholamines and stimulate severe hypertension and tachyarrhythmias.

Nursing management postoperatively

- Assessment
  - Watch for adrenal insufficiency, hypotension, shock and hemorrhage
- Risk for injury
  - Patient will not experience injury
    - Monitor and prevent shock
      - IV fluids and pressor agents
      - Watch VS and urine output
    - Monitor for adrenal insufficiency
- Pain
  - Patient will not experience pain
    - Assess for pain
    - Medicate for pain
    - Non-pharmacologic measures

Hyperpituitarism

- Overproduction of one or more of pituitary hormones
  - Prolactin and growth hormone are most common
- Typically caused by hormone secreting pituitary tumor
  - Benign adenoma is most common
- Common syndromes associated with hyperpituitarism
  - Cushing’s syndrome, acromegaly, amenorrhea, galactorrhea, hyperthyroidism and hypergonadism in men
Hyperpituitarism

- Symptoms are related to hormone that is overproduced
- May also see local manifestations of pituitary tumor due to compression of local tissues
  - Visual field abnormalities due to pressure on optic chiasm
  - Headache
  - Somnolence

Acromegaly

- Excess growth hormone leads to acromegaly when it occurs after the epiphysis closes
- Soft tissue swelling in hands or feet is early sign
- Gradually, bony changes alter the patient's facial features with protrusion of the brow and lower jaw, enlargement of the nasal bone and increased spacing between the teeth
- Arthritis and carpal tunnel syndrome occur
- Thick, coarse oily skin, skin tags, enlarged lips, nose and tongue, deepening of the voice, snoring, excessive sweating, fatigue and weakness, headache, impaired vision and enlargement of all organs is seen
Acromegaly

Management of Hyperpituitrism

- Resection of tumor is necessary
- Usually use transsphenoidal approach

Nursing Management of Hyperpituitrism

- Assessment
  - Good history
  - Baseline VS
  - Neurologic assessment
Nursing Management of Hyperpituitrism

- Deficient knowledge: surgery and possible outcomes r/t lack of instruction
  - Patient will understand surgery and outcomes
    - Explain procedure
    - Prepare patient for IV and urinary catheter
    - Teach regarding post op care
      - IV lines
      - Breathing exercises
      - Vital sign monitoring

Nursing Management of Hyperpituitrism

- Risk for injury r/t post op complications
  - Patient will not experience injury
    - Prevent adrenal insufficiency
    - Hydrocortisone pre-operatively
    - Monitor intracranial pressure
    - Monitor for hormonal deficiencies and meningitis
    - Oral hygiene
      - Lubricating jelly on lips
      - Do not brush teeth for 2 weeks
    - Monitor for CSF drainage
      - Nasal packing for 2-5 days
      - Observe for rhinorhea and post nasal drip
      - Avoid sneezing, coughing and bending over

Nursing Management of Hyperpituitrism

- Self care
  - Patient must take hormones for life after removal of pituitary
Hypopituitarism

- Deficiency of one or more pituitary hormones
- Panhypopituitarism is a deficiency of both anterior and posterior pituitary hormones
  - A patient with panhypopituitarism needs a medical alert tag.
  - They will need supplemental hormones FOR LIFE

Hypopituitarism

- Caused are usually the 9 I’s
  - Invasion – most common, ex tumor
  - Infarction - necrosis
  - Infiltration – sarcoidosis, hemochromatosis
  - Injury - head trauma
  - Immunology – lymphocytic hypophysitis
  - Iatrogenic - surgery, radiation
  - Infectious – mycosis, TB, syphilis
  - Idiopathic - familial
  - Isolated – def of specific hormone i.e. GH, FSH, LH, TSH, ACTH or prolactin

Hypopituitarism

- Manifestations
  - Do not appear until 75% of pituitary has been lost
  - Depend on age at onset and hormone that is deficient
  - Onset is usually gradual
- Examples
  - Short stature, reproductive disorders, hypothyroidism, secondary adrenocortical insufficiency and prolactin deficiency
Hypopituitarism

- Management
  - Removal of causative factor (tumor)
  - Replacement of missing hormone(s)
  - Medical and nursing care are related to specific hormone that is deficient
    - See specific diseases

Diabetes Insipidus

- Disorder from damage to hypothalamus
  - Cause unknown in 30% of cases
  - Tumor, head injury or cranial surgery may be cause
  - Drugs that inhibit release of ADH
    - Glucocorticoids, ethanol, adrenergic agents, phenytoin, narcotic agonists, lithium
  - Inadequate ADH production by the hypothalamus

Diabetes Insipidus

- Inability to conserve water leading to uncontrolled diuresis of dilute urine
  - Polydipsia and polyuria cardinal signs
  - Cool dry skin, tachycardia, weight loss, signs of electrolyte imbalance and neurologic changes
  - May be transient lasting only a few days
  - May last for several weeks or forever
Diabetes Insipidus

- Risk for dehydration
- Complications include electrolyte disturbances, hypovolemia, hypotension and shock
- Treat with daily replacement of vasopressin with DDAVP
  - IV or IM
  - SQ
  - Intranasal - preferred choice, action of 6-12 hours

Endocrine
Diabetes Insipidus

- Nursing Management
  - Know who is at risk and monitor I & O, excessive thirst, urine output and lab values
  - Educate regarding condition and how it is different from diabetes mellitus
  - Educate regarding symptoms of DDAVP overdose (signs of water intoxication)
  - Educate regarding how to prepare and administer medication as well as side effects.
Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH)

- Excess ADH secreted by posterior pituitary leads to water retention, increased volume and decreased osmolality
- Symptoms are related to fluid retention and decreased sodium and will resolve when disorder is corrected
- May be seen with a variety of conditions esp. infection, tumor or CNS trauma.
  - 80% of patients with small cell carcinoma have impaired ability to excrete water secondary to ectopic production of ADH

- Overproduction of ADH
- Water is retained
- Sodium is not retained leading to dilutional hyponatremia
- Osmolality is decreased
- Extracellular volume is increased
- Hyponatremia leads to suppression of renin and aldosterone secretion causing less sodium to be reabsorbed in the proximal tubule

- Manifestations r/t hyponatremia
  - Decreased DTR, fatigue, headache, nausea, decreased mental status, seizures, coma, death
- Manifestations r/t volume excess
  - Weight gain without edema, JVD, tachycardia, tachypnea, rales
- Severity of manifestations related to degree of hyponatremia
  - Confusion (Na<125)
  - Seizures (Na<115)
Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH)

- Serum sodium is low, urinary sodium elevated
- Serum osmolality increased, urinary decreased

Treatment
- Hypertonic IV fluids
- Sodium restriction
- Diuretics
- Demeclocycline to increase excretion of free water
- Treat underlying cause

Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH)

- Nursing Care
  - Know who is at risk and recognize problem
  - I&O and daily weight
  - Monitor lab values
  - Observe for signs of fluid overload
  - Seizure precautions
  - Fluid restriction
  - Educate regarding fluid restriction and medication
  - Emotional Support

Diabetes Mellitus

- 6th leading cause of death in 2000
  - Deaths are under reported since 65% are attributed to heart disease & stroke
- Long term complications affect every part of the body
  - A leading cause of blindness, end stage renal disease and amputations
Diabetes Mellitus

- $92 billion in direct costs alone in 2002
- Other indirect cost include disability payments, lost time from work and premature death totaling $40 billion
- Most of this cost could be prevented

Diabetes Mellitus

- Type 1 (previously IDDM)
  - 10% of cases of DM
  - Usually diagnosed before age 30
  - Occurs equally in males and females
  - More common in African American, Hispanic, American Indian and Asian populations
  - Although has familial influence, 90% of people with Type 1 diabetes do not have a first degree relative with DM
  - Characterized by destruction of pancreatic beta cells leading to absolute insulin deficiency
    - May be autoimmune
    - Can detect islet cell antibodies in preclinical stage

Diabetes Mellitus

- Type 1 diabetes
  - No preventative activities
  - Regular exercise and diet may prevent development of complications
  - Health maintenance activities
    - Keep glucose as normal as possible
    - Prevent hypo and hyperglycemia with close monitoring
    - Daily foot care and follow up of abrasions and infections
    - Prevent complications by removing to treating co-existing risk factors such as smoking, hypertension or heart disease and nephrotoxic drugs
    - Eye exams yearly by an ophthalmologis
Diabetes Mellitus

- Type 2 diabetes (previously NIDDM)
  - More common
    - >90% of cases
    - Genetic and environmental factors
    - Older people
    - Obesity is major risk factor
    - Unclear whether impaired tissue sensitivity to insulin or decreased secretion of insulin is the primary defect in this disorder

Diabetes Mellitus

- Risk factors for type 2 diabetes
  - Over 45
  - Overweight, sedentary lifestyle
  - Parent or sibling with diabetes
  - Ethnic background of high risk group
  - History of gestational diabetes or baby weighing more than 9 pounds
  - Hypertension, hyperlipidemia, recurrent infection, polycystic ovarian syndrome
  - History of impaired glucose tolerance

Diabetes Mellitus

- Health promotion and maintenance activities for type 2 diabetes
  - Good eating habits and avoid refined sugars and saturated fats
  - Maintain ideal body weight
  - Regular exercise
  - Screen those at risk
  - Remove or treat risk factors for complications
    - Smoking, hypertension, hyperlipidemia, nephrotic drugs
  - Monitor learning needs and glycemic control
  - Daily foot care
Diabetes Mellitus

- Impaired glucose tolerance
  - More discussion these days
  - Considered to have impaired glucose tolerance if fasting BS is 110-125 mg/dl
  - Also referred to as pre-diabetes
  - Are beginning to recommend lifestyle modifications for these people to prevent or delay onset of overt diabetes

Diabetes Mellitus

- Prevalence of diabetes in US is increasing
  - Aging population
  - Minority groups are growing fast
  - Increasing obesity
  - Sedentary lifestyle

Diabetes Mellitus

- Other factors that contribute to development of diabetes
  - Cushing’s syndrome
  - Pheochromocytoma
  - Glucocorticoids
  - Thiazide diuretics
Diabetes Mellitus

- Pathophysiology of type 1 diabetes
  - 5 stages
    - Genetic predisposition
    - Environmental trigger
    - Active autoimmunity (leads to)
    - Destruction of beta cells (Insulin production decreases)
    - Overt Diabetes Mellitus (Blood glucose levels rise)

- Honeymoon period
  - Refers to period when beta cells are still producing some insulin
  - Under normal circumstances, beta cells may be able to produce adequate insulin to maintain blood sugar
  - During times of stress or illness hyperglycemia may occur
  - After the illness resolves blood sugar levels may return to normal
  - Honeymoon period ends when beta cells are no longer able to produce enough blood sugar to sustain life and the patient becomes dependent on exogenous insulin

- Pathophysiology of type 2 diabetes
  - Beta cells become less responsive to hyperglycemia
  - Insulin resistance
    - Decreased sensitivity to action of insulin in both liver and peripheral tissue
    - Decreased sensitivity to glucose levels leads to continued production of glucose by liver even when blood glucose levels are high
    - Muscle and fat tissues are unable to increase glucose uptake
Diabetes Mellitus

Pathophysiology (cont)

Without insulin 3 metabolic problems occur

1. Decreased glucose utilization
   - Adipose tissue and skeletal and cardiac muscle require insulin for glucose transport and without adequate amounts cannot utilize ingested glucose
   - Glucose levels rise
   - Kidneys attempt to excrete excess glucose
   - Osmotic diuresis occurs leading to hypovolemia

2. Increased fat mobilization
   - The body turns to fat stores for energy
   - Fat metabolism results in production of ketones which are excreted through kidneys and lungs
   - Ketones increase hydrogen ion production and cause acidosis
   - When ketones are excreted in urine, sodium is lost leading to sodium loss, increased fluid loss and increased acidosis
   - Metabolism of fat leads to increased blood levels of lipids up to 5X normal which increases atherosclerosis

3. Increased protein utilization
   - Protein wasting occurs
   - Amino acids are converted to glucose in liver
   - This leads to further elevation of blood glucose levels
   - Patient may appear emaciated
Diabetes Mellitus

- Manifestations
  - Hyperglycemia leads to common manifestations
  - Type 1 first symptom may be ketoacidosis
    - Onset more rapid
  - Type 2 patients may have peripheral neuropathy
    - Onset subtle
  - Polydipsia, polyuria, polyphagia, fatigue, blurred vision, sores that don't heal
  - Weight loss and ketonuria (type 1)
  - Type 2 patients may be asymptomatic

Diabetes Mellitus

- Diagnosis is made by lab results
  - Fasting blood glucose
  - Random blood glucose
  - Post prandial blood glucose
  - Glycosylated hemoglobin
  - Glycosylated albumin
  - Oral glucose tolerance test

Diabetes Mellitus

- Diagnostic criteria for diabetes
  - Fasting blood sugar 126 or >
  - Random blood sugar 200 or >
  - Glucose level of 200 or > in oral glucose tolerance test
Diabetes Mellitus

- Diagnostic criteria for impaired glucose tolerance (pre-diabetes)
  - Fasting blood glucose 110-125
  - Glucose from 140-200; 2 hours after ingesting liquid provided by lab in oral glucose tolerance test or 2 hours after a meal

Diabetes Mellitus

- Glycosylated hemoglobin
  - Normal is <5%
  - ADA recommends <7 for patients with diabetes
  - Recent evidence suggests that we should be working to keep HbA1C as normal as possible

Diabetes Mellitus

- Self monitoring
  - Recommended for all patients with diabetes
  - Recommend at least TID for Type 1 preferably before each meal and possibly in the middle of the night
  - Type 2 is more individualized between patient and provider
  - More frequent monitoring when ill, suspect low or high blood sugar, taking OTC meds that affect blood sugar, changing medication dosages, insulin reaction, gain or loss of weight
Diabetes Mellitus

- Self monitoring
  - Uses whole blood
  - Results will be 12-15% lower than plasma

- Medical management
  - Maintain glucose levels near normal
    - Proper nutrition
    - Regular physical activity
    - Weight management
    - Administer medications
  - Maintaining good control helps patients to avoid complications

- Medications (table 45-4)
  - Oral agents
    - Sulfonylureas (oral hypoglycemic agent)
      - 2 generations
      - Stimulate beta cells to produce insulin, decrease insulin resistance and decrease production of glucose by liver
    - Meglitinides (oral hypoglycemic agent)
      - Stimulate insulin production
    - Biguanides (insulin sensitizer)
      - Increases tissue response to insulin
    - Thiazolidinediones
      - Decreases insulin resistance
    - Alpha-glucosidase inhibitors
      - Delays digestion of complex carbohydrates
Diabetes Mellitus

Medications (cont)

- Oral agents
  - 35% of type 2 diabetics will respond to oral agents
  - Usually better response if diabetic less than 5 years
  - Response decreases over time

- Insulin
  - Now almost exclusively human insulin
    - Peaks more precisely and predictably with shorter duration of action
    - Decreased antigenicity and does not cause lipoatrophy or lipodystrophy
  - Lower glucose by promoting transport of glucose into cells
  - Given by SQ injection or pump
  - Abdomen has fastest absorption, leg is the slowest

- Insulin pump
  - Needle inserted SQ into abdomen
  - Continuous infusion of insulin with boluses given at meal time
  - Requires careful supervision
  - Complications include
    - Infection
    - Hypoglycemia
    - Ketoacidosis
Diabetes Mellitus

- May use
  - One oral agent
  - Multiple oral agent
  - Oral agent in combination with insulin

Diabetes Mellitus

- Intensive therapy has shown to delay the onset and slow the progression of chronic complications by 35%-70% in type 1 diabetes
- Requires monitoring of blood sugar 4-6 times daily with multiple insulin injections
- Do not have data yet on type 2 diabetes

Diabetes Mellitus

- Nursing management
  - Team approach is recommended
  - Two approached to management
    - Compliance based
      - Patient adheres to recommendations of health care providers
    - Empower patient to manage own disease
      - Educate patient to make informed decisions about care
  - Initial education focuses on immediate survival needs with additional information to follow
Diabetes Mellitus

Nursing Management

Assessment

- Assess level of knowledge
- Assess ability to perform self care
- Otherwise, complete history or PA

Readiness for enhanced therapeutic regimen management r/t lack of knowledge ...

Patient will relate knowledge regarding pathophysiology, need for diet and exercise and medical regimen

- Explain pathophysiology
- Plan exercise program with patient
- Prevent complications from exercise

Exercise must be planned to ensure adequate calories and prevent hypoglycemia, adequate hydration

Plan nutrition

- Caloric restrictions
- Consider food likes, dislikes, allergies, culture, physical activity, weight, oral and dental health
- Adequate protein (10% daily calories)
- Low fat (<30% daily calories)
- Carbohydrate
  - Occasional high cal dessert is OK is planned for in total days calories, watch fat
Diabetes Mellitus

- Dietary management
  - Meals should be planned to match insulin action
  - Don’t skip meals
  - Many handouts are available
  - Work with dietician

- Risk for ineffective management of therapeutic regimen r/t lack of knowledge
  - Patient will state personal goals and demonstrate correct technique
  - Provide instruction on blood glucose monitoring, urine testing, insulin administration and storage

- Urine testing
  - Every 3 hours during illness
  - Any time blood sugar is >250
Diabetes Mellitus

- Insulin administration
  - Most preparations are U-100
  - U-500 is available for those with very large doses
  - Use only insulin syringe to administer
  - Use correct needle length
  - Store between 36-86 degrees
  - Vial in use may be stored at room temperature for 1 month otherwise keep in refrigerator
  - Always have a spare vial on hand

- Insulin administration
  - Administer at room temperature
  - Label with date opened
  - Agitate vigorously to mix completely
  - Swabbing top with alcohol or the site of injection are not recommended
  - If you do swab the site, make sure to let it dry
  - Syringes may be prefilled and stored vertically with needle upward in the refrigerator for 3 weeks (monitor FSBG more frequently to ensure no loss of potency)

- Insulin administration
  - Use all sites in an area and then move to next area in order to avoid dramatic changes in absorption
  - Reuse of needles
  - Disposal of equipment
Diabetes Mellitus

- Self care
  - Patient must be able to monitor blood sugar, administer medications or insulin, perform foot care, and understand diet and exercise program before discharge
  - Need to understand this is lifelong problem
  - Monitor HbA1C quarterly
  - Monitor self care abilities
- Sick days
  - Monitor blood sugar and urine ketones
  - Adhere to meal plan as much as possible
  - Do not skip insulin
  - Contact health care provider if lasts more than 24 hours or warning signs are present

- Modifications for the elderly
  - Insulin sensitivity decreases with age
  - Decreased sensation may mask manifestations of hyperglycemia
  - Changes in liver and kidney function and multi-drug regimens may exacerbate hypoglycemia

- Modifications for the elderly
  - Nutritional guidelines are the same
  - Pain, incontinence, decreased vision, decreased proprioception and postural hypotension may provide functional limitations
Diabetes Mellitus

- Surgical management
  - Pancreas or pancreas-kidney transplant
  - Must have good kidneys to receive pancreas only otherwise will receive both
  - Only useful for type I diabetes

Diabetes Mellitus

- Complications
  - Hyperglycemia and diabetic ketoacidosis
    - Without insulin, body uses fat and protein stores leading to ketosis and acidosis
    - Severe acidosis may lead to loss of consciousness (diabetic coma)
    - Primarily occurs with type I diabetes but can occur with type II in times of extreme stress
    - Common causes
      - Too little insulin or skipping doses
      - Increased need for insulin
      - Insulin resistance

Diabetes Mellitus

- Hyperglycemia and ketoacidosis
  - Lack of insulin leads to fat metabolism and hyperglycemia
  - Inability of cells to use glucose causes production of glucagon, catecholamines, cortisol and growth hormone in order to compensate, further increasing glucose levels
  - Hyperglycemia, osmotic diuresis, lipolysis, hyperlipidemia and acidosis occur
  - 3 pathologic events take place
    - Ketosis and acidosis
    - Dehydration
    - Electrolyte and acid-base imbalances
Diabetes Mellitus

- Ketosis and acidosis
  - Ketosis occurs from fat metabolism
  - Buffer systems are unable to compensate
  - Respiratory rate increases
  - Renal excretion of ketones leads to dehydration and hemoconcentration secondary to osmotic diuresis
  - Lactic acid build-up from anaerobic metabolism further increases acidosis
  - As buffer systems become depleted, the body succumbs to acidosis and diabetic coma occurs

- Dehydration
  - Hyperglycemia and ketosis lead to osmotic diuresis
  - Acidosis leads to nausea and vomiting
  - Water is lost in respiratory tract as body attempts to rid itself of acetone and CO2
  - Severe dehydration followed by hypovolemic shock and lactic acidosis occur

- Electrolyte imbalance
  - As pH falls, hydrogen ions move from extracellular to intracellular space
  - This leads to movement of potassium from intracellular to extracellular space
  - Intracellular depletion may be unnoticed due to normal or elevated serum levels
  - With osmotic diuresis, potassium is lost in urine
  - Hemoconcentration may cause potassium levels to appear even higher
  - Sodium, phosphate, chloride and bicarbonate are also lost
Diabetes Mellitus

- Manifestations of ketoacidosis
  - Abdominal pain, anorexia, nausea and vomiting
  - Polyuria, dehydration & hypotension
  - Fruity odor on breath
  - Kussmaul's respirations
  - Decreased level of consciousness and somnolence
  - Tachycardia, thirst, visual disturbances, warm dry skin, weakness and weight loss

Diabetes Mellitus

- Management
  - Usually takes place in hospital
  - Medical emergency
  - Dehydration resulting in hypovolemic shock, acute tubular necrosis and uremia are major causes of death
  - Correct pH and administer insulin
    - Insulin IV drip followed by SQ when more stable, monitor BS frequently
    - Bicarbonate only if pH <7.1
  - Rehydration
    - Isotonic IV fluids
    - Treat shock
    - Volume expanders
  - Correct fluid and electrolyte balances
    - Correct potassium balance
      - As acidosis is corrected K+ will move intracellular and lead to hypokalemia

Diabetes Mellitus

- Hyperglycemia, hyperosmolar, nonketotic syndrome
  - Mortality higher b/c patients are usually older and have other medical problems
  - Extreme hyperglycemia (600-2000 mg/dl)
  - Profound dehydration
  - Mild or undetectable ketonuria
  - Absence of acidosis
  - Hyperosmolality of plasma and elevated BUN
  - Major difference is lack of ketonuria
Diabetes Mellitus

- Hyperglycemia, hyperosmolar, nonketotic syndrome
  - Typically patient experiences excessive thirst, altered level of consciousness (coma or confusion), and manifestations of dehydration

Diabetes Mellitus

- Management
  - Determine precipitating event and correct it
    - Illness or infection, some medications
  - Fluid replacement
    - Usually normal saline over 2 hours followed by 0.45% saline
  - Administration of insulin and electrolytes
    - Lower doses since patient usually is producing some insulin
    - Glucose levels will fall with rehydration

Diabetes Mellitus

- Hypoglycemia
  - Overdose of insulin or possibly sulfonylurea
  - Missing meal or less food than usual
  - Increased activity without additional carbs
  - Nutritional imbalances from nausea and vomiting
  - Alcohol intake
  - Manifestations usually do not occur until BS 50-60 mg/dl
Diabetes Mellitus

- Manifestations
  - Adrenergic
    - Shakiness, nervousness, irritability, tachycardia, palpitations, tremor, hunger, diaphoresis, pallor, and paraesthesias
  - Neuroglycopenic
    - Headache, mental illness, inability to concentrate, slurred speech, blurred vision, confusion, irrational behavior, severe lethargy, loss of consciousness, coma, seizure, and death

- Hypoglycemia
  - Can occur any time
  - Common during exercise, 8-24 hours after exercise and in the middle of the night

- Management
  - 10-15g of simple carb
  - Follow with a longer acting mixture of carb and protein
  - Recheck blood sugar in 15-30 minutes and repeat treatment if blood sugar still less than 100
  - If no meter available, assume hypoglycemia and treat with glucagon or IV glucose of decreased level of consciousness
  - Better to prevent
Diabetes Mellitus

- Chronic complications
  - Macrovascular
    - CAD, cerebrovascular disease, hypertension, peripheral vascular disease and infection
  - Microvascular
    - Retinopathy and nephropathy
  - Neuropathic
    - Sensorimotor and autonomic dysfunction

Vascular changes take place due to accumulation of sorbitol, fructose and glucose in the basement membrane of the cell and between the cells.
Intracellular edema occurs.
Function is affected.
Microcirculation is affected because thickening of the basement membrane increases the distance that nutrients and waste products must diffuse.
This causes cells to receive inadequate oxygen and nutrition and build up of waste products.

Macrovascular
- CAD, cerebrovascular disease, and peripheral vascular disease occur at earlier ages and are more extensive in those with diabetes
- Risk is higher with type I than type II
- Typically LDL and VLDL are increased in patients with diabetes
Diabetes Mellitus

- Macrovascular disease may occur years before the onset of clinical disease
- Changes occur at a rate similar to that of type 2 diabetes in those with impaired glucose tolerance

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Diabetes Mellitus

- Health promotion activities
  - Maintain body weight
  - Exercise
  - Stop smoking
  - Normal lipid levels
  - Management of hypertension
  - Screen those at high risk
  - Treat CAD & PVD
  - Monitor blood sugar
  - Control risk factors

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Diabetes Mellitus

- CAD – 2-4X as likely to die from CAD and risk for women with type 2 diabetes is 3-4X greater
- Increased incidence of stroke is suspected to be related to nephropathy and the resulting proteinuria, hypertension and platelet adhesiveness
- Hypertension rate is increased 40% in diabetic population
- Incidence of PVD is increased
Diabetes Mellitus

- Microvascular complications
  - Changes occur in the capillary bed in renal, retinal and peripheral capillaries
  - DCCT makes it clear that consistent, tight control may prevent or stop microvascular complications

Diabetes Mellitus

- Retinopathy
  - A major cause of blindness
  - 80% have some form after 15 years
  - Manifestations do not develop until late stage
    - Because retina has highest oxygen consumption in body it develops anoxia quickly when deprived of capillaries
    - Do not develop until late stage
    - Blurred vision is common
    - Floaters or flashers

Diabetes Mellitus

- Management
  - Good control helps to prevent
  - Laser therapy halts or slows decline in vision
  - Vitrectomy for those who are not candidates for laser surgery
Diabetes Mellitus

- Nephropathy
  - Most common cause of end stage renal disease
  - 35-45% of type 1 have nephropathy after 15-20 years
  - 20% of type 2 have nephropathy after 5-10 years

- Damage to capillaries that supply the glomeruli
  - This leads to intercapillary glomerulosclerosis, nephrosis, gross albuminemia and hypertension
  - Risk factors are poor control, long duration of disease and hypertension
  - Monitor urine for albumin
  - ACE inhibitors decrease microalbuminuria
  - Treat hypertension aggressively
  - Low protein diet
  - Avoid nephrotoxic drugs

Diabetes Mellitus

- Neuropathy
  - Most common chronic complication
  - Nerve fibers do not have their own blood supply
  - Depend on diffusion of nutrients across membrane
  - Lack of oxygen and nutrients leads to slowed transmission of impulses
  - Accumulation of sorbitol further decreases sensory and motor function
  - Causes include vascular insufficiency, chronic elevated blood sugar, hypertension and cigarette smoking
Diabetes Mellitus

- Manifestations may be mild or severe and may be either temporary or permanent
- Regranex stimulates new tissue growth and is being used to promote healing in open wounds associated with lower extremity diabetic neuropathic ulcers that extend into the subcutaneous tissue or beyond.

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Diabetes Mellitus

- Management of the diabetic patient having surgery
  - Pre-operatively
    - Normalize blood sugars for several weeks to minimize risk
  - Intraoperative
    - Monitor blood sugar and administer regular insulin as needed
  - Post-operatively
    - Maintain IV infusions until able to take oral intake
    - Oral fluids that contain calories to prevent hypoglycemia
    - Monitor blood sugar 4-6X daily
    - Monitor for signs of hypoglycemia
    - Avoid catheterization to prevent infection
    - Monitor wound for infection and provide sterile technique for dressings

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