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UP FRONT...

It may simply be the interconnectivity and tranquillity of the canals, disturbed only by the chugging of the odd passing narrow boat or cackling duck, that makes for the special character of the BSAVA Congress – held as it is in the very heart of Birmingham.

In some respects, the programme of lectures and social events is dependent *on* the venue and not just accommodated *by* it. The 'sameness' of the place somehow doesn't matter and, unlike the insularity of the majority of veterinary congresses, it is a very public affair as delegates share the same canal paths and malls and squares as the workers, families and young people who come to the hub of their city for a multiplicity of reasons.

No matter what the highly intensive, introspective scientific programme may offer, the walk from the lecture theatres to the commercial exhibition leaves none of the delegates in any doubt of the continuity of the world around them and the communities in which they are called to serve and care.

If there was an emerging theme from this year's 60th anniversary congress, it was a realisation that for the veterinary professions to survive in our turbulent and highly fickle society, they must adopt a more flexible, holistic approach – not only towards working with each other, but also in meeting the expectations of their clients.

This principle was perhaps best encapsulated in a refreshing session led by RVNs Hilary Orpet and Andrea Jeffery, who said that any nursing care plan should be aimed at returning the patient to its *normal* routine. "Treat the whole patient ... not just the hole in the patient!" they said as they emphasised the importance of a holistic approach and showed how it helps to add the extra dimension of what is *normal* for an individual animal to complement the clinical approach, surgery and nursing.

A complete and thorough patient assessment should take place at the time of a pet's registration with the practice, in order to gain this background information – collected electronically via e-mail or using an App and added to the patient record and updated regularly.

This is an ideal role for veterinary nurses and ensures that they are engaged with every animal at an early stage of its involvement with the practice. Rather than waiting until the patient is subsequently admitted or has a problem, this information can be collected as a part of a 'new client' interview – an opportunity to introduce clients to the practice facilities and the nursing clinics available.

This holistic, patient-centred approach, in turn, increases client loyalty and can also include an element of client assessment to make sure that any case management plans involving home care take into account the owner's lifestyle. And everything becomes joined up, just like the canals in Brum.

David Watson
Editor

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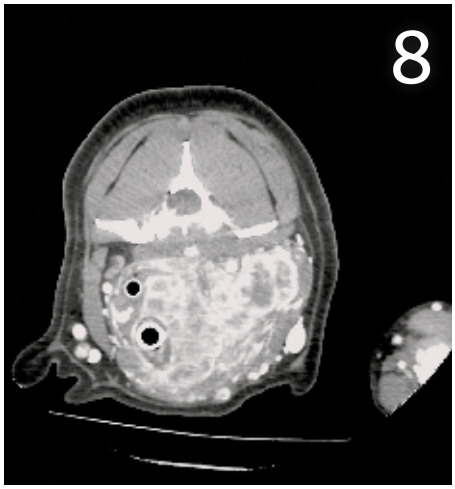

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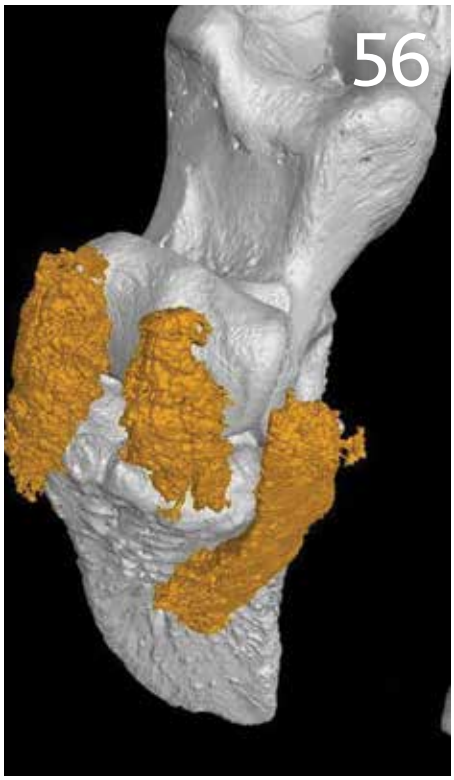

Exotics and wildlife

Management

Industry

Money money money. How much should we let clients spend?

James Yeates
BVSc BSc DWEL DipECAWBM PhD FRCVS

Dr James Yeates is chief veterinary officer of the RSPCA, RCVS Registered Specialist in Animal Welfare Science, Ethics and Law, editor of the Journal of Animal Welfare Science, Ethics and Law and previously chair of the BVA Ethics and Welfare Group and honorary secretary of the SPVS.

The topic of veterinary fees is one of continuous public contention. Most practices regularly receive complaints about charges – indeed, there have been a few 'pseudo-scandalous exposés' during recent years and many of us find discussions about treatment costs can be one of the hardest aspects of clinical work.

There is no doubt that veterinary fees can be unexpectedly high for unprepared owners. Many clients have unrealistic – and unreasonable – expectations about the cost of veterinary services, even when they have paid four-figure sums for their animals. This is partly a consequence of the opacity of costs in human health services and partly the result of a lack of research by owners before obtaining an animal. In many cases, some refuse to pay a fair price for necessary treatment and, as veterinary professionals, we cannot force them to do so. (What we do then is another issue).

Other owners may be very willing to spend money. In some cases, this may be money that we feel they can ill-afford. After we have explained the options and provided estimates, they may be willing to fork out for extensive specialist or involved treatment.

Cost concerns

There are three prominent areas for concern. The first is when owners do not appear particularly affluent, and we may worry that their expenditure could have a significant impact on their household budget, perhaps even depriving them of money for food or clothes.

The second is when such expenditure under insurance schemes may be expected to increase premiums.

The third is that this money spent on animals may be considered excessive, given the charitable medical needs of humans worldwide. Some might think it unfair that money is spent on helping animals when there are humans who cannot afford treatment for themselves, or other animals that are more in need of veterinary care.

When should we allow owners to spend this money? When should we not? What are our responsibilities as veterinary practitioners?

Areas of expertise

We, as veterinary professionals, can decide about animal welfare. Epistemically, we can – in discussion with owners and colleagues – have an authoritative view on what is best for our animal patients, based on our knowledge of animal welfare, prognoses and the clinical value of tests and treatments. Ethically, we have a responsibility to our patients as our primary concern. In some cases, our concern for our patients should mean we overrule owners' wishes.

In comparison, as veterinary professionals, we cannot make equivalent decisions about what is best for our clients. Epistemically, we cannot confidently contradict an owner on whether it is in their interests to spend their money on veterinary fees, in comparison to anything else. Ethically, we should not be so paternalistic as to overrule their autonomous choices on what to spend their money on. That is down to them.

So, as a general principle, we should offer and provide what is right for the animal, regardless of its owner's finances. We are not here to police owner's budgeting or to dictate to them how they should use their money.

However, this does not give us a carte blanche to charge whatever we like. What this means in practice can depend on the type of transaction. So let us consider three types of transaction in which the veterinary practice provides treatment and the owner provides payment. These can be categorised A, B or C depending on whether the treatment is in the animal's interests – and are regardless of the client's interests.

> "Many clients have unrealistic – and unreasonable – expectations about the cost of veterinary services, even when they have paid four-figure sums for their animals"

"...as a general principle, we should offer and provide what is right for the animal, regardless of its owner's finances"

Cost and value

Providing some expensive treatments might be contrary to the animal's interests. Let's call these transactions Type A.

Spending money on invasive surgery with limited prospect of success, or spending money on keeping a suffering animal alive are both misuses of funds. Fundamentally, we should not allow owners to spend money on treatment that is not in the animal's interest. We should not allow owners to spend money on over-treatment.

Actually, this is not an issue of owner expenditure – we should simply not be providing such treatment in the first place or offering it as an option, regardless of financial transactions.

A different argument applies to treatment that is (net) neither harmful nor beneficial – or, more accurately, those cases where the harms and benefits cancel each other out. Let us call these cases Type B.

There is no specific welfare-based reason not to provide such treatments – and no reason to do so either. In such cases, the ethical issue is one of using owners' money. Basic fairness might suggest that such transfer of funds is acceptable if the value of treatment is explained, and if the owner is richer than the veterinary surgeon; but not if the converse is true. However, such cases of genuine ambivalent treatment options are too rare to discuss them in detail.

More common are treatments that are in the animal's interests, but seem expensive relative to the owner's budget. In these Type C cases, our primary duty is to our patients, which creates a responsibility not to refuse to provide treatment in their interests. At the same time, we have no duty not to provide it in the interests of the owner – as we cannot know whether spending the money is in the owner's interests, and it would be arrogantly paternalistic to make that judgement for them.

Motivations

It is not enough, however, for the aim to be animal welfare. Many owners are motivated to spend money to help their animals. This may be because they love them, because they feel they have a moral duty to help them, because they would feel guilty for not treating them, or all three – and these all seem to be responsible, acceptable reasons.

Perhaps there are other motivations – of similar appearance – that are not so good. Some owners might want to spend money not to obtain treatment that will help the animals, but to spend money per se. I suspect some feel subconsciously proud of "How far they go" in paying for treatment – as if it is a measure of their love or compassion. Some may want to spend money so that they "Have tried", regardless of whether the treatment is actually useful.

These motivations may be acceptable if they coincide with helping the animals, but they risk deflecting treatment decisions away from what is right.

What is in the animal's interests?

An additional complexity comes into play when determining whether treatment is in an animal's interests, particularly given the implications of any expenditure. There are ways in which providing expensive treatment is actually *contrary* to the animal's interests. In particular, when owners explicitly have a limited budget for treatment – and one can, and should, discuss this with them in advance of treatment – then spending money on some veterinary work can use up resources that might be needed for others.

As one example close to home, it is not uncommon for charities to receive owners, who have spent large amounts on work-ups at a private practice, to then be sent to a charity for the treatment. Another example from private practice is when owners have an 'insurance limit' for a particular condition – once that money is gone, they may not have additional funds to spend.

This consideration turns some apparent Type C transactions into actual Type A ones. A given treatment might be marginally in an animal's interests – wide-scale pre-op screens or a diagnostic test for an unlikely differential – yet may well use up money that is then unavailable for treatment. At the same time, it could be argued to turn many Type B cases into Type A cases, in that providing such treatments will usually only have a negative effect on an owner's budget.

In such cases, we also know– as veterinary professionals – about the possible costs of future treatment and the relative value of different treatments. We cannot set owners' budgets, but we do know about the relative value of treatments within a budget.

Fair's fair

This approach also limits us in other ways. In particular, it limits how much we should charge for treatments. On the one hand, it could be argued that charging more for a treatment (say, £2,000 rather than £1,000) is a Type B transaction – it is simply an additional transaction. On the other hand, it could be argued that when charging more will use up budgets, it is a Type A transaction. 'Overcharging' could be considered unacceptable.

This does not mean that every treatment should be provided free. If we undercharge for treatment, then we use up practice resources that could be better used in other ways, such as sustaining or developing the practice, or we have to subsidise one owner's treatment by charging more to other owners. If we charge a reasonable amount, based on what the treatment costs the practice and an appropriate margin, then that means we can make treatment decisions based on the animal's interests rather than the owner's value for money.

Conclusions

So we should not refrain from providing veterinary treatment, however expensive, when it is in our patient's interests. But, when we can identify, from discussions with owners, a limited budget, then we can – and should – advise on the best ways to spend that budget to maximise the animal's welfare.

This type of conversation perhaps does not happen often enough. We do – and should – discuss estimates, whereas we rarely discuss budgets. Such conversations may be the best way to help both our patients and our clients. ■

Stephanie Williams
BSc(Hons) Diagnostic Radiography

Stephanie graduated as a diagnostic radiographer from University Campus Suffolk in 2009. She worked in the NHS for 6.5 years – at the Bradford Royal Infirmary and then at the Hammersmith Hospital – until January 2016, when she swapped humans for animals and began as lead CT radiographer for Ipswich Veterinary Centre.

In addition to running the CT service, Stephanie is deeply involved with delivering top quality CPD to veterinary surgeons and nurses on the subject of imaging. She describes herself as "animal mad" – having three horses, two chinchillas and a re-homed cat called 'Trev' – and is a keen showjumper in her spare time.

*Suggested Personal & Professional Development (PPD)

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IMAGING

Back to the chemistry classroom – contrast media in CT scanning

CT scanning is rapidly becoming the 'go-to' imaging modality in the veterinary world. With its speed and superior image reconstruction, it provides exceptionally detailed images and a clearer look at what's going on inside our patients.

Despite its speed and superior image reconstruction, CT scanning is quite complex and often many things are taken into consideration when choosing the correct protocol. One of the main questions is whether we need to use contrast media or not. If we do, how are we going to deliver it and which type of contrast medium are we going to use?

Contrast is generally talked about as being either positive or negative. Positive contrast is usually a substance that attenuates radiation owing to its high atomic number – iodinated contrast media or barium sulphate solution, for example; whereas negative contrast doesn't attenuate any radiation owing to its low atomic number – air or carbon dioxide, for example. In CT scanning we predominantly use iodinated contrast media, such as iohexol, iopromide or iodixanol (**Figure 1**).

Molecular structure

Let us strip contrast media right back to their bare molecular structure to gain an understanding of what they are and how they work within radiological imaging.

Contrast media that are currently used in the UK are made up of a 2, 4, 6 tri-iodinated benzene ring that has been modified using chemicals. Benzene is toxic and is not water soluble; so, to change this, carboxyl acid is added. The addition of acid causes the formation of salts or amides that alter the water solubility. Three of the hydrogen atoms within the carboxyl acid are replaced with iodine, which causes it to become radio-opaque.

Iodine is the element of choice because its high atomic number creates high contrast density, it is of low toxicity and it binds firmly to the benzene ring. The other two hydrogen atoms are replaced by a chain of hydrocarbons that lower the toxicity of the compound further and make it better received by the body (**Figure 2**).

Iodinated contrast media are usually categorised according to their chemical and physical qualities, osmolality, chemical structure, ionisation in solution and iodine content as demonstrated in **Figure 3**.

As seen in the diagram, both ionic and non-ionic contrast media can be further subdivided into monomers or dimers. In a monomer, the molecules of contrast only contain one benzene ring; whereas a dimer has two benzene rings combined. This results in a greater iodine

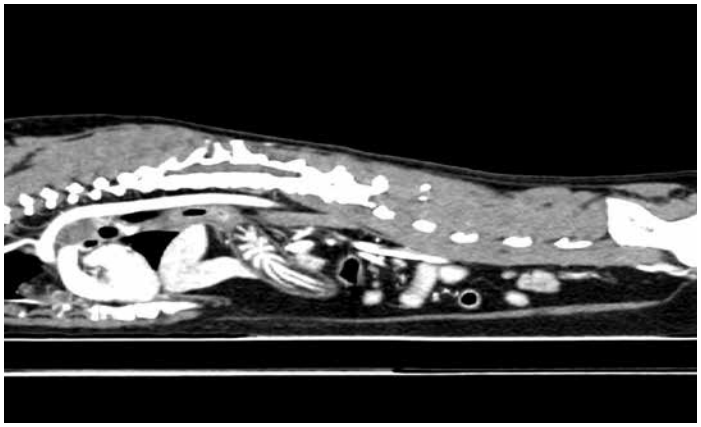


Figure 1. *White appearance of contrast media within the heart, aorta, liver and stomach.*

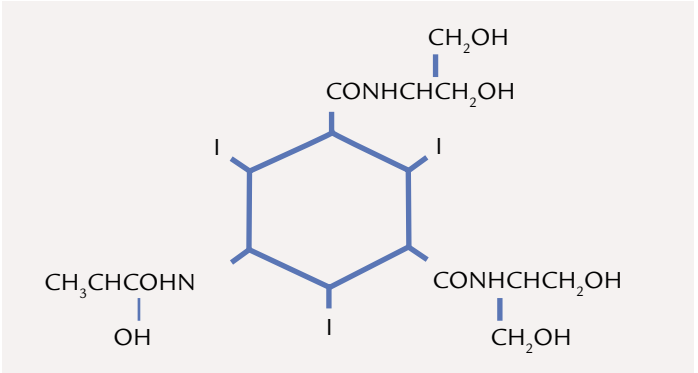


Figure 2. *The chemical structure of iodinated contrast media.*

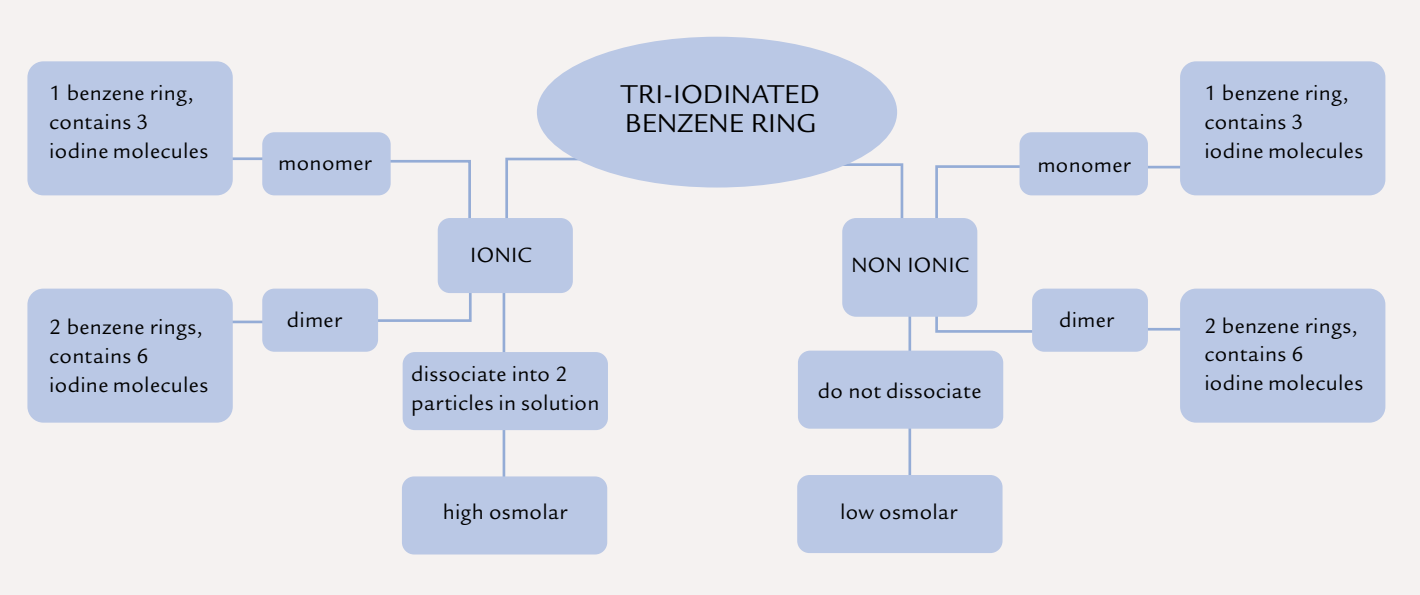


Figure 3. *Categorisation of contrast media.*

content per molecule of contrast – so, in theory, when using a dimer, you can use a smaller volume.

Contrast media are very viscous and have differences in osmolality to other bodily fluids, such as plasma and cerebrospinal fluid (CSF). Osmolality varies depending on the number of solute particles per kilogram – an example being iohexol 300 which has an osmolality of 672mOsm/kg as opposed to human blood which is 285-295mOsm/kg.

In ionic contrast media, the particles dissociate in solution, thereby creating a greater concentration of contrast medium, leading to higher osmolality. Non-ionic contrast media do not dissociate, so they are considered low osmolar as there is little disturbance to the concentration. Non-ionic low osmolar contrast agents are most commonly used in CT scanning because their toxic effect on the body is minimal.

However, iso-osmolar agents are now becoming more widely available. These have the same osmolality as blood and, therefore, further reduce the chances of any adverse reactions. It is believed that it is this change in osmolality that can trigger contrast reactions within the body.

Why are contrast media used and how are they administered?

Contrast media can be administered in a variety of different ways depending on the type of CT scan you are carrying out. Typically, they are administered intravenously – most commonly via the cephalic vein, by hand or using an injector pump (**Figure 4**).

They are then transported around the body via the blood stream. Transmission is quick and there is only a short window of opportunity to acquire contrast-enhanced scan pictures. After injection, the contrast medium makes its way to the right side of the heart (via the right atrium), then into the pulmonary circulation and out into the systemic circulation through the left side of the heart. It dilutes down with blood as it continues into the venous circulation.

Contrast medium quickly diffuses from blood vessels into the interstitial spaces within organs and creates a pattern of white enhancement. It is this process that helps to demonstrate a patient's vasculature for angiograms. Contrast enhancement seen within a mass lesion can be indicative of neoplasia and highlight distant metastases when staging (**Figures 5** & **6**).

Contrast studies of the bowel usually involve oral administration of barium sulphate solution or iodinated contrast media, although negative contrast with air to distend the bowel can also prove useful. This type of test can be invaluable in detecting bowel perforations, filling defects and to assess gastric emptying time.

If intervertebral disc disease or cord compression is suspected, the specific contrast study used would be a CT myelogram. This involves injecting contrast media into the subarachnoid space which, once mixed with CSF, bathes the spinal cord, thereby highlighting filling defects if lesions or herniated disc material is present (**Figures 7** & **8**).

Care must be taken to use only non-ionic, low osmolar agents when injecting intrathecally.

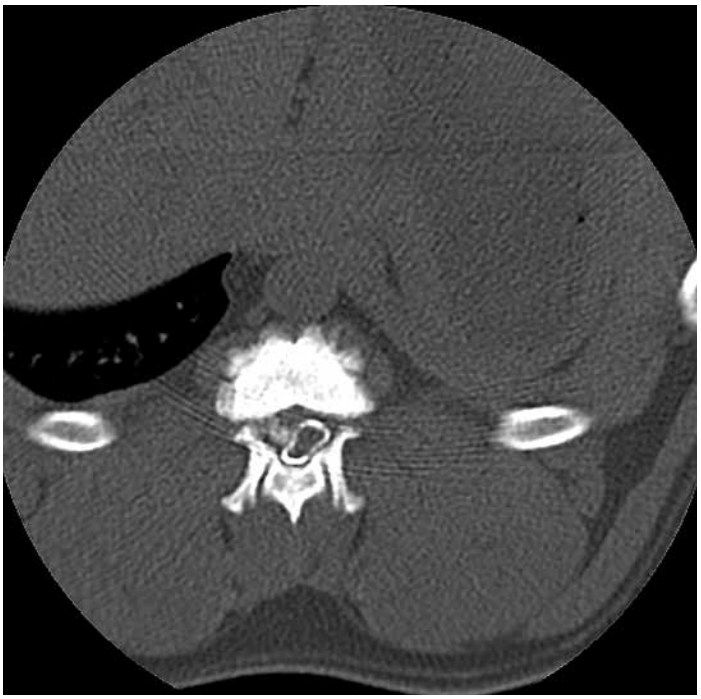
Figure 4. *Contrast medium in an injector pump.*

Evidence has shown that intrathecal injection of ionic, hyperosmolar contrast agents causes a neurotoxic effect on the brain and can result in seizures which, in some cases, can be fatal.

Adverse reactions

When administering contrast media intravenously

Figures 5 *&* ***6.*** *Pre- and post-contrast axial images of a neck mass.*

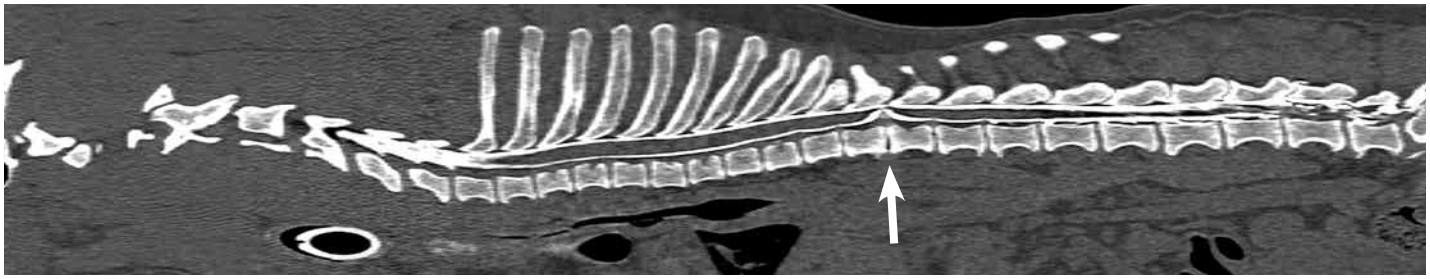


to humans, a thorough checklist has to be followed to reduce the chances of an adverse reaction occurring. Of particular importance in humans is any clinical history of allergies or asthma, because these patients may be more likely to have an adverse reaction. In humans, a contrast reaction can present itself as urticaria, vomiting, facial oedema and, in severe circumstances, anaphylaxis.

A recent study was carried out in 356 dogs and 58 cats to evaluate the prevalence of contrast media reactions in these species. Respiratory rate, mean arterial pressure and pulse rate were monitored following contrast injection and the study found that severe reactions to iodinated contrast media are very rare.

After administration of iohexol none of the cats suffered a severe reaction; but three dogs did. So 0.8 per cent of the dog sample needed to have immediate treatment following injection with contrast media. Although severe reactions in animals are rare, care must always be taken when implementing contrast studies, along with an awareness that some of the effects may not always be obvious clinically.

Intravenous contrast injection can induce some peculiar sensations in human patients. Patients are always warned that shortly after the injection



Figures 7 *&* ***8.*** *Sagittal and axial slices showing contrast within the spinal column. The arrow shows an area of filling defect where disc material is compressing the cord.*

it is likely that they will feel very warm, they may experience a metallic taste in their mouth and they may have the feeling that they are urinating!

Iodinated contrast media, when injected, causes a wave of vasodilation; and dilated blood vessels lead to an increase in blood flow – and as a result more heat. Blood is then warmer than usual as it passes down the vessels adjacent to the bladder and gives a warm, flushed sensation similar to that of urinating. In the majority of cases, animals are anaesthetised for contrast CT scans, so these responses are unlikely to pose problems in the veterinary field of CT contrast imaging.

Iodinated contrast medium, administered intravenously, is excreted via the kidneys, so care must always be taken if your patient has any renal conditions. If you are unsure of your patient's current renal status, then a pre-anaesthetic blood test should be performed to assess renal function.

In some cases, contrast media can cause a patient to have an acute kidney injury (AKI) or contrast-induced nephropathy (CIN), which could lead to renal failure. Iodinated contrast media also have a cytotoxic effect on the kidneys. They cause a resistance to renal blood flow by making blood more viscous and by reducing the ability of red blood cells to change shape. This downturn in vascular movement can cause ischemia within the kidneys. As already mentioned, it is usually the osmolality, ionicity and molecular structure of contrast media that play a part in reactions and renal injuries.

Consideration into whether to perform a contrast CT scan in a renally impaired patient should be based on a risk-benefit analysis. If electing to proceed, standard protocol can be amended to try and reduce the risk of an AKI. Intravenous fluids can be administered in order to dilute the contrast within the blood stream. If giving intravenous contrast is deemed an unacceptable risk, then a plain CT scan can still be performed – it may not, however, be as useful diagnostically.

Conclusion

There is much more to contrast media than meets the eye. Combined with radiation, it can highlight pathology, 'opacify' vessels and aid in a more precise diagnosis for our patients undergoing CT scanning. For this reason, it earns itself a vital role in radiology departments the world over. ■

PPD Questions

1. Which has the greater iodine content?
   A. a dimer
   B. a monomer
2. Where are contrast media injected for a CT myelogram?
3. Injection of intravenous contrast media can sometimes make humans feel as though they are urinating. True or false?
4. Do intravenous contrast media have the potential to cause an acute kidney injury (AKI)?

Answers
1. a dimer
2. intrathecally
3. true
4. yes.

References

Finke MD et al (2012). Ascending Tonic-Clonic Seizure Syndrome in a Dog Following Inadvertent Intrathecal Use of Ionic Contrast Agent. J Vet Emerg Crit Care (San Antonio) 22(4): 488-493.

Kirberger R et al (2012). The effects of repeated intravenous iohexol administration on renal function in healthy beagles – a preliminary report. Acta Vet Scand. 54(1): 47

Kyongtae T Bae (2012). Intravenous Contrast Medium Administration and Scan Timing at CT: Considerations and Approaches. RSNA Radiology. 256(1).

O'Brien R and Barr F (2012). BSAVA Manual of Canine and Feline Abdominal Imaging. British Small Animal Veterinary Association, pp 14-15.

Pasternak J and Williamson E (2012). Clinical pharmacology, uses, and adverse reactions of iodinated contrast agents: a primer for the non-radiologist. Mayo Clinic Proceedings. 87(4): 390-402.

Scarabelli S et al (2016). Adverse reactions following administration of contrast media for diagnostic imaging in anaesthetized dogs and cats: a retrospective study. Veterinary Anaesthesia and Analgesia. 43(5): 502-510.

Singh J and Daftary A (2008). Iodinated Contrast Media and their Adverse Reactions. Journal of Nuc Med Technology. 36(2): 69-74.

A guide to critical care nursing

Louise Welsh
CertVN DipAVN RVN

Louise qualified as an RVN in 2012 after working in first-opinion practice. She began referral nursing in 2013, working at North Downs Specialist Referrals as a 'rotating' nurse, before moving on to work in the Emergency and Critical Care department at The Royal Veterinary College (RVC) in 2014.

Louise gained the CertVN ECC in 2014 and, in January 2017, the Diploma in Advanced Veterinary Nursing (DipAVN), and now works as a senior emergency and critical care nurse at the RVC.

**Suggested Personal & Professional Development (PPD)*

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CRITICAL CARE

Intensive care unit (ICU) nursing has been described as dealing with patients suffering from high-dependency and life-threatening conditions (*HealthTimes*, 2015). For a veterinary nurse (VN), caring for critical patients is challenging and requires continuous monitoring and nursing interventions.

This article discusses the use of Kirby's Rule of 20 – a framework used within veterinary medicine to assess critical patients. VNs can apply this Rule of 20 to their nursing of critical patients, ensuring that fundamental aspects of care are not overlooked.

A commonly used framework within veterinary critical care medicine is Kirby's Rule of 20 – a list of key parameters that should be assessed at least once daily in all critically ill patients (**Table 1**). Linklater (2013) discussed the use of this framework in ensuring the ongoing needs of the patient are met, focusing on examining the patient as a whole with these parameters in mind.

This concept of holistic care is now widely recognised within veterinary medicine, particularly by VNs who are encouraged to consider the patient as an individual and not simply by its disease process. The use of a framework to highlight the ongoing needs of a critical patient allows assessment to be performed on an individual basis and include a more comprehensive evaluation of these cases.

It is beyond the scope of this article to go into detail of all 20 parameters included in the rule, so instead it will focus primarily on fluid balance, renal function, blood pressure, oxygenation and ventilation of critical patients.

Fluid balance

Fluid balance relates to a patient's hydration status and their tissue perfusion – their interstitial and intravascular volume respectively (Linklater, 2017) (**Figure 1**). Hydration and tissue perfusion are not mutually exclusive and emergency patients may present with deficits of either one or both, which is important to remember when treating these conditions.

Acute fluid loss from the intravascular space must be replaced rapidly, using solutions that are able to expand and maintain the intravascular volume; whereas losses from the interstitial space that have occurred over an extended period of time may be replaced more slowly, whilst also replacing any further ongoing fluid losses (Kirby, 2017).

Critical patients receiving multiple fluid types and drugs will often require the placement of a long-stay catheter to allow the infusion of these solutions. Long-stay catheters may be placed peripherally – in the lateral or medial saphenous veins – or centrally, in the jugular vein. Haskey (2016) described the benefits of long-stay catheter placement over short-term peripheral catheter placement, including the ability to carry out blood sampling (**Figure 2**), administer multiple drugs at one time through the individual lumens of the line and allow for measurement of central venous pressure (CVP).

Table 1. Kirby's Rule of 20 (Source: Kirby R, 2017)

Fluid balance	Red blood cell and haemoglobin concentration
Oncotic pull/albumin	Renal function
Glucose	Immune status/antibiotic dosage and selection/ WBC count
Electrolytes and acid/base balance	GI motility and mucosal integrity
Oxygenation and ventilation	Drug dosages and metabolism
Level of consciousness and mentation	Nutrition
Blood pressure	Pain control
Heart rate, rhythm and contractility	Nursing care and patient mobilisation
Albumin	Wound care/bandage change
Coagulation	Tender loving care (TLC)

CVP is the hydrostatic pressure in the vena cava – effectively a measure of the heart's ability to pump the volume of blood returned to it, estimating the relationship between the total blood volume of the patient and vascular filling (Hackner, 2017). CVP is a useful tool when determining fluid resuscitation end points in patients where usual clinical parameters are inconclusive (Hackner, 2017).

VNs monitoring critical patients may be asked to set up and record CVP measurements, alerting the consulting veterinary surgeon to any changes in readings. A normal CVP reading in cats and dogs is 0-5cmH_2O or 0-4mmHg (Hackner 2017).

In all critical patients, fluid losses must be matched where possible, ensuring ongoing fluid deficits do not occur. Calculations of urine output are useful in critical patients to identify ongoing losses – for example, where a post-obstructive diuresis occurs following a urethral obstruction. Drain outputs can also be calculated when an active suction drain has been placed to facilitate fluid removal from a wound or cavity (Lynch et al, 2011) (**Figure 3**).

A calculation of total fluid 'ins' versus total 'outs' should be performed every 12 to 24 hours as the addition of multiple fluid types throughout the day will significantly increase the risk of volume overload if not matched appropriately.

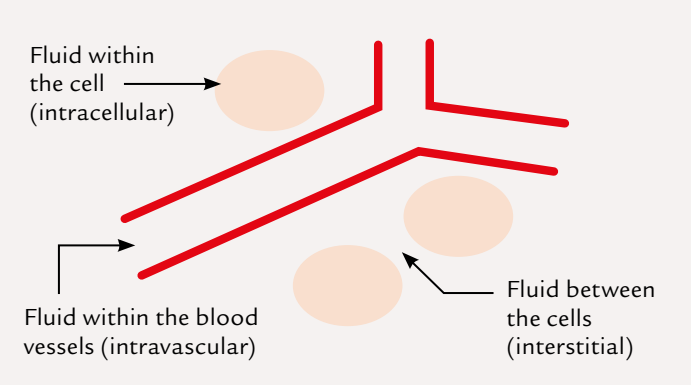

Figure 1. *Diagram outlining the different fluid compartments.*

Renal function

Insults experienced by critical patients – including shock, dehydration, hypotension, hypoxia and the use of nephrotoxic drugs – can all induce renal dysfunction (Kirby, 2017). Urine output is a useful monitoring tool in critically ill patients and can provide early indication of renal dysfunction, such as an acute kidney injury (AKI).

Measuring urine output is cheap and easy to perform. Benefits of urinary catheterisation include improved patient comfort, prevention of urine scalding, ease of patient management

"This concept of holistic care is now widely recognised within veterinary medicine, particularly by VNs who are encouraged to consider the patient as an individual and not simply by its disease process"

Figure 2. *Checking the central jugular catheter in a feline patient.*

Figure 3. *Assessing an abdominal Jackson Pratt drain in a feline patient.*

Figure 4a. *A feline patient receiving supplemental oxygen in an oxygen kennel.*

Figure 4b. *Managing the airway of an anaesthetised canine patient receiving mechanical ventilation.*

Figure 4c. *Nursing a patient receiving mechanical ventilation. A multi-parameter machine is visible, monitoring ECG, arterial blood pressure and capnography.*

and ease of monitoring urine output, usually calculated in ml/kg/hr. Urine output, specific gravity, and specific blood parameters including BUN and creatinine can be used to evaluate renal function (Kirby, 2017).

Kirby (2017) described glycosuria where hyperglycaemia is not present, likely representing renal tubular cell damage, indicating the need for urinalysis in critical patients where renal dysfunction is a concern. Placement of an indwelling urinary catheter in the bitch and feline patient can be difficult and may require the assistance of a veterinary surgeon, but VNs should be familiar with placing an indwelling urinary catheter in a male canine patient.

Blood pressure

Mean arterial blood pressure (MAP) is calculated as the product of cardiac output (CO) and systemic vascular resistance (SVR), significant in determining adequate organ and tissue perfusion (Copper & Copper, 2014). Although blood pressure measurement gives an indication of tissue perfusion, it may be misleading because adequate MAP does not necessarily mean that tissue perfusion is adequate.

Vasoconstriction, to increase SVR, occurs following a haemostatic insult, resulting in poor peripheral tissue perfusion despite adequate MAP (Copper & Copper, 2014). They discussed other monitoring parameters that give a far greater interpretation of tissue perfusion, including the physical examination, blood lactate and cardiac output determination.

In critical patients, hypotension is a common concern, associated with a failure of compensatory sympathetic mechanisms following an insult (Copper & Copper 2014). Invasive (direct) blood pressure measurement – obtained via catheterisation of a peripheral artery – is the gold standard for blood pressure measurement in the critically ill patient owing to associated accuracy and ease of constant monitoring of the patient's pressure (Clapham, 2011).

Oscillometric and Doppler pressure readings can be measured easily and should be used frequently in critically ill patients in the absence of invasive arterial pressure measurement.

For oscillometric readings, a cuff attached to the distal limb of the patient is inflated and then slowly deflated. Oscillations detected in the wall of the artery as the cuff deflates are displayed on a monitor as systolic, mean and diastolic pressures (Clapham, 2011).

A Doppler machine uses an ultrasound probe to measure blood flow through an artery. A cuff secured around a distal limb or tail is inflated and the audible sound of blood flow returning to that artery on deflation of the cuff is determined as the systolic pressure. Although limited to providing systolic measurements only, the Doppler is considered more accurate in smaller patients (Clapham, 2011).

Hypertension has been categorised by the American College of Veterinary Internal Medicine based on the risk of organ damage – patients with systolic blood pressures >180mmHg are defined as being at severe risk of developing target-organ damage (Linklater, 2017). VNs monitoring critically ill patients should be aware of the risks associated with both prolonged periods of hypo- and hypertension and ensure trends in readings are obtained that can be interpreted alongside other clinical parameters (Clapham, 2013).

> "Nursing the critical patient can be mentally and physically exhausting, full of challenges and obstacles; but also incredibly rewarding, providing a great sense of achievement and job satisfaction"

Oxygenation and ventilation

Some of the most intensive patients requiring continuous care, are those receiving mechanical ventilation. The main indications to start mechanical ventilation include (Haskey, 2013):

- hypoxaemia (typically defined as a PaO_2 [partial pressure of oxygen within arterial blood] <60mmHg) despite the administration of oxygen therapy)
- hypercapnia (typically defined as a $PaCO_2$ [partial pressure of carbon dioxide within arterial blood] >60mmHg)
- increased intracranial pressure
- impending respiratory fatigue.

It is beyond the scope of this article to go into detail of the VN's role in nursing those patients receiving mechanical ventilation; however, delivery of supplemental oxygen is vital in patients suffering respiratory distress and can be provided in several ways – via an oxygen kennel, oxygen mask, nasal catheters and nasal prongs.

Minimal stress for critical patients experiencing respiratory distress is key and sedation of these patients may be required to facilitate handling and further medical interventions (**Figure 4a-c**).

In the absence of blood gas analysis of PaO_2, oxygen saturation of the haemoglobin (SPO_2) can be performed using a pulse oximeter to provide an indication of oxygenation. PaO_2 can be extrapolated from the SPO_2 percentage using the oxyhaemoglobin dissociation curve – an SPO_2 of 90 per cent is equivalent to a PaO_2 of 60mmHg, where a normal PaO_2 of 80 to 100mmHg ($SPO_2 \geq 96\%$) is expected in patients breathing room air (Pachtinger, 2013).

As a surrogate for $PaCO_2$, ventilation can be assessed in intubated patients by use of capnography to measure end-tidal CO_2 ($ETCO_2$); and although less accurate, measurements can be gained from attaching a capnography reader to a nasal catheter in conscious patients. $ETCO_2$ is described as roughly 1-4mmHg less than $PaCO_2$ (Haskey, 2015).

Mucous membrane colour provides an indication of oxygenation, and should not be underestimated as an ongoing tool for use during assessment of critical patients. Patients presenting with cyanotic mucous membranes require immediate intervention and may require emergency intubation.

Conclusion

Nursing the critical patient can be mentally and physically exhausting, full of challenges and obstacles; but also incredibly rewarding, providing a great sense of achievement and job satisfaction. By using Kirby's Rule of 20 as a framework, fluidity in patient care can be achieved, ensuring changes in a patient's clinical status are appreciated, with nursing and veterinary intervention introduced rapidly and effectively. ■

PPD Questions

1. When considering a patient's fluid balance, tissue perfusion relates to which fluid compartment?
   A. interstitial
   B. intravascular
   C. intracellular
   D. extracellular

2. A normal CVP reading in cats and dogs is:
   A. 0-4mmHg
   B. 1-8mmHg
   C. 3-10mmHg
   D. 9-15mmHg

3. Renal dysfunction can be caused by:
   A. shock
   B. hypoxia
   C. nephrotoxic drugs
   D. all of the above

4. Which blood parameter can be used to help assess tissue perfusion?
   A. chloride
   B. lactate
   C. ionised calcium
   D. potassium

5. An SPO_2 reading of 90 per cent is equivalent to what PaO_2 value?
   A. 50mmHg
   B. 60mmHg
   C. 80mmHg
   D. 100mmHg

Answers
1.B 2.A 3.D 4.B 5.B

References

Copper E and Copper S (2014). 'Direct systemic arterial blood pressure monitoring', In Burkitt Creedon JM and Davis H (eds) Advanced Monitoring and Procedures for Small Animal Emergency and Critical Care. Oxford: Wiley-Blackwell.

Clapham L (2011). 'How to measure blood pressure: direct and indirect techniques', The Veterinary Nurse, 2(6): 324-326.

Hackner S (2017). 'CRITICAL CARE MONITORING: WHAT, WHEN, AND HOW?', (Online), Available from: http://www.cuvs.org/pdf/article-critical-care-monitoring-tools.pdf, (Accessed on: 21/02/2017).

Haskey E (2013). 'How to nurse the intensive care unit ventilator patient', The Veterinary Nurse, 4(2): 108-113.

Haskey E (2015). 'Nursing the Critical Patient: Part 1', The Veterinary Nurse, 30(1): 16-21.

Haskey E (2016). 'Nursing critically ill patients in the intensive care unit', BMJ Journals, 38(4): 5-29.

Health Times (2015). 'What is a Critical Care or Intensive Care Nurse?', (Online), Available from: https://healthtimes.com.au/hub/critical-care/21/guidance/nc1/what-is-a-critical-care-or-intensive-care-nurse/532/, (Accessed on 22/02/2017).

Kirby R (2017). 'Kirby's Rule of 20', (Online), Available from: http://vet.ucoz.com/kirbyrule.pdf, (Accessed on: 12/02/2017).

Linklater A (2013). 'The Rule of 20', (Online), Available from: http://www.msdvetmanual.com/emergency-medicine-and-critical-care/monitoring-the-critically-ill-animal/the-rule-of-20, (Accessed on: 11/02/2017).

Lynch AM et al (2011). 'Postoperative haemorrhage associated with active suction drains in two dogs', Journal of Small Animal Practice, 52(3): 172-174.

Pachtinger G (2013). 'Monitoring of the Emergent Small Animal Patient', Vet Clinics of North America: Small Animal Practice, 43(4): 705-720.

Sprunger-Helewa B (2017). 'Using Kirby's Rule of 20 to Create Nursing Plans', (Online), Available from: http://vetfolio.s3.amazonaws.com/b5/be/56a1a7264996ae1c41c807a19e05/using-kirbys-rule-of-twenty-to-create-nursing-plans-pdf.pdf, (Accessed on: 11/02/2017).

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A practical approach to hydrotherapy

Hydrotherapy, or aquatic therapy as it is also known, is the application of physiotherapy techniques carried out in water, using a heated pool or aquatic treadmill. It can assist and complement traditional treatment strategies in veterinary medicine and surgery, and hydrotherapists work as part of a multi-disciplinary team that may include veterinary surgeons, veterinary nurses, owners and trainers.

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Jemma is a veterinary physiotherapist and small animal hydrotherapist from the Ipswich Veterinary Centre. She has an equine background and initially trained in human sports massage and injuries and equine sports massage therapy, before qualifying as a veterinary physiotherapist treating dogs, cats and horses.

Jemma's previous roles include working as a full-time veterinary physiotherapist and hydrotherapist at a specialist small animal referral hospital and most recently working for the Dogs Trust at a large rehoming centre, before joining the team at the Ipswich Veterinary Centre.

*Suggested Personal & Professional Development (PPD)

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HYDROTHERAPY

Hydrotherapy can be used as part of an ongoing maintenance exercise regimen for pets with osteoarthritis or incorporated in a rehabilitation programme for pets with a range of orthopaedic or neurological conditions – as well as improving the fitness of working and sports dogs.

The choice between treatment using the aquatic treadmill or the pool may depend on the facilities available, the temperament of the animal and the condition from which it is suffering. For example, some dogs may be particularly anxious in an enclosed space or reluctant to walk on the treadmill and may be more suited to the pool; or visa versa, some dogs may be anxious having water so near their face in the pool and may be happier in the treadmill.

It may be useful for owners to understand that even dogs that are reluctant to enter water of their own accord during a walk, sometimes tolerate the controlled environment of hydrotherapy very well.

Some conditions, such as a cervical disc requiring a ventral slot, are not recommended therapy in the pool and are better suited to the neutral position of the head and neck when using the treadmill. Patients recovering from hip replacements, for example, are initially more suitable for therapy in the

Figure 1. *Dogs are showered both before and after treatment.*

Figure 2. *Regular hydrotherapy is a controlled and therapeutic way to gradually increase exercise tolerance, strength and fitness.*

"It may be useful for owners to understand that even dogs that are reluctant to enter water of their own accord during a walk, sometimes tolerate the controlled environment of hydrotherapy very well"

Figures 3 & 4. *Hydrotherapy has been proven to be beneficial in the treatment of a variety of orthopaedic and neurological conditions, including osteoarthritis.*

treadmill, encouraging a correct plane of movement of the limb and reducing the risk of dislocation. These techniques can also be achieved in the pool by using custom-made, static platforms, where available.

Water management

The condition of the water used in the hydrotherapy pool or treadmill is very important in order to avoid causing unnecessary irritation or spread of disease. The dogs are showered prior to treatment for cleanliness and also as part of the treatment, preparing the muscles for exercise (**Figure 1**). They are also showered following treatment and dried with a towel or drier, if required. The water is heated to around 30-32°C, is sanitised using either chlorine or bromine and the pH levels are checked regularly. The pool is vacuumed frequently to remove debris and the filters are cleaned to remove hair.

Benefits of hydrotherapy

Regular hydrotherapy is a controlled and therapeutic way to gradually increase exercise tolerance, strength and fitness (**Figure 2**):

- buoyancy and warmth of the water aids the dog's mobility and decreases loading on the limbs
- muscle-strengthening, maintenance and restoration
- non-weight-bearing exercise – the buoyancy of the water decreases the loading on limbs
- hydrostatic pressure provides relief from pain, inflammation and stiffness
- joint mobilisation
- cardiovascular fitness
- increases range of motion
- improves circulation
- blood vessels expand owing to warmth of water
- animals can go in the water as soon as sutures are removed/wound healed
- depth of the water, speed of the treadmill and duration specific to each individual animal
- some cats will also accept hydrotherapy.

Conditions that may benefit from hydrotherapy

Hydrotherapy has been proven to be beneficial in the treatment of a variety of orthopaedic and neurological conditions, as well as soft tissue injuries. Examples of conditions that may benefit from regular hydrotherapy following surgery or as part of a conservative treatment plan are:

- IVDD – in conjunction with essential regular physiotherapy
- cruciate ligament disease
- patella luxation
- hip replacement
- fractures

Figure 5. *Hydrotherapy may also be a beneficial part of a fitness programme for working or sports dogs.*

- obesity
- osteoarthritis (**Figures 3** & **4**)
- amputation
- CDRM
- muscle, tendon or ligament injuries.

Regular hydrotherapy may improve:

- muscle strength
- endurance
- cardiovascular fitness
- range of movement
- general mobility
- behaviour.

Hydrotherapy, in conjunction with veterinary treatment, can significantly improve the quality and rate of healing following surgery or a traumatic injury. After surgery, the careful use of hydrotherapy as part of a rehabilitation programme can increase the chance of an animal returning to its previous level of fitness.

Typical cases to benefit from this approach include post-spinal surgery or orthopaedic surgery, such as cruciate surgery, hip replacement and limb amputations. With agreement from the referring veterinary surgeon, hydrotherapy can commence once the surgical site has

Figure 6. *Case study 1. Male neutered miniature dachshund with progressive onset paraparesis.*

CASE STUDY 1

Patient: Male neutered miniature dachshund, six years old (**Figure 6**)
Condition: Progressive onset paraparesis
Surgery: T12–L3 hemilaminectomy and T13–L1 fenestrations

Physiotherapy and hydrotherapy recommended by the veterinary surgeon at the referral hospital as part of ongoing rehabilitation following surgery.

On presentation, two weeks following surgery, he was able to walk unaided. Mild ataxia and a 'hunched posture' evident. He was able to pass urine and faeces as normal. He did not appear in pain on palpation and the surgery site had healed well.

Treatment: Homecare and exercise advice for the owner to carry out. Land-based physiotherapy including massage, PROM, pulsed electromagnetic therapy, LASER, facilitated transitions, balanced lead walking and groundwork on different surfaces and through poles to improve proprioception.

Hydrotherapy weekly sessions involving static work using the shower, alternating the pool and the treadmill – including trot work and increasing intensity as he progressed. Owner to closely monitor movement and response to treatment.

Outcome: Stamina improved after initially becoming fatigued very quickly. Improved posture and movement. After a period of six months, the dog had reached its previous level of fitness with no signs of the condition evident. The owner decided to continue hydrotherapy as a form of exercise and to help maintain a healthy weight.

healed and any sutures have been removed.

Animals suffering from osteoarthritis can benefit from both hydrotherapy and land-based physiotherapy techniques – or a combination of both – when attending regularly (ideally once a week in the first instance). Owner compliance is especially important in these cases to ensure the animal is having appropriate ongoing care and exercise at home in order to gain the maximum benefits from the treatment.

It is important too that the animal's pain is correctly managed via medical therapy in conjunction with hydrotherapy/physiotherapy. In these cases, the aim is to improve mobility and reduce pain, thereby improving the animal's quality of life for as long as possible.

Additionally, hydrotherapy can enhance general

"The condition of the water used in the hydrotherapy pool or treadmill is very important in order to avoid causing unnecessary irritation or spread of disease"

CASE STUDY 2

Patient: Female neutered Labrador retriever, 12 years old
Condition: Osteoarthritis
Presenting signs: Slow to rise from a sitting or laying position, nail scuffing of hind limbs and general stiffness evident. Owner reported "stiffness at its worst first thing in the morning, struggles with the stairs, jumping into the car and fatigues on long walks".

Treatment: The dog was not insured, so the owner requested hydrotherapy only as a more affordable regular option.

Discussed homecare and exercise advice at length. Owner to incorporate several short walks, daily massage/grooming and range of movement into daily routine. No access to stairs, care with slippery floors and assistance getting into and out of the car. Use of a coat following hydrotherapy and in cold/damp weather, cushioned bed out of a draught.

Weekly hydrotherapy sessions in the pool, including static work in the shower, gradually increasing exercise intensity and duration. Owner asked to closely monitor response to treatment and to maintain medication as recommended by the referring veterinary surgeon.

Outcome: Treatment ongoing as an aged dog. Owner reports much brighter at home and keen to go out on several short walks. Now has a ramp for the car that has been successful. Maintaining a healthy weight, coat quality improved, increased mobility and improved stamina evident.

health and fitness, aiding convalescence and weight loss and improving recovery rates. Therapy for weight loss could typically include an exercise plan incorporating hydrotherapy in conjunction with nutritional advice from an experienced professional. Regularly recording weight or attending a weight clinic to monitor progress can help to achieve goals.

Hydrotherapy may also be a beneficial part of a fitness programme for working or sports dogs (**Figure 5**).

Summary

Hydrotherapy can be beneficial for dogs and cats (and horses) suffering from a wide variety of conditions, used in conjunction with traditional veterinary medicine and other complementary therapies, where appropriate*.

A successful treatment programme should include liaison with the whole team of veterinary professionals involved in the care and treatment of the dog, as well as seeking regular input and compliance from the owner. All hydrotherapy patients require an individually tailored rehabilitation programme and good owner compliance in order to gain the maximum benefits from treatment. ■

* If you are using an independent hydrotherapy centre that is not under the umbrella of a veterinary practice, you should check that it is staffed by suitably qualified members of one of the following organisations:

- The Canine Hydrotherapy Association (CHA) www.canine-hydrotherapy.org
- National Association of Registered Canine Hydrotherapists (NARCH) www.narch.org.uk

"... some cats will also accept hydrotherapy"

PPD Questions

1. What is hydrotherapy?
2. What are the main contraindications/precautions for hydrotherapy?
3. What are the most common forms of hydrotherapy?
4. When can an animal commence hydrotherapy following surgery?
5. Is it appropriate for cats to have hydrotherapy?

Answers

1. physiotherapy techniques carried out in water
2. skin conditions, epilepsy, diarrhoea, vomiting, contagious diseases, open wounds, cardiac abnormalities, external fixators
3. water treadmill or pool
4. if the consulting veterinary surgeon is in agreement, as soon as the surgery site has healed and any sutures have been removed
5. yes; as with all animals it depends on the individual, but compliant cats can benefit from hydrotherapy.

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Martin is lecturer in veterinary ethics and law at the RVC and his main areas of research and teaching are in veterinary politics and law, including regulation. His PhD focused on the concept of public interest within the veterinary profession, what gives veterinary surgeons their monopoly power to practise and how it is most effectively regulated.

Additionally, Martin's research applies ethics and law to study the ways in which veterinary surgeons and veterinary nurses behave in practice – including the regulatory mechanisms and the public interest empowerment of the profession. He teaches veterinary students, nurses and postgraduates in veterinary ethics and law.

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ETHICS

Client understanding of veterinary informed consent

Obtaining consent from a client to perform an intervention or investigation on their animal is a daily occurrence in all types of veterinary practice. It is a professional requirement as stipulated by the RCVS (2016) because it signifies the agreement – or contract – between the veterinary practice and the client.

The professional requirements of consent have been well expounded. These are published by the Royal College of Veterinary Surgeons (RCVS) and reiterated in guidance documents aimed at assisting those in practice (RCVS, 2016; BSAVA, 2015). The goal of informed consent is to empower the client to be sufficiently informed so as to make decisions based on their understanding of:

- treatment options
- associated risks of treatment options – including no treatment
- associated benefits of treatment options
- costs of treatment and aftercare
- matters relating to the 'cascade' use of drugs.

As a contractual agreement, consent has a legal component and this facet has undergone critical evaluation in various jurisdictions (Hannah, 2001; Flemming & Scott, 2004; Passantino, 2011). There is, however, limited writing specifically on UK veterinary contract law; yet it is generally accepted that the consenting process falls within this domain. The majority of the academic consideration of veterinary informed consent occurs in the professional ethics literature, focusing on autonomy and promotion of animal welfare (Macdonald & Gray, 2014; Yeates & Main, 2010).

Considering that consent hinges vitally on client understanding of such complicated matters as the risks and benefits of various treatment options – where each option carries its own variance of certainty – it is somewhat surprising that very little research has been undertaken to determine how clients *themselves* perceive the process of consent.

Client understanding of consent

To improve the process of client understanding of consent, it must first be determined how clients actually perceive the consent process. Once the critical 'pinch points' of the consent process have been identified, it may be possible to redress these issues specifically. The strategy of identification of consent difficulties in order to generate redress, is one which has been in place in human medicine for over 10 years (Akkad et al, 2004).

Their study found that human patients felt pressurised and vulnerable during consenting and, consequently, their autonomy of choice may have been compromised. There were also instances of perceived failure to care, as this key point of empowering patients to make choices regarding their own bodies was reduced to a ritualistic contractual agreement process (Akkad et al, 2006). This method of understanding client perception is applicable in veterinary medicine where the results from one study, performed at a veterinary referral hospital in a university setting, were found to be very similar (Whiting et al, 2017).

This study surveyed 470 clients who had recently visited a veterinary referral hospital for a single surgical or neurological procedure on their animal between January and July 2015. Those clients whose animals had died were not surveyed in order to prevent unnecessary distress to them. Thirty-five per cent of the invited clients completed the survey first used by Akkad et al (2006) which had been modified slightly to ensure the wording was relevant to veterinary clients rather than human patients.

The results of this survey indicate several learning points for optimising the process of veterinary consent.

The consenting process

The consenting process is understood to be everything from the conversation about the proposed treatments and their alternatives through to the signing of the consent form itself. The purpose of this stage of consent is to provide the client with all the necessary information about the required components of consent as listed above. This includes the treatment plan, as well as the alternatives – including doing nothing or euthanasia – and the risks, benefits and costs of each.

This information stage is where a complex dynamic must be struck between providing the fullness of information required to understand the consequences of any decision and communicating the information in a manner that the client can comprehend. The information in the

Mental Capacity Act 2007 (MCA) guidance (DCA 2007) is useful – as explained by Macdonald and Gray (2014) – where two questions should be considered:

- could information be explained or presented in a way that is easier for the person to understand (for example, by using simple language or visual aids)?
- have different methods of communication been explored, if required, including non-verbal communication?

Presenting complex information suitable for lay understanding is a task that is developed by those who undertake consenting on a regular basis.

The results of the survey found that – as was the case in human medicine – the majority of veterinary clients (77%) felt they received an adequate explanation of the procedures and the associated risks; and 86 per cent of them felt the information was presented to them in a manner they could understand. The majority of clients stated explicitly that they wanted to be forewarned on the costs of treatment and the anticipated costs of ongoing aftercare.

Determining why clients did not fully understand this information stage is more complex and there are two likely explanations. First, the client may have been overwhelmed by the complexity of the information provided. Such 'overwhelming' has been reported in human medicine and results in the consentee floundering in a consequential lack of understanding (O'Neill, 2003). It is important that only required information is provided, so that the client is 'sufficiently' informed to make a decision.

Second, the client's emotional state will impact on his or her ability to understand. Ensuring there is sufficient time to consider the options and ask questions may reduce stress by reducing the time pressure in what is often a fast consultation, early in the morning. Even though this survey involved clients whose consultation time was in excess of one hour, 13 per cent of the clients still reported feeling under pressure. Fear is also a confounding factor, and 33 per cent of clients felt frightened at the time of consent.

A third question was proposed by Macdonald's adaption of the MCA guidance: could anyone else help with communication (a family member, for example)?

While this is aimed at ensuring the communication level is 'client appropriate', it also plays an important role in decision making. Over 37 per cent of clients wanted – or needed – time alone or with a partner, to consolidate their thinking regarding the proposed intervention. This time with a partner could allow them momentary relief from the potential intimidation of the consent process, to gather their thoughts, and help them regain control of their situation; thereby further reducing their stress.

The consent form

It has already been established that the consent form itself plays a minimal role in the consenting procedure (Macdonald & Gray, 2014; BSAVA, 2015); Wilhite, 2010). A signed consent form only creates an evidential – but rebuttable – presumption of informed consent. However, in veterinary medicine it is an important part of the financial contract.

While all clients participating in the survey signed the consent form, six per cent still felt insufficiently informed. Eighty-six per cent felt the form made clear to them what had been agreed, but 50 per cent thought it did not reflect their wishes – although it is not clear why these clients continued to sign the form without further clarification.

It is noted that there is a great deal of scepticism, and clients were not clear on why the form was required, with some thinking it was purely to protect the hospital rather than protect their animal. This confusion could be a consequence of the combined purpose of the form as both a financial agreement and a professional medical consent. This might be resolved by separating these two components.

The legal status of consent

It is clear that there is a lack of understanding by clients on the purpose and legal status of the consent form. Nearly half of clients thought that signing the form removed their right to compensation or a claim of negligence; a third thought they could not change their mind once they had signed the form; and a third thought the veterinary surgeon could do something different rather than what was agreed.

These are startling results and they could have serious ramifications for client satisfaction. They may result in clients having interventions carried out, about which they have changed their mind, or it may result in fewer grievances being reported back to the practice than those actually felt by the clients. This last point can undermine client trust and satisfaction with the work of the practice – and yet the practice could be entirely unaware of this dissatisfaction and thus unable to remedy the situation.

A way forward

The consenting conversation, as expressed by Faulkner (2015), occurs at a critical time of stress for clients who are likely to feel disempowered, vulnerable, worried and stressed about the risks to their pet's welfare by any proposed treatment plan. The key improvements to help the client with consent may all revolve around improved communication between the veterinary team and the client.

The survey highlights those areas that most urgently need addressing, although these may be different in each practice. A proposed way forward to redress the 'balance of power' during consent could be as follows:

- individual practices to run the same survey as above to determine the specific needs of their practice and unique to their client base
- provide clear and easy-to-read information sheets, complete with diagrams if useful, of the most common elective procedures and on anaesthesia, so that clients can read these in advance of consenting
- identify key people in the practice who undertake consent most often, and provide them with additional training on this unique communication skill – there are many courses available in human medicine that will help here
- try to separate, as much as possible, the details of the procedure and its purpose from the financial agreement form, so it is clear to the clients what is being agreed
- confirm with the clients – even after signing the form – that they are happy their wishes are being undertaken
- follow up with the clients after procedures to ensure they remain happy with the intervention that was done, and refine the consenting process based on their feedback.

Conclusion

The most positive element of the survey was the substantial trust and respect that is present between clients and their practice – 86 per cent of clients understood sufficiently the intervention proposed and 60 per cent did not read the entire consent form as they fully trusted the veterinary team to be working in their animal's best interest.

Such outstanding client trust is testament to the high standard of communication and care already present. However, there is room for improvement and the survey revealed many similarities to the difficulties experienced in human medicine. Thus, the enormous wealth of training and information available from the NHS and other human healthcare providers could be a useful resource to improve the veterinary consenting process.

There is huge potential for the advanced training of the veterinary nursing team and the provision of veterinary nursing CPD. Indeed, the veterinary nurse may be ideally placed to take on this role of the informed consent conversation with the clients to ensure that client wishes and animal welfare are optimised. ■

"Over 37 per cent of clients wanted – or needed – time alone or with a partner, to consolidate their thinking regarding the proposed intervention"

References

Akkad A et al (2004). Informed consent for elective and emergency surgery: Questionnaire study. BJOG: An International Journal of Obstetrics and Gynaecology, 111(10): 1133-1138.

Akkad A et al (2006). Patients' perceptions of written consent: questionnaire study. BMJ (Clinical research ed) 333(7567): 528.

BSAVA (2015). BSAVA Informed Consent. British Small Animal Veterinary Association. Available at: https://www.bsava.com/Resources/BSAVAMedicinesGuide/Consent.aspx [Accessed October 14, 2015].

DCA (2007). Mental Capacity Act 2005 Code of Practice, London, UK: TSO.

Faulkner B (2015). Five steps to a successful consultation. In Practice, 37(3): 146-149.

Flemming DD and Scott JF (2004). The informed consent doctrine: what veterinarians should tell their clients. Journal of the American Veterinary Medical Association, 224(9): 1436-1439.

Hannah HW (2001). Legal Brief: Teaching veterinary medical law. Journal of the American Veterinary Medical Association, 219(5): 606-607.

Macdonald J and Gray C (2014). 'Informed consent' – how do we get it right? Veterinary Nursing Journal, 29(3): 101-103.

O'Neill O (2003). Some limits of informed consent. Journal of Medical Ethics, 29(1): 4-7.

Passantino A (2011). Informed consent in veterinary medicine: legal and medical perspectives in Italy. Open Journal of Animal Sciences, 1(3): 128-134.

RCVS (2016). 11. Communication and consent, London, UK: Royal College of Veterinary Surgeons.

Whiting M et al (2017). Survey of veterinary clients' perceptions of informed consent at a referral hospital. Veterinary Record, 180(1): 20.

Wilhite CL (2010). Informed Consent. Plastic Surgical Nursing, 30(4): 259-261.

Yeates JW and Main DCJ (2010). The ethics of influencing clients. Journal of the American Veterinary Medical Association, 237(3): 263-267.

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Nursing recumbent animals

Recumbent animals deserve a high level of intensive nursing care. To ensure that they are provided with the correct nursing, a thorough assessment should be carried out and a comprehensive nursing care plan completed to ensure the patient receives all its required needs (Bowes, 2016).

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As a practical examiner for the RCVS, Central Qualifications and City and Guilds she also has the pleasure of assessing the next generation of veterinary nurses.

To be able to provide the level of care needed for the nursing of recumbent patients, we first have to understand what recumbency is, its causes, and its effects on the animal.

The definition of recumbency is an animal that is lying down and unable to rise (Studdert et al, 2011). There are many possible causes of recumbency (Chandler and Middlecote, 2012). These include:

- road traffic incident
- spinal surgery
- fractures
- paraplegia
- neurological disorder
- head trauma
- old age
- anaesthesia
- debilitating medical disease, such as dilated cardiomyopathy.

It is important to be aware that recumbency can precipitate numerous issues over and above the original cause and these must be identified in the nursing care plan (**Figure 1**). Most of the issues are potential problems rather than actual problems and, with effective use of appropriate nursing care plans, they can be prevented or their effects can be reduced.

A very thorough patient assessment will aid in providing the appropriate nursing care to the patient. For example, a recumbent patient may benefit from having an indwelling urinary catheter and provision of enemata during its recumbency (Millis and Levine, 2014). This will require considered discussion with members of the veterinary team who are nursing the patients.

Each problem identified should be discussed and key measures implemented to prevent any potential problems and reduce the effect of any actual problems.

Musculoskeletal problems

Muscle tone and joint movement are usually maintained during normal exercise. However, because the recumbent animal is unable to stand, the patient may lose muscle tone. This is defined as muscle atrophy. The individual's joints may become stiff and the patient may develop oedema of the limbs as a consequence of the reduced movement which normally stimulates lymphatic drainage from the limb.

Physiotherapy is one of the key techniques that can be used in cases of musculoskeletal problems, to encourage the circulation of blood and lymph to the limbs. Another holistic approach is to employ hydrotherapy to reduce weight-bearing stress.

Different types of physiotherapy

Active exercise is used when the animal is able to stand, but is still weak. This can be enacted by the provision of a sling and encouraging the patient to take steps at its own speed. If you do not have a specially designed sling in the veterinary practice, this technique can be completed using a long towel placed under the chest and abdomen.

Active assisted exercise is used when the animal is very weak (paresis) and is unable to stand unaided (**Figure 2**). This patient can be enabled to walk using slings or other weight-supporting appliances available within the veterinary practice. The individual will need encouragement and will

- musculoskeletal
- eating and drinking difficulties
- depression
- coat and skin issues
- limited ability to control body temperature
- decubitus ulcers
- urination and defaecation issues.

Figure 1. *Possible problems relating to recumbent animals.*

Paresis – a generalised weakness of the limb or muscle
Paralysis (plegia) – loss of voluntary control of the limb/s
Monoparesis (or monoplegia) – affecting only one limb; e.g. in 'trapping' injuries
Paraparesis (or paraplegia) – affects the hind limbs; e.g. in road traffic injuries or thromboembolism
Tetraparesis (or tetraplegia) – affects all limbs and can be a result of head trauma
Quadriparesis (or quadriplegia) – again effects all limbs and can also be a result of head trauma
Hemiparesis – affects only one side of the animal and can be caused by head trauma.

Figure 2. *Useful definitions of paresis.*

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***Figures 3a** & **3b.** Passive exercise is the manipulation of joints through their full range of movements – using extension, flexion and rotation.*

require full weight-bearing support – and, depending on its size, this should be undertaken by two staff members to ensure the safety of both the nursing staff and the patient.

Passive exercise is the manipulation of joints through their full range of movements – using extension, flexion and rotation (**Figures 3a** & **3b**). This is very specific to the type of joint and can only be recommended if not contraindicated in the overall clinical context of the patient's recovery.

So, the elbow joint may be extended to manipulate that joint; the stifle can be extended and flexed to encourage joint movement; and the carpal/metacarpal bones can be rotated. The patient's head should be rotated to ensure that the animal's neck does not become stiff (Lawrence, 2006).

Eating and drinking can be difficult for these patients, so they may require assisted feeding techniques, such as tube feeding. Fluid therapy will also need careful consideration as to the most suitable methods.

"It is important to be aware that recumbency can precipitate numerous issues over and above the original cause and these must be identified in the nursing care plan"

Coat and skin issues

Owing to the disease or trauma, the patient may be unable – or unwilling – to groom itself. The result is that the coat may become matted and any specific sore areas may be missed. Also many animals will not eat if they feel 'unclean', so grooming a cat can be an effective appetite stimulant.

Animals with 'feathered' leg hairs – Cavalier King Charles spaniels, for instance – may benefit from having the feathered hair trimmed (with owner permission) and an external cohesive bandage can be placed to protect the tail. The animal should be groomed daily in conjunction with a thorough skin assessment to check for wounds, parasites and any specific discharges.

Also an area that is commonly overlooked is the animal's nails – their length should be checked and trimmed if required, including the dew claws.

Decubitus ulcers (bedsores)

Decubitus ulcers commonly occur in areas of bony prominence and minimal subcutaneous fat – for example, the wings of the ilium or the hock. When there is continued pressure to these areas, it results in a reduced blood supply and the tissue becomes anoxic and may turn necrotic. These ulcers can be very painful for the patient and take many months – and multiple surgeries – to heal; so their prevention is most definitely one of the most important considerations of nursing recumbent patients.

To prevent decubitus ulcers, the patient should be placed

on comfortable bedding such as 'vetbedding'; or, if 'bairhuggers' or any other inflatable bedding is available, this is the preferred option. When possible, the patient can be turned every two to four hours to prevent tissue anoxia and the bony prominences protected and padded by the provision of a 'doughnut' bandage. Provision of a barrier cream to the area also aids in protection – the author personally prefers antibacterial emollient creams.

The decubitus ulcer will present with signs of erythema, inflammation and ulceration. If the animal is unfortunate enough to get a decubitus ulcer, then the treatment will be extensive wound management and discussion around the application of suitable protective dressings.

At this point the animal should have barrier cream applied to all bony prominences (**Figure 4**) and its environmental management – bedding, for example – may require careful reconsideration.

Hypostatic pneumonia

Hypostatic pneumonia is a risk if there is limited scope for the patient to be turned or moved by staff. It is, however, preventable with careful consideration and the application of appropriate techniques. The condition needs prompt veterinary attention, because a secondary infection may develop, which can be fatal.

Hypostatic pneumonia is caused by long-term lateral recumbency and happens when the animal's blood pools in the lower lung. As a consequence of the pressure, the alveoli may collapse and become anoxic; thereby resulting in blood stasis and secondary infection owing to the reduced circulation. The clinical signs of hypostatic pneumonia are an overall increased respiratory effort, including depth and rhythm.

There are key methods to prevent hypostatic pneumonia from developing, but these should only be initiated following complete assessment and consideration with the consulting veterinary surgeon. The methods applied can be adapted to the animal's specific conditions:

- the animal can be turned every two to four hours – spinal injuries will need careful manipulation
- the animal may benefit from being placed in sternal recumbency – using foam pads or blankets to keep them upright
- assisted exercise should be encouraged using the methods discussed above
- appropriate respiratory physiotherapy will need to be considered – this includes postural drainage, positional therapy and manual techniques.

Positional physiotherapy is the use of patient positioning to increase lung volume and allowing the animal to clear secretions.

The animal can be positioned in a standing position to allow the maximum expansion of the rib cage, lung lobes and diaphragm. If the animal is unable to stand, then being placed in sternal recumbency allows some expansion of the ribs, lung and diaphragm. Lateral recumbency is not effective because it only allows for minimal expansion of the lung.

If standing and sternal positions are used, the recommended time is 10 to 15 minutes, three to four times per day. This is only suitable if the animal's injury does not contraindicate the procedure.

Postural drainage is the use of gravity to assist in the movement of secretions. This is useful if the animal is unable to stand and is in lateral recumbency. The affected lung is positioned uppermost and the head is placed lower than the body level. This aids in the secretions being drained into the main airway and coughed up by the patient.

Manual respiratory physiotherapy includes the method of coupage or percussion. This is a technique where the animal is gently and slowly slapped on the side of the thorax with cupped hands. It works better when the animal is placed in a postural drainage position. Again this can only be performed if the patient's injury does not contraindicate its use.

"One of the key things to remember when nursing recumbent patients is that every individual will be different and have their own holistic needs"

Figure 4. *To help prevent decubitus ulcers, barrier cream should be applied to all bony prominences.*

Other considerations

Depression is a very serious consideration for a recumbent patient; so stimulation should be provided by grooming and a great deal of TLC. The latter is one of the main roles of a veterinary nurse and time should be given to provide this to the patients so that they will respond better to treatments. Also, long-term recumbency can have a significant negative effect on an animal's confidence (Lawrence, 2006).

Recumbent patients struggle to maintain their body temperature owing to decreased heat production. This can be prevented by providing the appropriate environmental conditions – environmental re-warming is more effective and safer then surface re-warming for recumbent patients. Providing the animal with assisted exercise and many of the physiotherapy techniques discussed above will also aid in temperature increase (Chandler and Middlecote, 2012).

Summary

Recumbent patients require extensive nursing and the provision of external support by suitably qualified physiotherapists.

One of the key things to remember when nursing recumbent patients is that every individual will be different and have their own holistic needs. Thorough assessment and completion of nursing care plans will ensure that the animal will receive the level of care it requires for its well-being and that is expected by its owner. ■

PPD Questions

1. What is the definition of recumbency?
   A. animal is weak
   B. animal is lethargic
   C. animal is unable to stand and/or get up
   D. animal is weak on one side

2. What is the definition of hemiparesis?
   A. animal is weak
   B. animal is lethargic
   C. animal is unable to stand and/or get up
   D. animal is weak on one side

3. Passive exercise is:
   A. the manipulation of joints for full range of movement
   B. assisting the patient to walk with a sling
   C. taking full weight of the patient on a sling
   D. gently slapping either side of the chest

4. Decubitus ulcer is the technical term for a:
   A. hotspot
   B. urticaria
   C. pruritus
   D. bedsore

5. When positioning a recumbent animal, unless contraindicated, it is best left in which of the following positions?
   A. right lateral
   B. sternal
   C. left lateral
   D. standing

Answers
1.C 2.D 3.A 4.D 5.B

References

Bowes V (2015). Making sense of nursing care models. Veterinary Practice Today, 3(4): 20-22.

Carter C (2014). 'Reducing patient stress: Considerations for nurses', Veterinary Nursing Journal, 29(11): 362-364.

Chandler S and Middlecote L (2011). Chapter 17 – 'Principles of general nursing' in Cooper B et al. (eds) BSAVA Textbook of Veterinary Nursing (5th edn). Cheltenham, BSAVA.

Jeffery A (2012). 'The Nursing Process, Nursing Models and Care Plans', in Cooper B et al. (eds) BSAVA Textbook of Veterinary Nursing (5th edn), Cheltenham, BSAVA, pp 346-364.

Joiner T (2000). An holistic approach to nursing. Veterinary Nursing 15(4).

Lawrence K (2006). Canine mobility and physiotherapy, Veterinary Nursing Journal, 21(10): 24-26.

Maughan J (2012). The essentials of patient care. In Aspinall V(ed.) The Complete Textbook of Veterinary Nursing (2nd edn), London, Elsevier, pp 247- 268.

Millis DL et al (2004). Canine Rehabilitation and Physical Therapy. Philadelphia, PA: Elsevier Health Sciences.

Opperman E (2004). 'The recumbent patient', Veterinary Nursing Journal, 19(5): 164-166.

Studdert VP et al (2011). Saunders Comprehensive Veterinary Dictionary: includes EBook access. (4th edn). Edinburgh: Elsevier Health Sciences.

Is it time you upgraded to a fully integrated IT solution?

When practice management systems (PMS) were first introduced, they revolutionised the management of veterinary practices, client record keeping and invoicing and stock control systems. They saved time and money and increased efficiency.

Nothing, however, stands still and the traditional PMS has now become an essential requirement for running any veterinary practice.

New technology trends have led to a variety of extra facilities that can be added to the conventional PMS, with the goals of driving growth, delivering excellence and boosting a practice's competitiveness. These goals have often been sought with 'bolt-on' facilities added to existing software, with hopes of integration with existing systems.

Historically, the use of 'bolt-ons' has been the accepted norm for most practices, but the dependence on multiple support services is never a good option and can complicate life for the busy practice manager when problems occur. What's more, few software packages interact favourably, leading to a number of different systems and work flows, creating confusion, work duplication and increased training costs.

So, highly preferable to 'bolting on' these extra facilities is to install a fully integrated system and receive the huge benefits and greater efficiencies that this brings.

Fully integrated systems can seamlessly provide an efficient and effective management tool for both veterinary professionals and practice managers – which, in turn, significantly improves the service a client can receive from the practice.

Fully integrated benefits

The number and variety of integrated systems and services is ever-increasing and includes:

- accurate and up-to-date mobile access to client and patient records
- invoicing-driven stock systems that also provide access to reports, end-of-day and month procedures and loyalty point schemes
- appointment systems providing proactive planning
- flexible external communication, allowing SMS and e-mail direct from a client's record
- easy-to-use systems for creating, optimising and viewing flexible and fair staff rotas
- automated appointment, hospital and outpatient visit reminders that help to avoid missed appointments via automatic or manual contact methods
- targeted electronic client communications
- organised daybooks enabling large animal and equine practices to organise offsite visits more efficiently
- stock control systems with immediate access to all information about stock items, batch numbers, expiry dates and stock levels
- consultation notes that include graphical and chronological representations of dental, skin and eye conditions
- electronic storage of all patient files
- computer systems that can integrate with diagnostic equipment, providing imagery throughout the practice and branch surgeries
- in-house laboratory results saved directly to the patient record, with graphical comparison of previous results
- standardised structure for the practice e-mail
- creation and management of custom Practice Health Plans for engaging clients and securing future revenues
- picture archiving and communications system (PACS) with automated backup facilities
- creating, sending and tracking of insurance claims
- automatic microchip data services
- telemedicine compatibility
- a secure system protected from the wide range of internet threats and malicious attempts to compromise your data security.

'Need to' not 'nice to'

What we need to realise is that technology has moved on and rather than simply 'shopping for a PMS', a practice now needs a digital partner that can provide a fully integrated system, which supplies all the services mentioned on the previous page, and can advise on – and provide for – the practice's current and future IT needs.

The need for more and more sophisticated facilities and services has led to a paradigm shift from traditional practice with PMS to technology empowered practice.

For many, this requires a huge shift in mindset as practices look to align with technology partners to deliver future growth and differentiation from their competitors. We only have to think of such symbolic shifts as the traditional mobile phone to smartphone, photographic film to digital imaging, analogue to digital watches and 'wired to' mobile phones, to see the advantages for animal welfare and the veterinary industry.

Veterinary-owned computer company AT Veterinary Systems has been at the forefront of veterinary digital evolution for over 25 years and provides integrated technology solutions through its VetStation platform. The company has one of the largest portfolios of veterinary software and has seen an increase in demand for its fully integrated systems from start-up practices and expanding veterinary enterprises.

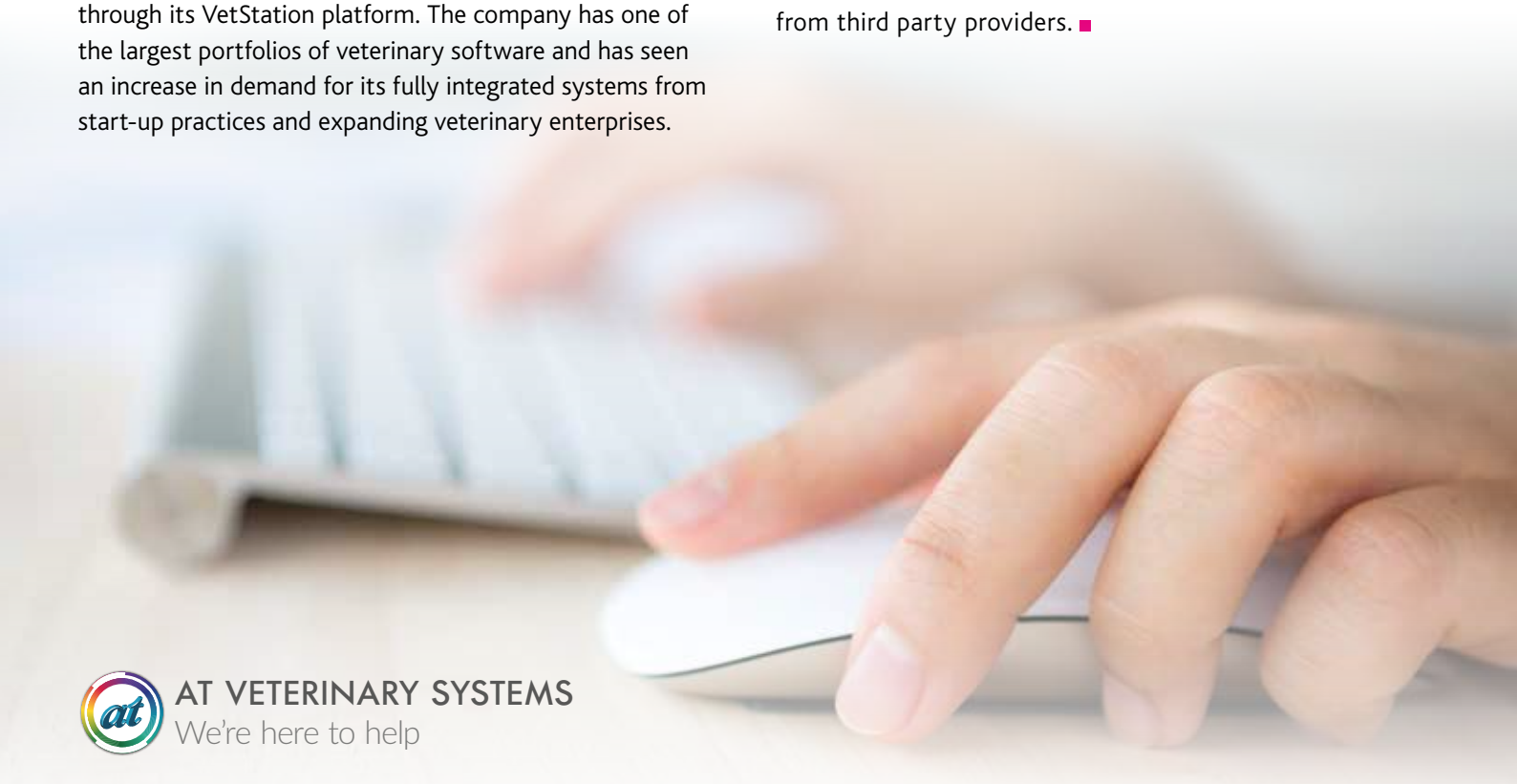
Technology empowered practice and ROI

One of the basic tenets of technology empowered practice is the optimal use of IT tools to achieve clinical and business excellence. A key characteristic of this type of practice is a clear focus on return on investment (ROI) rather than costs and, in general, it will spend a higher proportion of income on enabling software and hardware that can really 'do the job'.

Empowered practices focus on what technology can do for them, looking at achieving efficiency gains, clinical excellence and outstanding customer service. These practices look to align themselves and build strong relationships with IT partners of a similar ethos and commitment to the future of veterinary practice.

While it may be tempting for some practices to cut costs, reduce investment in IT or choose basic or free PMS solutions, this approach can often be more costly in the long run.

Empowered practices use technology to drive and underpin their growth in this technology driven era. Forward thinking practices – wanting an ideal work flow and maximum efficiency – must align themselves with an IT partner who can provide a fully comprehensive, integrated system, rather than continue to bolt on extra features from third party providers. ■



Jane Ellison
BSc(Hons)

Jane is an information scientist who has worked for the Veterinary Poisons Information Service (VPIS) and the human poisons service at Guy's Hospital, on and off since 1984, and has also worked in the pharmaceutical industry. She was a founder of the veterinary service in the 1980s and works in its 24-hour rota team.

The current pattern of small animal poisoning

Whilst recognising that the Veterinary Poisons Information Service (VPIS) only receives enquiries on the things that you choose to call us about – and that this may not be a full and accurate reflection of the amount and types of poisoning cases that are actually occurring in the field – there is, nonetheless, an annual 'Top 10' representing the agents about which we are most frequently contacted. There may be some unseemly jostling for position amongst the lower orders, but the overall pattern of agents to which animals are exposed remains predictably the same.

In previous articles, I have made the insightful comment that the VPIS list reflects substances that are most commonly found in our homes and this should not, therefore, come as too much of a shock, given that the majority of pets live so closely with their owners (**Figure 1**). Cats tend to favour the lily, pyrethrin (permethrin), benzalkonium chloride (disinfectant) triumvirate; whilst dogs remain well and truly loyal to NSAIDs, anticoagulant rodenticides and chocolate – which latter was discussed in depth in last month's issue of *Veterinary Practice Today* [*VPT* **5**(2)].

The most common causes of fatalities in companion animals – metaldehyde in dogs and ethylene glycol in cats – are, thankfully, not on the list of most commonly reported enquiries.

Most of these groups have been covered in previous issues of *Veterinary Practice Today*, including an approach to treating poisonings by an 'unknown' agent; but, given their continuing popularity, a brief refresher of a few key agents may be helpful, preceded by a look at two that have not received any attention – namely the sweetener, xylitol, and permethrin-containing products.

We shall look at adder bites in the next issue.

Xylitol

Xylitol is a 5-carbon sugar alcohol, found naturally at low concentrations in fruit and vegetables and is a normal intermediary metabolite in glucose metabolism. It is one of a number of non-sugar sweeteners permitted for use in foods (Dept of Health, 1983) and frequently found in sugar-free chewing gums and sweets.

Some human medications contain xylitol, but the most common enquiry to the VPIS involving the artificial sweetener is the ingestion of xylitol-containing chewing gums. Depending on the brand, flavour and presentation of chewing gum, the xylitol content can be as high as 470mg per piece of gum, and given that we would advise treatment for anything over 50mg/kg, even a 20kg dog would need treatment for as few as three pieces, with a smaller dog being at risk from even one piece.

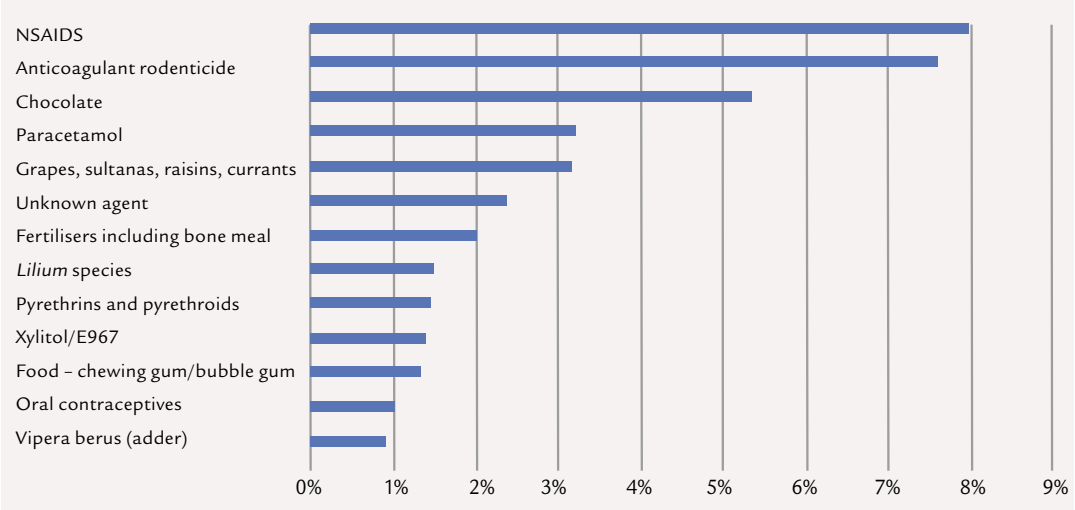


Figure 1. *Common small animal poisons ranked according to their frequency of being reported to the Veterinary Poisons Information Service.*

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Xylitol is a potent stimulator of insulin release in dogs – which appear to absorb the compound more extensively and rapidly than humans (Kuzuya, 1969). Ingestion will, therefore, result in hypoglycaemia, often within an hour of ingestion; although this can be delayed for 24-48 hours. Liver failure may occur in the absence of hypoglycaemia and signs appear nine to 72 hours after ingestion.

The clinical features of hypoglycaemia include vomiting, tachycardia, ataxia, coma, convulsions, hemiparesis, hypokalemia, hypomagnesaemia and hypophosphataemia.
If ingestion is known to be recent (<1 hour), an emetic should be given; binding of xylitol to charcoal is low, but it is probably still worthwhile in a case of large ingestion.
Glucose concentrations should be obtained on admission and monitored every one to two hours for at least 12 hours.

Potassium, phosphorus, total bilirubin, liver enzymes and clotting parameters should be monitored on admission and every 24 hours, for at least 72 hours. For animals without clinical features of hypoglycaemia, frequent small meals or oral sugar may be given for eight to 12 hours (Dunayer, 2004).

If this is ineffective – or the animal is symptomatic – then correct hypoglycaemia with glucose/dextrose.

Permethrin

Despite the campaign over recent years to improve awareness of the dangers of permethrin application to cats, the VPIS still receives many enquiries on this subject.

Cats are more susceptible to permethrin toxicity than dogs, and this is probably because they are less efficient at metabolising the compound, which leads to an accumulation of metabolites. Many of these feline cases occur because of inappropriate dermal application of canine products, particularly spot-on treatments; but cats are also at risk from secondary exposure through contact with other pets treated with permethrin.

The onset of clinical effects is usually within one to three hours, although sometimes this can be delayed for up to 36 hours; similarly, the duration of effects is usually one to three days but can be up to seven days.

The common presenting signs of a cat with permethrin toxicity include vomiting, diarrhoea, hypersalivation, thirst, ataxia, incoordination, dilated pupils, tachycardia, hyperexcitability, hyperaesthesia, hyperthermia, tachypnoea, tremor, twitching, muscle weakness and fasciculations, convulsions and respiratory distress (owing to weakness of respiratory muscles).

Treatment is aimed, ideally, at preventing – or at least controlling – the tremors and increased muscular activity.
If exposure is via the dermal route, wash the cat thoroughly with copious amounts of lukewarm water and a mild detergent; pyrethroids are not water soluble and the detergent will lift the chemical off and out of the fur.

If ingestion has occurred, absorption will be rapid, and so emetics are unlikely to be of use. The effectiveness of adsorbents is questionable owing to the non-polar nature of these agents (activated charcoal does not bind well to non-polar molecules).

Pyrethroids and pyrethrins are lipophilic and so the early use of lipid infusion is recommended if the exposure is thought to be significant, if the animal has marked neurological signs, or if the individual is failing to respond to other therapies. Lipid infusion has been used successfully in a number of cases of permethrin poisoning in cats (Brückner and Schwedes, 2012; Haworth and Smart, 2012; Kuo and Odunayo, 2013; Muentener et al, 2013).

Care should be taken to maintain hydration and body temperature in all cases; and diazepam, barbiturates, propofol and methocarbamol should be employed in the management of the increased muscular activity, although the use of lipid infusion should reduce the severity of the clinical effects, the amounts of these drugs needed, and the duration of the overall stay of the animal in hospital.

Non-steroidal anti-inflammatories

Representing eight to nine per cent of total enquiries annually, the ingestion by an animal of any NSAID intended for human use is potentially dangerous – the most commonly implicated actives are ibuprofen, naproxen and diclofenac.

The inhibition of prostaglandin production – although a boon at therapeutic levels in humans – is, in an overdose or inappropriate-use situation, responsible for ulcer formation in the gastrointestinal tract, as gastric acidity is increased; whilst, at the same time, the secretion of protective gastric mucus is reduced.

In addition, NSAIDs play an important role in renal homeostasis, and large overdoses will potentially result in acute kidney injury.

Prompt management is essential. Treatment should consist of emesis, activated charcoal, and seven to 14 days (depending on the clinical condition, the specific NSAID and dose ingested) of a H2 receptor antagonist, such as famotidine, ranitidine or cimetidine, the proton pump inhibitor, omeprazole and, if possible, misoprostol – which, as a synthetic analogue of prostaglandin, will provide the body with an external supply to redress the balance.
If the individual is symptomatic – or a large dose has been

"Every opportunity should be taken to increase awareness amongst owners of the potential risks that seemingly innocuous everyday substances may pose to their pets"

taken (the VPIS can advise on treatment doses) – 24 hours of maintenance fluids should also be part of the treatment strategy. Blood gases, electrolytes and renal function tests must also be assessed and monitored.

Paracetamol

Paracetamol is widely used therapeutically in dogs and we would advise that treatment is only required if >150mg/kg has been ingested. Cats, however, have a limited ability to metabolise the drug to non-toxic metabolites, so any ingestion – actual or suspected – should be treated as quickly as possible.

The main concerns are the development of methaemoglobinemia, caused by the oxidative damage of haemoglobin by the toxic metabolites of paracetamol, Heinz body anaemia and liver damage. Treatment with acetylcysteine, ascorbic acid and the liver protectant s-adenosylmethionine (SAMe) is recommended.

Anticoagulant rodenticides

The VPIS can advise on the treatment doses for various anticoagulant rodenticides, and a key factor in these cases is whether exposure has been a single, one-off, acute ingestion; or there is the possibility of a prior or chronic exposure.

If treatment is required, vitamin K should be given, but it is important to remember to check the prothrombin time three days after the final dose of vitamin K has been given, to ensure that the body is now producing its own clotting factors independently, rather than relying on the supplemental addition of vitamin K.

Grapes, raisins, sultanas, currants

Ingestion of grapes, sultanas or raisins can cause renal failure in dogs, although the exact toxic mechanism remains unclear. There does not appear to be a dose-response relationship (Eubig et al, 2005). However, a VPIS study does show a loose connection between outcome and mean quantity of fruit ingested. Individual variation in response may also occur.

Numerous fatal canine cases have been reported in the literature (Gwaltney-Brant et al, 2001; Penny et al, 2003; Eubig et al, 2005) and there is also a published case which – although it had a non-fatal outcome – involved only four or five grapes (Mazzaferro et al, 2004). Therefore, *any* dose is a potential problem, and we would advise treatment for ingestion of *any and all* amounts of grapes, raisins, sultanas or currants.

Emesis should be induced – this is worthwhile even beyond the standard two hours following ingestion because grapes and raisins slow gastric emptying. Repeat dose activated charcoal should then be given along with the administration of twice maintenance intravenous fluids for 48 hours. Renal function and electrolytes should be monitored for at least 72 hours post-ingestion.

Lilies

In an analogous situation to grapes and raisins, lilies cause renal failure in cats, but not dogs. All parts of the plant, including the pollen, are considered as toxic and although the toxic principle(s) and mechanism of lily toxicity are unknown (Bennett & Reineke, 2013), renal failure is caused by necrosis of renal tubular epithelial cells.

Whatever the toxic agent – either something in the plant or a feline-specific metabolite – it appears to be eliminated within 48 hours. This contention is supported by the observation that fluid diuresis for 48 hours prevents lethal renal failure (Fitzgerald, 2010).

Our treatment advice for a cat that has had any contact with a lily is: to thoroughly wash the fur; to apply a collar to prevent further grooming; to give an emetic and activated charcoal; and, similarly to the grapes and raisins scenario, to administer twice maintenance fluids for 48 hours whilst monitoring the renal function and electrolytes for 72 hours following exposure.

Summary

As with all things, prevention rather than treatment is the preferred situation. Every opportunity should be taken to increase awareness amongst owners of the potential risks that seemingly innocuous everyday substances may pose to their pets. ■

References

Bennett AJ and Reineke EL (2013). Outcome following gastrointestinal tract decontamination and intravenous fluid diuresis in cats with known lily ingestion: 25 cases (2001-2010). J Am Vet Med Assoc 242(8): 1110-1116.

Brückner M and Schwedes CS (2012). Successful treatment of permethrin toxicosis in two cats with an intravenous lipid administration. Tierärztliche Praxis: Ausgabe K, Kleintiere, Heimtiere 40: 129-134.

Department of Health (1983). The sweeteners in foods regulations. London: HMSO; 1983. SI 1983, 1211 as amended by SI 1988, 2122.

Dunayer EK (2004). Hypoglycemia following canine ingestion of xylitol-containing gum. Vet Hum Toxicol 46(2): 87-88.

Eubig PA et al (2005). Acute renal failure in dogs after the ingestion of grapes or raisins: a retrospective evaluation of 43 dogs (1992-2002). J Vet Intern Med 19(5): 663-674.

Fitzgerald KT (2010). Lily toxicity in the cat. Topics Compan Anim Med 25(4): 214-217.

Gwaltney-Brant S et al (2001). Renal failure associated with ingestion of grapes or raisins in dogs. J Am Vet Med Assoc 218(10): 1555-1556.

Haworth MD and Smart L (2012). Use of intravenous lipid therapy in three cases of feline permethrin toxicosis. J Vet Emerg Crit Care, 22(6): 697-702.

Kuo K and Odunayo A (2013). Adjunctive therapy with intravenous lipid emulsion and methocarbamol for permethrin toxicity in 2 cats. J Vet Emerg Crit Care doi:10.111/vec.12070

Kuzuya T et al (1969). Stimulation of insulin secretion by xylitol in dogs. Endocrinology 84(2): 200-207.

Mazzaferro EM et al (2004). Acute renal failure associated with raisin or grape ingestion in 4 dogs. J Vet Emerg Crit Care 14(3): 196-202.

Muentener CR et al (2013). Treating permethrin poisoning in cats. Veterinary Record 172(24): 643.

Penny D et al (2003). Raisin poisoning in a dog. Veterinary Record 152(10): 308.

What is the answer to animal cruelty?

In February, Battersea Dogs and Cats Home launched a campaign for longer jail terms for those convicted of animal cruelty. Currently, the maximum sentence for this in England and Wales is six months – the shortest in Europe – and campaigners want to see it increased to five years. They have made the point that this custodial term is 10 times shorter than illegal 'waste dumpers' can expect to receive when they are convicted.

Under the Animal Welfare Act 2006, the maximum penalty for causing unnecessary suffering to an animal is an unlimited fine or six months imprisonment – or both. It is rare that sentences and fines of this magnitude are imposed; and serious animal cruelty crimes have been committed where jail sentences have been given for periods of only 21 weeks. In 2015, of the 933 people convicted of animal cruelty in England and Wales, only 91 were sent to prison and the average sentence was under four months in length.

For those of us who care about animals and spend our days devoted to their well-being, the thought of animal cruelty is abhorrent and very difficult to understand. The reasons for it are far from simple. Animal neglect and cruelty is not selective – crossing, as it does, all social and economic boundaries. And there have been a number of instances where veterinary surgeons and veterinary nurses – professionals whose sworn roles are devotion to the care and welfare of animals – have been prosecuted for animal cruelty.

Animal cruelty can be broken down into two main categories – passive and intentional.

Passive cruelty is typified by cases of neglect, in which the cruelty is a *lack* of action rather than the action itself. It may include starvation, dehydration, parasite infestations, inadequate shelter in extreme weather, and failure to seek veterinary care when necessary. This passive cruelty can be the consequence of a number of factors.

Ignorance

Although not helpful in any way to the animals concerned, it is a fact that some cruelty is the result of simple ignorance regarding their needs and well-being. In some cases, it is not a lack of understanding but an *inability* to understand that leads to distressing animal neglect.

Hoarding

Animal hoarders are a good example of pet owners who, as a consequence of their own psychological problems, cannot see the suffering they are causing. They collect animals rather in the way that other hoarders collect household objects to extremes and impose severe neglect by housing far more individuals than they are able to adequately care for. This and other types of animal neglect are often indicators of people in need of social or mental health service support.

Abuse

The correlation between the abuse of animals and the abuse of the human abuser is well documented and, sadly, much of the cruelty to animals is perpetrated by people who have themselves been abused at some time during their lives. Data on domestic violence and child abuse cases reveal that a staggering number of animals are targeted by those who abuse their children or spouses – over 60 per cent of domestic violence victims report that their abuser also targeted their pets.

If we look at all three of the above categories, it is difficult to see that a custodial sentence would be the answer to preventing further animal harm – although, irrespective of the original reasons for the cruelty, it could make sense in the short term to prevent further animal ownership.

Intentional cruelty can be either of an individual nature or organised.

Individual

In these situations, people are cruel in the full knowledge that their actions hurt the animal, and they do it to cause the animal pain. It is hard to say why they do it, but often they see the animals as objects instead of creatures with feelings. This intentional cruelty is strongly correlated with other crimes, including violence against people.

Organised

In some respects this is perhaps the worst and most insidious form of animal cruelty and encompasses such activities as organised dog fighting, badger baiting, cock fighting and bull fighting.

Those who are intentionally cruel to animals deserve to be punished and a significant custodial sentence is probably the answer. A ban on keeping animals would also be appropriate, although some kind of re-education on animal care and respect might just make a difference with some individuals.

Photo: © Battersea Dogs & Cats Home.

As with most education, however, it is always a good policy to start early. It has to be the case that teaching about the care of – and respect towards – animals from a very young age in schools will help children to understand their responsibilities towards the whole animal kingdom as they grow up.

As veterinary professionals, we have a duty to fulfil this educational role as part of our corporate social responsibility and we should all be able to find ways of educating children in schools, clients in practice, and the general public, on how to care for animals. We are, in many ways, role models as advocates for animal care – so let's make sure that we honour this responsibility. ■

Equine wound management – first principles (Part 1)

This article, the first in a two-part series, is directed towards new graduates and those colleagues in mixed practice who see the occasional equine wound. We shall focus on the management of full thickness wounds that heal by second intention – looking at principles of wound healing, clinical assessment, debridement and the selection of appropriate dressings.

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*Suggested Personal & Professional Development (PPD)

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WOUND MANAGEMENT

The horse is a 'flight' creature and, therefore, predisposed to wounds (Booth et al, 1999; Stashak et al, 2009; Theoret, 2009). The lack of soft tissue over the equine distal limb means that wounds in this area can be particularly problematic and prone to complications (Knottenbelt, 1997). Such wounds can also cause extensive scarring, which can adversely affect mechanical function resulting in lameness and loss of use (Knottenbelt, 1997; Stashak et al, 2009). This highlights the importance of correct wound management in the horse.

Principles of wound healing

Epidermal cell migration and proliferation enables repair of partial thickness wounds (Stashak et al, 2009). Healing of full thickness wounds, however, involves a co-ordinated response of haemostasis, acute inflammation, cellular proliferation, remodelling and scar formation (Hess et al, 2003; Stashak et al, 2009; Theoret, 2009).

The 'acute inflammation phase' typically lasts up to three days following tissue insult and involves vascular and cellular responses that prepare the wound bed for regeneration (Stashak et al, 2009; Theoret, 2009). The vascular response comprises a complex series of changes in vessel tone and permeability, resulting in blood coagulation and platelet activation, which further promotes inflammation (Hess et al, 2003; Stashak et al, 2009; Theoret, 2009).

The cellular response involves leukocytes chemotactically attracted to the wound site by complement, activated platelets, injured mesenchymal cells and vasoactive mediators (Hess et al, 2003; Stashak et al, 2009). Foreign material and necrotic tissue are removed from the wound by neutrophils and macrophages (Stashak et al, 2009). Inflammatory mediators liberated from leukocytes in the wound bed maintain the sequence of events leading to repair (Stashak et al, 2009).

In horses, the acute inflammatory response can be weak compared with other species, resulting in inefficient healing (Knottenbelt, 1997; Stashak et al, 2009).

Once the wound bed is cleared of debris, the 'cellular proliferation phase' commences – typically within 48 hours of the initial injury (Stashak et al, 2009; Theoret, 2009). Angiogenesis, fibroplasia and collagen deposition lead to the formation of granulation tissue in the wound bed which, along with epithelialisation and myofibroblast-mediated contraction at the wound margins, enables repair of the deficit (Stashak et al, 2009; Theoret, 2009). Collagen is realigned along lines of tension in the resultant scar during the 'remodelling phase', and cells no longer needed in the area undergo apoptosis (Stashak et al, 2009).

With this understanding of how it is that wounds heal, we can begin to consider how we are able to optimise regeneration and repair in those wounds healing by secondary intention.

Figure 1. *Blunt thoracic trauma. The focus of the owner was the 6-inch x 6-inch flap with extensive muscle trauma; the immediate concern of the attending veterinary surgeon, however, was the clinical status of the patient who presented in shock and became progressively dyspnoeic. A pneumothorax was diagnosed secondary to costal fracture and open communication with the pleural cavity.*

Figure 2. *Radiography of a wound with a metal probe placed within the wound tract, confirming likely tarso-crural joint involvement.*

Clinical assessment

It is imperative that a full clinical examination is performed on the patient presented for wound management, (Booth et al, 1999); although the wound may not be the immediate priority (**Figure 1**).

Once the patient has been fully assessed, stabilised, and any haemorrhage controlled, the wound can be evaluated, taking into consideration:

- which tissues are damaged?
- is there potential for synovial/tendon/ligament/nerve involvement?
- is there eyelid/lip trauma that could affect function?
- how old is the wound?
- is the wound contaminated/colonised/infected?
- is there a foreign body?
- is there any discharge from the wound?
- is there any exposed bone?
- is the wound causing lameness?

Synoviocentesis, radiography using a radio-dense probe placed within the wound, and ultrasonography may be necessary to evaluate the extent of the wound (**Figure 2**).

Wound preparation

The wound should be infiltrated with a hydrogel while the area is clipped to prevent further contamination by commensal skin bacteria (Booth et al, 1999; Stashak et al, 2009). Copious volumes of sterile saline should be used to lavage the wound and remove foreign matter and bacterial contamination (Booth et al, 1999; Jeffrey, 2001).

Where possible the wound should be irrigated under pressure (7-8 PSI), using a pressurised fluid bag (300mmHg) or 35ml syringe and 19G needle (Jeffrey, 2001). Commercial wound cleansers and antiseptics should be avoided as they can be cytotoxic and dessicate the wound (Jeffrey, 2001). Tap water is hypotonic and, therefore, may cause cell swelling and be detrimental to fibroblasts.

Nonsteroidal anti-inflammatory drugs should only be given where any

Figure 3. *The value of staged debridement for a grossly contaminated facial wound with severe tissue trauma; non-viable tissue was debrided every day for three days, as shown.*

Figure 4. *Plantar metatarsophalangeal wound with septic tenosynovitis managed surgically and with primary closure.*

"In horses, the acute inflammatory response can be weak compared with other species, resulting in inefficient healing"

associated swelling is compromising circulation or there is severe pain; otherwise they should be avoided because their use will weaken the inflammatory response (Stashak et al, 2009).

Debridement

Careful debridement is necessary to remove foreign material and devitalised tissue that would otherwise act as a culture medium for bacteria (Breuing et al, 2005; Jeffrey, 2001; Stashak et al, 2009) (**Figure 3**). As would be expected, a greater level of contamination is associated with higher incidences of infection – faecal material contains up to 1,011 microorganisms per gram (Adams et al, 1999).

Debridement can be achieved using a blade (sharp debridement), dry swab, dressings (antimicrobial gauze, hypertonic saline gauze), hydrosurgically (Versajet, Smith and Nephew), biosurgically (maggot therapy) or using CO_2 laser and serves to shorten the inflammatory phase (Jeffrey, 2001; Oosthuizen et al, 2014; Stashak et al, 2009). By far the most commonly utilised means of debridement are hydrosurgical and sharp debridement.

Hydrosurgical techniques combine irrigation with debridement as they employ a high pressure water jet and suction to efficiently aspirate contaminants without over-hydrating tissues (Oosthuizen et al, 2014). During debridement, it may be necessary to enlarge the wound; this, however, should only be done along lines of tension, where closure might be possible.

In most cases, debridement can be performed on the standing, sedated horse; but in severely contaminated wounds overlying or involving synovial structures, it may be safer to anaesthetise the horse.

Primary versus secondary closure

Where possible, the wound should be closed within hours of being formed – using sutures or staples to enable first intention healing, also known as 'primary closure' (Hess et al, 2003; Stashak et al, 2009). Tension-relieving sutures and obliteration of dead space may also be necessary. Primary closure enables faster healing with less scarring when compared with secondary intention healing (Stashak et al, 2009) (**Figure 4**).

In some cases, severe tissue trauma or contamination mean that primary closure must be delayed for up to 48-72 hours to allow for staged debridement, (Breuing et al, 2005; Hess et al, 2003; Stashak et al, 2009). Primary closure is, however, associated with dehiscence – typically if the wound is infected, under tension or overlies an area of movement, such as a joint (Stashak et al, 2009).

Primary closure is not always possible and second intention healing indicated. This may be for practical reasons owing to extensive tissue loss, excessive skin tension or because of wound dehiscence (Stashak et al, 2009). Alternatively, primary closure may not be attempted because of financial constraints, (Stashak et al, 2009). Second intention healing involves serial bandage changes or topical dressing until the wound is closed





Figure 5. *The same wound as in Figure 3, managed with topical manuka honey following initial staged sharp debridement.*

by granulation, contraction and epithelialisation (Hess et al, 2003).

Dressing selection

Pivotal to wound management for secondary intention healing is appropriate dressing selection. The aim of wound dressing is to maintain a clean, warm, moist wound environment that optimises cellular and enzymatic activity at the site and prevents marginal epithelial dessication (Jones et al, 2006; Stashak et al, 2009).

The ideal wound dressing should also absorb exudates, allow gaseous exchange and provide insulation, as well as protect from bacterial contamination and further trauma (Jones et al, 2006). It is also important that dressings are non-adhesive, so as to avoid causing further wound damage when they are changed (Jones et al, 2006).

Hydrogels are commonly used to hydrate wounds to facilitate both the inflammatory and proliferation phases. They are composed of a 3-dimensional network of hydrophilic polymers and have 90 to 95 per cent water content (Hunter et al, 2003; Jones et al, 2006). Hydrogels are indicated for 'dry' wounds and help in cases where there is limited necrosis, by softening these areas and stimulating collagenase production, thus enhancing cellular debridement (Hunter et al, 2003; Jones et al, 2006).

Ideally, hydrogels should be used in combination with bandaging to prevent excessive tissue cooling which might reduce the inflammatory response.

Foam dressings are composed of a polyurethane compress and are routinely used in combination with topical preparations for their absorptive capacity, thereby reducing the potential for maceration (Jones et al, 2006). They are not only useful in the early stages, but also in exuding wounds and during the late granulation phase (Jones et al, 2006).

"The aim of wound dressing is to maintain a clean, warm, moist wound environment that optimises cellular and enzymatic activity at the site and prevents marginal epithelial dessication"

Alginate dressings are also very useful in the early stages of wound healing in horses. They are composed of alginic acid salts obtained from seaweed, which makes them very hydrophilic and absorbent and thus able to attract wound exudates (Jones et al, 2006). This results in the dry dressing forming a hydrophilic gel at the dressing-wound interface that encourages moist healing (Jones et al, 2006).

Alginates have been shown to activate the clotting cascade, macrophages and mast cells; which makes them particularly useful for managing equine wounds where the inflammatory and granulation response may otherwise be limited, (Jones et al, 2006). These dressings can be used in combination with foam dressings to increase the absorptive capacity and left in place for several days to minimise wound disturbance depending upon the level of exudate.

Macrophages play a crucial role during the inflammatory phase and topical medical grade manuka honey can be used to attract them into the wound bed. Manuka honey can be beneficial during the proliferative phase of wound healing as it has been demonstrated to cause up-regulated monocyte expression of inflammatory mediators, potentially resulting in epithelialisation and enhanced fibroplasia (Lusby et al, 2002; Stashak et al, 2009) (**Figure 5**).

Manuka honey is available as a liquid that can be applied to wounds directly or on a foam/gauze dressing, depending upon the level of wound exudates. The main disadvantage of honey is that it can cause wound occlusion and also have an osmotic effect on leukocytes and fibroblasts. Owners should be discouraged from using their 'pantry stores' of honey as such supplies are potentially contaminated with *Clostridium botulinum* and their antibacterial effect is variable (Willix et al, 1992).

During the proliferative phase of wound repair, the goal of therapy is to enhance proliferation and migration of cells optimising fibroplasia, angiogenesis and epithelialisation (Stashak et al, 2009). Topical application of cytokine-rich cellular supernatants or a platelet-rich plasma gel has been shown to stimulate the proliferative phase (Carter et al, 2003; Stashak et al, 2009).

Non-adherent dressings, such as Melolin (Smith and Nephew), are cheap and readily available in practice. However, they have poor absorptive capacity and should only be used for surgical wounds that have undergone primary closure and are associated with minimal exudate. ■

* In the second article in this series, the author will consider the application of bandages and casts, the use of skin grafts, approaches to wound infection and the complementary role of adjunctive therapies.

References

Adams AP et al (1999). 'Antibacterial Properties of a Silver Chloride-Coated Nylon Wound Dressing'. Veterinary Surgery 28: 219-225.

Booth TM and Knottenbelt DC (1999). 'Distal limb casts in equine wound management'. Equine Veterinary Education 11(5): 273-280.

Breuing KH et al (2005). 'Early Experience Using Low-Frequency Ultrasound in Chronic Wounds'. Annals of Plastic Surgery 55(2): 183-187.

Carter CA et al (2003). 'Platelet-rich plasma gel promotes differentiation and regeneration during equine wound healing'. Experimental and Molecular Pathology 74: 244-255.

Hess CL (2003). 'A Review of Mechanical Adjuncts in Wound Healing'. Annals of Plastic Surgery 51(2): 210-218.

Hunter H et al (2003). 'Hydrogel wound dressings: where do we stand in 2003?' Ostomy/wound Management 49(10): 52-57.

Jeffrey A (2001). 'Wound Irrigation in Musculoskeletal Injury'. Journal of the American Academy of Orthopaedic Surgeons 9(4): 219-226.

Jones V et al (2006). 'ABC of wound healing: Wound dressings'. British Medical Journal 332: 777-780.

Knottenbelt DC (1997). 'Equine wound management: are there significant differences in healing at different sites on the body?' Veterinary Dermatology 8: 273-290.

Lusby PE et al (2002). 'Honey: A Potent Agent for Wound Healing?'. Journal of Wound, Ostomy and Continence Nursing 29(6): 295-300.

Oosthuizen B et al (2014). 'Comparison of standard surgical debridement versus the VERSAJET Plus™ Hydrosurgery system in the treatment of open tibia fractures: a prospective open label randomized controlled trial'. International Journal of Burns and Trauma 4(2): 53-58.

Stashak TS and Theoret CL(2009). Equine Wound Management 2nd edn. Wiley-Blackwell: USA.

Theoret C (2009). 'Tissue Engineering in Wound Repair: The three ''R''s—Repair, Replace, Regenerate'. Veterinary Surgery 38: 905-913.

Willix DJ et al (1992). 'A comparison of the sensitivity of wound-infecting species of bacteria to the antibacterial activity of manuka honey and other honey'. Journal of Applied Microbiology 73(5): 388-394.

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Kieran works in Buckinghamshire for Buckingham Equine Vets (a member of XL Vets). He recently finished his RCVS Certificate in Advanced Veterinary Practice for Equine Medicine and is currently studying for his RCVS Certificate in Advanced Veterinary Practice for Equine Dentistry. Kieran has a keen interest in restorative dentistry, especially infundibular restorations.

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DENTISTRY

What's new in equine dentistry?

Equine dentistry is much more than just rasping an overgrown tooth. The equine clinician is expected to have a thorough understanding of the anatomy and pathology of the equine mouth. It is now commonplace for motorised dental equipment to be used for the routine reduction of enamel overgrowths by both veterinary and BEVA/BVDA-accredited equine dental technicians (EDTs).

Sedation is often used for routine dental visits, allowing a thorough oral examination to be performed and the reduction of all enamel overgrowths. EDTs may request the accompaniment of a veterinary surgeon in order to sedate the horse. It is important that the attending clinician understands which procedures the EDT is qualified to perform.

There are three categories of dental procedure. Category 1 procedures are those that can be performed by any individual because they are not classed as acts of veterinary surgery. They limit unqualified EDTs to the use of hand rasps only. It is important to point out that unqualified technicians often do not have their own professional indemnity insurance.

Category 2 procedures are those that can be performed by BEVA/BVDA accredited EDTs. These include the use of motorised dental equipment.

Category 3 procedures are those that can only be performed by a qualified veterinary surgeon. It is illegal for any EDT to perform or assist a veterinary surgeon with a Category 3 procedure. As a veterinary surgeon, you could be liable for any inappropriate care performed during your presence or under your instruction. Further information on the procedure categories and EDTs can be found on the British Equine Veterinary Association (BEVA) website, www.beva.org.uk.

Infundibular cemental hypoplasia and necrosis

Infundibular hypoplasia and infundibular caries are a common finding when performing an oral examination. The clinical importance of infundibular caries has been debated widely amongst dental specialists; however, the general consensus is that infundibular caries are a significant cause of dental disease.

The maxillary cheek teeth differ from the mandibular cheek teeth in that they have a mesial and distal infundibulum. These infundibulae are filled with cementum except for a central vascular channel. Incomplete filling of the infundibulae with cementum is a common occurrence that allows food material to become impacted within the infundibulum causing decay leading to infundibular caries (Suske et al, 2016; Dixon et al, 2014).

A recent study found infundibular cemental hypoplasia to be present in 50 per cent of healthy teeth (deemed non-pathological) but >70 per cent of diseased cheek teeth. Infundibular caries were present in >27 per cent of diseased teeth – these teeth also had endodontic disease suggesting a predisposition to erosion. The same study found the triadan 09 and the mesial infundibulum to be over-represented (Suske et al, 2016).

Infundibular caries have been identified as an important cause of tooth fracture and endodontic disease (Dixon et al, 2014; Dacre et al, 2008; Dacre et al, 2007). Pearce (2015) recently described a case series of apical infections caused by infundibular patency – debridement and restoration of the infundibulae was found to be curative in five of the six cases (Pearce, 2015).

Coalescing of both the mesial and distal infundibulae through decay can result in a structural weakening of the tooth, resulting in a midline sagittal fracture (Dixon et al, 2014). Various techniques for debridement and restoration of the infundibulum using different materials have been described but are beyond the scope of this article.

The aim of the restoration is to improve the structural strength of the tooth and halt the decay which, owing to the variation of anatomical shape, size and depth of the infundibular caries, can be challenging (Dixon et al, 2014) (**Figures 1**, **2** & **3**).

Temporomandibular joint disease (TMJD)

This is rarely encountered in the equid; however, when reported, it is most commonly septic in aetiology which results in degeneration of the temporomandibular joint (TMJ) (Carmalt, 2014). In the literature, there are very few reports of TMJD without sepsis, and aseptic TMJD remains a controversial diagnosis (Carmalt, 2014; Witte, 2015). It is possible that cases of TMJD may be under-reported.

It has been hypothesised that dental malocclusions cause TMJ inflammation and, therefore, pain. However, Carmalt et al (2006) found there was no correlation between dental malocclusions

Figure 1. *This oroscopic image shows impacted food material within the mesial and distal infundibulae of 109 and the mesial infundibulum of 110. The 110 also has occlusally open pulp chambers 3, 5 and 4. Computed tomography of this case revealed endodontic disease of and periapical infection of 110 resulting in a mild asymptomatic sinusitis of the rostral maxillary and ventral conchal sinuses.*

Figure 2. *This oroscopic image shows the infundibular restoration of a mesial 110 infundibulum immediately post filling.*

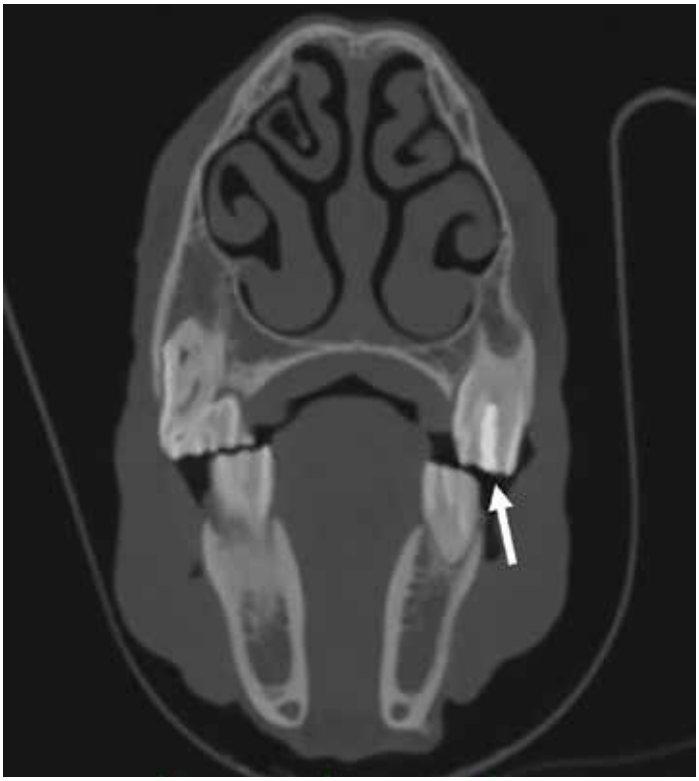

Figure 3. *A computed tomography (CT) segment showing a hyperattenuating material in the mesial infundibulum of the triadan 206. This hyperattenuating material is restorative material following debridement of grade 3/5 infundibular caries.*

and an increased inflammatory cytokine level in the TMJ (Carmalt et al, 2006).

Regular dental visits require the use of a dental gag, but what impact does this have on the TMJ? Pereira et al (2016) designed a study to determine this. Clinical and thermographic examination and synovial fluid analysis were performed six hours after a dental speculum had been in place for 60 minutes, and compared to baseline levels taken prior to the investigation.

Even though clinical and thermographic examination showed a significant result, synovial fluid analysis showed no significant changes (Pereira et al, 2016). As the sample size of this study was not large and inflammatory cytokines were not analysed, further study is required on this topic.

Reduction of overgrown cheek teeth

Dental overgrowths are a regular occurrence in equine dentistry and may result from a number of reasons including: brachygnathism (overbite), prognathism (underbite), campylorrhinus lateralis (wry nose) supernumerary teeth, tooth fracture, diastema, oligodontia and exodontia (Dixon, 2000). These overgrowths generally involve some reduction from the occlusal surface that can carry a risk of pulpar exposure (O'Leary et al, 2013; Allen et al, 2004: Marshall et al, 2012).

White and Dixon (2010) studied the sub-occlusal secondary dentine (SO2D) thickness of 408 permanent cheek teeth. A wide variation was found between individual pulp horns in the same tooth and different teeth. The SO2D was found to be as low as 2mm over some pulp horns and the maximum SO2D thickness recorded was 37mm.

It has previously been hypothesised that, with increasing age, the SO2D thickness would increase. This study found no correlation between age and SO2D thickness. There was also no correlation between buccal-lingual/buccal-palatal or rostral/caudal or contralateral SO2D thickness over the pulp horns. Mandibular cheek teeth were found to have significantly thicker SO2D compared to maxillary; and it was proposed that this variation was caused by the mandibular cheek teeth being narrower and, therefore, experiencing a greater force (White & Dixon, 2010).

There has been a question over the effects of reduced occlusal wear of a tooth on the SO2D thickness (Marshall et al, 2012). The reduced stimulation from the occlusal surface should cause a reduction in the amount of SO2D deposited, resulting in the SO2D become thinner. Conversely, reduced wear from a lack of occlusion should result in an increased thickness in SO2D. Marshall

et al (2012) found only a small increase in the SO2D thickness for overgrown maxillary cheek teeth. The SO2D thicknesses found in overgrown cheek teeth were similar to those reported in normal cheek teeth (Marshall et al, 2012; White & Dixon, 2010). Therefore, the equine practitioner cannot assume a thicker SO2D in overgrown cheek teeth.

When reducing large dental overgrowths, the equine practitioner must be aware, not only of exposing pulpar tissue, but also the potential for thermal injury and necrosis to the pulp. The temperature increase at which pulpar necrosis occurs – termed the critical temperature – has not been determined in the horse; although studies in other animals have taken this to be >5.5°C (O'Leary et al, 2013; Allen et al, 2004).

It was shown that increases in pulpar temperature >5.5°C resulted in irreversible pulpar necrosis in 15 per cent of teeth and increases of 16.7°C resulted in irreversible pulpar necrosis in 100 per cent of teeth (Jeffrey et al, 1990). Allen et al (2004) showed the reduction of large overgrowths with motorised dental equipment can result in irreversible thermal damage to pulp tissue. The same study also showed the use of water cooling to be protective whilst performing large reductions (Allen et al, 2004).

The duration of rasping has been shown to increase the risk of the critical temperature being reached. O'Leary et al (2013) compared rasping with motorised equipment for 30 seconds against 45 seconds, 60 seconds and 90 seconds. The likelihood of reaching the critical temperature was increased by 7.3, 8.9 and 24.7 times respectively. They also found presence of a thicker SO2D and the use of water cooling to be protective. Interestingly there was no significant difference between a constant in-built water cooling system and intermittent water cooling (O'Leary et al, 2013).

Haeussler et al (2014) found that critical temperature was reached more quickly with increased spin speed of motorised equipment. They found that doubling the rotation speed from 6,000rpm to 12,000rpm halved the time taken to reach the critical temperature.

Periodontal disease

Periodontal disease is a common disorder found in horses' mouths (Kennedy et al, 2016). In the horse, periodontal disease owing to diastemata (abnormal gaps between teeth) trapping of forage is common (Dixon et al, 1999; Dixon et al, 2014) (**Figure 4**).

Periodontal disease results in gingivitis that is characterised by reddening, bleeding and inflammation of the gums. In severe cases, deeper structures of the periodontium can be affected, resulting in tooth loss and osteomyelitis (Kennedy et al, 2016). The oral microbiome of healthy horses compared with that of horses suffering from periodontal disease has recently been described. Kennedy et al (2016) found that the *Tannerella* and *Treponema* genera were significantly increased in the sub-gingival samples collected from horses suffering from periodontal disease. They have also been associated with other dental conditions, such as equine odontoclastic tooth resorption and hypercementosis (Sykora et al, 2014).

Prevotella and *Veillonella* genera were significantly increased in the group suffering from periodontitis when compared with healthy horses. In healthy horses, *Gemella* and *Actinobacillus* genera are detected in significantly higher numbers when compared with the group suffering from periodontal disease (Kennedy et al, 2016). These findings are very similar to those found in man (Sykora et al, 2014).

Equine odontoclastic tooth resorption and hypercementosis

Equine odontoclastic tooth resorption and hypercementosis (EOTRH) is a relatively newly described condition affecting predominantly the incisors and canines in older horses (Lorello et al, 2016; Hole & Staszyk, 2016; Staszyk et al, 2008; Earley & Rawlinson, 2013). Recently, cases of EOTRH of the maxillary and mandibular cheek teeth have been reported, but these seem to be less severe (Moore & Schroeder, 2015).

Three forms of EOTRH have been proposed: resorptive, hypercementotic and mixed (Earley & Rawlinson, 2013; Smedley et al, 2015; Toit & Rucker, 2013). It is a progressive disease that can be very painful (Hole & Staszyk, 2016; Earley & Rawlinson, 2013).

Clinical signs include gingival recession, inflammation and oedema, calculus formation, bulbous swellings, an increased tooth mobility and periodontal disease (Hole & Staszyk, 2016; Smedley et al, 2015) (**Figures 5** & **6)**.

The aetiology of EOTRH is still unknown but it is likely to be multifactorial. A number of potential causes have been hypothesised including an autoimmune disorder, increased occlusal forces on aged teeth and infection with microorganisms (Sykora et al, 2014; Hole & Staszyk, 2016; Staszyk et al, 2008). As mentioned previously, *Tannerella* and *Treponema* species have been indicated in EOTRH, which fits the microorganism theory.

Figure 4. *A diastema between two mandibular cheek teeth after removal of all the impacted food material. Note the gingival haemorrhage caused by localised periodontal disease and peripheral caries on the lingual aspect of the tooth.*

Whatever the aetiology, odontoblasts respond to an inflammatory stimulus, resulting in tooth resorption. This compromises the integrity of the tooth, resulting in the deposition of irregular cementum by cementoblasts. The hypercementosis is a reparative action in an attempt to preserve the root. Early cases of EOTRH can be difficult to detect and radiographic changes can be subtle (**Figure 7**); even advanced cases can look similar to age-related changes in the teeth (Lorello et al, 2016; Hole & Staszyk, 2016).

Diagnosis is made predominantly on the basis of clinical signs and radiographic changes (Hole & Staszyk, 2016). Histologically EOTRH teeth show cemental hyperplasia with regions of lysis. In these lytic areas, bacteria, plant material and necrotic tissue were often found.

Periodontal disease was commonly associated with a lymphoplasmacytic inflammation. Also, it is not uncommon for the endodontic system to be compromised; however, it has been noted that the resorptive lesions

Figure 5. *This horse, presented at a routine dental visit, was unable to bite down on harder food stuffs such as carrots and was struggling to maintain weight. All the incisors were digitally loose and had periodontal detachment greater than 70 percent. The incisors were extracted in two stages, two months apart. At the time of the second stage extraction the owner reported an increased appetite and increased body condition score.*

Figure 6. *In this radiograph, resorptive and hypercementotic lesions of the 303,304, 403 and 404. The remaining incisors radiographically show hypercementotic lesions and detachment from the periodontium. Grossly, post-extraction lytic areas were present.*

Figure 7. *This radiograph has very mild periodontal changes of the mandibular incisors. These could be due to early EOTRH or periodontal disease from diastemata.*

seem to begin on the external surface of the tooth, rather than in the pulpar cavity (Smedley et al, 2015).

In the long term, the prognosis is poor for advanced cases and, ultimately, the treatment of choice is extraction of the compromised teeth. In some instances, this can involve extracting all the maxillary and mandibular incisors and canines (Lorello et al, 2016; Hole & Staszyk, 2016). Early cases can be managed by regular monitoring, removal of impacted forage from between incisor diastemata, regular brushing of the incisors and incisor reductions.

A potentially beneficial nutraceutical (Equident) has been described; although, currently, there is little supporting evidence in the literature.

Removal of the incisors seems to be a drastic step but there are reports of a positive response to extraction with an improved quality of life and increase in body condition score (Lorello et al, 2016). It should be noted that once the incisors have been extracted, the horse's tongue will protrude from the mouth. Owners should be made aware of this prior to extraction (Hole & Staszyk, 2016).

And finally...

Antimicrobials are regularly used to treat apical infections – but remember, no amount of antibiosis will heal a dead pulp! ■

References

Allen ML et al (2004). In vitro study of heat production during power reduction of equine mandibular teeth. Journal of the American Veterinary Medical Association. 224(7): 1128-1132.

Carmalt JL et al (2006). Temporomandibular joint cytokine profiles in the horse. J Vet Dent. 23(2): 83-88.

Carmalt JL (2014). Equine temporomandibular joint (TMJ) disease: Fact or fiction? Equine Veterinary Education. 26(2): 64-65.

Dacre I et al (2007). Equine idiopathic cheek teeth fractures. Part 1: Pathological studies on 35 fractured cheek teeth. Equine Vet J. 39(4): 310-318.

Dacre I et al (2008). Pathological studies of cheek teeth apical infections in the horse: 5. Aetiopathological findings in 57 apically infected maxillary cheek teeth and histological and ultrastructural findings. Vet J 178(3): 352-363.

Dixon PM et al (1999). Equine dental disease Part 2: a long-term study of 400 cases: disorders of development and eruption and variations in position of the cheek teeth. Equine Vet J. 31(6): 519-528.

Dixon PM (2000). Removal of equine dental overgrowths. Equine Veterinary Education. 12(2): 68-81.

Dixon PM et al (2013). A long-term study on the clinical effects of mechanical widening of cheek teeth diastemata for treatment of periodontitis in 202 horses (2008–2011). Equine Veterinary Journal - Wiley Online Library.

Dixon PM et al (2014). Critical evaluation of ex vivo restoration of carious equine maxillary cheek teeth infundibulae following high-pressure gas and micro-particle abrasion. Vet J. 200(3): 368-374.

Earley E and Rawlinson JT (2013). A new understanding of oral and dental disorders of the equine incisor and canine teeth. Vet Clin North Am Equine Pract. 29(2): 273-300.

Haeussler S et al (2014). Intra-pulp temperature increase of equine cheek teeth during treatment with motorized grinding systems: influence of grinding head position and rotational speed. BMC Vet Res. BioMed Central. 10(1): 47.

Hole SL and Staszyk C (2008). Equine odontoclastic tooth resorption and hypercementosis. Equine Veterinary Education. 178(3): 372-379.

Jeffrey I et al (1990). Dentinal temperature transients caused by exposure to CO2 laser irradiation and possible pulpal damage. Journal of Dentistry 18(1): 31-36.

Kennedy R et al (2016) The microbiome associated with equine periodontitis and oral health. Vet Res 47: 49.

Lorello O et al (2016). Clinical treatment and prognosis of equine odontoclastic tooth resorption and hypercementosis. Equine Vet J. 48(2): 188-194.

Marshall R et al (2012). A study of sub-occlusal secondary dentine thickness in overgrown equine cheek teeth. Vet J. 193(1): 53-57.

Moore NT and Schroeder W (2015). Equine odontoclastic tooth resorption and hypercementosis affecting all cheek teeth in two horses: Clinical and histopathological findings. Equine Veterinary Education. 28(3): 123-130.

O'Leary JM et al (2013). Pulpar temperature changes during mechanical reduction of equine cheek teeth: comparison of different motorised dental instruments, duration of treatments and use of water cooling. Equine Vet J. 45(3): 355-360.

Pearce CJ (2015). Treatment of maxillary cheek teeth apical infection caused by patent infundibula in six horses (2007-2013). Equine Veterinary Education. 28(11): 600-608.

Pereira TP et al (2016). Effects of the Oral Examination on the Equine Temporomandibular Joint. Journal of Equine Veterinary Science. 43: 48-54.

Smedley RC et al (2015). Equine Odontoclastic Tooth Resorption and Hypercementosis: Histopathologic Features. Vet Pathol. 52(5): 903-909.

Staszyk C et al (2008). Equine odontoclastic tooth resorption and hypercementosis. Vet J. 178(3): 372-379.

Suske A et al (2016). Infundibula of equine maxillary cheek teeth. Part 1: Development, blood supply and infundibular cementogenesis. Vet J. 209: 57-65.

Suske A et al (2016). Infundibula of equine maxillary cheek teeth: Part 2: Morphological variations and pathological changes. Vet J. 209: 66-73.

Sykora S et al (2014). Isolation of Treponema and Tannerella spp. from equine odontoclastic tooth resorption and hypercementosis related periodontal disease. Equine Vet J. 46(3): 358-363.

Toit du N and Rucker BA (2013). The gold standard of dental care: the geriatric horse. Vet Clin North Am Equine Pract. 29(2): 521-527.

White C and Dixon PM (2010). A study of the thickness of cheek teeth subocclusal secondary dentine in horses of different ages. Equine Vet J. 42(2): 119-123.

Witte TH (2015). TMJ pathology: is it real? Equine Veterinary Education. 28(3): 173-174.

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Chantal graduated from the Royal (Dick) School of Veterinary Studies, Edinburgh, in 2006. Initially she worked in mixed practice in Lincolnshire, but then moved to the Midlands where she fell in love with The Peaks. Almost five years ago, Chantal switched to farm practice and has been working at Scarsdale Vets, a member of XL Vets, ever since.

In her spare time, Chantal goes walking with her dog, Tinkerbell.

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SHEEP LAMENESS

Sheep lameness

Sheep lameness is an animal welfare issue that needs to be addressed in such a way that it will also result in better health across the flock. At every stage of production, lameness will impact on performance, with potentially serious consequences.

Lame sheep will spend more time lying down and less time eating, resulting in reduced body condition. This can lead to ewe replacements being too small to go to the tup and fattening lambs taking longer to fatten. Ewes may suffer pregnancy loss owing to poor body condition or, if affected in the third trimester, they could have poor colostrum, light lambs or pregnancy toxaemia.

The prevalence of lameness in the national flock is currently five per cent, with a target of two per cent by 2021 (SHAWG, 2016). This is encouraging, as it represents a halving in prevalence from the 10 per cent recorded in 2011.

To help in this process, a five-point plan has been produced by the Agriculture and Horticulture Development Board (AHDB) to highlight the areas upon which efforts should be concentrated. This is outlined in **Table 1**. The plan relies on an accurate diagnosis of the cause of lameness, because an incorrect diagnosis would reduce the efficacy of any treatment.

The most common causes are foot problems, many of which are infectious in origin. At the flock level, there could be more than one aetiology,

	Intention	Methods
Cull	Build resilience	▪ lameness is moderately heritable ▪ removing repeat offenders should naturally improve the flock resistance.
Quarantine	Reduce disease challenge	This is an area that needs improvement: ▪ any new animal or any animal that has left and returned to the flock (for example show animals) should be quarantined for 28 days ▪ animals should be examined for signs of foot rot or CODD, treatment should be started as necessary ▪ foot-bathing can be carried out three times at five-day intervals using 3% formalin or 10% zinc sulphate ▪ other diseases should be looked for and treated as appropriate during the same period.
Avoid		▪ clean and dry handling facilities ▪ limit poaching of feed and water trough areas ▪ muddy, wet, dirty areas are breeding grounds for bacteria, so should be avoided when possible ▪ repair damaged tracks, move troughs when required, and in wet conditions use gravel or wood chips to limit the damage done ▪ mobile handling systems mean you can avoid bringing different batches all to the same place and limit spread between groups ▪ 'isolation field' for lame animals as they are often the biggest source of infection ▪ when animals are indoors, regularly clean out pens and use isolation pens for lame sheep.
Treat		▪ catch disease early Inspect – identify lame sheep, clean hoof and examine carefully Diagnose – identify the cause correctly Mark – record ear tag number and affected limb Cull repeat offenders.
Vaccinate	Establish immunity	This works well if the problem is foot rot, the licensed vaccine needs to be given every six months.

Table 1. BRP Lameness five-point plan. (Source: Agriculture and Horticulture Development Board)

Figure 1. *CODD lesion showing necrosis of the tissue and separation of the laminae.*

Figure 2. *CODD lesion with secondary infection leading to shelling of hoof.*

so ideally a representative proportion of lame sheep should be examined. Being a prey species, sheep will often mask significant pain before there is any obvious sign of lameness, meaning treatment of visibly lame sheep should be a priority.

Pathogenesis

The main causes of infectious foot lameness are interdigital dermatitis (ID), foot rot and contagious ovine digital dermatitis (CODD). The clinical signs and treatment are different for each – although those for ID may be very similar to mild foot rot.

Interdigital dermatitis

Interdigital dermatitis (ID, 'scald') is caused by *Dichelobacter nodosus*, which requires damage to the interdigital space either via trauma or as a result of wet conditions (Witcombe et al, 2014) – wet pasture or bedding damages the integrity of the skin allowing entry of *D. nodosus*. This is prevalent in growing lambs in spring and autumn and is one of the most common causes of lameness (Hodgkinson, 2010).

Foot rot often follows damage caused to the skin by *Fusobacterium necrophorum* and it presents as red, moist tissue with necrotic layers in the interdigital skin, often accompanied by an unpleasant smell. Lesions progress to show ulceration and erosion of the skin.

The disease can present with a wide range of clinical signs – ranging from lesions indistinguishable from ID, to severe under-running of the horn. *D. nodosus* can survive in the environment for seven to 10 days and for several weeks on hoof clippings. The main risk is posed by animals carrying the bacterium on to the farm and spreading it (Witcombe et al, 2014).

The outcome of infection depends upon several factors: genetic susceptibility, environmental conditions and bacterial virulence, leading to wide-ranging clinical signs – from benign infection to a virulent form. Without prior damage to the skin of the foot, there is no way for *F. necrophorum* or *D. nodosus* to invade.

Disease begins in the interdigital space, progressing to separation of the wall and exposure of the sensitive laminae underneath. Tissue necrosis and exudation produces putrid caseous material; and even if animals recover from the infection and are no longer lame, they can become carriers, acting as a source of infection for the rest of the flock. This is problematic because they are still infecting the pasture yet show no clinical signs.

This should be borne in mind when buying stock, because chronic carrier animals will appear to be sound and can introduce infection to the flock, if bought unwittingly.

Contagious ovine digital dermatitis

Contagious ovine digital dermatitis (CODD) was first identified in 1997 (Harwood et al) and is not currently well understood. The causative agents are thought to be treponemes, similar to those found in bovine digital dermatitis, with or without the involvement of *D. nodosus*.

CODD lesions are distinct – beginning with ulceration and loss of hair at the coronary band, the lesion spreads rapidly down the hoof wall, separating it from the underlying laminae (**Figures 1** & **2**). Untreated cases can lead to irreversible damage and distortion of the claw (**Figure 3**); whilst in the most severe instances, the entire hoof capsule can fall off.

Figure 3. *Misshapen hoof following CODD infection.*

Treatment and control

Treatment differs for foot rot and CODD, so their identification needs to be accurate. Before you can teach farmers how to treat and control these two conditions, it is important that they are able consistently to identify a lesion on a claw (Kaler, 2008). Interdigital dermatitis and foot rot may be confused on clinical examination, although CODD should be easily identifiable as it starts from a different point.

Prompt antibacterial treatment for ID and foot rot assists recovery and prevents disease in other sheep. Recent studies have shown that routine foot-paring of the whole flock causes increased lameness and paring lame sheep is associated with slower recovery time (Kaler et al, 2010).

Infected animals should be separated from uninfected animals in order to reduce spread and allow monitoring of response to treatment. Lame animals will be in pain and should be given a non-steroidal anti-inflammatory agent (NSAID) to reduce this (although none are licensed specifically for this indication). Antibiotic treatment should be given to treat the infection of the foot – with oxytetracycline at 20mg/kg currently being recommended (Kaler et al, 2010).

Topical antibiotic treatment can help reduce spread of infection and animals heal well if kept on dry conditions for 24 hours (Green & George, 2008).

Foot bathing is useful for the control of ID and foot rot, if performed correctly. A clean, well-maintained handling area and footbath are required. Animals should be held on hard standing for 30 minutes after footbathing. Sheep can be walked through a 3-5% formalin solution; however, for a 10% zinc sulphate solution to be effective, the sheep need to stand in it for 15 minutes for prevention and 30 minutes to treat.

Vaccination can aid long-term control and treatment of foot rot and this is an important part of the five-point plan. As *D. nodosus* is involved in CODD, vaccination against foot rot will help reduce the levels of CODD in a flock. If possible, rotate pastures, keeping the ground free of sheep for three weeks, because this will significantly reduce pathogen load. Rapid, effective treatment of foot rot will cure most individuals, although some will become carriers and it is necessary to cull non-responsive animals (Allworth, 2014).

In combination, these measures will all help in the reduction of foot rot levels in the flock, thereby reducing the risk of spread and lowering the impact on production. Unlike in Australia, where eradication of foot rot at the farm level has been achieved, in the UK, eradication is impractical owing to the wet environment that allows survival of *D. nodosus*. Control is a more realistic aim.

Following the control of an outbreak of foot rot, there will still be some sheep in the flock that are lame from other causes, so it is important to manage a farmer's expectations before embarking on an expensive and time-consuming project to ensure that they are not disappointed with the results.

Special considerations for CODD

For CODD, long-acting amoxicillin has been proven effective, although tilmicosin also works well (Duncan et al, 2014). Affected animals are often very lame and so NSAIDs are indicated for pain relief. Strict quarantine procedures for bought-in sheep are the best control measure to prevent CODD from entering the flock. This involves bringing animals in to a separate field or pen, with a minimum three-metre gap from the rest of the flock. The bought-in animals – or those returning from time away from the farm – should be quarantined for at least 28 days.

During the quarantine period, they should have their feet examined on a weekly basis, or if they show any signs of lameness. The sheep should also be foot bathed at least three times in either 3% formalin or 10% zinc sulphate, at weekly intervals. Any sheep showing signs of lameness should be examined and treated appropriately and no lame sheep should join the flock, even if they have reached the end of the 28 days.

At the same time, the sheep should also be wormed and brought up to date with any vaccines the rest of the flock receives. It is also sensible to check for other infectious diseases during this time – orf, CLA and scab, for instance.

The biggest risk factor with CODD is co-infection with foot rot, so CODD incidence can be reduced by controlling foot rot (Angell et al, 2015). Other risk factors include cattle with digital dermatitis, increasing flock size, buying in sheep, sheep returning from rented pasture, time of year and housing.

A stocking density of over eight ewes per hectare results in an increased prevalence of foot rot and ID (Duncan et al, 2014) and separating lame sheep into an isolation pen will reduce the prevalence of foot rot and ID. Larger flocks have a bigger risk of CODD, possibly owing to the limitations of examining all sheep regularly.

The prevalence of CODD increases in late summer/early autumn, which is thought to be as a result of having the highest number and mass of sheep at this point. There is a small increase of CODD and foot rot in spring when there is increased infection pressure following housing for lambing (Winter & Green, 2017).

Other, non-infectious causes of lameness exist, but they are beyond the scope of this article. These tend to be infrequent and are often an 'individual animal' problem; so, as such, they need to be treated on a case-by-case basis.

Summary

Lame sheep spend more time lying down and less time eating as they are in pain. A reduction in feed intake results in poorer body condition which in turn leads to reduced fertility, poorer growth and slower fattening. All these things negatively impact on the productivity of the flock. The biggest improvements in flock health can be seen by implementing a successful plan for foot rot, ID and CODD.

To do this successfully the disease involved needs to be identified correctly so that the appropriate treatment can be used. Control at the flock level

"Treatment differs for foot rot and CODD, so identification needs to be accurate"

"Recent studies have shown that routine foot-paring of the whole flock causes increased lameness and paring lame sheep is associated with slower recovery time"

is an ongoing process and can be done using a five-point plan. This plan allows a structured approach to controlling lameness and will help reduce prevalence in the flock.

The outcomes for the flock should be an increased resilience, reduced disease challenge and an improved immunity to diseases causing lameness. Farmers can use the plan to tackle disease from all angles, giving them the greatest chance of success. Lameness continues to be an animal welfare issue and should be one of the priorities for our profession. ■

"Lameness continues to be an animal welfare issue and should be one of the priorities for our profession"

PPD Questions

1. Which of the following are the infectious agents involved in foot rot?
   A. *Dichelobacter nodosus*
   B. Treponemes
   C. *Fusobacterium necrophorum*
   D. *Streptococcus epidermis*
   E. *Pasteurella*

2. Name four risk factors for contagious ovine digital dermatitis.

3. Under-running of the horn starting from the interdigital space and moving towards the wall is characteristic of which lesion?
   A. 'white line' disease
   B. CODD
   C. foot abscess
   D. foot rot
   E. infected joint

4. What makes the control of interdigital dermatitis difficult?
   A. lack of response to antibiotics
   B. the ubiquitous nature of *Fusobacterium necrophorum*
   C. hard to diagnose
   D. foot-bathing doesn't work

Answers
1. A&C
2. A. wet pasture; B. housing for lambing; C. large flock size; D. cattle with digital dermatitis; E. concurrent infection with footrot; F. buying in sheep
3. D
4. B

References

Allworth MB (2014). Challenges in ovine footrot control. Small Ruminant Research 118: 110-113.

Angell JW et al (2015). Sheep and Farm level factors associated with contagious ovine digital dermatitis: A longitudinal repeated cross-sectional study of sheep on six farms. Preventive Veterinary Medicine 122: 107-120.

Duncan JS et al (2014). Contagious ovine digital dermatitis: An emerging disease. The Veterinary Journal 201: 265-268.

Green LE and George TRN (2008). Assessment of current knowledge of footrot in sheep with particular reference to Dichelobacter nodosus and implications for elimination or control strategies for sheep in Great Britain. The Veterinary Journal 175: 173-180.

Harwood DG et al (1997). Virulent Footrot in Sheep. The Veterinary Record Letters 140(26): 687.

Hodgkinson O (2010). The importance of feet examination in sheep health management. Small Ruminant Research 92: 67-71.

Kaler J (2008). Epidemiological investigations into lameness in sheep. PhD thesis, University of Warwick.

Kaler J and Green LE (2009). Farmers' practices and factors associated with the prevalence of all lameness attributed to interdigital dermatitis and footrot in sheep flocks in England in 2004 Preventive Veterinary Medicine 92: 5952–5958.

Kaler J et al (2010). Randomized clinical trial of long-acting oxytetracycline, foot trimming, and flunixine meglumine on time to recovery in sheep with footrot. Journal of Veterinary Internal Medicine 24: 420-425.

SHAWG (2016). Sheep Health and Welfare Report for Great Britain 2016/17

Winter JR and Green LE (2017). Cost-benefit analysis of management practices for ewes lame with footrot. The Veterinary Journal 220: 1-6.

Witcomb LA et al (2014). A longitudinal study of the role of Dichelobacter nodosus and Fusobacterium necrophorum load in initiation and severity of footrot in sheep. Preventive Veterinary Medicine 115: 48-55.

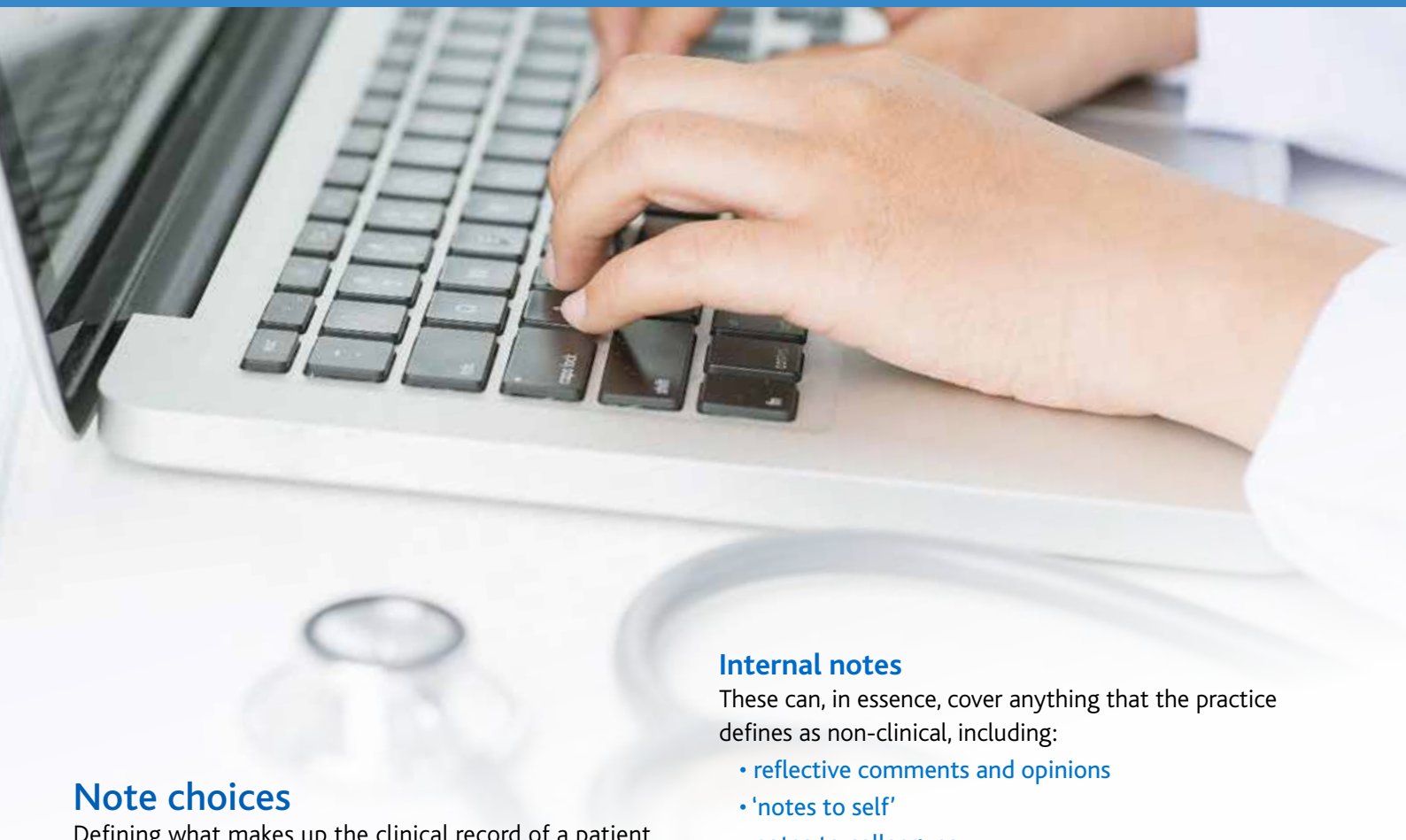
A closer look at recording clinical notes

Having accurate, timely and comprehensive records is a vital part of practising good veterinary medicine and surgery.

The notes making up a patient's record following an examination and/or treatment can often be complex – containing information such as details of the examination, treatment given, procedures undertaken, medication supplied and the results of any diagnostic or laboratory tests. They will also include advice given to the client, suggestions made for future treatment or procedures and all kinds of notes regarding telephone conversations, estimates, consents given, recommendations, discussions, referral advice and so on.

In the interest of animal and practice staff welfare, together with good medical practice, it may also be prudent to record 'internal notes'. These may refer to the behaviour of the animal concerned – particularly if it is aggressive or difficult – the disposition/attitude of the owner, levels of expectation, reliability of information given and any other details that may assist colleagues in managing the condition, including 'notes to self and colleagues'.

"Personal or sensitive information and any client financial information should be stored separately from the clinical records as recommended in the RCVS *Guide to Professional Conduct*"



Note choices

Defining what makes up the clinical record of a patient and what information stored on the practice's computer system is for internal use only is not clearly defined. Here are some guidelines.

Clinical notes

Clinical notes comprise factual information about the health and condition of the animal examined and include:

- findings from – and details of – the examination
- diagnosis
- treatment given or advised
- procedures undertaken
- medicines given or prescribed
- details of diagnostic or laboratory tests – radiographs, ultrasounds, electrocardiogram images, scans
- future treatment or investigations advised
- follow-up care and advice
- notes of any telephone conversations during which advice is given
- consents given or withheld
- recommendations
- referral discussions.

These clinical notes may be requested by the other veterinary surgeons, the client, insurance company or other parties.

Internal notes

These can, in essence, cover anything that the practice defines as non-clinical, including:

- reflective comments and opinions
- 'notes to self'
- notes to colleagues
- notes about the client – financial details, personal details, personality
- notes about the pet – aggressive, timid?
- payment discussions
- credit worthiness
- family issues
- abuse
- information about the pet's environment and other factors
- potential differential diagnoses
- clues and uncertainties that are not substantiated.

Neither of these lists is exhaustive but a practice policy will help the veterinary staff to decide into which category notes should be placed.

The internal notes do not form part of the clinical record and it is up to the practice to set its own policies on whether and how these are made available externally. They may be useful if and when a practice is faced with an external investigation.

It is also worth bearing in mind that although client records are the property of the veterinary practice, under data legislation, clients have the right to access information about themselves.

Who sees what?

Viewing clinical and internal information concurrently can be helpful for practising veterinary surgeons. So having this information appear in context and in one place can ultimately lead to better communication, diagnoses and clinical outcomes. But it comes with some risks.

To avoid the scenario where a client requests to see their pet's notes – only to discover additional comments included that they may not like – requires the imposition of robust procedures. There are two options if you wish to avoid this unfortunate circumstance:

1. Do not write down the comments in the first place
2. Record the comments in a separate area.

If 1 is not a realistic option, it is vital that certain non-clinical comments are not read by some parties.

It is, however, equally important that colleagues are aware of delicate issues and potential circumstances when they have to deal with a particular pet or client; so they are of great internal value.

It makes a great deal of sense, therefore, to separate clinical notes from non-clinical notes and to be very clear what each category should encompass. In order to achieve this, practices really need to have a policy for taking notes and define carefully what is clinical and what is not clinical – and where and how the different categories should be recorded.

Who is the gatekeeper?

Just as the practice needs a policy for note taking, so it should also have a policy for discharging, signing off and showing data to others. Too often it is left to a receptionist to "send the notes on" to a third party without any scrutiny of their contents.

Although a 'note discharging policy' will take longer to process – because the notes will need to be checked by a suitable person – it will certainly be a lot safer and more professional.

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"Having a policy on note taking makes it clear which notes are clinical notes and can therefore be released and which are internal practice/ communication notes for use within the practice"

A word of caution about making notes. Time is always a pressure and it is tempting to write up notes at the end of a consulting period rather than at the time. It is always better, however, for notes to be written at the time of the consult – even if they are only a brief record that can be elaborated on later.

It is preferable to have these primary, short, informative clinical notes so that if things change between the first examination and the final writing up of full notes, there is an initial record available such that a full and accurate picture can be painted. If no original notes have been made, the final write-up – after, say, a second examination – may be perceived as not giving the full facts. ■

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Developments in treating cattle lameness – where digital structure and function meet nutrition and management (Part 1)

It feels like waiting for the next bus. There has been nothing much of significance coming along to change our approach to cattle lameness for several years – yet now, all of a sudden, we have new research coming at us from all directions! These are truly exciting times for cattle foot 'geeks'.

Owen Atkinson
BVSc DCHP MRCVS

Owen is a farm animal vet who worked for over 20 years in clinical farm practice before establishing Dairy Veterinary Consultancy, based in Cheshire but covering the whole UK – and occasionally overseas. He provides strategic health advice and tailor-made training to ruminant and dairy agri-businesses, as well as veterinary practices and primary producers. He also offers a second-opinion and referral service for practices.

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CATTLE LAMENESS

This first article in a two-part series explores some of the 'game changers' emerging from research on the relationship between hoof structure and function, the vital importance of nutrition and housing in late pregnancy, and treatment of claw horn lesions.

The digital cushion – fat pad theory

The anatomy of the hoof is shown in **Figure 1**. The pedal bone is suspended within the horn capsule by several structures:

- the lamina bonds between hoof wall and dorsal surface of the pedal bone
- soft tissue attachments of ligaments and tendons
- the digital cushion.

A strong support structure is important because when there is excess pressure on the corium, which is responsible for new sole horn production, contusion occurs that leads to the lesions of sole haemorrhage, sole ulcer and white line disease. These are claw horn lesions, as opposed to infectious or skin diseases.

Around the time of calving, the soft tissue support, particularly at the laminae, is weakened (Tarlton et al, 2002). This is a consequence of the effect of relaxin, under the influence of oestrogen, and is a side effect, if you like, of Nature's design, whereby pelvic ligaments relax a little to allow the calf to pass through the birth canal. I guess most veterinary surgeons have recognised this for a while now, and it is the basis for advice regarding particular care of maximising lying times and comfortable housing of cows around the high-risk calving period, to reduce the risk of sole damage leading to sole ulcers in early lactation.

> "...the digital cushion looks to be at least as important as the laminae and other soft tissue attachments in the support it provides to the pedal bone"

But here is 'game changer' No. 1 – the digital cushion looks to be at least as important as the laminae and other soft tissue attachments in the support it provides to the pedal bone. Machado et al (2010) discovered that cows with a poor body condition score at drying off had a higher risk of becoming lame in the following lactation.

Bicalho et al (2009) found that the digital cushion thickness was related to lameness risk – a thicker digital cushion had less risk of lameness, and thinner cows had a thinner digital cushion. Randal et al (2015) also found that lower body condition scores (BCS) were related to more lameness. Therefore, we might say that thin cows go lame, as well as probably lame cows go thin.

The digital cushion is not situated entirely under the heel bulbs, as one might imagine. **Figure 2** illustrates how the cushion, in fact, extends under the pedal bones, broadly in three connected pillows of fat. These act in the same way as the air-cushioned soles of sports shoes. The digital cushion fat pad story explains how nutrition plays a role in lameness risk – it has little or nothing to do with 'laminitis', now an outdated and discredited explanation for sole ulcers (though it might still exist to some extent...!).

If rumen health is poor – including, but not limited to, sub-acute rumen acidosis – or the cows' nutrition is not meeting their needs in other ways, then they are likely to lose weight. This leads directly to reduced fat cushioning in the foot and damage to the corium.

There is still much to learn. For example, do certain breeds have more protective digital cushions? Is speed of weight loss important, or just low BCS? Can digital cushion thickness or quality be selected for genetically? How does age affect digital cushion properties?

Take home messages

- do not calve cows at BCS less than 2.5 (Holsteins)
- avoid thin cows at any stage of lactation (never <BCS 2.0)
- consider housing thin cows on straw yards to protect their feet and maximise lying times.

Previous trauma causes permanent changes

We move on to 'game changer' No. 2.

Evidence is emerging that the digital cushion fat pad alters with trauma and inflammation. Under the influence of inflammatory mediators, such as those released during episodes of corium contusion, the physical nature of the fat pad may become more fibrous. It seems it may lose some of its protective cushioning effect. It may become thicker ('swollen') for at least a while, but not necessarily more protective.

And not only that. The same inflammation in this region seems to lead to permanent bony changes of the pedal bone. Exostoses are produced on the palmer (plantar) surface, particularly towards the caudal edge, in cows that have had previous episodes of claw horn lesions (Newsome et al, 2016).

Sometimes the bony protuberances can be very pronounced (**Figure 3**). Clearly, this would increase the risk of further pressure in this high-risk zone of the foot leading to more contusion and sole horn damage.

Take home messages

- cows with previous episodes of claw horn lesions are more likely to go lame again
- exostoses are caused by inflammation and are permanent
- inflammation also damages the digital cushion
- reduce inflammation – use NSAIDs early on in disease.

The most effective treatment for claw horn lesions

Thomas et al (2015) compared four treatments for sole bruising and sole ulcer in a case controlled study. These were corrective trimming alone (T), corrective trimming plus blocking the ipsilateral (non-damaged) claw (TB), corrective trimming plus NSAIDs (three-day course of ketoprofen) (TN) and corrective trimming plus blocking plus NSAIDs (TBN).

Table 1 summarises the results of these comparisons. All four treatments resulted in an average complete cure (non-lame, mobility score 0, five weeks later) of 36 per cent. Adding blocking or NSAIDs to trimming only improved the success rate slightly. However, trimming plus NSAIDs plus blocking, gave the best outcome of a 56 per cent cure.

There is more than one possible reason why NSAIDs might give a better success rate. It could be argued that cows receiving pain killers lie down more easily, eat more frequently and, in some way, have an altered behaviour that leads to better cure. Alternatively, the reduction of harmful (and permanent) inflammation within the foot is a very credible explanation.

Take home messages

- use NSAIDs as part of first-line treatment for claw horn lesions
- don't wait until the lesion is severe before resorting to NSAIDs.

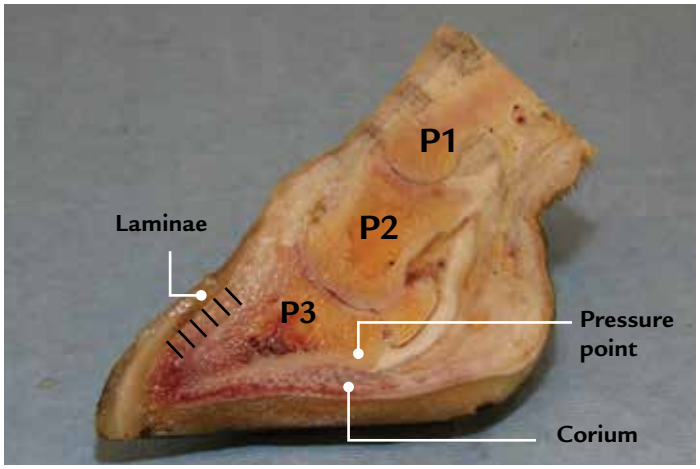


Figure 1. *Cross-section of a bovine digit. P1 = 1st phalanx; P2 = 2nd phalanx; P3 = 3rd phalanx or pedal bone.*

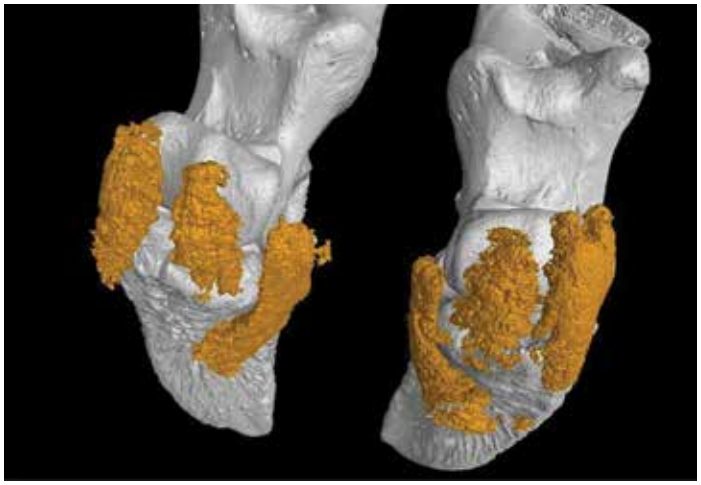


Figure 2. *CT scan of bovine digits showing the digital cushion (yellow).*

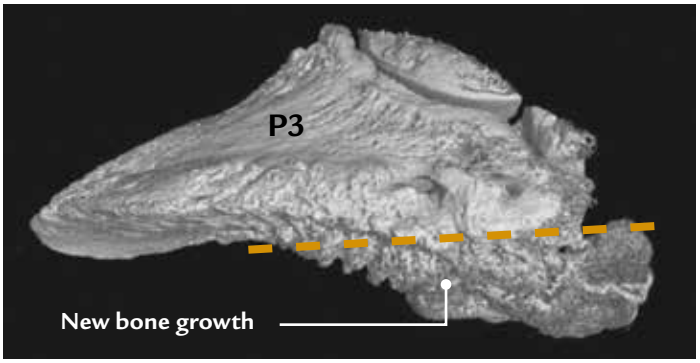


Figure 3. *CT scan of the pedal bone of a cow affected with a chronic claw horn lesion showing extensive exostoses.*

Table 1. Lameness outcomes following four different treatment programmes for claw horn lesions (Thomas et al, 2015)

Treatment Group	Sound (MS 0) at Day 35 (%)	Non-lame (MS 0 & MS 1) at Day 35 (%)
Trim only (T)	24	69
Trim plus block (TB)	36	72
Trim plus NSAID (TN)	29	76
Trim plus NSAID plus block (TBN)	56	85

wSummary
Veterinary surgeons don't actually get to treat many lame cows nowadays, despite there being no shortage of potential candidates! Professional hoof trimmers have the kit and (hopefully) the skills to trim cows in large numbers, quickly, and are usually farmers' first point of call for dealing with lame cows.

But the world of cattle hoof care is a fast-moving one, and veterinary surgeons are still at the forefront of research in this area. In order for this work to have an impact and improve the lives of cattle, as well as make dairy farms more sustainable, the veterinary profession holds many of the keys and should not be shy in coming forward to carry the baton.

This might be by educating and training farmers and foot trimmers, working with independent foot trimmers, or including foot trimmers as part of their vet-led teams. ■

Acknowledgements
Figures 2 and **3** are used with permission from The University of Nottingham and AHDB Dairy. They illustrate some of the results of the AHDB-funded research package on lameness, led by Professor Jon Huxley of The University of Nottingham, which continues to provide much needed answers to our lameness questions.

* The second article of this two-part series on latest developments in cattle lameness will take a look at EDPET (early detection, prompt effective treatment), optimising toe length and tackling toe necrosis.

"Evidence is emerging that the digital cushion fat pad alters with trauma and inflammation"

PPD Questions

1. Which of the following is the most correct explanation for sole ulcers?
   A. rumen acidosis causes laminitis which in turn leads to sole haemorrhage lesions and sole ulcers early in lactation
   B. the digital cushion is a fat pad predominantly under the heel bulbs and bruising here resulting from long standing times causes sole ulcers
   C. contusion of the corium beneath the caudal part of the pedal bone causes sole haemorrhage, the precursor lesion to sole ulcers. This results from a combination of concussive forces and lack of pedal bone support, which includes poor cushioning from the digital cushion fat pads

2. Which of the following is probably true about the digital cushion? (one correct answer)
   A. weight loss after calving reduces the thickness of the digital cushion fat pad
   B. the fat pads of the digital cushion are unlikely to alter in response to dietary changes
   C. digital cushion fat metabolism is independent of subcutaneous fat metabolism, which is typically measured by body condition scoring

Answers
1.C 2.A

References

Bicalho RC et al (2009). Lameness in dairy cattle: a debilitating disease or a disease of debilitated cattle? A cross-sectional study of lameness prevalence and thickness of the digital cushion. Journal of Dairy Science, 92 (7): 3175-3184.

Machado VS et al (2010). The effect of claw horn disruption lesions and body condition score at dry-off on survivability, reproductive performance and milk production in the subsequent lactation. Journal of Dairy Science 93(9): 4071-4078.

Newsome R et al (2016). Linking bone development on the caudal aspect of the distal phalanx with lameness during life. Journal of Dairy Science, 99: 4512-4525.

Randall LV et al (2015). Low body condition predisposed cattle to lameness: an 8-year study of one dairy herd. Journal of Dairy Science, 98(6): 3766-3777.

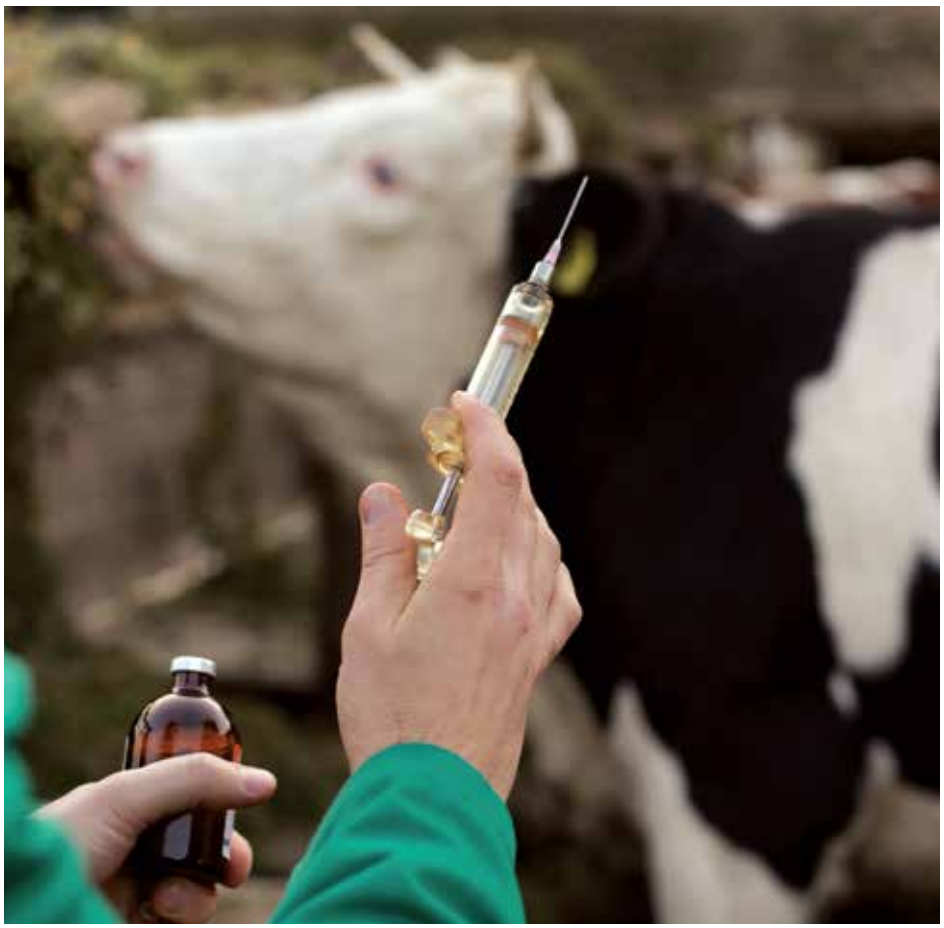
Tarlton JF et al (2002). Biomechanical and histological changes in the support structures of bovine hooves around the time of first calving. Veterinary Journal 163: 196-204.

Thomas HJ et al (2015). Evaluation of treatments for claw horn lesions in dairy cows in a randomized controlled trial. Journal of Dairy Science, 98(7): 4477-4486.

Jumping on the bandwagon

The good news is that antibiotic usage in agriculture is falling. In fact, it is falling faster than in human medicine.

During a House of Commons debate on 7 March, junior health minister, Nicola Blackwood, said that between 2014 and 2015 the total consumption of antibiotics fell by 4.3 per cent, while sales of antibiotics for food-producing animals dropped by 10 per cent. This is a small – yet significant – step in the right direction; but, as always happens, there are distractions precipitated by those who are bringing other arguments and agendas into the arena.



Unnecessary distractions

In the same debate, MP Theresa Villiers called for action on intensive farming – saying that we need to move away from this type of farming which is reliant on the prophylactic use of antimicrobials. The Soil Association has also waded into the debate, calling for farm antibiotic use to be significantly reduced through 'kinder farming methods'. It is also asking for donations to fund its campaign work, including bringing farmers to a round-table discussion, meeting supermarket buyers and briefing MPs. In essence, the Soil Association is manipulating the issue of antibiotic resistance to further its call for a change in the way animals – particularly indoor-reared animals – are farmed.

Gwyn Jones, chairman of the Responsible Use of Medicines in Agriculture Alliance (RUMA) has called this a divisive campaign that could alienate many first-rate conventional farmers across the UK. He also pointed out that antibiotic resistance is very much a 'One Health' issue across both animal and human medicine and that it was in no way helpful to cause divisions in this area.

It seems a great pity that two organisations, who are basically working towards a better system for farming and animal welfare, have to create such tensions and animosity. Change does not happen overnight and everyone would agree that the progress so far in reducing the use of antibiotics is welcome, even if there is still so much more to do.

Undoubtedly intensive farming and the rearing of animals in very close quarters lends itself to infection and disease; and the wholesale dosing of batches of animals when only a few are diseased, or the use of preventive antibiotics is – although understandable – now very difficult to justify. In the same manner, UK vegetable farming and the use of pesticides at numerous stages of growth in many ways mirrors the use of antibiotics in the animal sector.

Reality check

It would, indeed, be wonderful to return to the consumption of food produced by more natural – and possibly humane – methods; but reality dictates otherwise. The whole farming system cannot be changed overnight, either in practical terms or politically. UK consumers are, in fact, dependant on both animal and vegetable intensive farming for their everyday food needs. Reduce intensive farming and the short-term shortage of food – cheap or otherwise – would lead initially to food prices rising (some would of course quite rightly say that we should pay for quality) and also the influx of cheaper non-UK produce, probably produced by intensive methods elsewhere.

Of course, we have to continue to reduce the quantity of antibiotics used in farming and maybe organic farming is one of the ways forward; however, we can never remove the issue of cost while the general public expects cheap food. As a nation we have become used to spending less and less on food. Statistics show that in 1957 the average family spent 33 per cent of their income on food, in 1975 it was 25 per cent, in 2006 it was 15 per cent and in 2016 it was further reduced to 11 per cent.

The population is growing and expects food to be cheap. There are those who care about where their food has come from and how it was reared, but there is still a majority who will simply buy the cheapest. So rather than jumping on the bandwagon to score political points or further a cause, we should all be working steadily towards a reduction in the use of antibiotics in both animal and human medicine, whilst always having the welfare of our farmed animals at the fore. ■

John Carr
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John qualified as a veterinary surgeon in 1982. After five years in general practice, he returned to university to complete a Leverhulme residency in pigs and a PhD at Liverpool specialising in microbiology and pathology. He has taught production medicine at several universities – Liverpool and the Royal Veterinary College, London; North Carolina and Iowa State in the US; and Murdoch in Western Australia.

John runs a consultancy practice with clients in North America, Europe, Asia, Australia and Africa. As a veterinary professional, he has great interest in maintaining the health of bees and his global practice has introduced him to wonderful bee keepers around the world.

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HONEYBEE

Post-mortem examination of the honeybee (*Apis mellifera*)

The veterinary profession has not really engaged in problems associated with honeybees; although there is a great deal that veterinary professionals can offer the bee, beekeepers and bee inspectors. There are a number of modern threats to apiaries and we owe bees a duty of care.

As veterinary professionals we should work with local bee inspectors and aim to provide an additional layer of advice and reassurance – the British Veterinary Bee Association members will always be more than happy to help out and have a great website containing a plethora of interesting tips, www.britishbeevets.com (**Figures 1**, **2** & **3**).

So what can we offer bees?

Firstly, a clinical approach to their problems.

As with any animal population, the vast majority of their problems are associated with husbandry rather than pathogens – suboptimal husbandry weakens the bee's health to a point where the pathogen becomes significant. The most important causes of bee disorders are often a combination of greed resulting from bee keepers stealing too much honey and pollen, combined with adverse weather conditions.

When considering diseases in bees, all the normal villains are present: poisons (insecticides); predators (*Vesper crabro*), parasites (*Varroa destructor*), bacteria (*Melissococcus plutonius*), fungi (*Ascosphaera apis* – 'chalkbrood') (**Figures 4** & **5**) and viruses (ABPV [Acute Bee Paralysis Virus]) and a few unknown causes – colony collapse disorder, for example.

Examination of the problem starts with the clinical history, observation and the gathering of facts. The majority of the problems are not complex – basic husbandry errors and subsequent interaction of potential pathogens all contribute to the daily problems in a bee hive. As with all types of farming, beekeeping is 'steeped' in its own language; but once the basics have been grasped, the whole world of bees will flower.

Figure 1. *Honeybee on the almond crop in Australia.*

The whole hive has died

Starvation is a common reason for a hive to collapse. If in the spring the hive is found to be dead, post-mortem the hive and note the position of the bees. If the bees are small in number and gathered together, in a clump – probably with a dead queen in the middle – and a few other worker bees are dead with their heads in a cell, consider starvation as a likely cause of the hive's demise (**Figure 6**).

Bees are more than capable, if provided with sufficient stores, to survive the harsh winters of Canada down to -30°C. But the long wet British winter/spring can put a lot of stress on a hive's resources, especially if the bee keeper has taken too much honey in the autumn or is trying to create too many hives.

Figure 2. *The average modern breakfast.*

Figure 3. *The breakfast without bees! A little more boring – and in fact the egg yolk would probably be white without the additional help of bees.*

Galleriasis

If when you open up the hive there is a mass of webbing with small black faecal dots present, the problem is probably wax moth (*Galleria mellonella* or *Aphomia grisella*). There may

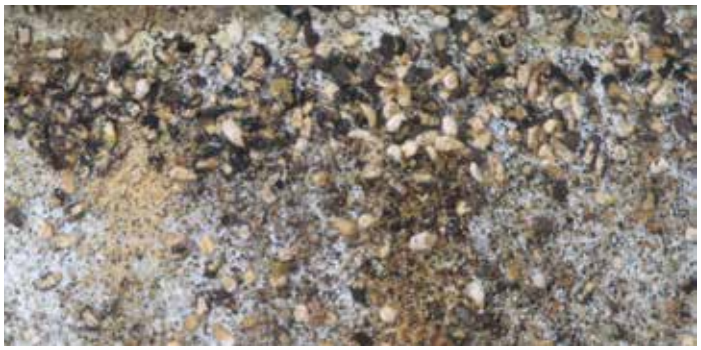

Figure 4. *The hive debris above has clear indication of 'chalkbrood'* (Ascosphaera apis).

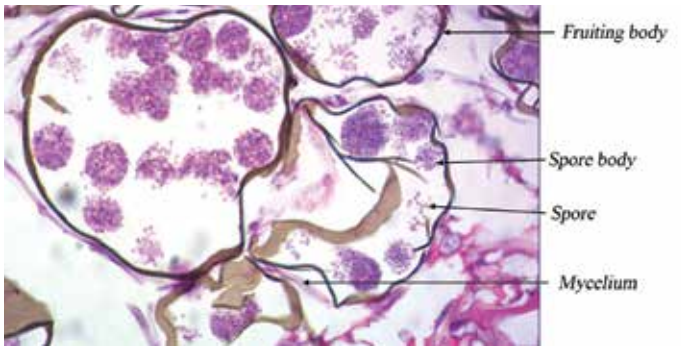

Figure 5. *A histological section of 'chalkbrood' infested pupa with the characteristic fruiting bodies in section.*

Figure 6. *The characteristic pattern of bees in a starved hive from Canada – the white fungus growing on the dead bees is secondary.*

Figure 7. *Wax moth infestation in an abandoned Kenya top box hive in Uganda.*

Figure 8. *The hive debris indicates where the bees are in the brood box above in the winter time.*

Figure 9. *Examine hive debris with a hand lens – look particularly for* Varroa.

be mummified or live larvae in characteristic cocoons and dead moths (**Figure 7**). The bees have left – note the wax moth probably came in late once the hive was already seriously weakened. The wax moth, *Aphomia sociella*, is also a very serious pest to bumblebee nests.

Examine the hive debris

If the hive has an open bottom or a removable tray, the hive debris will fall onto a tray or on the ground (**Figure 8**). The hive debris will often contain evidence of disorders – varroosis, for example, or the presence of wax moth (**Figure 9**).

The veterinary surgeon can request the hive debris and examine it by using a dissecting microscope to count the number of *Varroa* present. The 'varroa drop count' provides an indication of the amount of stress the hive may be under, associated with the varroosis (**Figure 10**).

Examining a frame of bees

If you are able to examine the hive in situ, examine the hive frame by frame. In conjunction with the beekeeper – and ideally the bee inspector – you can learn, over time, how to quickly and accurately identify common problems. The major challenge, as with any clinical examination, is learning what is normal (**Figures 11-14**).

Sample collection

There are some basic principles to follow when sampling a bee hive:

- collect bees using a matchbox – one matchbox-full of bees equates to around 30 workers.
- one frame of bees is about 500 bees
- do not accidentally collect the queen!

The type of sample also can affect the likelihood of identifying the pathogen. For example, if you only collect bees from the landing board, you are only going to collect adult working bees more than three weeks of age and, obviously, will miss disorders of the brood.

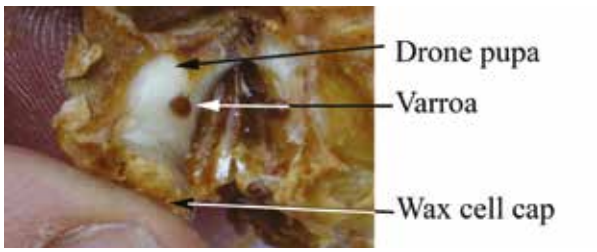

Figure 10. Varroa *mites in a capped drone cell. There are three mites visible can you spot the other two?*

Figure 11. *Stage 3 worker larva starting to fill the entire cell.*

Figure 12. *The air gap under the wax capping makes the capping brown.*

Figure 13. *Honey – the lack of air under the capping makes the white wax obvious.*

Figure 14. *The domed and larger cells characteristic of developing drone pupae.*

Figure 15. *Two possible results using the lateral flow device.*

Recognising significant pathogens

The classic pathogens to be diagnosed are *Paenibacillus* larvae (American Foul Brood) and *Melissococcus plutonius* (European Foul Brood); and there are hive side lateral flow devices that may be useful to aid in the diagnosis (**Figure 15**). But these are notifiable pathogens and any suspicion must be reported to the government authorities.

To examine bees by post-mortem

The general anatomy of a honeybee is shown in **Figure 16** and its internal anatomy in **Figure 17**.

Place the bees in a refrigerator for 20 minutes to anaesthetise them and then kill with washing-up liquid. For 'dry' bees, place them in the freezer overnight prior to working on them but remember this will damage any histological examination.

For histological examination, place the bees in a refrigerator for 20 minutes to anaesthetise them and then kill in chilled 10% buffered formalin, placing a small piece of filter paper over the surface of the formalin so the bees are completely submerged in the solution. Return the container to the refrigerator for two hours.

When to carry out a post-mortem on a bee

When the queen dies or has to be replaced, examine the old queen in detail to become more familiar with a major player in the hive. With the introduction of a new queen, a couple of the attendants could be examined to check for specific pathogens and thus enhance the biosecurity principles.

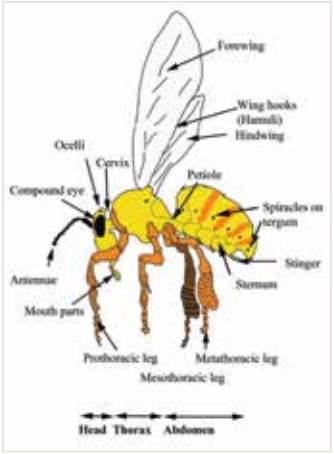

Figure 16. *General anatomy of a honeybee.*

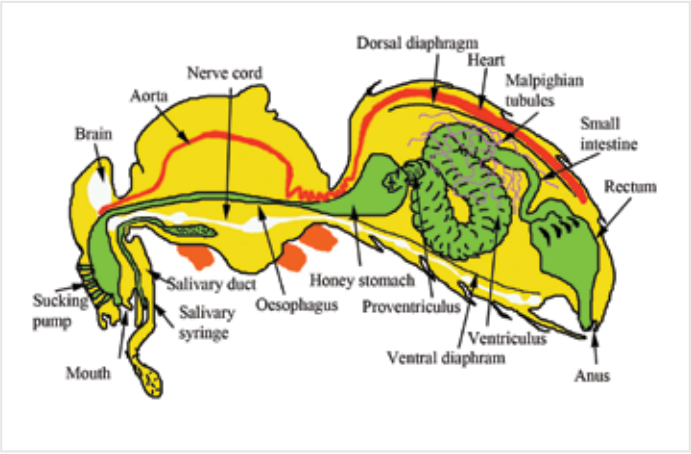

Figure 17. *General layout of the internal anatomy of the worker honeybee.*

External examination of the bee – pupae and adult

Under a dissecting microscope or hand lens examine the submitted bees and note:

- the sex of the bees under examination
- the colour of the eyes and other structures in pupae – this aids in ageing them
- the shape and structure of the wings
- any mites or other abnormalities
- the hair distribution and areas of hair loss.

Is the bee's shape, especially its abdomen, normal? Check that the queen's legs are intact – the loss of a foot ('balling') – is a common cause of queen failure.

Examination of the tracheal system

Pin the bee on its back and remove the head and first pair of legs by pushing them off with a scalpel or razor blade using a downwards and forwards motion. This can be facilitated by pinning the bee to a piece of angled cork (**Figures 18** & **19**).

Make a second cut a couple of millimetres back to create a slice of the bee prothorax (**Figure 20**).

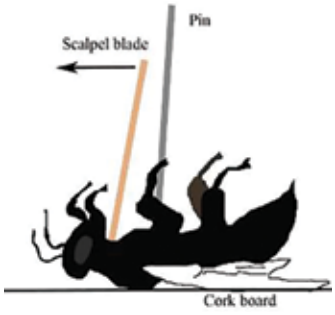

Figure 18. *Drawing of scalpel placement to remove head and first pair of legs.*

Figure 19. *An angled cork block making removal of the head and prothoraxic legs easier. The cut surface needs to be examined under the dissecting microscope.*

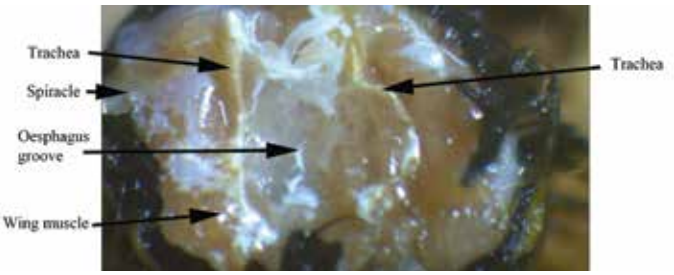

Figure 20. *Normal view of the prothoraxic slice.*

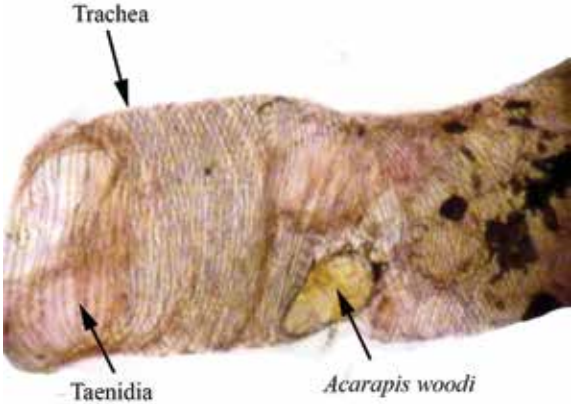

Figure 21. *Trachea infested with mites.*

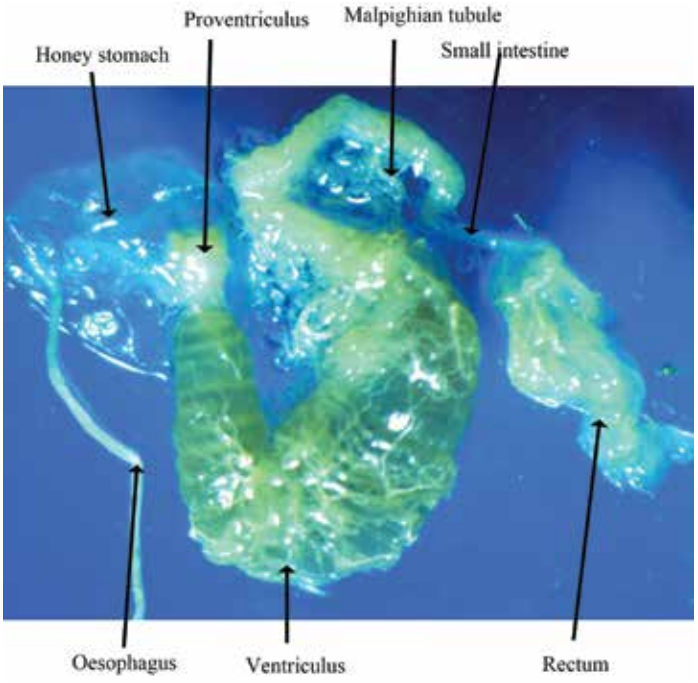

Figure 22. *The gross anatomy of the digestive tract and Malpighian tubules.*

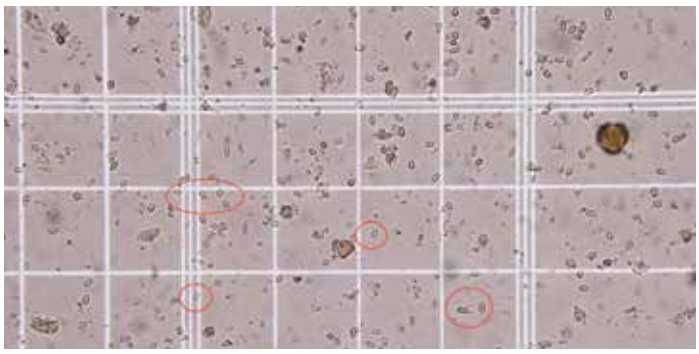

Figure 24. *Counting* Nosema *spores (rice grains) with the haemocytometer – a couple of spores are circled.*

Place the disc on a microscope slide, add a few drops of lactic acid in order to make the material more transparent. Examine the thin slice down the dissecting microscope and observe the two large trachea from the first spiracle. Occasionally, small mites will be seen in the trachea (**Figure 21**). These may be tracheal mites, *Acarapis woodi.*

Examination of the digestive tract

The digestive tract can easily be obtained from a bee (**Figure 22**). The head has already been removed; so grasp as much of the stinger as possible with a pair of fine tweezers and then with a steady, gentle pull withdraw the entire digestive tract from the abdomen with the stinger attached.

An alternative approach is to remove the legs and embed the bee on its back or the front in some wax and carefully dissect the dorsal or ventral surface to examine the abdominal contents in situ (**Figure 23**). Immersing the bee in isopropylene alcohol will improve the view down the microscope.

One reason for examination of the digestive tract is to confirm the presence of a

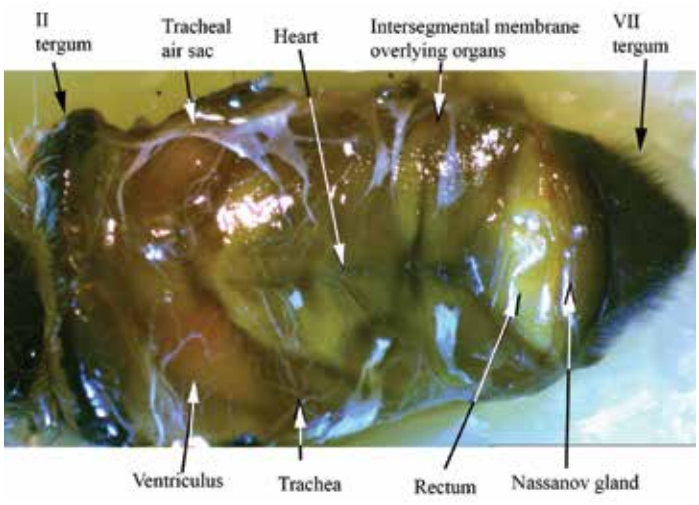

Figure 23. *The anatomy of the honeybee abdomen with the dorsal surface removed.*

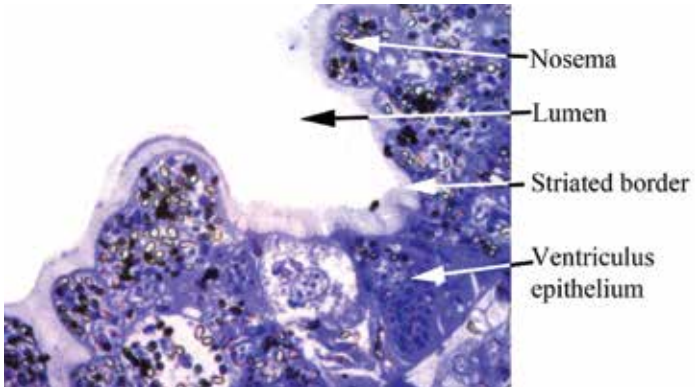

Figure 25. *Histological section of the ventriculus wall revealing a heavy infestation with* Nosema.

fungal infestation by *Nosema*. Crush the ventriculus with a glass slide and examine the contents down the microscope – the *Nosema* spores can be recognised as small 'rice grains'.

A numerical examination can be made by using a haemocytometer to provide a guide to the number of *Nosema* spores per millilitre of ventriculus contents. An infested bee may have 10 million spores/ml (**Figure 24**).

Nosema may also be recognised in histological sections made from the dissected ventriculus or on whole bee sections. With a normal H&E strain they can be seen, but are more obvious with specific stains, such as toluidine blue (**Figure 25**).

Total crude protein concentration

The crude protein concentration percentage can vary between 21 to 67 per cent in working bees, and it is important to maintain the workers with a crude protein concentration above 40 per cent. If the protein concentration falls below that level, the life span of the workers will fall from the normal 46 to 50 days to only 20 to 26 days.

As a consequence, 'foraging bees' will not be able to fly for so long or so far, further reducing the health of the hive. The bees become very susceptible to European Foul Brood (*Melissococcus plutonius*) and Nosema *(Nosema apis* and *N. ceranae*). This is a

particularly important check in the autumn, because bees with low protein concentration will generally fail to overwinter.

Viral pathogens

Increasingly, viral pathogens are being recognised by PCR examination of whole bees. However, many of these pathogens are extremely common and are only significant in stressed hives.

Histological examination

Histological examination of bees is the most rewarding post-mortem technique to employ; although this is still rarely performed. It utilises normal mounting and H&E stained sections – albeit, of necessity, slightly thicker than normal until the laboratory becomes accustomed to cutting through the hard cuticle (**Figures 26**-**28**).

The use of immuno-histochemistry (IHC) may be particularly useful in the diagnosis of diseases of bees.

Major diseases of honeybees

The 2017 OIE list of honeybee pathogens and diseases includes:

- *Melissococcus plutonius* (European Foul Brood)
- *Paenibacillus* larvae (American Foul Brood)
- *Acarapis woodi* (Tracheal mite)
- infestation with *Tropilaelaps* spp.
- infestation with *Varroa* spp.
- infestation with *Aethina* tumida (Small hive beetle).

Major threats today to the UK bee industry are the Asian hornet (*Vesper velutina*), which was first seen in the UK in 2016; and the small hive beetle (*Aethina tumida*) which is being fought in the south of Italy.

Summary

Many veterinary professionals are beekeepers, but few veterinary surgeons offer professional services to bees in general. With the increasing threats to bees, it is incumbent on the profession to offer a wide range of services to support these domesticated and hard-working creatures and to enhance the diagnostic capabilities of the honey industry. ■

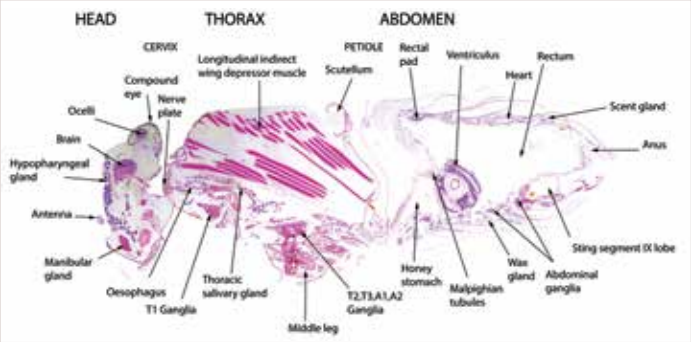

Figure 26. *The normal sagittal H&E histological section of an adult worker honeybee.*

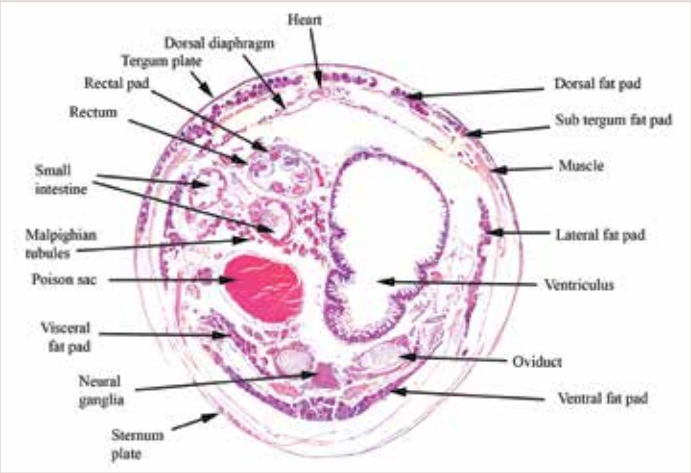

Figure 27. *The normal transverse abdominal H&E histological section of an active queen bee.*

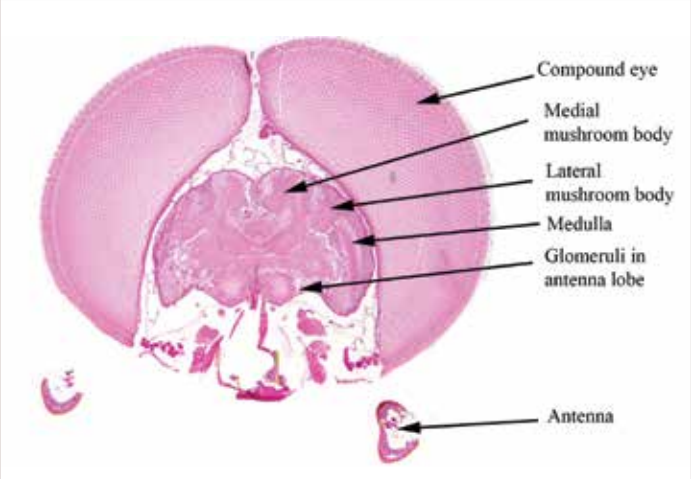

Figure 28. *The normal transverse H&E histological section of the head of a drone. Note the large compound eyes.*

Further reading

Carr J (2016). Managing bee health. A practical guide for beekeepers. 5M Publishing. ISBN 978-1-910455-03-6.

Dietemann V et al (2013). Coloss Beebook Volumes I and II. Standard methods for Apis mellifera research. ISBN 0-85098-274-2 2013.

Penn State University (2011). A Field Guide to Honey Bees and their Maladies.

Snell I (2012). Understanding Bee Anatomy: A Full Colour Guide. ISBN 978-0-9574228-0-3.

Snodgrass RE (1953). Anatomy of the Honey Bee. ISBN 978-0-8014-9302-7.

Varroosis, Tropilaelaps, Small Hive Beetle, Foulbrood. Series of booklets published by DEFRA–UK–FERA.

Vega FE and Kaya HK (2012). Insect Pathology, 2nd edn. ISBN 978-0-12-384984-7.

Vidal-Naquet N (2015). Honeybee veterinary medicine. Apis mellifera. L. ISBN: 9781910455043.

Wildlife emergencies – what to expect at this time of year

Simon Cowell, CEO of the Wildlife Aid Foundation, writes...

One of the most common issues practising veterinary professionals will face during May and June will be injured fledgling birds. The most common injuries will be puncture wounds inflicted by cats and other predators, and broken limbs and wings.

Puncture wounds can be particularly difficult to diagnose and treat as they are often tiny and not easily visible. They present a high infection risk owing to the number of bacteria most cats carry in their mouths; and we would ask practices not to automatically euthanise these cases but to use antibiotics, where appropriate, to reduce infection risks.

Stranded baby birds need immediate attention because they will perish away from the nest. If they cannot be returned to the nest they need intervention and most wildlife hospitals will have expertise at hand-rearing baby birds (**Figure 1**).

Fledglings, on the other hand, do not always need intervention. If they are not in immediate danger and there is no obvious injury, the best course of action is to leave them and monitor the situation. Often an adult will be nearby. Corvids, particularly, will often spend several days on the ground after leaving the nest before they fly off.

In early summer, native hedgehogs will be having their first broods of the year and will be nesting in leaf litter, in hedges and in and around sheds. Injuries inflicted by lawn mowers and strimmers are common and can prove fatal. Hedgehogs, however, are hardy animals and respond well to treatment. They are also very inquisitive, which can land them in a range of trouble.

We recently treated a hedgehog that had been covered in hot wax from an overturned bin at the rear of a beauty parlour. The wax had set in a ball on the animal's underside and it took us several hours to cut it away – during the procedure the hedgehog went into cardiac arrest twice but survived (**Figure 2**).

It is important for all veterinary practices to have details of their nearest wildlife hospital to hand. Most wildlife centres are happy to advise on specific cases and the number can also be passed on to members of the public who call with concerns about a wild animal they have found.

Figure 1. *Baby owls.*

Figure 2. *'De-waxing' a hedgehog.*

Education is one of the most important factors in improving outcomes for wildlife. Around 40 per cent of calls we receive from concerned members of the public – who have encountered a wild animal and believe it needs assistance – do not require human intervention. Unless there is apparent injury or immediate threat, the best advice we can give is for callers to monitor a situation for a few hours. Often animals that appear in distress, will move off after time.

Should an animal require medical treatment, the Wildlife Aid Foundation (WAF) www.wildlifeaid.org.uk promotes close co-operation between veterinary practices and wildlife charities that can offer rehabilitation and ongoing treatment following emergency triage. The aim for most of the UK's wildlife rescue services is to get patients fit and back out into the wild where they can enjoy a second chance. ■

Reference

Cowell S et al (2017). 'Immediate care for orphaned wildlife', Veterinary Practice Today, 5(2): 60-63.

Stress beliefs – what is real?

In today's society, there is an increasing focus on stress and its effects on health. We are bombarded with negative information about how detrimental stress is to us. But stress is not a hard factor; it is strongly linked to our beliefs and our coping skills – and short-term, moderate stress may even be good for us.

Anne-Marie Svendsen-Aylott
CandMedVet, MRCVS

Anne-Marie is an Inspirational Leadership coach and trainer. Her focus is on helping businesses create a culture of change where employee motivation and happiness is in focus. All her training is grounded in research and psychology and provides in-depth skills in communication.

Anne-Marie qualified as a veterinary surgeon, has worked for many years in sales, marketing and training and now runs the company, PurpleCat Coaching.

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STRESS

New research

Over the last 15 years, the focus on stress has increasingly moved from factual, stressful events into how people interpret what happens to them. The terminology and the research has shifted from life stress into what is called 'perceived stress' – in acknowledgement that what people find stressful is highly individual and very much based on their personal levels of resilience and positivity (**Figure 1**).

Figure 1. *One of the components that leads to stress is the level of perceived threat. New things are often seen as more threatening and therefore are more likely to increase stress if we do not realise that it is simply a learning opportunity (Photo: Alosh Bennett).*

Significant findings have linked high levels of perceived stress with an increased risk of mortality, and many theories have been proposed as to why that is. In 2012, the research took a new turn (Keller et al, 2012). Scientists found some indication that high perceived levels of stress in themselves are not enough to cause increased risk of mortality. On the contrary – people with high levels of perceived stress are no more likely to die than people with low or moderate levels of stress.

What does make a difference is the *belief* that stress is harmful to you when combined with high levels of perceived stress. In essence: high levels of perceived stress + perception that stress affects health negatively = a whopping 43 per cent increased risk for premature death.

Previous research has identified that an acute stress response has a number of potentially beneficial effects (Aschbacher et al, 2013; Waugh et al, 2010). The cardiovascular system gears up in the same way as with exercise and the immune system mobilises immune cells and distributes them in the body ready for action (Dhabhar et al, 2012).

Most people will be familiar with situations where they have fought off a cold for a special event only to become unwell the moment they started to relax. Even with low levels of chronic stress, episodes of moderate perceived stress are associated with reduced levels of oxidative damage (Aschbacher et al, 2013).

In addition, it has also been shown that what you believe about health plays an important role in determining health outcomes. Having negative (pessimistic) expectations of life events is predictive of poor physical and mental health (Geers et al, 2007; Maruta et al, 2002), even to the point of having more negative reactions to placebo treatments. This may be because your beliefs about health and stress are a proxy for negative expectations – it becomes a self-fulfilling prophecy as the beliefs increase worrying and negativity, which again increases harmful physiological effects in the body in response to stress. This is supported by research.

Waugh et al (2010) demonstrated that recovery from stress is faster and more effective when positive emotions are present and that people recover quicker from stress when an action is involved rather than just an anticipation of an action. In short – the anticipation is worse than the event itself!

The key message to take away here is that stress is complex and dynamic; and that our outlook, thoughts and attitudes are critical in determining how resilient we are to stress.

What makes something stressful?

The perception of stress is linked to two key factors (Lebois et al, 2016): level of perceived threat and coping skills.

Level of perceived threat

Over time, we develop an internal list of things that we associate with stress, and when events happen that include multiple items from the list, we label the event as 'stressful'. There are a couple of important points to realise in this process.

First of all, because we are drawing on previous events, we tend to react to the same things without necessarily realising that we have changed. Over a lifetime, our resources – our skills, energy levels, emotional control and experience – are constantly changing. The first time we experience something new, we are likely to feel a physiological adrenaline response that includes an increased heart rate, slightly increased respiratory rate and possibly increased sweating.

This is very similar to what happens when we exercise; yet the interpretation in our own head may be 'stress' and we may attribute negative emotions to this feeling. In actual fact, it is the body simply gearing up to do its best. Because we may have added a label to the physiological response of 'stress' or 'fear', the next time we have that response in another context, we may immediately associate it with our label. Yet the label is entirely fictitious and does not take into account that we may have learned further coping skills and have a higher energy level than the last time we felt these bodily changes.

One of the key factors that determines how threatening we find a situation is our expectations. Our brains may be filled with thoughts about how things 'ought' to be and about how we 'should' be able to perform. Because we have already formed a clear picture of what we are expecting in this type of situation, we are more likely to react negatively or to waste time getting upset when things don't go according to plan.

Another factor is how we interpret the situation. If we attribute the possible outcome to our identity (Am I good enough/smart enough?), the potential emotional impact of the situation is far higher and it becomes a bigger threat (**Figures 2** & **3**).

If we realise that outcomes invariably reflect on our skills, knowledge and current resources, it is easier to acknowledge that if something doesn't go to plan, it simply means that we need to work harder at identifying what to change and it is a challenge rather than a threat (**Figure 4**).

Finally, it is vital that we remember that our thoughts about stress can either help us or hinder us. By realising that some degree of stress actually can have beneficial effects on our bodies, the threat perception is already reduced – and the stress less likely to cause problems.

Coping skills

Coping consists of the cognitive and behavioural strategies that people employ to manage challenging demands.

Coping strategies can be divided in different ways, but a useful model by Conner-Smith and Flachsbart (2007) divides them into 'engagement coping' and 'disengagement coping' (**Figure 5**).

Primary engagement strategies are approach-oriented responses – people engage in problem-solving, implementing solutions and staying organised and on

Figure 2. *Cognitive bias, such as attentional bias or confirmation bias, may distort the world around us and prevent us from changing how we think and how we interpret what happens to us. This may lead to increased stress (Photo: Greg Varinot).*

These are two key mental filters that determine what we think and how we react to perceived threat.

- Attentional bias – interpreting the world around us in accordance to our recurrent thoughts (Bar-Haim et al, 2007; Kakoschke et al, 2014). If we believe that we are stressed, we may inadvertently read even non-stressful situations as being stressful; and if we start out the day in a negative mood, we are more likely to react negatively throughout the day – no matter what happens.
- Confirmation bias – the tendency to focus on and remember information that confirms our preconceptions instead of evaluating information with a fresh eye (Oswald & Grosjean, 2004). Rather than listening and noticing when someone points out how the situation isn't really stressful, we choose to hold on to our belief that something is a stressor. A prime example is learning a new skill – it is to be expected that we are not perfect at it to begin with, so strictly speaking there should be no stress – only the increased adrenaline of wanting to learn well; yet that is not necessarily how the situation is interpreted.

Figure 3. *Cognitive bias.*

- Describes people performing poorly on a task but lacking the ability to realise it (Kruger & Dunning, 1999; Ehrlinger et al, 2008). This has been recognised in people taking a test – those who are in the bottom 25% of performance consistently overestimate their performance.
- Owing to a lack of skills, they genuinely do not know what they don't know. And because they do not know what they don't know, they are unable to judge their performance correctly. This may explain why people with poor coping strategies genuinely do not realise that they have a choice over how to deal with potential stressors.

Figure 4 . *The Dunning-Kruger effect.*

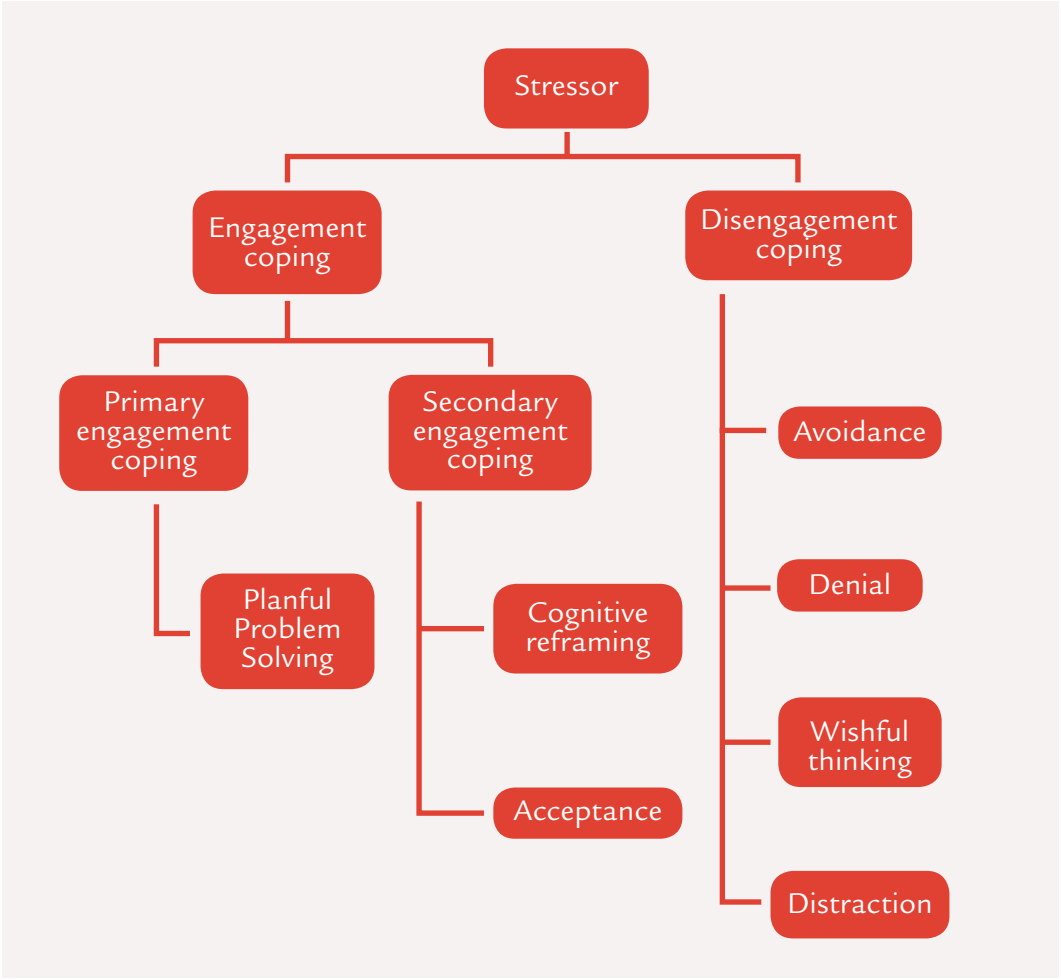

Figure 5. *Coping strategies (Conner-Smith & Flachsbart, 2007).*

task. This tends to be quite successful in preventing negative consequences from stressors (Kim et al, 2003). Logically, if you can remove the cause of the stress, the stress is more likely to go away.

Secondary engagement strategies are also active forms of engaging with the problem, but focus on adjusting oneself to the stressful situation to create a better fit between the self and the environment. These strategies include cognitive re-framing to identify benefits and humour in the situation, and acceptance in the form of understanding how to learn to live with one's limitations.

Both primary and secondary engagement strategies have been shown to increase resilience to stress, even when long-term, quite severe stress is present (Karlsen et al, 2006; Piazza et al, 2014).

In contrast to both forms of engagement coping, disengagement strategies are coping strategies that distance one from all aspects of the stressful situation (**Figure 6**). These techniques are thought to be ineffective in the long run at managing stress and can even backfire spectacularly, leading to sudden breakdowns and panic attacks.

People may inadvertently choose the route of disengagement strategies simply because they lack – or think they lack – the skills to engage with the problem actively. The biggest challenge is to help people recognise that their stress is not a consequence of the situation, but the need for a specific skill set, such as increased emotional intelligence skills or increased problem-solving skills.

Summary

The important message is that feeling stressed is not a given. There are specific reasons for why that feeling occurs – and there are specific skills that can be developed to change that. In a future article, we will look further at those skills. ■

Figure 6. *Commonly used disengagement coping strategies are avoidance and denial. Of all of the coping strategies, these are the most likely to cause problems in the long term (Photo: Desi).*

PPD Questions

1. How does what you believe about stress impact on your health?
2. What are the two key factors that are linked to your perception of stress?
3. What are three factors that can increase our level of perceived stress?
4. What are some examples of 'engagement coping'?
5. What are some examples of 'disengagement coping'?

Answers

1. combined with high levels of stress, the belief that stress is harmful to your health increases the chance of premature death by 43per cent
2. level of perceived threat; coping skills
3. having previously labelled something as being stressful; expectations to what we think 'should' or 'ought to' happen in the situation; assuming that the situation is about who you are rather than what you do
4. planning, problem-solving, cognitive re-framing, acceptance
5. avoidance, denial, wishful thinking, distraction.

References

Aschbacher K et al (2013). Good stress, bad stress and oxidative stress: Insights from anticipatory cortisol reactivity. Psychoneuroendocrinology, 38(9): 1698-1708.

Bar-Haim Y et al (2007). Threat-related attentional bias in anxious and non-anxious individuals: A meta-analytical study, Psychological Bulletin, 133(1): 1-24.

Connor-Smith JK and Flachsbart C (2007). Relations between personality and coping: A meta-analysis. Journal of Personality and Social Psychology, 93: 1080-1107.

Dhabhar FS et al (2012). Stress-induced redistribution of immune cells – from barracks to boulevards to battlefields: A tale of three hormones – Curt Richter Award winner. Psychoneuroendocrinology, 37(9): 1345-1368.

Ehrlinger J et al (2005). Peering into the bias blind spot: People's assessments of bias in themselves and others. Personality and Social Psychology Bulletin, 31(5): 680-692.

Geers AL et al (2007). Further evidence for individual differences in placebo responding: An interactionist perspective. Journal of Psychosomatic Research, 62(5): 563-570.

Goodyear-Smith FA et al (2012). Analysis of decisions made in meta-analyses of depression screening and the risk of confirmation bias: a case study. BMC Medical Research Methodology, 12: 76-83.

Kakoschke N et al (2014). Attentional bias modification encourages healthy eating. Eating Behaviors, 15(1): 120-124.

Karlsen E et al (2006). The possible benefits of difficulty: how stress can increase and decrease subjective well-being. Scandinavian Journal of Psychology, 47(5): 411-417.

Keller A et al (2012). Does the perception that stress affects health matter? The association with health and mortality. Health Psychology, 31(5): 677-684.

Kim HW et al (2003). The role of coping in maintaining the psychological well-being of mothers of adults with intellectual disability and mental illness. Journal of Intellectual Disability Research, 47: 313-327.

Kruger J and Dunning D (1999). Unskilled and unaware of it: How difficulties in recognising one's own incompetence lead to inflated self-assessments. Journal of Personality and Social Psychology, 77: 1121-1134.

Lebois LAM et al (2016). Establishing the situated features associated with perceived stress. Acta Psychologica, 169: 119–132.

Maruta T et al (2002). Optimism-pessimism assessed in the 1960s and self-reported health status 30 years later. Mayo Clinic Proceedings, 77(8): 748-753.

Oswald ME and Grosjean S (2004). Confirmation Bias. In Pohl RF: Cognitive Illusions: A Handbook on Fallacies and Biases in Thinking Judgement and Memory. Hove, UK: Psychology Press, pp 79-96.

Piazza VE et al (2014). Coping and psychological health of aging parents of adult children with developmental disabilities. 119(2): 186-198.

Waugh CE et al (2010). Cardiovascular and affective recovery from anticipatory threat. Biological Psychology, 84(2): 169-175.

New CCOAS Centre opens in Exeter

The Central College of Animal Studies staff are passionate about veterinary nurse training. And this passion is being shared through an expanding number of centres across the country. The latest addition to the fold is in Exeter.

Open house

There was a steady flow of visitors to an open day at the new CCOAS Centre in Exeter in March. The wide appeal of a career in veterinary nursing was evident from the diversity of the people coming through the door – nurses in from local practices, people wanting to change their career and young people looking to embark on a career in a caring profession.

There were also representatives from local practices interested in working in partnership to train student nurses and to develop the skills of their existing nursing teams.

Practical approach

South West Regional Manager, Jan Litten, and Head of Centres, Ella Canham, were busy all day explaining the 'ins and outs' of the basic nursing training course; and potential nursing students were impressed with the flexibility on offer and the emphasis on practice and practical application.

The layout of the new training facility is logical – theory downstairs and practical rooms upstairs to facilitate putting learning into practice and promoting confidence with techniques before students are sent out on placement.

Welcome facility

Situated on the outskirts of the city and transformed from its former life as a training facility for electricians, the new centre in Exeter is providing Level 2 and Level 3 qualifications – all of which are work-based and carried out in a training practice to ensure students are confident in a veterinary environment.

The new centre will also provide a venue for CPD events for veterinary nurses from across the South West, especially Devon and Cornwall – which is an area that sometimes misses out on top quality education. Recent such events have included a seminar on wound management and an OSCE day for clinical coaches.

Overheard on the stairs...

"The small class sizes are really encouraging"

"It is a great learning environment – warm, welcoming; light and airy"

"The course is really flexible..."

"Thank you for your e-mail, the open day at the Exeter Centre was brilliant, it was very informative and the staff were all so welcoming and helpful.

I have enclosed my completed application form.

I look forward to hearing from you.

Thank you, CM"

There are other CCOAS training centres in Ipswich and Stowmarket in Suffolk and at Whitchurch in Bristol. Our Kent centre relocated to East Malling in 2016 and is now newly refurbished.

It has a new cohort of students starting in September on both full and part-time veterinary nursing programmes; and links are being forged with local practices as we offer various CPD events for veterinary nurses and veterinary surgeons later this year.

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Alison Lambert
BVSc MMRS MRCVS

After qualifying as a veterinary surgeon from the University of Liverpool, Alison worked in small animal practice for several years before pursuing a business career. She worked with Hill's Pet Nutrition and MARS before founding Onswitch, www.onswitch.co.uk. Alison is a visiting lecturer at the University of Nottingham veterinary school, covering customer understanding.

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MONEY

That old chestnut – asking for money

For many people working in veterinary practice, having to discuss bills and ask for money is one of the hardest parts of the job – especially if it is related to a poor prognosis or unexpected treatment.

Broaching the not-so-small matter of a four-figure bill is always going to be difficult – even more so when you know the client lost her job recently. Hardest of all is when euthanasia is required; and yet putting a much-loved animal to sleep incurs not only direct costs for the practice (drugs, needles, the veterinary surgeon's time) but also a share of the not inconsiderable indirect costs of running any business (heating, lighting, insurance, VAT and so on).

"There's no charge for today"

Until our practices become charities, it is vital for the health of the business – not to mention the security of your job – that all costs incurred are allocated correctly and fully billed for. Any commercial enterprise relies on bringing in more money than it spends in order to keep going.

A veterinary practice, ultimately, has a very simple business model, consisting of five key stages:

1. make the phone ring
2. convert the caller into a paid appointment
3. deliver valuable services during – and as a result of – the consultation
4. charge correctly for work done
5. be recommended.

The fourth stage of this model is crucial and requires you to bill accurately for the professional time and expertise afforded to the client and her pet/horse – because this is where the real value is felt by the owner. She can't buy your personal recommendation and bespoke patient care online – Dr Google doesn't know that Molly's reluctance to eat is the consequence of advanced gingivitis. But you do.

Veterinary accountancy specialists estimate that around 25 per cent of clinician time is never billed – invoices not reflecting the actual time taken, 'free' work and favours undertaken, for instance – resulting in a huge amount of lost revenue at the average practice. Yet the necessity of paying for services rendered is understood by all owners – so, whilst in the past you might not have found it easy to ask for money, with a shift in thinking and by employing some simple techniques, it will become as natural as booking the next appointment.

Talk about value not price

Onswitch callers ring hundreds of practices every month as part of its 'Index' programme. All too often we hear people being apologetic for the cost of common procedures or advising us to try another practice or a pet

shop, where costs are lower. If you are not confident in the value for money that you offer, how can you expect your clients to appreciate it?!

One of my favourite quotes comes from Warren Buffett, American business magnate, investor and philanthropist, who reminds us all that, "Price is what you pay, value is what you get".

So whilst I may well be able to buy worming treatment at the supermarket, it won't be as effective as one prescribed to suit my dog's lifestyle and dosed according to his weight – only my veterinary practice can do that. And whilst I can buy a flea collar cheaply online, it takes a couple of days to arrive and my cat slips out of it after 10 minutes. Popping in to see the lovely RVN at my local practice means the problem is dealt with straight away and she can advise me how to treat my home to reduce the risk of further infestation.

Your practice offers convenience, expertise, excellent products and treatments tailored to suit me and my pet – and that's worth paying for. That's value for money.

If you're thinking, that's all very well on paper, but you try asking owners what they think about pricing – we have! Our 'vox pop' research with pet and horse owners across the UK consistently finds that fewer than 10 per cent of clients choose their practice based on price alone. Nine out of 10 owners appreciate that they get what they pay for. They understand that expertise has a price, and they are willing to pay for it.

However, they are less willing to pay if the person presenting the bill looks uncomfortable and comments negatively on the cost – they then may question the reasons behind that attitude. It becomes about the price again, and not about the value.

So, present the bill confidently and with positive body language – smile, meet the owner's eye, use the pet/horse's name and speak clearly.

Avoid surprises

Nobody likes to receive an invoice for more than they were expecting, and in my experience this is the cause of many uncomfortable situations at the reception desk. Obviously veterinary medicine is complex. No two cases are ever the same; equipment and medicines are costly; and patient responses are unpredictable.

Giving an accurate cost up front is nigh on impossible. So give an informed estimate and obtain the owner's consent *before* starting treatment; ensuring that she is then told about – and crucially, agrees to – the cost implications of everything that changes from there on. That way, the owner is expecting the resulting bill and was fully engaged with the process by which it was generated. Setting out the itemised components also helps give clarity and shows the owner that many of the costs are for external products and services over which you have little control, such as laboratory fees and drugs.

Think car

If we try to match what we do with what our clients want, it is a helpful analogy to consider how we pay for our motoring:

- there are the essential things that we need to do each year – insurance, road tax, MOT
- sensible things we choose to do to increase the life of the car and/or save money – servicing, breakdown cover
- there are the daily expenditures, smaller things that add up over the year – fuel, oil, new tyres, screen wash
- finally, there is the unexpected garage bill following accidents or the dreaded dashboard warning light.

In each of these scenarios, we have choices. We might not take out breakdown cover, it may come included as a perk of holding a particular bank account or we may choose a full belt-and-braces 'home start' service. We may take the car to the main dealer for an annual service (essential if it's still under warranty) or opt for a basic 'once over' at the local garage every so often.

If we're fitting new tyres, we may choose a 'fast-fit' high street specialist, such as Kwik Fit, or a mobile service that can come to our home after work; rather than the dealer (that fancy showroom doesn't pay for itself!) There is something available for everybody – cautious saver, money no object and every penny counts. Ultimately we should offer these same people the same flexibility when it comes to paying for the care of their pets and horses.

Make it easy

As consumers ourselves, we pay for things in a whole host of different ways (**Figure 1**). The list is a long one and continues to grow.

Cheques and cash are very infrequently used in the 'real' world, so why has

"Veterinary accountancy specialists estimate that around 25 per cent of clinician time is never billed..."

- childcare funded through salary sacrifice schemes
- Christmas presents saved for throughout the year by means of savings stamps
- travel through pre-paid cards, such as Oyster
- school dinners through fingerprint-activated accounts pre-loaded with cash on an app
- contactless purchases via our mobiles
- pay day loans, such as Wonga
- 0% finance on furniture and phones
- balloon payments on car purchases
- dental care funded by a Health Plan
- contact lens costs spread over the year by direct debit
- meals out paid for by Tesco Clubcard points.

Figure 1. *Examples of innovative ways of paying for services and things.*

veterinary practice been so slow to embrace convenient alternative payment options? Sure, there's insurance to cover unexpected costs, and Health Plans to help owners budget for the costs of routine care through the year; but as you know, uptake of these is not as high as we would like it to be. Some equine practices still offer payment on account for long-standing customers, but those same practices also experience slow payers and bad debt – which I'm sure is no coincidence!

Isn't it time to think a bit differently? To allow our clients to pay for our services the same way they pay for other things? How about:

- a practice app to allow clients to make payments via their mobiles?
- secure payments via your website?
- using PayPal?
- loyalty points awarded on each invoice, building up into cash credit at the practice?

Stay on the money

As the song says, 'Money makes the world go round'. It pays your wages and your clients expect to pay it for the service they have received. They want the best for their pets and horses and they know the best doesn't come for free.

"Present the bill confidently and with positive body language – smile, meet the owner's eye, use the pet/horse's name and speak clearly"

Be open about the true costs of veterinary care and never apologise for presenting a bill or pricing a procedure. Value the excellent service you provide and your clients will too. ■

PPD Questions

1. What proportion of owners choose their practice primarily on price?
A. 10 per cent
B. 15 per cent
C. 25 per cent
D. 50 per cent
E. 75 per cent

2. Which of these is not one of the five stages of the veterinary business model?
A. make the phone ring
B. convert the caller into a paid appointment
C. book the next appointment before the client leaves
D. charge correctly for work done
E. be recommended

3. What percentage of clinician's time do accountants estimate is never billed for?
A. 20 per cent
B. 25 per cent
C. 30 per cent
D. 45 per cent
E. 50 per cent

4. Avoiding nasty surprises when the bill comes is key. Which one of these is not a useful technique here?
A. provide written estimates
B. email the invoice after the consultation
C. agree all changes with the owner as they happen
D. produce an itemised bill
E. discuss possible options up front

5. How do clients measure their response to a bill?
A. the final price alone
B. the amount of bought-in costs
C. the hourly rate of the vet
D. the value for money it provides
E. if it's printed on headed paper

Answers
1.A 2.C 3.B 4.B 5.D

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*Suggested Personal & Professional Development (PPD)

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WELLBEING

Work, stress and mental health

At the combined VPMA and SPVS Congress in Newport (27-28 January), Dr Radha Modgil, a GP and co-host of BBC Radio 1's *The Surgery*, outlined how to recognise common mental health problems in our colleagues and the steps to take once these have been identified. Her 'take home' message was that if you want a happy, well-run, functioning workplace, then you need to look after your employees – and that includes their mental health.

Common mental health problems (CMHPs) are defined by the Health & Safety Executive (HSE) as 'more frequent and prevalent, and which can be treated successfully in a primary care setting, such as by a GP, rather than needing psychiatric intervention'. They include anxiety and panic disorders, depression and schizophrenia.

According to the HSE, one in four adults will experience a mental health problem at some point in their lifetime. Often triggered by a difficult life event, such as moving house or problems at work; these are generally short-lived and can be treated by medication from a GP.

Work-related stress (WRS) is defined by the HSE as 'the adverse reaction people have to excessive pressure or other types of demand placed on them at work'. When talking about CMHPs, it is important to discuss stress because the two often go hand-in-hand.

The fundamental difference between CMHPs and WRS is how they are caused and how they are treated. WRS can arise from reactions to events or experiences, but CMHPs may occur as a result of life events such as bereavement or divorce. Sometimes there is no cause at all. However, chronic WRS can be a precursor to CMHPs – or it can contribute to their development.

Dr Modgil explained to delegates that, whatever the situation, employers can manage and prevent stress by improving conditions at work. While doctors usually treat CMHPs with medication, employers can help by making adjustments and helping the individual manage the problem in the workplace.

So when does WRS turn into a CMHP? Dr Modgil claims that in practice it can be hard to distinguish. That is because most symptoms of stress are similar to those that people experience when they are under pressure. The main differences are the duration of the symptoms, their severity and how much they impact someone's life. A GP will usually be able to diagnose the problem and offer treatment – usually medication, talking therapies, or a combination of the two.

Why should you care?

Anxiety and depression are two of the most common CMHPs caused by stress at work. Under the Health and Safety at Work Act 1974 and the Management of Health and Safety at Work Regulations 1999, employers have a legal responsibility to minimise the risk of stress-related illness to their staff. At board level, this includes keeping up-to-date with best practice relating to work stress and examining stress as a possible factor in relation to absenteeism.

***Figure 1.** Dr Radha Modgil explained that, whatever the situation, employers can manage and prevent stress by improving conditions at work.*

During the session, Dr Modgil highlighted an array of benefits that come from preventing stress in the workplace. They include reduced sick leave usage, increased work engagement, reduced costs and improved employee health and well-being. She also said that preventing stress reduces symptoms of poor physical health in staff and results in fewer injuries.

Workplace stressors

There are many factors that can lead to feelings of stress in the workplace. They include – but are not limited to – the organisational culture, bad

> "There are many factors that can lead to feelings of stress in the workplace ... organisational culture, bad management practices, job content and demands, a lack of support, and the work environment itself"

- be aware that work-related stress and common mental health problems are significant health and safety issues
- ensure a safe working environment
- de-stigmatise mental health by openly acknowledging it as a problem
- discuss issues and grievances with employees and take action where possible
- devise a stress management policy in consultation with the employee
- reduce the need for overtime by reorganising duties or employing more staff
- appreciate that employees have personal lives and recognise that work pressures and home pressures will sometimes conflict
- if necessary, seek advice from health professionals.

Figure 2. *An action plan.*

management practices, job content and demands, a lack of support, and the work environment itself. Employees may also become stressed if they discover that they have insufficient skills for their job, lack the resources required to do their job, or find that there are few opportunities for promotion. Boring work, tight deadlines and unexpected changes are further cited as common reasons why people develop WRS.

Possible signs and symptoms

Dr Radha explained that there are three levels of workplace stress that an employer can identify. The first level contains those employees who are not showing any signs of mental illness at all. At this level, the employer should take action to identify and reduce organisational causes of stress and implement stress management intervention, such as exercise, relaxation and teaching problem-solving skills.

Level two is for employees at risk of developing stress through their job role. For these workers, the employer should implement programmes that are focussed on personal support, individual social skills, and coping skills training.

The third level incorporates staff who are experiencing CMHPs. At this level, the employer is advised to provide brief (up to eight weeks) cognitive behavioural therapy. This is a talking therapy that can help the employee manage their problems by changing the way they think and behave.

Dr Radha also spoke about how the signs and symptoms of stress can be physical, psychological and behavioural:

- physical symptoms include headaches, muscle tension, sleeping difficulties and gastrointestinal upsets
- psychological signs might include irritability, pessimism and feelings of being overwhelmed or unable to cope
- behavioural symptoms can include mood swings, aggression and a drop in work performance. Stressed staff may also take more time off sick.

Helping staff

According to research by the mental health charity Mind, 30 per cent of staff say they would not be able to talk openly with their manager if they were feeling stressed. As a result, the organisation is calling upon employers to create an open culture where people feel able to discuss their well-being and tackle the cause of stress among their staff (**Figure 2**).

Figure 3. *Managers can learn how to spot the crucial warning signs of mental illness, in the same way that physical first aid is taught.*

This includes increasing awareness of CMHPs, promoting teamwork, and providing a safe environment for staff to share concerns. Employers can back this commitment with a clear mental health strategy and specific policies to ensure employees experiencing mental health problems receive the support they need, immediately, says Mind.

Employers can also help to prevent stress in the workplace by encouraging self-help. This involves promoting exercise and time away from the desk, leaving doors open, eating lunch together and supporting regular relaxation.

Dr Modgil explained that if an employee goes to their manager for help, the manager should advise the employee to seek professional counselling from a psychologist. On the employee's return to work, the manager should put together a support plan and be considerate over 'bad days'. Regular reviews and risk assessments can also help to make the employee feel supported and cared for.

More practical ideas

Mind offers a variety of practical mental health training courses that run

"Sometimes there is no cause at all"

"Employees may also become stressed if they discover that they have insufficient skills for their job, lack the resources required to do their job, or find that there are few opportunities for promotion"

throughout the year and, if you need a training session for a group of staff, they will come to your organisation. Mental Health First Aid England also runs a course which teaches people how to identify, understand and help a person who might be developing a mental health problem. This course teaches managers how to spot the crucial warning signs of mental illness, in the same way that physical first aid is taught (**Figure 3**).

Building resilience

Resilience was very much at the heart of this year's VPMA and SPVS Congress and is defined by *Psychology Today* as 'that ineffable quality that allows some people to be knocked down by life and come back stronger than ever.' Making simple lifestyle changes – such as making time for friends, developing hobbies and practising relaxation techniques – are all ways that we can achieve this. Looking after our physical health too – getting more sleep, taking more exercise, eating healthier – can also help us to cope better with difficult situations as they arise.

Summary

Mental health is an increasingly pressing issue in the veterinary sphere. In recent years, studies have shown that the rate of suicide amongst veterinary surgeons is around four times higher than the national average. Insufficient earnings, long working hours and increasing public expectations are all thought to be reasons why so many veterinary surgeons are forced to take time off sick or leave the profession altogether ('Vet Futures', 2015).

Many of the actions discussed in this article should be considered as investments – and, in time, will lead to higher work engagement, reduced sick leave and a notable improvement in health and well-being. Ultimately, realising that your employees think, feel and are subject to the same stresses as you are, is key. Show compassion and reap the rewards of a healthier, happier workforce. ■

References

Mind (2013). Taking care of your staff [online]. [Accessed 9 February 2017] available at http://www.mind.org.uk/workplace/mental-health-at-work/taking-care-of-yourself/.

Mind (2013). How can I be more resilient? [online]. [Accessed 17 February 2017] available at http://www.mind.org.uk/information-support/tips-for-everyday-living/stress/developing-resilience/#.WKcgbRD3ck8.

Modgil R (2017). Work-related Mental Health. VPMA and SPVS Congress, 27-28 January. Newport, Wales.

Psychology Today (2017). All about resilience [online]. [Accessed 17 February 2017] available at https://www.psychologytoday.com/basics/resilience

'Vet Futures' Project Board (2015). Taking charge of our future: A vision for the veterinary profession for 2030.

Useful links

More information on mental health training courses and access to free, downloadable resources:

Mind: mind.org.uk/workplace/mental-health-at-work
time-to-change.org.uk/get-involved/get-your-workplace-involved
Mental Health First Aid England: mhfaengland.org
Mental Health Foundation: mentalhealth.org.uk

Evidence-based veterinary medicine – a view

The Royal College of Veterinary Surgeons (RCVS) defines evidence-based veterinary medicine as 'evidence-based decisions combining clinical expertise, the most relevant and best available scientific evidence, patient circumstances and owners' values'.

This is actually quite a big 'ask' for the busy veterinary surgeon who is presented with a number of hurdles to achieving evidence-based veterinary medicine (EBVM). Time is probably the biggest obstacle; but access to all the necessary resources may also come as a serious contender and, in some cases, the culture of the practice may make it hard to achieve the levels of evidence-based work required.

A recent survey, carried out by the Royal Veterinary College (RVC), looked into the commercial benefits of EBVM and found that it was seen as good practice by most veterinary surgeons (96%), with younger members of the profession being most enthusiastic. Most felt that by implementing EBVM they would be providing the best care and would be more confident in their decision making – seeing it as an inspiring intellectual challenge. As might be expected, however, they saw the main barriers to the practice as being time and the availability of information.

Although the majority of veterinary surgeons would like to practise EBVM, the reality is that in a general practice environment this is not quite as easy at is may seem and the interpretation of EBVM in one practice may be very different to that executed in another.

Information overload?

The key to EBVM is searching and appraising all the evidence. It is deciding what literature to search and which databases to use, assessing the quality of the research, and, indeed, having the knowledge to do this in the first place. It is about adequately assessing and interpreting a scientific paper and deciding if the information it contains is relevant, what sort of study the paper is describing – is it 'observational' only, just 'descriptive', or is it real evidence for you to use – and what is the quality of the work.

EBVM may involve discussing a case with experienced colleagues, or practising reflection on one's own previous experiences. How is the information gained then applied? Is it possible within the practice? Does the individual veterinary surgeon have the skills to do so? What are the time constraints with regard to the need for the animal's treatment? It could, possibly, also be argued that EBVM might be limited in usefulness when applied to individual patients, and that it could reduce the autonomy of the veterinary surgeon/patient relationship. And at the end of all of this, the really big question is, how do you really know that you *are* practising the best EBVM?

The RCVS is addressing many of these questions by way of 'RCVS Knowledge' and the 'EBVM Toolkit'. It aims to become a global intermediary for EBVM knowledge by providing access to information that is of immediate value to practising veterinary professionals who will contribute directly to evidence-based decision making.

However, the RCVS is not alone. The University of Nottingham's Centre for Evidence-based Veterinary Medicine works with various groups within the school, the university and the veterinary profession. It also has important and close-working relationships with a number of veterinary practices to ensure its work is relevant and useful to practitioners.

Indeed, at the VPMA/SPVS Congress in January this year, it was suggested during the discussion on the commercial benefits of EBVM that many of the corporates are now so large that they themselves may develop their own EBVM resources. There may one day be the definitive EBVM resource; but, until then, the general practitioner with a case to treat, would seem to have to negotiate a minefield of information sources.

Client perspective

And then there are the clients. At an empirical level the obvious answer to whether or not there is a commercial case for practising EBVM is "Yes" – the obvious benefits being increased standards of care leading to an enhanced reputation. This, in turn, will attract more applicants for jobs; and with the increased standards of animal care will come increased client satisfaction and, by default, improved client retention.

But just how important is it that clients are aware of EBVM? Currently, according to the RVC Survey results, the majority of veterinary surgeons believe that clients are unaware of EBVM and it is not unreasonable to ask whether clients actually need to know about it. Would they not expect this kind of clinical excellence anyway?

Clients assume that their pet is being treated in the best way possible – why would they think otherwise? All we could be doing is adding yet another layer of 'veterinary standards' for clients to get their heads around. And if the RCVS Practice Standards Scheme is anything to go by, this client education will take a long time. ■

Industry Profile

Your name: Liz Cox CertSAN RVN
Position: Senior veterinary nurse and chair of VN Council Royal College of Veterinary Surgeons
Company: Golden Valley Veterinary Hospital

First, the obvious question. What made you want to be a veterinary nurse?
Meeting an inspirational VN. I was a teenager struggling with the emotional upset of a rapidly declining elderly family dog with renal failure. Sara was fantastic – providing support, time and explanation for the whole family. She completely understood the human animal bond. Her knowledge, compassion and communication skills had me hooked. I wanted to be like her.

A few years later I joined the practice as a trainee VN. Sara was now the head nurse. She challenged me daily to be the best nurse possible, and always with lots of questions. We are still good friends to this day.

You have been in the profession for over 20 years. What do you think have been the most significant changes in veterinary nursing during that time?
There have been so many; but my key one must be that RVNs are recognised professionals in their own right – and the responsibility and accountability that comes with that.

I also think the changes in regulation and business models allowing RVNs to move into practice ownership have been key to retaining and developing very experienced RVNs. It is refreshing now to hear about VNs who hold senior positions within large companies that value their skills and experience. Being an RVN isn't limited to clinical practice. We have opportunities available to us that were unimaginable just a few years ago.

My final significant change would be the huge improvements that have been made in the training of nurses. The UK produces excellent RVNs and standardised training equips them to work within the wide range of practice. There are also many opportunities for post-registration qualifications. RVNs are truly valued and respected members of the veterinary team. The role is increasingly becoming more technical, although general nursing and consideration of holistic patient care cannot be replaced. I cannot imagine what modern practice would be like without an RVN!

What made you get involved with veterinary politics?
Being challenged to do so. It was time to 'put up' or 'shut up'. As so many do, I had my views and frustrations about veterinary nursing. So, yet again another timely inspiration from a VN who suggested I get involved because the VN Council of the time didn't have any practising nurses. I am really pleased to say that our current Council has veterinary nurses from a wide range of areas from within the profession – from education, various types of practice, management and even a male nurse working in a zoo.

You are chair of the RCVS VN Council. What does this entail and how much time does it involve?
It varies from month to month; but, on average, meeting attendance is around eight days per month. In addition, there are many e-mails and telephone calls. It makes for a busy life; yet I'm truly honoured to work for a profession that has given me so much pleasure and so many challenges over the years. It's great to give something back and, hopefully, make a difference.

As chair of VN Council, one is often the point of contact for question, comment or oversight. I never expected as a RVN that I would be interviewed by BBC radio and television! It's a great job.

Council members are expected to sit on various committees and working parties. I'm currently chairing the Schedule 3 working party which is a very exciting and useful area of work. The chair of VN Council also works on additional committees, including the RCVS operational board and Brexit taskforce group.

The VN Futures project aims to deliver an action plan to take veterinary nursing into its next phase of development. Can you tell us about your vision for these phases?
It is a five-year plan – and rightly so. It is ambitious. It is also a large piece of work that will require all members of the veterinary team, organisations and stakeholders to work together. Since publication of the report, we have been busy prioritising actions and signing up volunteers.

The 'One Health' ambition has taken us by surprise. We have been contacted by several human health groups, who want to work with us, and we want to capture the interest we have generated in this area. By spring 2017, we expect to have several development groups starting off. Throughout the project we always had the '3Rs' in mind – recruitment, retention and returners. We are acutely aware of the difficulty in recruiting RVNs, so we hope that by addressing key concerns and prioritising these, the situation will improve. We do have to accept that change will take time.

It was reported at the 'Vet Futures' Summit in July this year that only five per cent of RVNs return to full-time work after maternity leave. How can the profession encourage more RVNs to return on a full-time basis?
It surprised me that, with the RVN population being 98 per cent female, this has never been raised before. We train a lot of nurses, and they leave the profession for a number of reasons – family commitments and salary are commonly cited. Why do we not encourage the experienced and valued nurses to return after maternity leave?

Full time in the veterinary world doesn't mean 9 to 5, Monday to Friday. Many practices are now open seven days a week and being flexible is the key – both the employee and the employer. During the Veterinary Nurse Futures (VNF) roadshow, I met several nurses with young families who only work out of hours and weekends, whilst their partners are at home with the children. Antisocial hour working used to be seen as the unwanted shifts – but not for all.

After having my first child, I returned as a 'job share' head nurse, which worked extremely well. I have also worked three 'long days' for another employer. Later, I was fortunate to have a part-time, term-time contract when my children were younger. I worked

the busiest part of the day for the practice, covering days when students attended college and some weekend work. That's what I mean about being flexible.

Employers need RVNs, and with the current shortage, nurses are in a strong position to negotiate terms that benefit them and their employer. Recruitment is a two-way affair.

It was also suggested at the Summit that the role of head nurse should be abandoned and divided among nurses with particular skill sets. What is your opinion on this suggestion?
I wholeheartedly agree. Why is it that nurses are promoted to this role, often not long after registration and frequently without any training or support? Practice owners and managers are generally older and have honed their clinical and people skills before taking on such a role.

Some nurses will thrive, but many do not – often leaving the profession citing work pressures, lack of clinical exposure, being undervalued and unsupported. A social media support group just for senior nurses, frequently has posts to this effect.

We all have own our areas in which we excel; we all have areas which we prefer. If a nurse enjoys teaching, why not encourage that person to be a clinical coach? There's no benefit for either the student or nurse if the clinical coach is appointed simply for being the head nurse. We have all worked with staff who may be excellent clinically, but who are not the most organised, or don't enjoy administration work. The VNF report suggests dividing up the role into areas of strength. This will also aid with succession planning, and allows for training in specific areas. It may also improve RVN retention.

How far do you think Schedule 3 can realistically be extended to allow VNs more freedom to carry out procedures?
The Schedule 3 working party is already tackling this issue. The RCVS will be running a consultation period this year to better understand what is currently happening; what is understood – or not; and what the professions would like it to be. We will be forming a proposal to take to Defra, based on this consultation. The focus is not to make nurses 'mini vets' but to value and utilise their skills and interest. With the concerns around veterinary workforce and Brexit, it may be timely to review how all staff are utilised.

How can the profession educate clients more with regard to a RVN's role in veterinary practice?
This needs to be driven by both professions. The NHS has a campaign called 'Hello, my name is...'. It encourages better communication and personalisation. I introduce myself to clients and tell them I'm a veterinary nurse. I want them to know that they and their animal are being looked after by a qualified professional nurse – and now I'm older, not to be mistaken for a vet! I encourage my student nurses to tell clients they are training because this takes some pressure off them and the clients are often interested in their journey.

The BVNA encourages VN Awareness Month, which is a popular event. I believe that it is the daily trickle that makes the most impact. We need to show and tell the public what we do every day. In my current practice, clients are very aware of their patient's care and who was involved. The nursing care is a specific part of the hospitalisation fee and is clearly identified on the invoice.

We are not "Just a nurse" or "One of the nurses" or – my pet hate – "One of the girls". Veterinary surgeons are never described that way, and neither should we be. It is demeaning.

You are a passionate believer in the importance of VN training. What is your involvement in your own practice?
Absolutely, it's about giving back the support and encouragement I had. I'm a clinical coach and mentor. I currently support two SVNs and a VCA. Having students around keeps me on my toes and up to date with current teaching.

Why is nurse mentoring so important?
We all need support, and this can come at varying times in our careers. There are keys points – newly registered, the classic one- to two-year post-registration 'wobbly', changes in role and simply when we need some feedback, direction or someone to talk to. A mentor doesn't have to be within the same profession.

Where do you go from here career-wise?
Who knows? Certainly it will be within the veterinary world. I have learnt many new skills during my time with the RCVS; and the profession is changing rapidly, with new opportunities occurring all the time. I'm open to offers!

What do you do to relax in your spare time?
I live in Somerset and I enjoy walking my lively working Cocker spaniel for miles across the beaches and woodland. Having two teenagers also keeps me busy. So not much relaxing at all!

What do you do to unwind from the pressures of work?
As the saying goes, 'Choose a job you love, and you will never have to work a day in your life'. However, an evening putting the world to rights with friends or colleagues over a nice glass of wine works well! ■

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