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# The veterinary nurse's role in equine ultrasonography

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**ABSTRACT:** This article discusses the veterinary nurse's role in equine ultrasonography and describes the equipment required and patient preparation.

## Introduction

Veterinary nurses who work in mixed or equine practice are likely to assist veterinary surgeons in the ultrasonography of equine patients. A range of body systems may be imaged, including musculoskeletal, gastrointestinal and reproductive systems. RVNs should be able to arrange a suitable environment, select appropriate equipment and prepare patients effectively in order to ensure that an optimum image is produced with minimal stress to the patient.

## Selecting the appropriate environment

Due to its large size and the potential for "flight" behaviour, injury is always a possibility when dealing with the species, particularly in unfamiliar environments. The RVN should select a suitable area in which to examine the patient, to minimise the risk of injury to personnel, the horse and the expensive equipment used to perform the procedure.

When assisting a vet with ultrasonography in the hospital environment the RVN should select a large examination room, which is ideally lined with non-slip rubber matting to reduce the likelihood of injury to the patient or personnel if the patient were to become stressed or anxious. The room should have dimmable lights, to improve visualisation of the ultrasound image on the screen of the scanner. If the patient is having transrectal ultrasonography, stocks should be used if the hospital has these available in order to reduce the risk of kick injuries to the vet performing the procedure.

If the procedure is to be carried out in the patient's home environment, a stable should be selected, as the patient is likely to be calmer in their normal environment. The bedding should be brushed back to facilitate positioning of the scanner and the stable should be kept as dark as possible to facilitate visualisation of the image. If the patient is having transrectal ultrasonography and its temperament is unpredictable, the patient should be positioned so that the vet can ultrasound the patient over the stable door to reduce the risk of injury.

## Ultrasound equipment

Prior to any ultrasonography procedure the RVN must enter the patient's details into the machine to ensure that recorded images can be saved onto the patient's clinical records. This will allow comparison images to be taken throughout the treatment regime.

The ultrasound scanner is usually based on a trolley (**Figure 1**). This allows easy movement of the machine into an appropriate position and also enables it to be repositioned quickly if the patient becomes stressed.

A range of transducers are available for use and each one produces varying image quality depending on the part of the anatomy imaged. The majority of musculoskeletal imaging is performed using a linear-array transducer, especially the superficial digital flexor tendon (Neelis & Roberts, 2012). It produces better images closer to the skin and thus would be the ideal transducer for imaging this region (Smith, Holmes, & Turley, 2012).



Figure 1. Ultrasound scanner on a trolley



Figure 2. A linear-array transducer with stand-off pad

For transrectal ultrasonography a 5–10 MHz linear rectal transducer is used. If the patient is having abdominal ultrasonography, a convex transducer (often referred to as curvilinear) would be chosen. A low-frequency, phased-array (sector) transducer is used for cardiac ultrasonography, and for ophthalmic ultrasonography the RVN should select a high-frequency linear probe which is generally also selected for distal limb, musculoskeletal imaging.

To improve musculoskeletal imaging, a stand-off pad (Figure 2) containing sonolucent substances should be used on top of the transducer. This improves image quality, as superficial structures are moved further away from the transducer and closer to the focal zone, and contact between the transducer and skin is improved (Smith et al., 2012).

### Patient handling and restraint

The patient is likely to become stressed and anxious in the hospital environment. Therefore, it should ideally be held by its owner, with whom it is more likely to feel relaxed. If, however, the horse becomes very difficult and potentially dangerous, the veterinary nurse should restrain the horse, to prevent injury to the owner and potentially liability of the practice if the owner was to become injured. Patients that are undergoing transrectal ultrasonography should be restrained within stocks prior to and during the procedure, to ensure the safety of personnel. Although the procedure is completely painless and non-invasive, patients that are nervous, anxious or in pain may need to be sedated by the vet (Aspinall, 2006).

### Patient preparation

Patient preparation is very important for ensuring a good acoustic window (the area in which sound waves pass through the patient unimpeded), thus facilitating good-quality image production. To ensure a good-quality image, the patient must stand squarely, bearing weight evenly on all four legs if possible. This is especially important in distal limb, musculoskeletal imaging, as changes in the patient's position can lead to an enlargement of the acoustic window.

### Distal limb ultrasonography

For distal limb musculoskeletal imaging, where patients could have a suspensory ligament injury, the palmar or plantar aspect of both limbs in the area of interest should be prepared, including medially and laterally if required. The area should be clipped using clean, well-lubricated, size 40 clipper blades and cleaned using chlorhexidine to remove any contaminants which could cause artefacts on the image. Image quality can be improved by applying coupling gel in order to prevent a transducer–air–skin interface (air between the transducer and the skin). Without clipping and applying coupling gel, the high-frequency waves would not

be produced by the electrical stimulation within the transducer (Holloway, 2012). The gel should be left in contact for 10 minutes before the examination commences, as the longer the contact time the better the transmission of ultrasound waves through the skin, thus giving an improved image (Smith et al., 2012).

Following the procedure, the patient's legs should be washed carefully to remove the coupling gel, as it can irritate the skin (Smith et al., 2012). The stand-off pad should also be washed in warm water as, although the gel is water-soluble, it can be difficult to remove once it has dried. The machine, transducer and cables should be cleaned and checked for damage after use.

### Transabdominal ultrasonography

If a patient requires transabdominal ultrasonography (Figure 3), for investigating conditions such as gastrointestinal pain, the RVN should consult with the vet regarding hair removal. If the patient has a thick coat, the high-frequency waves would not be produced by the electrical stimulation within the transducer and a poor image could be produced. In these cases, the patient's entire abdomen should be clipped from the paralumbar fossa region from the level of the tuber coxae to the level of the stifle, extending cranially to the 4th intercostal space and ventrally from the inguinal region to the sternum. The area should then be cleaned and copious amounts of surgical spirit or isopropyl alcohol should be applied to improve transducer–skin contact. If the patient has a thin coat, it might not require clipping to improve image quality.

Following the procedure, the patient's skin should be rinsed thoroughly and the region dried, especially on cold days in order to reduce the risk of hypothermia. The transducer needs to be cleaned following use as the surgical spirit or isopropyl alcohol can cause damage to the latex at the end of the transducer.

### Cardiac ultrasonography

If the patient requires cardiac ultrasonography, the region is prepared in the same way as for transabdominal ultrasonography.

### Pre-breeding examination

Mares having a pre-breeding examination of the uterus and ovaries will require transrectal ultrasonography, so the RVN will need to bandage the patient's tail so that it does not get in the way during the examination. This also prevents hairs from





▲ **Figure 3.** Transabdominal ultrasound scan

entering the anus during the procedure (Crabtree, 2012).

#### Ophthalmic examination

Occasionally patients with ocular disorders, such as corneal oedema and ocular trauma, may require ophthalmic ultrasonography. The vet will perform an auriculo-palpebral block and apply local anaesthetic to the surface of the cornea. K-Y jelly is then applied as an acoustic gel either directly onto the cornea, if the vet is performing a direct placement,

or onto the eyelid if the procedure is transpalpebral.

Following a direct placement, the eye should be lavaged to remove the K-Y jelly and, if transpalpebral, the K-Y jelly should be removed with damp cotton wool (BCF, 2014).

#### Conclusion

Ultrasonography can be used for a range of diagnostic procedures in

equine practice. If patients are handled and prepared adequately there is a low risk of injury to personnel and the patient. There are also many advantages associated with the use of ultrasound rather than other diagnostic techniques: ultrasound is relatively inexpensive, enables anatomy to be viewed in real time and negates the need to use ionising radiation, thus reducing the inherent risk to the patient and personnel (Neelis & Roberts, 2012).

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#### Further information

<http://www.uk-ireland.bcftechnology.com/learning/equine/clinical-resources>

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