

APLS: SIMULATION with SKILLS: intraosseous infusion

CASE I-2



History *{initial candidate briefing prior to arrival of child}*

A two year old boy is brought to the Emergency department by ambulance with a one day history of persistent vomiting and mild diarrhea since morning. He became drowsy and pale at about 4pm and his mother phoned 999

Initial Impression *{to tell candidate as child arrives}*

The child is responsive to voice, looks pale and hypotonic. Guide weight 12kg

Additional History and Observations Respiratory rate 40bpm, HR 190bpm, SaO₂ in high flow oxygen 98%, cool peripheries, CRT 4 seconds, BP 70 systolic. He is afebrile and has no rash.

Clinical Course *{to be given to candidate as he/she progresses through the assessment and treatment of the child}*

IV access is not possible, any delay in gaining circulatory access results in loss of saturation reading on monitor (central pulse only is palpable). If IO access is gained and fluid bolus given, there is little improvement. The abdomen appears distended and the child vomits again. A second bolus of fluid produces an improvement in conscious level and systolic BP rises to 80 but the PR remains at 190. ED ultrasound examination shows free fluid in the abdomen and an emergency surgical opinion is sought.

INSTRUCTORS INFORMATION

Key Treatment Points

Airway	Establish airway patency. NG tube to empty stomach and reduce airway risk	<input checked="" type="checkbox"/>
Breathing	Administer high flow oxygen	
Circulation	IV-IO access,(manual or EZIO) fluid boluses, blood tests, Consider antibiotics. Consider analgesia for IO	
Disability	Monitor	
	Urgent surgical referral, transfer needed,	
APLS+	Peritoneal needle aspiration may be needed for severe abdominal distension causing respiratory compromise and hypotension.	

Diagnosis

Small bowel volvulus

Following the closure of the simulation with any teaching points clarified as necessary, all candidates should perform the IO skill, until competent. As a group, let the candidates discuss the transfer issues.

Skills to be practised and assessed in this simulation: intraosseous infusion, either manual or EZIO. Candidates should be asked to show clearly how they would do the skill.

Following the closure of the simulation with any teaching points clarified as necessary, all candidates should perform the basic airway, oropharyngeal airway and bag/mask ventilation skills only, until competent

Intraosseous trainer or ALS baby with leg pads and chicken thighs or wrapped Crunchie bars

5ml syringes x 3

50ml syringes x 2

Intraosseous needles x 3

Blue food dye x 1

Jug

0.9% Saline 500ml

Intraosseous trainer [Humerus and tibia].

Please note that the bones provided with the trainer should be used initially and then Crunchie bars wrapped in Elastoplast and frozen can be used to aid multiple candidate practice.

And/or

EZ-IO Driver

10ml syringes x 2

10ml amp normal saline

EZ-Connect® extension tubing

EZ-IO needle sets

Giving set

Pressure bag

INTRAOSSIOUS INFUSION

- Identify the infusion site. The landmarks for the upper tibial and lower femoral sites are shown below:

TIBIAL	FEMORAL
Anterior surface, 2 - 3 cm below the tibial tuberosity	Anterolateral surface, 3 cm above the lateral condyle

- Clean the skin over the chosen site
- Insert the needle at 90° to the skin
- Continue to advance the needle until a give is felt as the cortex is penetrated
- Attach the 5 ml syringe and aspirate or infuse to confirm correct positioning
- Attach the filled 50 ml syringe and push in the infusion fluid in boluses

INTRASOSEOUS INFUSION – USING POWERED DEVICES

The EZ-IO drill is a powered device which enables rapid insertion of an intraosseous needle. The same landmarks are used as for manual insertion and the procedure is less painful for the conscious victim due to its rapidity. The EZ-IO needles are in two sizes - under 40kg and over 40kg.

The procedure for insertion is as follows:

- Universal precautions.
- Clean site.
- Choose appropriate size needle and attach to drill - it will fix magnetically.
- Hold the drill and needle at 90 degrees to the skin surface and push through the skin without drilling, until bone is felt.
- Push the drill button and drill continuously and push until there is loss of resistance - there is a palpable give as the needle breaches the cortex.
- Remove drill and unscrew trochar.
- Aspirate marrow if possible.
- Attach pre-prepared connection tube.
- There is an optional device to secure the needle but this is not essential.
- Proceed with required therapy.

It should be noted that rapid infusion of fluid may be painful for the conscious patient and if this proves to be the case 0.5mg/kg of 2% lignocaine may be infused slowly to combat this.

The instructor should discuss with candidates the complications of IO insertion.