Injection Techniques
Principles and Practice

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Introduction

- Administering injections is considered a routine clinic activity
- Safety demands knowledge of:
  - Anatomy & Physiology
  - Pharmacology
  - Psychology
  - Communication skills
  - Practical expertise

Learning Objectives

- Understand the reasons why medications are given via the parenteral (injection) route
- Differentiate between the structures involved and uses of the intramuscular (IM), subcutaneous (SC), intradermal (ID), intravenous (IV), subconjunctival (SJ), and subTenon’s (ST) routes of administration
- Be aware of factors influencing choice of needles and syringes
- Demonstrate the basic preparation and administration techniques for the IM, SC, ID, IV, SJ, and ST routes
- Understand the importance of Universal Precautions when giving injections
Primary Considerations

- Equipment
- Route
- Site
- Technique
- Safety

Equipment: Syringes

- Luer Lok®
  - Eccentric Luer slip tip
  - Concentric Luer slip tip

Equipment: Needles

- For intramuscular injections:
  - 21G or 23G
  - Green or Blue hub
  - Length depends on patient and site
Equipment: Needles

- For Subcutaneous injections
  - 25G or 26G
  - Orange or Brown hub
  - Length depends on patient and site

Equipment: Needles

- For Intradermal
  - 26G or 28G
  - Green or Brown hub
  - Length depends on patient and site

Equipment: Needles

- For Intravenous
  - Green or Brown hub
  - Length is usually 3/4” winged infusion needle
Equipment: Needles

- For Subconjunctival or SubTenon’s
  - 26G or 28G
  - Green or Brown hub
  - Length depends on patient and site but typically 1/2” or 3/8”

Equipment: Needles

- Blunt Fill or Filter Needles
  - Blunt Fill: reduce risk of needle stick injury
  - Blunt Filter: filters out invisible particles of glass, rubber, fibre or other residue.
    - This contaminant may cause phlebitis, vascular occlusions, embolisms, granulomas and septicemia
  - Use when withdrawing drugs from vials (Blunt Fill) and glass ampules (Blunt Filter)

Reasons for Giving Medications by Injection

- Rapid action required
- Delivery to specific location/tissue required
- Drug altered by intestinal secretions
- Drug not absorbed by GI tract
- Patient cannot take oral drug
- Drug unavailable in oral form
Prepare the Patient

- Promote comfort and relaxation
- Explain reason for injection
- Describe procedure
- Obtain informed consent
- Check for allergies/hx anaphylaxis
- Check prescrip/drug/patient identity
- Check expiration dates and record lot numbers
- Position patient

Procedure for Injection

- Select site
- Select correct needle gauge, needle length and syringe
- Wash hands and put on gloves
- Prepare injections using aseptic technique

Procedure for Injection

- (Re-)check patient identity
- Skin prep (local protocol)
- Inject slowly and remove needle
- Dispose of sharps
- Document procedure
- Recheck patient as appropriate
Preparation of skin

- Little evidence to support the need for skin asepsis prior to ID, IM or SC injection
- If local protocols require, skin can be cleaned with soap and water, or an alcohol pad

Intramuscular Injection

- Standard injection sites:
  - The Deltoid
  - The Ventrogluteal site
  - The Dorsogluteal site
  - The Vastus laterals

- Delivered directly into the muscle
- Choose proper site
- Z-track method for IM injections
- Pull skin taught
- Insert needle at 90-degree angle
- Aspirate plunger before injecting
- Inject 1mL every 10 seconds
- Wait 10 seconds before removing needle
- Keep skin taught until needle removed
- Don't massage site
Subcutaneous Injections

- Injected into the fat layer underneath the skin
- Choose proper site
- Technique
  - Lift skin fold
  - Insert needle at 45º - 90º
  - Do not aspirate
  - Inject slowly and remove needle
  - Release lifted skin fold

To aspirate or not to aspirate…

- Organizations which state (IM or SC) aspiration is not necessary:
  - Centers for Disease Control (CDC)
  - Advisory Committee on Immunization Practice (ACIP)
  - Department of Health Services (DHS)
  - American Academy of Family Physicians (AAFP)
  - U.K. Department of Health (DoH)
  - World Health Organization (WHO)

Intradermal Injection

- All injections to the eyelid and the periorbital skin for purposes of minor surgery!
- All local anesthetic injections performed by Optometrists!
- Medication delivered into dermis creating an external wheal
Intradermal Injection

- Technique
  - Can be administered at any skin site
  - Enter skin at shallow 15º angle
  - Do not aspirate
  - Inject slowly creating an overlying wheal

Subconjunctival/Sub-Tenon’s Injection

- Rarely used in Optometry

  - Potential Uses:
    - To achieve high corneal and intraocular levels of drugs for short periods
    - Administration of drugs that penetrate the cornea poorly (antibiotics)
    - Administration of drugs with slow absorption characteristics (steroids)
    - When topical medication can not be administered

  - Possible Advantages
    - Markedly increased penetration of water soluble drugs
    - Short term high concentrations of drug in cornea and anterior chamber
    - Supplement to topical therapy
**Subconjunctival/Sub-Tenon’s Injection**

- **Known Disadvantages**
  - Local irritation, residues, necrosis, granuloma formation at injection site
  - Once injected, drug cannot be removed
  - Temporary pain at injection site
  - Injection can be difficult with potential of injury to the eye

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**Subconjunctival/Sub-Tenon’s Injections**

- **Technique**
  - Instill topical anesthetic
  - Utilize lid speculum if needed
  - Use atraumatic or 0.12 mm conjunctival/corneal forceps to grasp and tent up conjunctiva/Tenon’s
  - Grasp as far from limbus as possible

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**Subconjunctival/Sub-Tenon’s Injections**

- Stay in the oblique quadrants to avoid trauma to EOMs
- Insert needle between conj/Tenon’s and sclera
- Inject medication creating a wheal under the conjunctiva or posteriorly beneath Tenon’s capsule
IV injections

- In optometry, used primarily for administering NaFI 10% solution in the performance of retinal angiography
- Must prep skin with aseptic agent
  - Betadine
  - Chlorhexidine
- Must establish sterile field
- Must adhere to Universal Precautions

IV injections

- Use vein in hand or forearm for access
- Butterfly needle (winged-infusion set) 21G - 23G
- Tourniquet can help localize vein
- Insert needle parallel to direction of vein
- Enter at angle of ~ 20º
- Look for red flash in hub
- Secure wings of butterfly to skin with tape
- Secure tubing to syringe and inject carefully checking for infiltration of tissue as you inject

Potential Complications

- General
  - Infection
  - Pain
  - Anaphylaxis
  - Long and short term nerve damage
  - Intramuscular hemorrhage
  - Hitting a blood vessel
  - Sterile abscess
  - Lipodystrophy
Potential Complications

- General Ophthalmic
- Penetrating injury
- Perforating injury
- Intracameral injection

Risk of Infection from Needle Stick

- HBV: 1 in 3
- HCV: 1 in 30
- HIV: 1 in 300

Protect yourself from needlestick injuries:
- Plan for safe handling and disposal before using needles.
- Dispose of used needles promptly in sharps disposal containers.
- Complete annual blood borne pathogens training.
- Get your hepatitis B vaccines.
- Report all sharps-related injuries to your supervisor to ensure appropriate follow-up.

For BBP Program information, contact the Office of Occupational Health and Safety at uwohrs.uwo.ca.