Subcutaneous Injections & Insulin Administration

For Phlebotomists and Medical Assistants

Review
IV Priming & IV Medications

Order: **Cefazole 1 g IVPB q8h**

- **DOSAGE & ADMINISTRATION:**
- CEFAZOLE may be administered IM or IV after reconstitution with sterile water for injection. Total daily dosages are the same in both cases. **CEFAZOLE-500mg and CEFAZOLE-1g vials are reconstituted in 2ml and 2.5ml of sterile water for injection, respectively.** Mix well after reconstitution and inspect visually for particulate matter prior to administration. If particulate matter is evident in reconstituted fluids, the drug solutions should be discarded.
- Further dilute in 100 ml NS
- CEFAZOLE-1g, IV administered over hour

- How much medication do you withdraw from the vial?
  - 2.5 ml
- What do you further dilute medication in?
  - 100 ml NS
- What rate would I set a pump?
  - 100 ml/hr
- What would my drop rate be if a pump was not available? The drop factor is 10 gtt/ml.
  - 16.6 gtt/min (16-17)

Parenteral Medication Preparation & Delivery

Parental Medications:

- Parental injections are used to instill medications into body tissues.
- Injected drugs act more quickly than oral drugs

- The nurse must:
  - Monitor the client's response closely
  - Be aware of potential adverse reactions
  - Be aware of the risk of infection (Always use aseptic technique!)
- Nurses administer parenteral meds via four different routes: subcutaneous, intradermal, intramuscular, and intravenous

Administration of Injections

- Equipment: Syringes and Needles
  - Syringes
    - Packaged separately
    - Sterile
    - 0.5 ml to 60 ml
    - 1-3 ml syringe is usually adequate for IM's or SC's. Callibrated in "tenths" of ml

Syringes

- Insulin syringes – hold up to 1 ml and are calibrated into units

- Tuberculin syringes – have a long thin barrel with a pre-attached thin needle. Calibrated & will hold up to 1 ml.
  - Used when preparing small amount of potent drugs, or in preparing small, precise amounts for infants and young children

Needles

- Made of 3 parts – hub, shaft, bevel or slanted tip
- Range in length from l/4 to 3 inches
- Choose needle based on: client's size, weight, type of tissue

Length:

IM's = I – 1 ½ inches

SC'S = 3/8 – 5/8 inches



Needles

- Gauge: the smaller the gauge the larger the needle diameter

IM's = 19-23 gauge (22 most common)
SC's = 25-27 gauge (25 most common)

Subcutaneous Injections (SC)

- Drug absorption is slower than intramuscular (IM) because subcutaneous tissue is not as richly supplied with blood as the muscle.
- As the area contains pain receptors, clients may experience discomfort during injection.
- Injection site must be free of infection, skin lesions, scars, bony prominence, and large underlying muscles or nerves.

SC's

- Injection sites should be rotated
- Only small doses (0.5 – l ml) of water soluble medication should be given
- Collecting of medication within the tissues can cause sterile abscesses which appear as hardened painful lumps under the skin.

SC's

- Needle length and angle of insertions is based on the client's weight
- generally a 25 gauge, 5/8 inch needle is used, needle should be approximately half the length of skin fold.

Recommended sites for SC injection
Perry & Potter:

Angle of insertion
Perry & Potter:

SC Injection Sites

- Figure 22-13 p. 592
  - Outer aspect of upper arm
  - Abdomen from below the costal margins to the iliac crests (at least 2 inches from umbilicus)
  - Anterior aspect of thighs

SC

- Inject at 90 degree in the average client – 45 degrees if the client has small amt of subcutaneous tissue (Figure 22-14 p.592)
- (If you can pinch 2 inches, use 90 degrees, otherwise use 45 degrees)
- Do not aspirate
- Heparin – use lower abdominal folds – Arms are moved frequently and are at greater risk for tissue disruption and bruising, do not inject heparin (or "blood thinners" into arms)
- Do not massage following the injection of Insulin or Heparin (cause more tissue disruption)

Preparing from Ampule & Vials

Skill 22-1 p. 580

- 6 rights (client, medication, dose, route, time, documentation)
- 3 checks
- Review prescription, drug information, client's history & allergies, client's knowledge of the medication(s).

Ampule

- Equipment (Ampule): syringe, filtered needle, gauze pad, alcohol swab, gloves, appropriate needle for patient size

Order: Morphine 5 mg SC prn (10 mg/ml)

Ampule

Order: Morphine 5 mg SC prn (10 mg/ml)

- Wash hands
- Gather supplies, clean flat surface
- Tap ampule (or “swirl”), moves fluid from neck of ampule
- Place gauze or unopened alcohol swab around neck
- Snap AWAY from hands
- Draw up medication (on flat surface or invert) with filtered needle
- Remove air, recap needle and pull back air (removes medication in needle), replace with needle for injection, expel air
- Wash hands

Adminstration SC Injection

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- Wash hands, provide privacy
- Select an injection site (no bruises, edema, inflammation, scars), if abdomen at least 2 inches away from umbilicus, rotate injection sites
- Apply gloves, hold a dry gauze in nondominant hand
- Cleanse site with antiseptic swab (allow to dry)
- Remove needle cap

- Hold syringe between thumb and forefinger of dominant hand
- Pinch skin with nondominant hand
- Inject quickly and firmly at appropriate angle:
- Release pinch if it is NOT a bloodthinner…Maintain pinch if administering a bloodthinner
- With needle in site, grasp lower end of syringe with nondominant hand and inject medication with dominant hand on plunger
- Remove needle quickly and place dry gauze over site with gently pressure (do not massage)
- Discard needle and syringe (DO NOT RECAP A USED NEEDLE)
- Remove gloves and wash hands

Vial with Solution

- Equipment (vial with solution): syringe, needle (1 for drawing up medication, the other for injection if needle needs to be changed), gauze pad, alcohol swab, gloves

Order: Heparin 2500 units SC BID
(10,000 units/ml)

Vial with solution

Order: Heparin 2500 units SC BID
(10,000 units/ml)

- Wash hands
- Gather supplies, clean flat surface
- Inject equal amount of air
- Withdrawl medication, remove air, recap
- Change needle if indicated (i.e. medication on needle tip can be irritating to tissue), pull back air (removes medication in needle), replace with needle for injection, expel air

Diabetes & Insulin Therapy

Definition:

- A chronic disease resulting from deficient glucose metabolism
- Caused by insufficient insulin secretion from beta cells or resistance to insulin's actions
- Result: elevated blood glucose levels (hyperglycemia)

Type 1 Diabetes

- Insulin dependant (IDDM)
- Juvenile onset diabetes mellitus
- Accounts for approximately 5 – 12 % of diabetics
- Destruction of pancreatic beta cells
- Relatively abrupt onset

Type 2 Diabetes

- Non insulin dependant (NIDDM)
- Adult onset
- Most prevalent
- 85% – 90% of diabetics
- Heredity, obesity major risk factors
- Some beta cell function, and varying amounts of insulin production
- ~ 1/3 require insulin, others managed with oral agents

Other forms of diabetes

- Secondary:
  - medication induced (i.e. steroids)

- Gestational:
  - onset during 2nd / 3rd trimester, as hormone secretion increases

Insulin

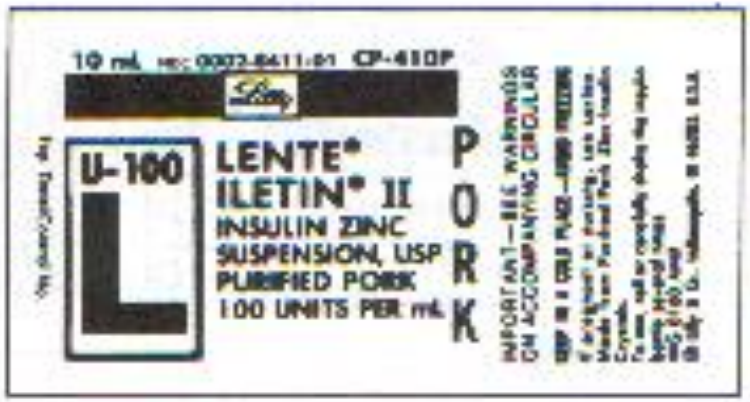
- Released from beta cells, in the islets of Langerhans, in response to ↑ blood glucose
- Most diabetics require 0.2 – 1.0 units/kg/day
- Needs are greater with infection and stress


10 mL
CP-2105
U-100
REGULAR
ILETIN® II
INSULIN
INJECTION
USP
PURIFIED BEEF
100 UNITS PER mL
BEEF


10 mL
CP-2106
U-100
REGULAR
ILETIN® II
INSULIN
INJECTION
USP
PURIFIED PORK
100 UNITS PER mL
PORK


10 mL
100 units per mL
Humulin® R
REGULAR
insulin human
injection, USP
(recombinant DNA origin)
U-100


10 mL
VL-7510
100 units per mL
Humalog®
insulin lispro injection
(rDNA origin)
U-100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CP-410P
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ILETIN® II
INSULIN ZINC
SUSPENSION, USP
PURIFIED PORK
100 UNITS PER mL
PORK


10 mL
CP-410S
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LENTE®
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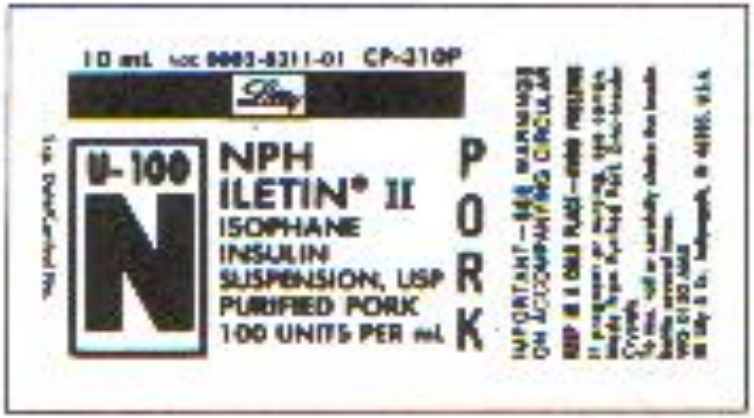
INSULIN ZINC
SUSPENSION, USP
PURIFIED BEEF
100 UNITS PER mL
BEEF


10 mL
CP-310P
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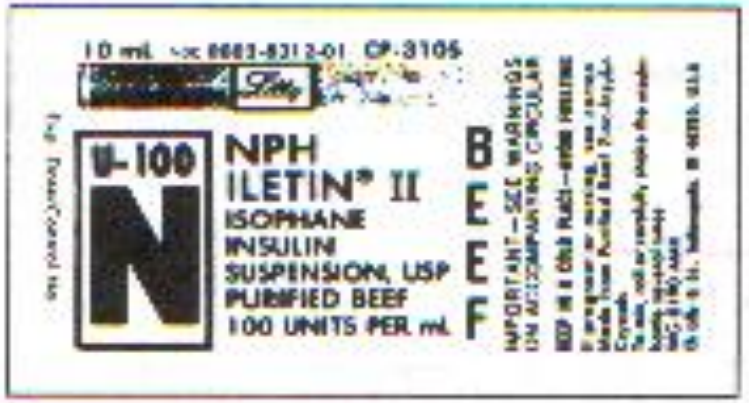
N
NPH
ILETIN® II
ISOPHANE
INSULIN
SUSPENSION, USP
PURIFIED PORK
100 UNITS PER mL
PORK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CP-310S
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NPH
ILETIN® II
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SUSPENSION, USP
PURIFIED BEEF
100 UNITS PER mL
BEEF


10 mL HI-410
100 units per mL
Humulin® L
LENTE®
human insulin
(recombinant DNA origin)
zinc suspension
U-100


10 mL HI-310
100 units per mL
Humulin® N
NPH
human insulin
(recombinant DNA origin)
isophane suspension
U-100

Commercially prepared insulin

- Required by all Type 1, and some Type 2
- Available in several forms, with varying features, properties
- Must be injected, due to destruction by GI secretions
- SC preferred method
- Only Regular (R) insulin can be given IV

Insulin Preparations

Table 22-2 p. 593

- Classified as: rapid, intermediate, long acting, combination
- Regular (unmodified) clear
- Modified (slower acting) cloudy
- Always prepare regular insulin first (think about this)
- Do not shake – rotate for at least 1 minute
- Do not administer cold

Insulin Preparation cont'd

- Administer within 5 minutes of preparing it if insulin's are mixed (short or rapid acting can combine with longer acting, reducing the action of the faster acting insulin)
- When giving insulin, must always be checked with instructor or RN (have MAR cosigned)
- **Know blood glucose level before administration (is it safe to give) and know the S&S of hyperglycemia/hypoglycemia**
- Refer to Skills text: 593

Insulin therapy

	Onset	Peak	Duration
Rapid Acting (Lispro)	5 – 10 min	1h	4 h
Short Acting (Regular)	30 – 60 min	2 – 4 h	3 – 6 h
Intermediate (N)	2 – 4 h	4 – 12 h	12 – 18 h
Long Acting (Ultra lente)	6 – 10 h	10 – 16 h	18 – 24 h

Skill: Preparing Insulin

Figure 22-1 p. 587 (mixing insulin's or other compatible medications in one syringe)

*Lantus (a long acting clear insulin) CANNOT be mixed with other insulin

Equipment: Insulin's (i.e Hum R, Hum N), insulin syringe (correct size), alcohol swabs, gauze pad, gloves

Mixing Insulin's

Order: Hum N 12 units Hum R 8 units SQ am

- Wash hands
- Gather supplies, clean flat surface
- When mixing rapid or short acting with intermediate or long acting, aspirate volume of air equivalent to dose to be withdrawn from cloudy insulin first (longer acting)
- Inject air into the cloudy (long acting) insulin first (be sure the needle does not touch the solution) withdrawl needle
- Aspirate air equivalent to dose to be withdrawn from rapid or short acting insulin (clear)
- Inject air into clear (rapid or short acting) and withdraw correct amount of insulin (Hum R 8 units). Remove any air bubbles, CHECK DOSE with another RN (always)

Mixing Insulin's

- Determine total amount of units on syringe, combined units of insulin (i.e Hum N 12 units Hum R 8 units = 20 units total)
- Insert needle in vial of intermediate or long acting insulin (cloudy), invert vial and carefully withdrawl desired amount to the total amount of units (i.e 20 units) desired. Recap
- Wash hands

- If combining two medications from a vial and an ampule (p. 586) prepare medication from vial first using a filtered needle (inject equal amount of air), then withdrawl medication from ampule. Change filtered needle to appropriate size for your client as previously indicated
- Be sure the two medications are compatible
- Wash hands

Adminstration SC Injection

p. 595

- Wash hands, provide privacy
- Select an injection site (no bruises, edema, inflammation, scars), if abdomen at least 2 inches away from umbilicus, rotate injection sites
- Apply gloves, hold a dry gauze in nondominant hand
- Cleanse site with antiseptic swab (allow to dry)
- Remove needle cap
- Hold syringe between thumb and forefinger of dominant hand
- Pinch skin with nondominant hand
- Inject quickly and firmly at appropriate angle
- With needle in site, grasp lower end of syringe with nondominant hand and inject medication with dominant hand on plunger
- Remove needle quickly and place dry gauze over site with gently pressure (do not massage)
- Discard needle and syringe (DO NOT RECAP A USED NEEDLE)
- Remove gloves and wash hands

Evaluate & Document

- Assess for pain, burning, numbness or tingling at site
- Observe response to medication (onset, peak, duration)
- Record response to medication (prn)
- Immediately after administrating chart on MAR
- Document and report any side effects to physician according to hospital policy

Remember….

- Medication administration is one of the nurse's most important responsibilities!
- Errors can be prevented !
- 6 rights…3 checks!
- Skills improve with practice!