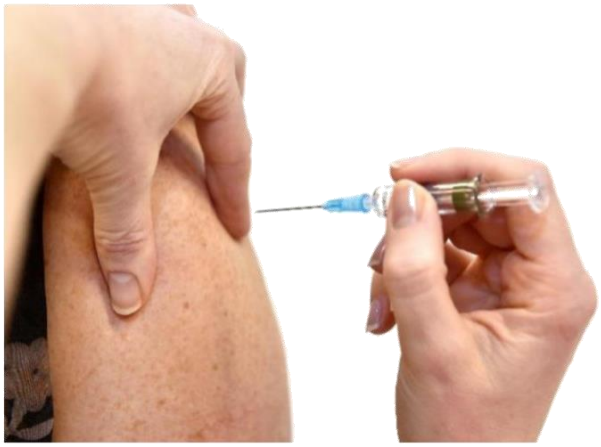
# VACCINE TRAINING PRACTICAL SKILLS HANDOUT



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# Contents

## Introduction

The following information is designed to cover practical aspects of vaccine training. As always, you must practice within the limitations of your role and to the level that your training has deemed you competent for. The core topics covered include

Theoretical topics within this course:

- Preparing for administering a vaccine
- Adverse events including faint, anaphylaxis and panic attacks
- Documentation

Practical topics:

- Correct administration techniques including intramuscular (IM), subcutaneous (SC) and intranasal vaccines
- Reconstitution of vaccines
- Administration of emergency adrenaline for anaphylaxis
- Recovery position
- Basic life support for adult, child and infant

# Preparation for Administering a Vaccine

### Preparing the environment

Ensure you have a **safe and private** room to provide a vaccination. The room needs to be adequately lit (if working in a room with motion-sensor lighting ensure the lights will remain on for the duration of the consultation) and an ambient temperature. [2]

Ensure the room is equipped with **suitable seating** - this will depend on the space inside your room but you will need at least 2 chairs, preferably 3. If there is only space for 2 chairs and a chaperone has come into the room, the patient and pharmacist sit whilst the chaperone stands. Be at the same eye level as the patient during the consultation and then in a comfortable position to give the injection (personal preference).

Your room needs to be **clean** and clear from clutter meaning surfaces can be easily cleaned. Use 70% alcohol (isopropyl alcohol or ethanol) to clean the preparation surfaces.

**Handwashing facilities** - in accordance with the World Health Organisation (WHO), during a normal vaccine administration hand hygiene needs to be performed before you prepare the injection material, before touching the patient/injecting and after touching the patient/injecting. Hand hygiene refers to hand washing or using alcohol based hand rub. If hands are visibly dirty or contaminated wash them with anti-bacterial soap and dry using single use paper. If hands are visibly clean alcohol gel can be used instead. [1]

For further details on hand cleaning techniques see WHO guidance.

Make sure someone else is aware you are administering a vaccination in case you need any assistance and know your procedure for summoning help (e.g. the use of panic buttons, nearest phone).

The **fridge** in which you store the vaccine should specifically designed for the storage of medications/vaccines. It should be kept between +2 C̊ to +8 C̊ and the temperature checked and documented daily. Within the refrigerator, sufficient space around the vaccine packages needs to be left for air to circulate. Vaccines should be kept away from the side and back walls of the refrigerator otherwise the vaccines may freeze rendering them inactive and unusable. (2,5)

## Preparing the equipment

Ensure you have the following:

- Documentation - Ensure that you have all the required documentation. This may include a pre-vaccination checklist/risk assessment questionnaire. Be familiar with the protocol for communicating vaccine records with other Primary Care Health care professionals (if needed). Vaccine records should ensure the following information is documented: vaccine name, dose, site, batch number and expiry date. (2)
- **Vaccine** – check you have the correct drug and dose.
- **Cotton wool** – this is applied to the injection site for 2 reasons
    - To prevent any vaccine leakage/bleeding
    - To prompt the clinician to check the site for any immediate local reactions (potentially anaphylaxis). The used cotton wool is a potential risk of infection, reduce this risk by asking the patient to hold it in position and place it in the appropriate bin. (2)
- **Sharps container** – Sharps must be disposed of immediately after use into a puncture resistant sharps box (UN-approved, BS 7320). Local guidance for the disposal of sharps must be adhered to. The bin should be sealed and changed once the filling line is reached. Ensure sharps boxes are kept in a secure area (for further guidance on safe disposal of sharps see section on "miminising the risk of needlestick injuries"). (2,3,4).
- **Gloves** - Have single use, non-sterile well-fitting gloves available. However, you do not need to wear gloves unless your policy states otherwise or
    - There is likelihood of coming into contact with patients' blood or bodily fluids
    - If your skin is not intact e.g. cracked skin or eczema. Cuts must be covered. (4)
- **Tray** - To keep all the equipment organised and easily accessible.
- **Emergency equipment** - A protocol for the management of anaphylaxis and an anaphylaxis pack must always be available. This would normally contain 2 doses of adrenaline (appropriate to the age of the patient) either in Auto-injector or ampoules and a pocket mask. (5)
- **Plasters** – Offer to the patient post vaccination. These should be hypoallergenic.
- **Alcohol hand gel –** see section above on handwashing. For further details on hand cleaning techniques see WHO guidance. (1)

## Preparing the Patient

You must assess your patient's suitability for the vaccine – following your PGD and completing your documentation will form the basis for assessing the patient's suitability and confirm whether there are any contraindications to the immunisation. You must always adhere to your PGD. Start by confirming the identity of the patient.

## Chaperone

It is best practice to offer all patients a chaperone for any examination or procedure. If your organisation has a chaperone policy, please ensure you are compliant with this.

## Consent

Informed consent must be gained before administering a vaccine. The individual must be informed about the process, benefits and risk of immunisation and be able to communicate their decision. To gain informed consent Health professionals should ensure that the individual (or those giving consent on their behalf) fully understands the vaccination procedure including

a) which immunisation is to be administered
b) the disease against which it will protect
c) the risks of not proceeding
d) the side effects that may occur and how these should be dealt with
e) Any follow-up action required.

The patient should give their consent voluntarily and freely and should be obtained **before** any vaccine is administered.

*You must ensure you have gained informed consent*

**Mental capacity** (7, 12)

For consent to be valid it must be given by someone who has the capacity to consent to the intervention. The Mental Capacity Act defines someone who lacks capacity as someone who is unable to make a decision for themselves due to impairment or disturbance in the functioning in their mind or brain. A person's Mental Capacity may be impaired either temporarily or

permanently. Temporary impairment may be due to sedative medications or acute confusion, longer term impairment may be as a result of dementia, brain injury or a learning disability.

To be deemed to have capacity an individual must be able to make a decision and therefore, be able to do the following

1. Understand the information relevant to that decision, including understanding the likely consequences of making, or not making the decision
2. Retain that information
3. Use or weigh that information as part of the decision-making process
4. Communicate their decision

Individuals who are able to give consent on behalf of another individual are those with parental responsibility (for a patient under the age of 18), someone authorised under a Lasting Power of Attorney or someone who has the authority to make decisions about their treatment as a court appointed deputy.

For more information see Department of Health –*Reference Guide to consent for examination and treatment*

**Side effects** (5)

Common vaccine induced side effects are

- Pain, swelling and redness at the site of injection.
- Systemic reactions including fever, malaise, loss of appetite, muscle ache.
- The timing of systemic reactions will vary depending on the vaccination received.

Rare reactions include anaphylaxis (please see additional notes on anaphylaxis)

**Management of side effects** –

Local reactions to the site are normally self-limiting and don't require treatment however if they cause discomfort, paracetamol or ibuprofen can be given.

Advice on the appropriate dose of paracetamol/ibuprofen for fever should be given at the time of immunisation. It is not recommended that paracetamol/ibuprofen are given routinely after vaccination to prevent fever (unless specifically stipulated, e.g. for MenB) as there is some evidence that prophylactic administration of antipyretic drugs around the time of vaccination may lower antibody responses to some vaccines. (5)

Refer to The Green Book for further details.

Provide the patient with a copy of the Patient Information Leaflet (PIL) or an advice sheet.

## Allergies

Check the allergy status of the patient.

**Vaccines should <u>not</u> be given to those who have had**

- a confirmed anaphylactic reaction to a previous dose of the vaccine, or
- a confirmed anaphylactic reaction to any component of the vaccine [5]

Refer to the product SPC for information regarding components of the vaccine.

## Eligibility/contraindications

The inclusion/exclusion criteria will be detailed in the PGD which must be adhered to. Details of contraindications can also be found in The Green Book.

## Previous reactions

Check for any previous reactions/problems with vaccines. If the patient is prone to fainting, lie them down prior to vaccination.

## Current health status

If the patient has an acute, severe febrile illness, vaccination should be postponed. If your patient has a minor illness without fever or systemic upset immunisation does not need to be postponed. If an individual is acutely unwell, immunisation may be postponed until they have fully recovered. This is to avoid wrongly attributing any new symptom or the progression of symptoms to the vaccine.

## Patient Positioning

The arm should be fully exposed to ensure you can identify the deltoid muscle. Encourage the patient to relax their arm either by their side or hand rested on their hip. Tight shirts should be removed, or the vaccine may be given too low and end up as a SC rather than IM injection with subsequent local reactions and suboptimal immune response. A tight shirt sleeve can also act as a tourniquet and encourage bleeding at the injection site.[2] Assess the condition of arm. Injection sites should be free from infection, oedema, scabs, inflammation or skin lesions. [6]

## Skin Cleansing

If the patient is "socially clean" then no further skin cleansing is required. The Green Book states only visibly dirty skin needs to be cleaned pre-injection by washing with soap and water. (5)

### Anxious patients [2]

Be aware of anyone who may be anxious and help them remain as calm as possible by

- Adopting a calm approach.
- Use distraction techniques eg, engage them in conversation unrelated to the vaccination.
- Explain the procedure to ensure that the patient knows what to expect and reassure that it is a quick and simple process.
- Prepare the vaccine and administer out of site of the patient where possible.

### Patient concerns/questions (8)

Answer any questions a patient may have. You should be aware of any current controversies and misconceptions surrounding immunisations but use reliable and official sources to keep up to date i.e. Public Health England.

### Resources

All Health Care Professionals involved in immunisations should have access the Green book and be able to access relevant immunisation guidance e.g. DOH/PHE/vaccine updates. Regular e-mail vaccine updates are available through Public Health England.

### Monitoring your patient

If anaphylaxis or fainting does occur it is likely to happen within 10 minutes following the vaccinations, and the majority of adverse reactions will occur within 2 minutes [2]. Follow your policy for guidance on the length of time you need to observe your patient for post vaccination.

## Preparing the Vaccine

Ensure you have the right product and dose. Check the expiry date and discard if it has passed. [5]

### Cold chain

Maintaining the cold chain ensures that vaccines are transported and stored according to the manufacturer's recommended temperature range of +2°C to +8°C until the point of administration. Breaks in the cold chain may result in a loss of potency of the vaccine and subsequently to vaccine failure. Vaccines should be stored according to the manufacturer's summary of product characteristics. [2,5]

### Check for damage

If the vial or syringe containing the vaccine or diluent is damaged or not intact, the vaccine should not be used. These should be removed from use immediately, labelled as damaged and either disposed of according to the local policy or reported as a product defect. [5]

### Appearance

Before use, the colour and composition of the vaccine must be examined to ensure that it conforms to the description as stated in the Summary of Product Characteristics (SPC). Any vaccine which contains particles or whose colour differs from the SPC should be discarded. (5)

### Air bubble

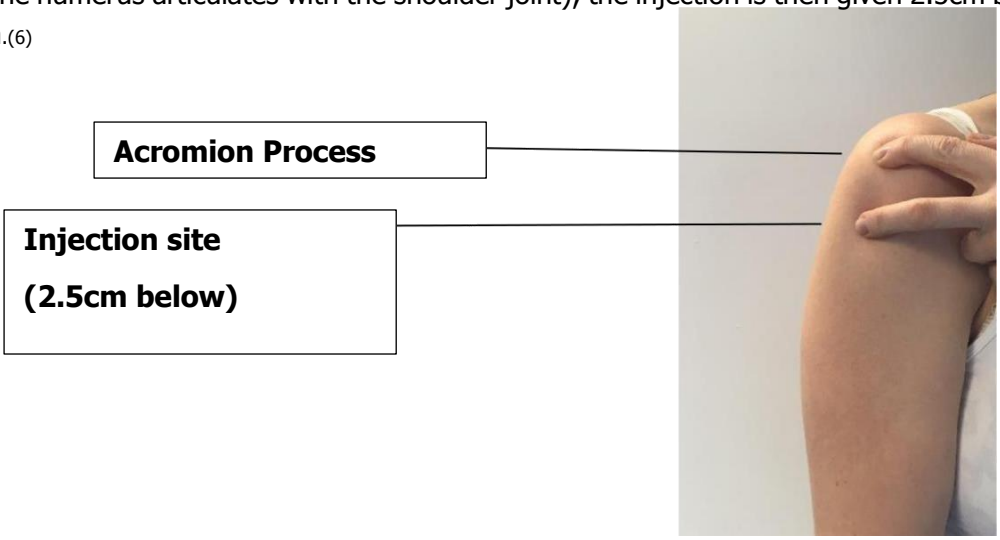
Pre-filled syringes have an air bubble in which PHE have advised is **NOT** to be expelled before administration of the vaccine for two reasons. Firstly, to try to expel the bubble risks accidently expelling some of the vaccine therefore not giving the patient the full dose. Secondly, the air bubble injected into the muscle forms an airlock preventing the medication seeping out along the needle tract into subcutaneous tissue. The small bolus of air injected following administration of medication clears the needle and prevents a localised reaction from the vaccination. (9)

## Injection Technique

### Location

An intramuscular (IM) injection administers medication deep into the muscle tissue underneath the subcutaneous layer. The preferred site for vaccines (in those over the age of one year) is the deltoid muscle - the small triangular muscle in the upper arm. (5,18) The deltoid muscle has the advantage of being easily accessible and it avoids major nerves and blood vessels. The maximum volume that can be administered to this site is 1ml because the deltoid has a small muscle mass. (5,6)

To identify the correct site in the deltoid, palpate the acromion process (the bony prominence where the humerus articulates with the shoulder joint), the injection is then given 2.5cm below this location.(6)



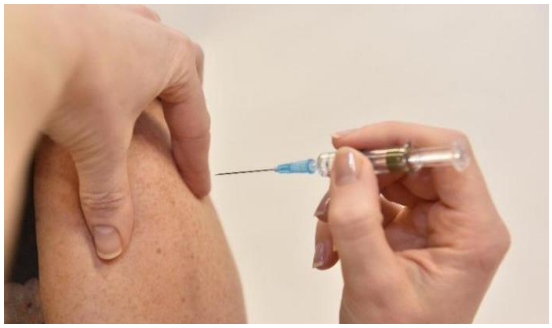

*Always ensure you correctly locate the injection site*

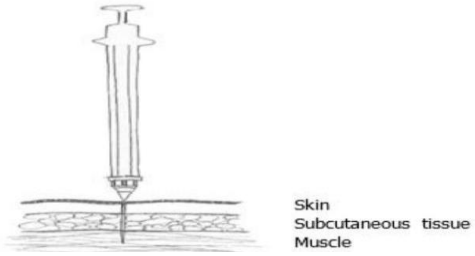
**NOTE** - Where two or more injections need to be administered at the same time, they should be given at separate sites, preferably in a different arm. If more than one injection is to be given in the same arm they should be administered at least 2.5cm apart. The site at which each injection is given should be noted in the individual's records. (5)

## Intramuscular Injections

Hold the syringe between thumb and forefinger as if holding a pen or dart. Stretch the skin from above with your non-dominant hand to displace the subcutaneous layer and to reduce the sensitivity of the nerve endings. Insert the needle quickly in a controlled manner into the skin at a 90-degree angle. Depress the plunger at approximately 1 second for each 0.1ml then in a controlled manner, remove the needle.

Once the needle has been withdrawn, immediately dispose in the sharps container. Ask the patient to apply gentle pressure to the site afterwards with the cotton wool. (5,6)





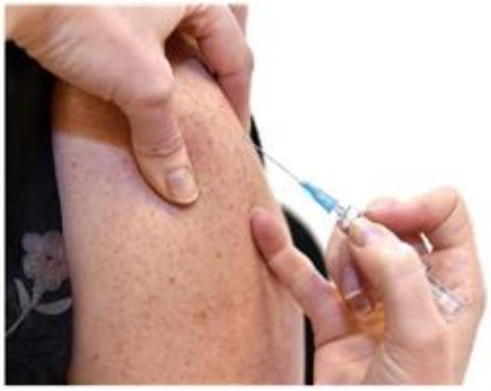

## Subcutaneous Injections

Subcutaneous injections (SC) are given beneath the epidermis into the layer of fat (adipose) and connective tissue. (6) For individuals with a bleeding disorder, vaccines normally given by an IM route should be given by deep subcutaneous injection to reduce the risk of bleeding - this subcutaneous layer is not richly supplied with blood vessels. (6)

Guidance regarding flu vaccines states that most patients on stable anticoagulant therapy can receive influenza vaccine by intramuscular injection, for example, individuals on warfarin who are up to-date with their scheduled INR testing where their latest INR was in the therapeutic range. (16)

For a subcutaneous injection the skin is bunched between the thumb and forefinger, in order to lift adipose tissue from underlying muscle. Holding the syringe between thumb and forefinger insert the needle at a 45-degree angle and inject the vaccine slowly. Once the

needle has been withdrawn, immediately dispose in the sharps container. Ask the patient to apply gentle pressure to the site afterwards with the cotton wool. (5,6)




**NOTE –** An aseptic (non-touch) technique should be followed for all injections i.e, using single use sterile equipment, ensuring thorough hand cleansing and not allowing the needle to touch any contaminated surface. (4)

## Post Vaccine care

- Ensure you have immediately disposed of the sharp.(4)
- Following an IM or SC injection the site should not be rubbed or massaged as this can cause trauma to the injection site. (2)
- Check the injection site for any local reactions and to ensure any bleeding has ceased. Offer the patient a plaster. (2)
- Allow the client to replace their clothing as necessary and discard all used equipment appropriately.
- Observe the client for immediate adverse reactions and refer to your local policy for information on how long to observe them for.

Complete the documentation; the following information should be recorded: (5)

- Vaccine name, product name, batch number and expiry date
- Dose administered
- Site used
- Date vaccine given
- Name and signature of vaccinator

Remember to give your client a copy of their paperwork and in particular the Patient Information Leaflet (refer to local policy).

## Correct Needle Size

The correct length and gauge of the needle are key in ensuring that the vaccine is delivered to the correct location as painlessly as possible and with maximum immunogenicity. (2)

Some vaccines are provided in a pre-filled device with an integral needle so the needle length cannot be changed. When using vaccines with a fixed needle - if it is felt that the needle length

will not be sufficient to deliver the vaccine to the appropriate site then an alternative should be sought. [2]

Many vaccines are supplied with non-fixed needles or in ampoules, allowing individual choice on needle length.

For IM, injections the needle needs to be sufficiently long to ensure that the vaccine is injected into the muscle. Studies have shown that the needle should be at least 25mm long to ensure it reaches muscle (in all but the smallest of babies) and to reduce the risk of local vaccine reactions. [2,5]

The width of the needle (gauge) may also need to be considered. The colour on the hub of the needle refers to the gauge (width) rather than the length of the needle- different gauges can be obtained in different lengths (see box below). The higher the number of the gauge, the narrower the lumen of the needle. [2]

UK Needle Gauge and Length

| Colour | Length | Gauge |
|---|---|---|
| Orange | 16mm or 25mm | 25G |
| Blue | 25mm | 23G |
| Green | 38mm | 21G |

A 23g 25mm (blue) or 25g 25mm (orange) needle is recommended for older babies, children and adults for intramuscular injections of most vaccines. [5]

A longer (38mm) needle may be required for IM injections in larger adults. A 16mm needle would only be used for pre-term or very small babies. [5]

If the vaccine is required to be given via the SC route a shorter needle may be adequate however, it must be sufficient enough to administer the vaccine deep into the subcutaneous layer. [5] It is a common misconception that the longer the needle, the more painful the injection will be, this is not the case as muscle fibres have fewer pain receptors than subcutaneous tissue. [2]

It is always advisable to check the instructions with the vaccine you are using for specific instructions.

## Errors in vaccine preparation and administration

For guidance on vaccine incidents including errors in vaccine storage, preparation or administration refer to the Health Protection Agency document "Vaccine incident guidance". [17]

**Frequently asked question**

**What do I do if the whole dose of vaccine isn't given?**

Where vaccines are administered at less than the recommended dose the vaccination will need to be repeated because less than the full dose may not be sufficient enough to evoke a full immune response.

See Vaccine Incident Guidance for further details.

### Minimising the risk of needlestick injuries

A few tips to help minimise the risk of needlestick injuries:

- Remove the sheath just before you intend to administer the vaccine
- Never resheath the needle
- Place the sharps bin no more than one arms distance away from the client and ensure it is open and ready to use
- Place the needle and syringe straight into the sharps bin before placing cotton wool on the client's arm
- Some vaccine sheaths are tight to get off so point the needle and syringe down and away from you to gently release the sheath

In the unlikely event that you do sustain a needlestick injury, follow this immediate advice prior to checking with your local policy for the subsequent steps.

1. Encourage the wound to gently bleed
2. Wash the wound using running water and plenty of soap
3. Don't scrub the wound whilst you are washing it
4. Don't suck the wound
5. Dry the wound and cover it with a waterproof dressing or plaster
6. Seek urgent medical assistance as prophylactic treatment is available. Check with your policy whether you attend Accident and Emergency or your Occupational Health Department

## Intranasal Sprays

Children between the ages of 2-18 years receiving influenza vaccines receive the vaccine intranasally as opposed to intramuscularly. Evidence shows that this live attenuated intranasal influenza vaccine (LAIV) provides superior effectiveness in young children, it has a good safety record and is easier to administer than injected vaccines. (5,14)

The attenuated (weakened) vaccine virus is cold adapted so that it cannot reproduce at body temperature (37°C) but will allow the child to produce antibodies, which then protects them against infection. (14)

Administration of the vaccine is via a nasal applicator which delivers 0.1ml (around 1/50th of a teaspoon) of fluid into each nostril. The plunger is depressed rapidly to convert the fluid into a mist. (14

## Current health status

Vaccination with LAIV should be deferred in children with a history of active wheezing in the past 72 hours or those who have increased their use of bronchodilators in the previous 72 hours. LAIV is not recommended for those who are currently taking oral steroids or who have been prescribed oral steroids in the last 14 days for respiratory disease.

As with vaccines given by injection, if a child is acutely unwell, immunisation may be postponed until they have recovered. This is to avoid confusing the differential diagnosis of any acute illness by wrongly attributing any signs or symptoms to the adverse effects of the vaccine. However, minor illnesses without fever or systemic upset are not valid reasons to postpone immunisation. (14)

## Contraindications

See The Green Book/ SPC and always follow your PGD.

## Potential side-effects

Nasal congestion/runny nose (rhinorrhoea), reduced appetite, weakness and headache are common adverse reactions. Immediate reactions such as urticaria, angio-oedema, bronchospasm and anaphylaxis can occur rarely.

### Can LAIV be given when the patient has a blocked or runny nose?

There is no data on the effectiveness of LAIV when given to children with a heavily blocked or runny nose caused by either infection or allergy. As heavy nasal congestion might impede delivery of the vaccine to the nasopharyngeal mucosa, deferral of administration until the nasal congestion has resolved should be considered. (14)

## Procedure (15)

- Remove applicator tip - do not remove the dose divider at the other end of the applicator
- With the patient sitting upright place tip just inside one nostril
- Depress plunger as rapidly as possible until the dose divider prevents it going any further
- Remove syringe from nostril
- Remove dose-divider clip
- Place the tip inside the other nostril and depress plunger rapidly to deliver remaining vaccine
- Appropriately discard the syringe as per local guidance

**What if the child sneezes or blows their nose afterwards?**

Administration of the dose does not need to be repeated. Binding of the virus to epithelial cells occurs very rapidly and there are more virus particles in the vaccine than are needed to establish immunity. Therefore, sneezing or blowing the nose immediately after immunisation will not affect immunity and reassurance should be given that the vaccine will still be effective if this occurs. (14)

# Paediatric Injections

Modifications are needed to be able to safely vaccinate children.

## Consent for children

"For young children, not competent to give or withhold consent, such consent can be given by a person with parental responsibility, provided that person is capable of consenting to the immunisation in question and is able to communicate their decision. Where this person brings the child in response to an invitation for immunisation and, following an appropriate consultation, presents the child for that immunisation, these actions may be considered evidence of consent." (5)

See The Green Book for further details on "**Who has parental responsibility?"**

The consent process should include discussion on the following:

- What immunisation(s) are to be given
- Which disease(s) will be prevented
- Benefits and risks of immunisation versus risks of disease(s) – be open and honest about this
- Possible side effects and how to treat
- Any follow-up/action required
- Agreement to proceed

The child should be given an explanation (age appropriate) of the vaccination process.

Evidence shows that children appear to be less traumatised when parents value vaccinations

**Extra notes on consent (5,7)**

- ✓ An adult is considered as a person of **18 years**.
- ✓ People of **16-17 years** are presumed to be capable to give consent for their own medical treatment.
- ✓ **Children under 16 years** who have sufficient understanding and intelligence to enable them to understand fully what is involved in a proposed intervention will also have the capacity to consent to that intervention. This is described as being **Gillick Competent.**
- ✓ Where a young person of 16 or 17 or a child under 16 but Gillick Competent refuses treatment, it is possible that this refusal could be over ruled, if in all probability it could lead to death of the child or severe permanent injury.

Child positioning: [2]

To help administer a safe vaccine to a child follow the steps below:

1) The parent should understand the importance of not allowing the limb to move during the procedure and holds the child gently but firmly
2) Young children should be held on their parent/carer's knee
3) The child's free arm is tucked behind the parent and the child cuddled into their body when the injection is to be given in the deltoid
4) The arm to be injected is held close to the child's body – the parent can hold the forearm to prevent movement
5) While older children may choose to sit on their own, the parent may still be required to help hold their arm still

Where a child needs to be given more than one injection at a visit then it can be helpful for two members of staff to inject at the same time, as the child is not usually aware that two injections have been given and hence reduces the distress. This would be appropriate for children who are old enough to have injections into each of their upper arms.

The following position can be adopted:

- Sit the child on the parent's lap with both arms accessible
- Face the child forward, looking at something of interest
- Engage the child in conversation
- Give both injections simultaneously, using a prearranged signal between the two healthcare professionals

Prepare as much as possible out of sight and ensure a quick and smooth vaccination

## Reconstitution of Vaccines

Some vaccines are supplied in a pre-filled syringe, others need to be reconstituted before use. Vaccines should be reconstituted when required, not in advance of an immunisation session, to avoid errors and maintain vaccine efficacy and stability. [5

To reconstitute

- Only use the diluent supplied and note the time scale in which it must be used after dilution (often 1-4 hours). [2]
- A green needle (21G x 38mm (11/2 inch)) should be used to draw up the diluent and to inject it **slowly** into the ampoule containing the vaccine. [5] Injecting diluent rapidly into the vaccine may cause frothing, which can affect the dilution and consequent potency of the vaccine; shaking the ampoule may have a similar effect. [2]
- If the freeze-dried powder does not instantly dissolve in the diluent, **gently** rotate the ampoule until it dissolves.
- Draw up the appropriate dose.

- Unless the vaccine is supplied in a pre-filled syringe with an attached needle, a **new** needle of a size appropriate to the individual patient should be used to inject the vaccine. (5)

**TIP -** When removing liquid from a vacuum-sealed ampoule, first inject the equivalent measure of air to the volume of liquid to be removed to break the vacuum. (2)

**Extra information**

- When drawing up from a glass ampoule, use a needle gauge no larger than 21G to eliminate the possibility of drawing up glass fragments
- Where possible change a needle after it has passed through a rubber bung before administering the vaccine.
- For quantities, less than 1ml use a graduated 1ml syringe (2)

Appropriate infection control and aseptic techniques should be used at all times.

# Reporting Adverse Reactions (13)

## Yellow Card Scheme – MHRA (Medicines and Healthcare Products Regulatory Agency)

The Yellow Card Scheme helps the MHRA monitor the safety of all healthcare products in the UK to ensure they are acceptably safe for patients and those that use them. Reports can be made for all medicines including vaccines, blood factors and immunoglobulins, herbal medicines and homeopathic remedies, and all medical devices available on the UK market. The Scheme collects information on suspected problems or incidents involving:

1. Side effects (also known as adverse drug reactions or ADRs)
2. Medical device adverse incidents
3. Defective medicines (those that are not of an acceptable quality)
4. Counterfeit or fake medicines or medical devices

It is **not** suitable for reporting procedural errors i.e. wrong vaccine given or wrong dose. This should be reported via local internal reporting procedures.

Always refer to your own local policy for reporting of any incident.

# Anaphylaxis (5,20)

## What is anaphylaxis?

Anaphylaxis is a severe, life-threatening, generalised or systemic hypersensitivity reaction.

## Causes of anaphylaxis

Anaphylaxis due to vaccines is extremely rare, approximately 1 per million vaccine doses given.

Other triggers for anaphylaxis include

- Stings
- Foods such as nuts, milk, fruits, fish
- Medication including anaesthetics, antibiotics and NSAID's
- Latex

The time of onset of an anaphylactic reaction depends on the route of the trigger, an IV trigger will cause a more rapid reaction than orally ingested triggers.

Children and young adults, people with asthma and females are more at risk of having an anaphylactic reaction.

## Physiology

The principle chemical released in an anaphylactic reaction is histamine which is secreted by mast cells and basophils. Histamine causes

- **Vasodilation** – which lowers blood pressure and increases the permeability of blood vessels
- **Smooth muscle constriction** – leading to airway constriction and gastrointestinal symptoms (abdominal cramps, diarrhoea, vomiting)

## Diagnosing anaphylaxis

The Resuscitation Council advice that anaphylaxis is likely when all of the three criteria are met-

1. Sudden onset and rapid progression of symptoms
2. Life Threatening Airway and/or Breathing and/or Circulation problems
3. Skin and or mucosal changes (although absent in 20% of cases of anaphylaxis)

The following supports the diagnosis:

Exposure to a known allergen for the patient

## Recognition of Anaphylaxis

When recognising and treating any acutely ill patient, the ABCDE assessment approach is used. The key principle of this assessment is to complete an initial assessment, to reassess the patient regularly and to identify and treat left threatening problems before moving to the next part of the assessment.

| | |
|---|---|
| **Airway** | Airway swelling, e.g., throat and tongue swelling (pharyngeal/laryngeal oedema). The patient has difficulty in breathing and swallowing and feels that the throat is closing up.<br>Hoarse voice.<br>Stridor –a high-pitched inspiratory noise caused by upper airway obstruction. |
| **Breathing** | Shortness of breath – increased respiratory rate.<br>Wheeze.<br>Patient becoming tired.<br>Confusion caused by reduced oxygen levels (hypoxia)<br>Cyanosis (appears blue) – this is usually a late sign.<br>Respiratory arrest. |
| **Circulation** | Signs of shock – pale, clammy.<br>Increased pulse rate (tachycardia).<br>Low blood pressure (hypotension) – feeling faint (dizziness), collapse.<br>Decreased conscious level or loss of consciousness.<br>Cardiac arrest. |
| **Disability** | Unconsciousness or reducing levels of consciousness.<br>Confused, aggressive.<br>Assess their conscious level using the **AVPU** method: **A**lert, responds to **V**ocal stimuli, responds to **P**ainful stimuli, or **U**nresponsive to all stimuli. |
| **Exposure** | Respect the patient's dignity.<br>Skin and mucosal changes - are often the first feature and present in **over 80% of anaphylactic reactions.**<br>They can be subtle or dramatic.<br>There may be just skin, just mucosal, or both skin and mucosal changes.<br>There may be erythema – a patchy, or generalised, red rash.<br>There may be urticaria (also called hives, nettle rash, weals or welts), which can appear anywhere on the body. The weals may be pale, pink or red, and may look like nettle stings. They can be different shapes and sizes, and are often surrounded by a red flare. They are usually itchy. |

## Treatment

1. Call 999
2. Administer IM Adrenaline – this may be through an auto-injector or drawn up from an ampoule
3. Position patient as per their symptoms

## Adrenaline

Adrenaline has the opposite effect of histamine – it causes vasoconstriction and bronchodilation thus treating the life-threatening aspects of the reaction. It also increases the force of the myocardial contraction.

### Doses

Adrenaline should be given to all patients with life threatening features. It works best when given early after the onset of the reaction.

**IM doses of 1:1000 adrenaline:**

| Age | Dose |
|---|---|
| Children over 12 years and adults | 500 mcg (0.5 mL) |
| Child 6 -12 years | 300 mcg(0.3 mL) |
| Child < 6 years | 150 mcg(0.15 mL) |

Further doses can be given at 5 minute intervals if there is no improvement or the patient continues to deteriorate.

The preferred site of injection is the midpoint of the thigh, anterolateral aspect.

Anyone who has had an anaphylactic reaction needs to be taken to hospital for second line treatment and monitoring.

## Adrenaline Auto-injectors

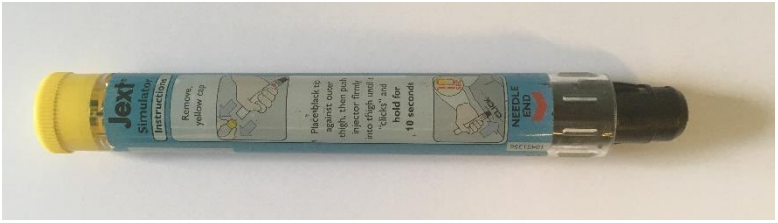
There are a variety of auto-injectors available. Make sure you are familiar with the ones you will be using for your vaccination sessions. They are designed to go through clothing for speed of delivery.

### Epipen (Available in Adult dose – 300mcg, paediatric dose 150mcg)

- Keep your thumb out of the way, hold the Epipen like a dagger
- Pull off the blue safety cap
- Hold the device about 10cm from the outer thigh with the orange tip pointing to the thigh
- *Swing and push* the device against the thigh until it clicks
- Hold in place for 10 seconds to ensure the whole dose is administered
- Massage the area afterwards to encourage blood supply

Jext (Available in Adult dose – 300mcg, paediatric dose - 150mcg)

- Hold the Jext like a dagger in your dominant hand
- Remove yellow cap
- Place black tip against outer thigh, then push injector firmly into thigh until it clicks
- Hold in place for 10 seconds
- Massage the area afterwards to encourage blood supply




Emerade (Available in all three doses - 500mcg, 300mcg, 150mcg)

- Remove needle sheath
- Press device against outer thigh
- Hold in place for 5 seconds
- Massage the area afterwards to encourage blood supply


### Adrenaline ampoules [2, 19]

Alternatively, you may be using adrenaline ampoules to draw up the required dose. Standard needles are not designed to go through clothing so the thigh would need to be exposed for adrenaline to be given.

Use an appropriate size needle to draw up the required dose from the ampoule and administer the adrenaline.

- A blue needle (25mm) is suitable for all ages
- A green (38mm) needle should be used for very large adults

## Anaphylaxis or a Faint?

### Fainting [5,19]

Fainting is relatively common when vaccinating adults and adolescents but rare in infants and children. Sudden loss of consciousness in young children should be presumed to be an anaphylactic reaction, especially if a strong central pulse is absent. [5] The table below distinguishes between a faint and anaphylaxis.

| Signs or Symptoms | Anaphylaxis | Faint |
|---|---|---|
| **Onset** | Rapid, sudden onset and progressive life threatening condition **LIFE THREATENING** | Usually gradual but can be sudden **NON-LIFE THREATENING** |
| **Airway** | Swelling to lips, tongue, throat & stridor | Normal |
| **Breathing** | Shortness of breath, wheeze | Normal |
| **Circulation** | Pale, clammy, low blood pressure, **rapid pulse** | Pale, clammy, low blood pressure, **slow pulse** |
| **Disability** | Confused, agitated, sense of impending doom, loss of conciousness | Dizziness, nausea, temporary loss of consciousness with rapid recovery |
| **Exposure** | Swelling, general red rash, raised itchy rash | Normal, but possibly pale and clammy |
| **Course of Action** | 999 | Position patient, reassure and monitor |
| **Treatment** | Administer Adrenaline 1:1000 as per local policy and repeat after 5 mins if there is no improvement. | Lay patient on their back with legs raised. Monitor recovery and allow them to sit up on their own time. |

## Panic Attacks (5,9)

Some individuals have panic attacks prior to immunisation due to extreme anxiety. Symptoms include hyperventilation that can lead to numbness and tingling in the arms and legs (paraesthesiae), cramps in the hands and feet and feeling of tightness in the chest.

### ABCDE assessment

A – Airway not compromised

B – rapid, deep breathing. Patient will feel like they cannot breathe. No wheeze present.

C – rapid pulse, no hypotension

D – could reduce consciousness if persists for a long time

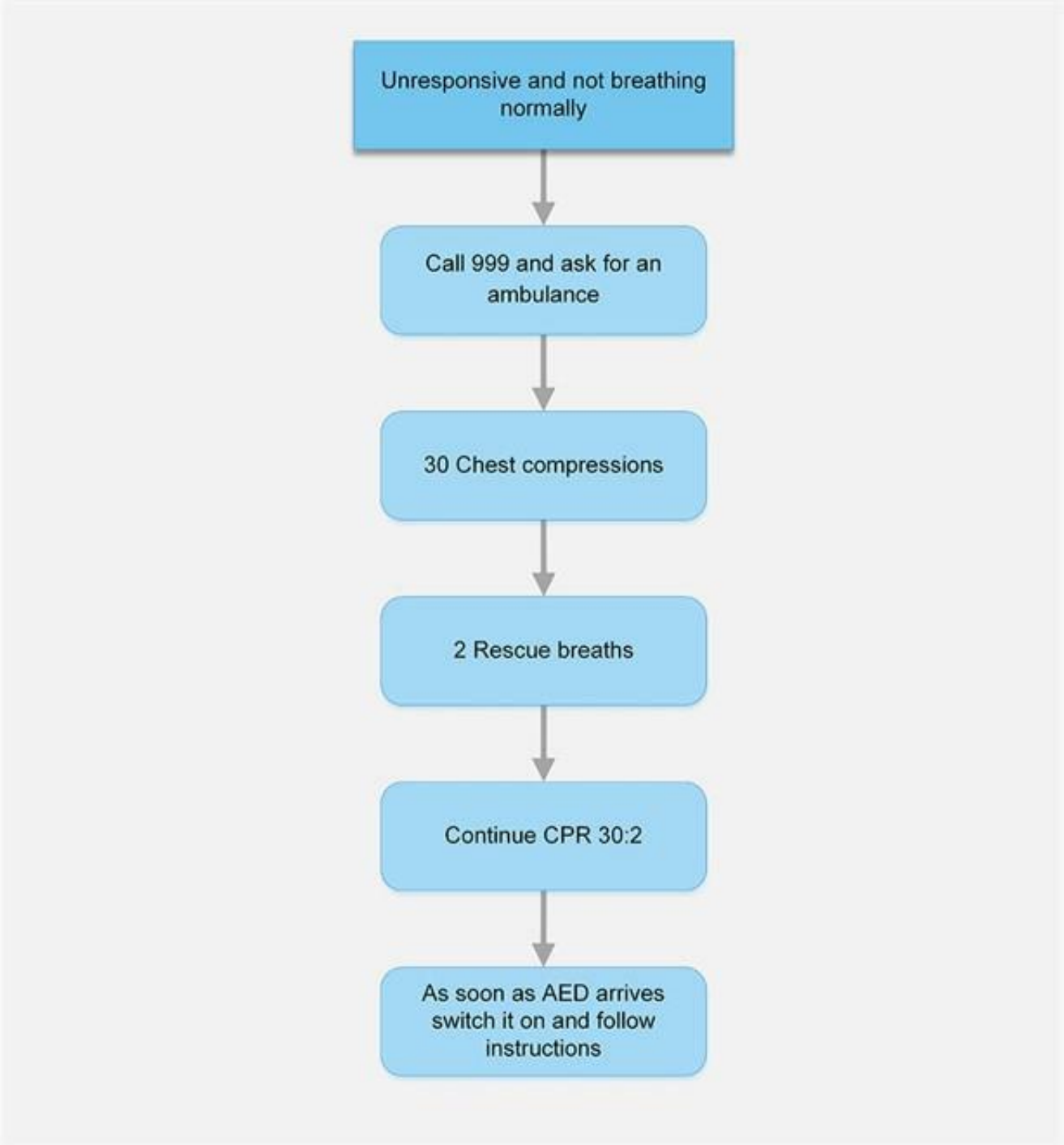
E – Potentially flushed skin, no cyanosis, cramping of hands

### Management (19)

- Stay calm, be firm but reassuring
- Coach the patient's breathing to encourage them to slow their breathing down
- Call form medical advice if the attack is prolonged or you are in doubt.

DO NOT ask the patient to breathe into a paper bag – if the hyperventilation is due to a more serious underlying cause this could worsen it.

# Adult Basic Life Support (11)



| SEQUENCE | TECHNICAL DESCRIPTION |
|---|---|
| **SAFETY** | **Make sure you, the victim and any bystanders are safe** |
| **RESPONSE** | **Check the victim for a response**<br>• Gently shake his shoulders and ask loudly: "Are you all right?"<br>If he responds leave him in the position in which you find him, provided there is no further danger; try to find out what is wrong with him and get help if needed; reassess him regularly |
| **AIRWAY** | **Open the airway**<br>• Turn the victim onto his back<br>• Place your hand on his forehead and gently tilt his head back; with your fingertips under the point of the victim's chin, lift the chin to open the airway |
| **BREATHING** | **Look, listen and feel for normal breathing for no more than 10 seconds**<br>In the first few minutes after cardiac arrest, a victim may be barely breathing, or taking infrequent, slow and noisy gasps. Do not confuse this with normal breathing. If you have any doubt whether breathing is normal, act as if it is they are not breathing normally and prepare to start CPR |
| **DIAL 999** | **Call an ambulance (999)**<br>• Ask a helper to call if possible otherwise call them yourself<br>• Stay with the victim when making the call if possible<br>• Activate the speaker function on the phone to aid communication with the ambulance service |
| **SEND FOR AED** | **Send someone to get an AED if available**<br>If you are on your own, do not leave the victim, start CPR |
| **CIRCULATION** | **Start chest compressions**<br>• Kneel by the side of the victim<br>• Place the heel of one hand in the centre of the victim's chest; (which is the lower half of the victim's breastbone (sternum))<br>• Place the heel of your other hand on top of the first hand<br>• Interlock the fingers of your hands and ensure that pressure is not applied over the victim's ribs<br>• Keep your arms straight |

| SEQUENCE | TECHNICAL DESCRIPTION |
|---|---|
| | • Do not apply any pressure over the upper abdomen or the bottom end of the bony sternum (breastbone)<br>• Position your shoulders vertically above the victim's chest and press down on the sternum to a depth of 5–6 cm<br>• After each compression, release all the pressure on the chest without losing contact between your hands and the sternum;<br>• Repeat at a rate of 100–120 min |
| **GIVE RESCUE BREATHS** | **After 30 compressions open the airway again using head tilt and chin lift and give 2 rescue breaths**<br>• Pinch the soft part of the nose closed, using the index finger and thumb of your hand on the forehead<br>• Allow the mouth to open, but maintain chin lift<br>• Take a normal breath and place your lips around his mouth, making sure that you have a good seal<br>• Blow steadily into the mouth while watching for the chest to rise, taking about 1 second as in normal breathing; this is an effective rescue breath<br>• Maintaining head tilt and chin lift, take your mouth away from the victim and watch for the chest to fall as air comes out<br>• Take another normal breath and blow into the victim's mouth once more to achieve a total of two effective rescue breaths. Do not interrupt compressions by more than 10 seconds to deliver two breaths. Then return your hands without delay to the correct position on the sternum and give a further 30 chest compressions<br>• You can also use a pocket mask if available<br>Continue with chest compressions and rescue breaths in a ratio of 30:2<br><br>If you are untrained or unable to do rescue breaths, give chest compression only CPR (i.e. continuous compressions at a rate of at least 100–120 min) |
| **IF AN AED ARRIVES** | Switch on the AED<br>• Attach the electrode pads on the victim's bare chest<br>• If more than one rescuer is present, CPR should be continued while electrode pads are being attached to the chest<br>• Follow the spoken/visual directions<br>• Ensure that nobody is touching the victim while the AED is analysing the rhythm |

# Paediatric Basic Life Support Modifiers

- Give 5 rescue breaths before starting chest compressions
- Depress the chest 1/3 of the depth (2 fingers for an infant and 1 or 2 hands for a child)
- If you are on your own, give 1 min of CPR before going for help

**Chest compressions in children aged over 1 year:**

- Place the heel of one hand over the lower half of the sternum (as above)
- Lift the fingers to ensure that pressure is not applied over the child's ribs
- Position yourself vertically above the victim's chest and, with your arm straight, compress the sternum to depress it by at least one-third of the depth of the chest, approximately 5 cm
- In larger children, or for small rescuers, this may be achieved most easily by using both hands with the fingers interlocked

If there are 2 or more rescuers you can use the encircling technique as featured in this image. One rescuer would perform chest compressions and the other would deliver rescue breaths to the patient using relevant equipment if available.

- Placing both thumbs flat, side-by-side, on the lower half of the sternum with the tips pointing towards the infant's head.
- Spread the rest of both hands, with the fingers together, to encircle the lower part of the infant's rib cage with the tips of the fingers supporting the infant's back
- Press down on the lower sternum with your two thumbs to depress it at least one-third of the depth of the infant's chest, approximately 4 cm

Basic life support should continue until one of the follow applies:

- The child shows signs of life (normal breathing, cough, movement or definite pulse of greater than 60 min)
- Further qualified help arrives
- You become exhausted

## BLS in Pregnancy

A left lateral tilt in pregnancy over 20weeks will reduce inferior vena caval compression. However, the current advice from The Resuscitation Council is that the left lateral tilt is effective **provided** she is on a firm surface (e.g. tilting table or spinal board) tilted at 15-30° from head to toe. The patient's body needs to be supported on a firm surface to enable effective chest compressions.

## Recovery position

| | |
|---|---|
| **RECOVERY POSITION** | **If you are certain the victim is breathing normally but is still unresponsive, place in the recovery position**<br>• Remove the victim's glasses, if worn<br>• Kneel beside the victim and make sure that both his legs are straight<br>• Place the arm nearest to you out at right angles to his body, elbow bent with the hand palm-up<br>• Bring the far arm across the chest, and hold the back of the hand against the victim's cheek nearest to you<br>• With your other hand, grasp the far leg just above the knee and pull it up, keeping the foot on the ground<br>• Keeping his hand pressed against his cheek, pull on the far leg to roll the victim towards you on to his side<br>• Adjust the upper leg so that both the hip and knee are bent at right angles<br>• Tilt the head back to make sure that the airway remains open<br>• If necessary, adjust the hand under the cheek to keep the head tilted and facing downwards to allow liquid material to drain from the mouth<br>• Check breathing regularly<br>**Be prepared to restart CPR immediately if the victim deteriorates or stops breathing normally** |

## References


1 - World Health Organisation (2009) WHO guidelines on Hand Hygiene in Healthcare; a summary (online). Available at http://apps.who.int/iris/bitstream/10665/70126/1/WHO_IER_PSP_2009.07_eng.pdf

2 - The Vaccine Administration Taskforce (2001). *UK guidance on best practice in vaccine administration.* London: Shire Hall Communications (online). Available at- http://www.wales.nhs.uk/sitesplus/documents/861/UK%20best%20practice%20guidance%20vacc%20 admin%202001.pdf

3 - Health and Safety Executive (2013) Health and safety (Sharps regulations in Healthcare) Regulations (online). Available at -http://www.hse.gov.uk/pUbns/hsis7.pdf

5 - World Health Organisation (2010) *WHO best practices for injection and related procedures toolkit* (online)

Available at - http://apps.who.int/iris/bitstream/10665/44298/1/9789241599252_eng.pdf

Public Health England (2013) *The Green Book (Immunisation against Infectious Diseases (*online). Available at -https://www.gov.uk/government/collections/immunisation-against-infectious-disease-the-green-book

6 - Dougherty L, Lister S (Eds) (2015) *The Royal Marsden Hospital Manual of Clinical Nursing Procedures (9th Ed).* Wiley Blackwell: Chichester

7 - Department of Health (2010) Reference Guide to consent for examination and treatment (online) Available at - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/138296/dh_103653__1_.pdf

8 -Public Health England and Royal College of Nursing (2015) Immunisation Knowledge and Skills competence assessment tool (online). Available at https://www2.rcn.org.uk/__data/assets/pdf_file/0011/641918/RCN_PHE_immunisation_TOOL_2015_WEB.pdf

9 - Public Health England (2014) Vaccine update. Issue 222 (online). Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/383514/VU_222_Nov_DEC_2014_09_Accessible.pdf

10 - Medical Protection Society (2016) (online). Available at - https://www.medicalprotection.org/uk/resources/factsheets/england/england-factsheets/uk-chaperones

11 - Resuscitation Council UK (2015) Adult Basic Life support and automated external defibrillation guidelines. (online) Available at - https://www.resus.org.uk

12 - Mental Capacity Act (2005) (online).
Available at
http://www.legislation.gov.uk/ukpga/2005/9/
section/3

13 - Medication & Healthcare Products Regulatory Agency (20106) (online)
Available at - https://yellowcard.mhra.gov.uk/the-yellow-card-scheme/

14 - Public Health England (2016) The National Childhood Flu Immunisation Programme 2016/17: Information for healthcare practitioners (online). Available at - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/551676/Childhood_flu_programme_information_for_healthcare_practitioners.pd

15 - EMC (2016) SPC - *Fluenz Tetra nasal spray suspension Influenza vaccine (live attenuated, nasal* ) (online) Available at-
https://www.medicines.org.uk/emc/medicine/29112

16 - Public Health England (2016) Seasonal Influenza Vaccination with the inactivated influenza vaccine – Information for Health Care Practitioner 2016/17 (online). Available at-
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/567675/Inactivatedfluv accineInfoforHCW.pdf.pdf

17 - Health Protection Agency (2012) Vaccine incident guideline (online). Available at - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/326417/Vaccine_Incide nt_Guidance.pdf

18 - Ogston Tuck (2014) Intramuscular injection technique: an evidence-based approach. *Nursing Standard. 29, 4*

19 - Pilbery, R. and Lethbridge, K. (2016) *Ambulance Care Practice*. Class Professional Publishing: Bridgewater

*20* - The Resuscitation Council (2015) *Emergency treatment of anaphylactic reactions: Guidelines for healthcare providers (online).* Available at -
https://www.resus.org.uk/anaphylaxis/emergency-treatment-of-anaphylactic-reactions/
*21* – Youtube videos covering core topics on Vaccination course -
https://www.youtube.com/playlist?list=PLQMgtoxUXDV8OoHf425lXMcK_zzABzWb4