MONITORING ANAESTHESIA OF LABORATORY ANIMALS

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Anaesthesia is the controlled and reversible intoxication of the central nervous system where the patient neither perceives nor recalls noxious stimuli [1]. The keywords are controlled and reversible, which infers that the state of unconsciousness is monitored and managed, and that complete recovery occurs. Furthermore, there will be no experience of pain. The aim of anaesthesia is to create a balance of unconsciousness, analgesia and muscle relaxation [2]. However, anaesthesia is a complex process, with many critical steps that must be performed in a considered, timely and competent way. Monitoring during anaesthesia must focus on both subjective and objective observations and measurements of the central nervous system, the cardiovascular system, the respiratory system and the thermoregulatory system. In tiny laboratory animals it is much more difficult to monitor the aforementioned physiological systems as the size of the animal, visual and tactile access is often limited, and equipment must be customised for accuracy. Nevertheless, comprehensive monitoring remains vital to ensure anaesthesia is both safe and efficacious.

The most important aspect of monitoring during anaesthesia is having a person dedicated to the role of monitoring and recording the physiological status of the animal and any events related to the safe conduct of anaesthesia [3, 4]. This person should be appropriately skilled and trained or working under the direct supervision of someone who is appropriately skilled and trained. This person should not be the person performing the procedure.

Figure 1: Australian and New Zealand College of Veterinary Scientists Position Statement on monitoring of anaesthetised dogs and cats.

POSITION STATEMENT:

During anaesthesia of healthy dogs and cats there must be a person dedicated to the role of monitoring and recording the physiological status of the animal and any events related to the safe conduct of anaesthesia. This person must be appropriately trained and experienced or must work under direct supervision of someone who is appropriately trained and experienced.

In addition to clinical observations of the animal (palpation of a peripheral pulse, measurement of pulse rate and respiratory rate, observation of mucous membrane colour/ capillary refill time and subjective assessment of depth of anaesthesia), monitoring of anaesthesia should be complimented by the use of equipment including a pulse oximeter, capnograph, blood pressure monitor, and thermometer. A record of anaesthesia must be created in every case. Animals must always be observed from the time that drugs are first administered to the time that adequate recovery from the procedure has been confirmed.

The Code[5] makes various statements about anaesthesia of animals:

3.3.8 The use of local and general anaesthetics, analgesics and sedatives must be considered as part of a plan to manage pain and distress, and such use should at least parallel their use in current veterinary or medical practice.

3.3.11 Regardless of their mechanism of action, the effectiveness of all anaesthetics must be monitored throughout anaesthesia.

3.3.12 When general anaesthesia is used, procedures must conform with current veterinary or medical practice and ensure that:

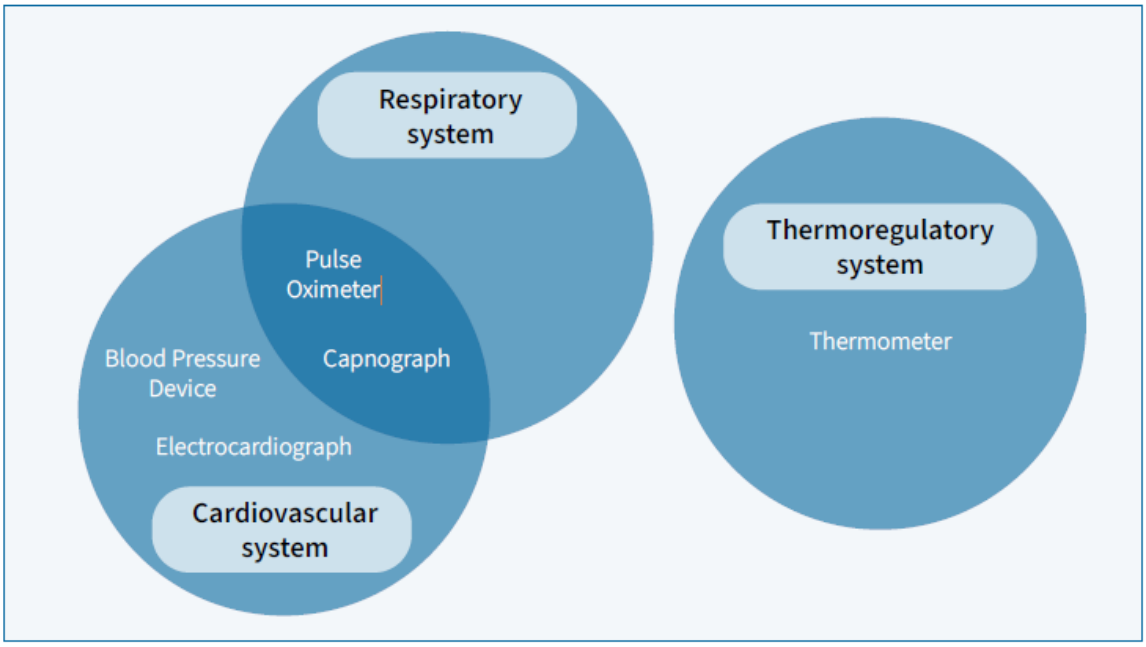
(i) induction is smooth, with minimum distress to the animal

(ii) the animal and the effectiveness of the anaesthetic are monitored to maintain an adequate plane of anaesthesia, minimise physiological disturbances, and monitor and manage potential complications (e.g. hypothermia, and cardiovascular and respiratory depression).

With these expectations in mind application of the general principles of monitoring anaesthesia must be contextualised to the species of animal.

Monitoring of the cardiovascular, respiratory and thermoregulatory systems along with subjective assessment of depth of anaesthesia infers central nervous system depression (which cannot itself be accurately and directly measured in animals in real time…..yet). Basic monitoring can be performed with a stethoscope, thermometer and clinical observations. More advanced monitoring requires equipment such as a blood pressure measurement device, pulse oximeter, electrocardiograph and capnography.

Figure 2: Monitoring equipment may give information about more than one physiological system.



During anaesthesia observation monitoring of laboratory animals includes the following[6]:

- Colour of mucous membranes and skin, ears, tail and paw pads
    - Indicates tissue perfusion and oxygenation
- Respiratory rate and pattern
    - Changes in respiratory rate, pattern, effort and depth may be indicative of anaesthetic depth or response to noxious stimuli
- Response to painful stimulus
    - Paw withdrawal indicates inadequate depth of anaesthesia

Monitoring equipment can also be used in laboratory animals:

- Thermometer
- Pulse oximetry
- Electrocardiography
- Blood pressure
- Capnography

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