Calculating and Drawing Up Anaesthetic Drugs

University of BRISTOL

Year Group: BVSc3 +

Document number: CSL_A07

University of BRISTOL

Equipment list: Calculating and Drawing Up Anaesthetic Drugs

Equipment for this station:

- Pen
- Paper
- Syringe
- Needle
- ‘Drugs’ (in the Clinical Skills Lab labelled bottles of water are used)
- Labels

Considerations for this station:

- Use sharps safely and dispose of them in a sharps bin
- In practice, drugs in bottle have different colours and consistencies. The appearance of all the example drugs in this booklet are the same, which does illustrate the importance of labelling each syringe at the time.
- It can be useful to refer to a compendium of data sheets e.g. NOAH Compendium (www.noahcompendium.co.uk/), when calculating drug dosages.
- Towards the end of this booklet there are scenarios to try calculating drug doses; then practise drawing up each drug.

Anyone working in the Clinical Skills Lab must read the ‘CSL_I01 Induction’ and agree to abide by the ‘CSL_I00 House Rules’ & ‘CSL_I02 Lab Area Rules’

Please inform a member of staff if equipment is damaged or about to run out.

University of BRISTOL

Clinical Skills: Calculating and Drawing Up Anaesthetic Drugs

Start with the pre-medication drugs.

Select the appropriate syringe for the amount to be drawn up; for example, for 0.4ml, a 1ml syringe is the closest available size. Choosing a syringe of the most appropriate size allows for greatest accuracy.

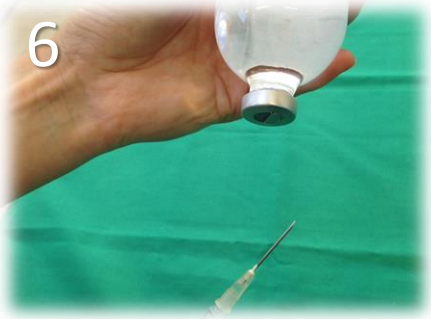
Attach a needle to the syringe.

Note: In the Clinical Skills Lab old needles are re-used but in practice always use a sterile needle and syringe.

Hold the pre-medication drug e.g. Acepromazine upside down *(in the Clinical Skills Lab it will be water in a labelled bottle).* Insert the needle into the centre of the rubber seal at the end of the bottle.

Draw back carefully on the syringe plunger to withdraw the required volume of drug.

If too much is drawn into the syringe it can be injected back into the bottle. However, ONLY if using a new needle and syringe AND there is only a single drug in the syringe. DO NOT inject back into the bottle if there is a combination of drugs in the syringe.



Remove the needle and syringe from the bottle, be careful not to stab yourself! Cap the needle using a one-handed technique (see booklet 'CSL_U02 Safe Use of Needles').

University of BRISTOL

Clinical Skills: Calculating and Drawing Up Anaesthetic Drugs

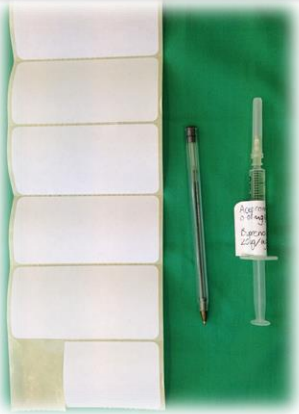
7

For the second premedication drug: Select a new needle and syringe and carry out the same procedure. Be careful to draw up the correct amount, for example, for 1.3ml use a 2ml syringe.

8

Combine the premedication drugs in the same syringe: Remove and discard the needle from one drug 'X'. Holding the syringe vertically (nozzle upwards) draw back the plunger to create an air bubble. Place the needle attached to the other syringe (drug 'Y') into the nozzle of syringe X and inject the drug to mix them. Attach a fresh needle. The premedication can then be administered in one injection.

9



Write a label to clearly indicate what is contained inside the syringe, and stick it around the body of the syringe.

10

Inject the premedication (refer to 'CSL_U04 Intramuscular Injection' as a reminder of the injection technique if necessary).

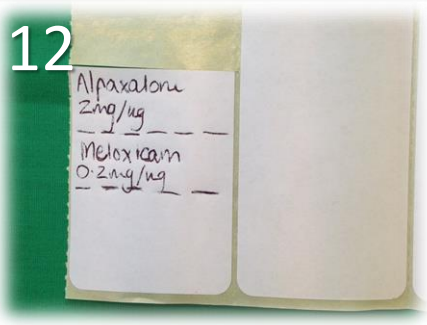
Carefully replace the cap on the needle (see booklet 'CSL_U02 Safe Use of Needles') and remove the needle from the syringe. Discard of the contents of the syringe in the sink.

11

Draw up the induction agent and analgesia. In practice, use a new syringe and needle for each, but in the Clinical Skills Lab please re-use resources whenever possible.

N.B. **Only** the premedication drugs can be mixed together in one syringe. The induction agent and analgesia must be given separately.

12



Don't forget to label each syringe with the contents, otherwise it is easy to get them mixed up.

University of BRISTOL

Resetting the station: Calculating and Drawing Up Anaesthetic Drugs

1. Dispose of any used paper in the bin.
2. Tidy the needle and syringe away ready for the next person. If the needle is blunt, discard it in a sharps bin.
3. Put the drug bottles away, ready for the next person.

Station ready for the next person:

Please inform a member of staff if equipment is damaged or about to run out.

University of BRISTOL

I wish I'd known:
Calculating and drawing up anaesthetic drugs

- When sticking on the label onto the syringe to identify what it contains, place the label on the part of the syringe barrel that does not contain the drug. Therefore, the label does not prevent you from seeing how much of a drug you have given. This is particularly important with a drug such as propofol which is given 'to effect'.
- In practice, you draw up all the drugs you require in advance – so you will have one syringe of pre-medication, one syringe of induction agent and one syringe of pain relief. Often these three syringes (plus any other drugs the animal is likely to need) are stored together in a kidney dish until used, hence the need for proper labelling.
- In small animal clinics, you will typically calculate the dose of induction agent (propofol, alfaxalone) but then draw up a full syringe e.g. if the does is 3.6ml, draw up 5ml. This makes it easier to see how much drug has been given when dosing to effect.
- Be careful when drawing up a combination of drugs into one syringe; if you draw up too much of one drug into the syringe you cannot inject it back into the bottle as you will contaminate the bottle with the other drug in the syringe.
- Ensure you use the full generic drug name if asking a colleague to administer medication on your behalf. For example, "bute" could be interpreted as phenylbutazone, butorphanol or even the trade name for a deltamethrin pour-on suspension.

University of BRISTOL

Clinical Scenario 1
Calculating and Drawing Up Anaesthetic Drugs

You are presented with Stig, a three year old, 20kg male Springer spaniel. His owners have decided to have him castrated and you are drawing up the drugs for his anaesthetic. Work out how much of the following drugs (in ml) will be needed to anaesthetise Stig *(answers are on the next page).*

Premedication:

- Acepromazine
  - Dose rate: 0.04mg/kg
  - Concentration: 2mg/ml

- Buprenorphine
  - Dose rate: 20µg/kg
  - Concentration: 0.3mg/ml

Induction:

- Alfaxalone
  - Dose rate: 2mg/kg
  - Concentration: 10mg/ml

Nonsteroidal anti-inflammatory drug (NSAID):

- Meloxicam
  - Dose rate: 0.2mg/kg
  - Concentration: 5mg/ml

University of BRISTOL

Scenario 1 Answers: Calculating and Drawing Up Anaesthetic Drugs

Premedication:

- Acepromazine
  - Dose rate: 0.04mg/kg = 0.04 x 20(kg) = 0.8mg required.
  - Concentration: 2mg/ml = 0.8/2 = **0.4ml**

- Buprenorphine
  - Dose rate: 20µg/kg = 20 x 20(kg) = 400µg required.
  - Convert from µg to mg: 400/1000 = 0.4mg required.
  - Concentration: 0.3mg/ml = 0.4/0.3 = **1.3ml**

Induction:

- Alfaxalone
  - Dose rate: 2mg/kg = 2 x 20(kg) = 40mg required
  - Concentration: 10mg/ml = 40/10 = **4ml**

Nonsteroidal anti-inflammatory drug (NSAID):

- Meloxicam
  - Dose rate: 0.2mg/kg = 0.2 x 20(kg) = 4mg required
  - Concentration: 5mg/ml = 4/5 = **0.8ml**

Next try drawing up the calculated doses.

University of BRISTOL

Clinical Scenario 2
Calculating and Drawing Up Anaesthetic Drugs

Barney is a 5kg tom cat who has been brought in for castration. The practice uses the following drug combination for cat anaesthesia. Work out how much of each drug will be needed for Barney.

Premedication:

- Dexmedetomidine
  - Dose rate: 2µg/kg
  - Concentration: 0.1mg/ml

- Methadone
  - Dose rate: 0.1mg/kg
  - Concentration: 10mg/ml

Induction:

- Propofol
  - Dose rate: 4mg/kg
  - Concentration: 10mg/ml

Nonsteroidal anti-inflammatory drug (NSAID):

- Meloxicam
  - Dose rate: 0.2mg/kg
  - Concentration: 2mg/ml

University of BRISTOL

Scenario 2 Answers
Calculating and Drawing Up Anaesthetic Drugs

Premedication:

- Dexmedetomidine
  - Dose rate: 2µg/kg = 2 x 5(kg) = 10µg
  - Convert from µg to mg: 10/1000 = 0.01mg required
  - Concentration: 0.1mg/ml = 0.01/0.1 = **0.1ml**

- Methadone
  - Dose rate: 0.1mg/kg = 0.1 x 5(kg) = 0.5mg required
  - Concentration: 10mg/ml = 0.5/10 = **0.05ml**

Induction:

- Propofol
  - Dose rate: 4mg/kg = 4 x 5(kg) = 20mg required
  - Concentration: 10mg/ml = 20/10 = **2ml**

Nonsteroidal anti-inflammatory drug (NSAID):

- Meloxicam
  - Dose rate: 0.2mg/kg = 0.2 x 5(kg) = 1mg required
  - Concentration: 2mg/ml = 1/2 = **0.5ml**

Next try drawing up the calculated doses.

University of BRISTOL

Clinical Scenario 3
Calculating and Drawing Up Anaesthetic Drugs

Lulu is a 4kg female cat who has been brought in to be spayed. The practice uses the following drug combination and protocols for cat spays. Work out how much of each drug will be needed for Lulu.

Feline 'Triple combination' anaesthesia:

- Dexmedetomidine
  - Dose rate: 20µg/kg
  - Concentration: 0.5mg/ml

- Ketamine
  - Dose rate: 5mg/kg
  - Concentration: 100mg/ml

- Butorphanol
  - Dose rate: 0.1mg/kg
  - Concentration: 10mg/ml

Nonsteroidal anti-inflammatory drug (NSAID):

- Carprofen
  - Dose rate: 4mg/kg
  - Concentration: 50mg/ml

University of BRISTOL

Scenario 3 Answers
Calculating and Drawing Up Anaesthetic Drugs

Feline 'Triple combination' anaesthesia:

- Dexmedetomidine
  - Dose rate: 20µg/kg = 20 x 4(kg) = 80µg
  - Convert from µg to mg: 80/1000 = 0.08mg required
  - Concentration: 0.5mg/ml = 0.08/0.5 = **0.16ml**

- Ketamine
  - Dose rate: 5mg/kg = 5 x 4(kg) = 20mg required
  - Concentration: 100mg/ml = 20/100 = **0.2ml**

- Butorphanol
  - Dose rate: 0.1mg/kg = 0.1 x 4(kg) = 0.4mg required
  - Concentration: 10mg/ml = 0.4/10 = **0.04ml**

Nonsteroidal anti-inflammatory drug (NSAID):

- Carprofen
  - Dose rate: 4mg/kg = 4 x 4(kg) = 16mg required
  - Concentration: 50mg/ml = 16/50 = **0.32ml**

Next try drawing up the calculated doses.

University of BRISTOL

Clinical Scenario 4
Calculating and Drawing Up Anaesthetic Drugs

Moose is a nine year old Arabian mare. She weighs 350kg and has been brought to the surgery for investigative intestinal surgery. The practice uses the following drug protocol. Work out how much of each drug will be needed for Moose.

Premedication:

- Acepromazine
  - Dose rate: 0.02mg/kg
  - Concentration: 10mg/ml

- Romifidine
  - Dose rate: 100µg/kg
  - Concentration: 10mg/ml

Induction:

- Ketamine
  - Dose rate: 2.2mg/kg
  - Concentration: 100mg/ml

- Diazepam
  - Dose rate: 0.05mg/kg
  - Concentration: 5mg/ml

Analgesia:

- Buprenorphine
  - Dose rate: 20µg/kg
  - Concentration: 0.3mg/ml

- Flunixin
  - Dose rate: 1.1mg/kg
  - Concentration: 50mg/ml

University of BRISTOL

Scenario 4 Answers
Calculating and Drawing Up Anaesthetic Drugs

Premedication:

- Acepromazine
  - Dose rate: 0.02mg/kg = 0.02 x 350(kg) = 7mg required
  - Concentration: 10mg/ml = 7/10 = **0.7ml**

- Romifidine
  - Dose rate: 100µg/kg = 100 x 350(kg) = 35000 µg
  - Convert from µg to mg: 3500/1000 = 35mg required
  - Concentration: 10mg/ml = 35/10 = **3.5ml**

Induction:

- Ketamine
  - Dose rate: 2.2mg/kg = 2.2 x 350(kg) = 770mg required
  - Concentration: 100mg/ml = 770/100 = **7.7ml** *(Ketamine has a high therapeutic index so this would normally be rounded up to 7.8 or even 8 so that it can be drawn up accurately)*

- Diazepam
  - Dose rate: 0.05mg/kg = 0.05 x 350(kg) = 17.5mg required
  - Concentration: 5mg/ml = 17.5/5 = **3.5ml**

Analgesia:

- Buprenorphine
  - Dose rate: 20µg/kg = 20 x 350(kg) = 7000µg
  - Convert from µg to mg: 7000/1000 = 7mg required
  - Concentration: 0.3mg/ml = 7/0.3 = **23.3ml**

- Flunixin
  - Dose rate: 1.1mg/kg = 1.1 x 350(kg) = 385mg
  - Concentration: 50mg/ml = 385/50 = **7.7ml** *(Flunixin has a low therapeutic index so this would normally be rounded down to 7.6 so that it can be drawn up accurately)*

Next try drawing up the calculated doses.