Giving injections

Department of Emergency and Disaster Medicine
Medical University of LODZ
The tray

- Medication
- 2 needles
- Seringe
- Antiseptic swab
- Container (kidney-shaped basin)
- band
Parts of a needle and syringe

<table>
<thead>
<tr>
<th>Europen cod of color</th>
<th>Diameter of lumen (mm)</th>
<th>Gauge of needles</th>
</tr>
</thead>
<tbody>
<tr>
<td>yellow</td>
<td>0,9</td>
<td>20</td>
</tr>
<tr>
<td>green</td>
<td>0,8</td>
<td>21</td>
</tr>
</tbody>
</table>

Needle gauges are numbered from 12 to 27.
Medication containment

• Ampules
  – glass
  – Plastic

• Viales
  – glass
Removing medication from an ampule

• Wash your hands

• Tap the stem of the ampule or twist your wrist quickly holding the ampule vertically (this facilitates movement of medication in the stem to body of ampules)
Removing medication from an ampule (2)

- Wrap a small gauze pad or dry alcohol swab around the neck of the ampule (this protects your fingers from the glass as the ampule is broken)

- Use the snapping motion to break off the top of the ampule along the prescored line at its neck. Always break away from your body. (This protects your face and fingers from any shattered glass fragments)
Removing medication from an ampule (3)

- Remove the cap from the needle by pulling it straight off. Insert the needle into the ampule, being careful not to touch the rim.

- Use one of the following methods:
  - Insert the tip of the needle into the ampule, which is upright on a flat surface, and withdraw fluid into the syringe
  - Insert the tip of the needle into the ampule and invert the ampule. Keep the needle centered and not touching the side of the ampule.
Removing medication from an ampule (4)

- Do not expel any air bubbles that may form in the solution. Wait until the needle has been withdrawn to tap the syringe and expel the air carefully.

- Discard the ampule in a suitable container

- Cap the needle on the syringe

- Wash your hands
Removing medication from a vial (1)

- Wash your hands
- Remove the metal or plastic cap on the vial that protects the rubber stopper
- Swab the rubber top with the alcohol swab
- Remove the cap from the needle by pulling it straight off.
- Pierce the rubber stopper in the center with the needle tip and inject the measured air into the space above the solution. (do not inject air into solution) The vial may be positioned upright or inverted
Removing medication from a vial (2)

- Invert the vial and withdraw the needle tip slightly so that it is below the fluid level
- Draw up the needed amount of medication while holding the syringe at eye level and vertically
- If any bubbles accumulate in the syringe, tap the barrel of the syringe.
Intramuscular injection
The tray

- Medication
- 2 needles
- Seringe
- Antiseptic swab
- Container
  (kidney-shaped basin)
Intramuscular injection sites

- Dorsogluteal site
- Ventrogluteal site
- Vastus lateralis site
- Deltoid site
Intramuscular injection sites (1)

The ventrogluteal site is located by placing the palm on the greater trochanter and the index finger toward the anterior superior iliac spine. The middle finger is then spread posteriorly away from the index finger as far as possible. A V or triangle is formed by this maneuver. The injection is made in the middle of the triangle.

The dorsogluteal site for administering an intramuscular injection is lateral and slightly superior to the midpoint of a line drawn from the trocanter to the posterior superior iliac spine. Correct identification of this site minimizes the possibility of accidentally damaging the sciatic nerve.
The vastus lateralis site for intramuscular injections is identified by dividing the thigh into thirds horizontally and vertically. The injection is given in the outer middle third.
The deltoid muscle site for intramuscular injections is located by palpating the lower edge of the acromion process. At the midpoint, in line with the axilla on the lateral aspect of the upper arm, a triangle is formed.
Intramuscular injection (1)

- Put on your gloves
- Locate the side of choice
- Clean the area thoroughly with an alcohol swab, using friction
- Remove the needle cap by pulling it straight off
- Spread the skin at the side using your nondominant hand
- Hold the syringe in your dominant hand between the thumb and forefinger. Quickly dart the needle into the tissue at a 90-degree angle
Intramuscular injection (2)

- As soon as the needle is in place, move your nondominant hand to hold the lower part of syringe. Slide your dominant hand to the tip of the barrel.
- Aspirate by slowly pulling back of the plunger to determine whether the needle is in blood vessel. If blood is aspirated, discard the needle, syringe and medication, prepare a new sterile setup, and inject another site.
- If no blood is aspirated, inject the solution slowly.
- Remove the needle quickly.
- Massage the injection side with the alcohol swab using gentle pressure (massaging helps to distribute the solution)
Intravenous injection
indications

• Venous puncture (venipuncture) with a needle is indicated only for the sampling of venous blood
• Medications may be administered as a one time dose via this technique

Venous caniulations is indicated for:
• Repeated sampling of venous blood
• Administration of intravenous medications
• Fluid solutions
• Blood products
• Nutritional support
Contraindications

- Infected skin
- A vein proximal to a running venous infusion should not be used for venous blood sampling
- Venipuncture and venous cannulation of veins in an extremity with an arteriovenous fistula should be avoided.
- Veins in the upper extremity that may be needed for arteriovenous fistula construction for hemodialysis in near future should not be punctured unless absolutely necessary.

- Scarring of the vein may complicate surgical procedures.
- All catheters are potentially thrombogenic. They should be left in place only as long as needed.
The tray

- Medications
- Antiseptic solutions
- 2 needles
- Seringe
- Antiseptic swab/gauze
- Container (kidney-shaped basin)
- Band/tourniquet
Venous access devices

1. Butterfly needle with extension tubing
2. Hollow needle
3. Catheter over the needle
4. Catheter through the needle
5. The wire guided catheter
Selecting the site
**FIGURE 36-2** Venous valves. Cross-section of converging veins demonstrating the valve leaflets that only permit forward flow, proximally, toward the right heart. The arrows represent the directional flow of blood.

**FIGURE 36-3** Preferred venous access sites. Preferred sites (red "O") are at the apex of converging veins or in the middle of a long straight vein. Sites just distal to branching or convergence of veins (red "X") are best avoided due to the presence of valves and the difficulty in threading a cannula.
technique

The angle the needle and the skin must be varied based upon the depth and diameter of the target vein

A. A shallow angle must be used for small and superficial veins

B. A steeper angle must be used for deeper veins

C. A butterfly type needles permits the shallowest angle of entry for very small and superficial veins
VENIPUNCTURE

• A syringe or vacuum tube may be used.
• Vacuum tubes reduce the risk of needle-stick injuries. The amount of suction provided is fixed and may result in hemolysis of the specimen and cause small veins to collapse.
• Syringe aspiration allows greater control over the amount of suction applied. Large syringes can be difficult to manipulate while maintaining the tip of the needle in the vein.
• Use a 5 to 10 mL syringe, as larger syringes result in hemolysis of the specimen and collapse of the vein.
Selecting the site

- Cuff of sphygmomanometer
- Or band /tourniquet
• Put on yours gloves
• Locate the side of choice
• Clean the area thoroughly with an alcohol swab (isopropyl alcohol or povidone iodine), using friction
• Remove the needle cap by pulling it straight off
• **Put on band/tourniquet**
• Spread the skin at the side using your nondominant hand
• slowly dart the needle into the vein at a 30-degree angle
• Aspirate by slowly pulling back of the plunger to determine whether the needle is in blood vessel.
• **Put off band/tourniquet**
• inject the solution slowly
• Remove the needle quickly
• Press gently the injection place by alcohol swab
VENOUS CANNULATION

There are four main techniques of vein cannulation.

• The first is the needle-only, using a butterfly type needle. This is seldom used today.
• The catheter over-the-needle technique is the one most commonly used for peripheral venous cannulation.
• The catheter- through-the-needle technique is occasionally used but not very popular.
• The Seldinger wire-guided technique is most commonly used for central venous access.
NEEDLE-ONLY TECHNIQUE

This technique is used occasionally for short term venous access in young children and elderly patients with fragile veins.

This system is prone to malposition and infiltration. The tip of the needle can easily lacerate the vein if the needle is not secure and allowed to move.

- Grasp and fold the wings of the butterfly needle with the dominant index finger and thumb
- Briskly insert the needle through the skin and into the vein.
- A flash of blood will be seen in the tubing when the tip of the needle enters the vein.
- Carefully advance the needle an additional 3 to 5 mm into the vein.
- Attach a 5 mL syringe to the extension tubing and aspirate blood.
- Remove the tourniquet from the extremity.
- Securely tape the wings of the butterfly needle to the patient's skin.
- Remove the 5 mL syringe, attach intravenous tubing to the catheter, and begin the intravenous infusion.
CATHETER-OVER- THE-NEEDLE TECHNIQUE

• The catheter-over-the-needle systems are the ones most commonly used for venous access.
• The infusion catheter fits closely over a hypodermic needle.
• The needle and the catheter are advanced as a unit into the vein. These devices are inexpensive (about $1 to $4 each), come in a variety of diameters (12- to 24-gauge) and lengths, and are widely available.
• Insert the catheter-over-the-needle through the skin and into the vein (A)
• A flash of blood in the hub of the needle confirms that the lip of the needle is within the vein.
• Advance an additional 2 to 3 mm to ensure that the catheter is within the vein. (B)
• Hold the hub of the needle securely.
• Advance the catheter over the needle until its hub is against the skin.
• Apply pressure, with the nondominant index finger, over the catheter to prevent blood from exiting the catheter.
• Remove the tourniquet from the extremity.
• Withdraw the needle. (C)
• Attach intravenous tubing to the hub of the catheter and begin the infusion. (D)
• Secure the catheter to the skin with tape.
# Complications of venous catheterization

<table>
<thead>
<tr>
<th>observations</th>
<th>complications</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin puncture site</td>
<td>Immediate swelling</td>
<td>hematoma</td>
</tr>
<tr>
<td></td>
<td>Remove catheter, apply pressure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delayed swelling</td>
<td>Extravasation or hematoma</td>
</tr>
<tr>
<td></td>
<td>Remove catheter, apply pressure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Erythrema or discharge</td>
<td>infections</td>
</tr>
<tr>
<td></td>
<td>Remove catheter, antibiotics</td>
<td></td>
</tr>
<tr>
<td>Catheter</td>
<td>Cannot infuse</td>
<td>Thrombosis or kinking</td>
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<tr>
<td></td>
<td>Flush catheter, check position, remove catheter</td>
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</tr>
<tr>
<td></td>
<td>Blood runs up iv tubing</td>
<td>Arterial placement</td>
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<tr>
<td></td>
<td>Remove catheter, apply pressure</td>
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</tr>
<tr>
<td>systemic</td>
<td>Fever</td>
<td>Sepsis</td>
</tr>
<tr>
<td></td>
<td>Remove catheter, once infection is verified</td>
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