

new knowledge and skills.

Another step forward in veterinary educational technology on show at the open day was the haptic cow being developed by Sarah Baillie, who recently moved to the RVC from the University of Glasgow. This is a device intended to help teach the palpation skills needed for such routine tasks as pregnancy diagnosis in cattle and colic investigations in the horse.

Inside the model of a cow's rump there is a movable device attached to the student's finger which gives him or her an indication of the shape and texture of the internal organs encountered during an examination per rectum.

A visual representation of those structures and the position of the finger sensor appears on the television screen alongside.

Unlike any investigations in a real animal, with the simulator a clinical tutor can see exactly what the student's hand is doing and allows the tutor to have a more effective input in the learning process,

Mrs Baillie explained.

She emphasised what a difficult skill palpation can be for the student to learn. Access to suitable clinical material is an increasing limitation on veterinary education because of the greater numbers of students and more demanding animal welfare guidelines. So the technology enables students to develop basic skills in a safe environment before being required to test that knowledge in a real animal.

Training will often take the form of a role-playing session in which the tutor is cast as the farmer and the student as the clinician. Another of the advantages of this form of teaching is that it allows standardised training methods.

Mrs Baillie said a project was currently being undertaken to extend this concept to the teaching of key skills in small animal medicine. It could, for example, be applied to teach abdominal palpation and prostate examinations in the dog.

Humane teaching methods in veterinary education

Andrew Knight believes 'non-harmful alternatives' should be used whenever possible in training veterinary students

ANIMAL USE RESULTING in harm or death has historically played an integral role in veterinary education worldwide, in disciplines such as surgery, physiology, biochemistry, anatomy and pharmacology.

However, many non-harmful alternatives now exist, including computer simulations, high-quality videos, "ethically-sourced cadavers" from animals that have been euthanased for medical reasons, or have died naturally or in accidents, preserved specimens, models and surgical simulators, non-invasive self-experimentation and supervised clinical experiences (Rowan, 1991; Bauer, 1993; Knight, 1999; Gruber and Dewhurst, 2004; Martinsen and Jukes, 2006).

Humane veterinary surgical courses ideally comprise several stages. Students learn basic manual skills such as suturing and instrument handling using knot-tying boards, plastic organs and similar models. They then progress to simulated surgery on ethically-sourced cadavers. Finally, students observe, assist with, and then perform

necessary surgery under close supervision on real patients that actually benefit from the surgery – as distinct from on healthy animals that are later killed – similar to the manner in which physicians are trained (Knight, 1999).

Animal shelter sterilisation programmes are a popular component of many humane veterinary surgical courses worldwide (Richardson *et al*, 1994; Howe and Slater, 1997). The UK is the only major region of the developed world where such non-harmful surgical training is the norm.

Faculty opposition to humane teaching methods

Protracted struggles by veterinary students around the world have shown that some veterinary academics remain opposed to the introduction of humane teaching methods.

While a veterinary student at Western Australia's Murdoch University in 1998, I had to initiate legal action and media exposure of curricular animal killing before Murdoch allowed their use.

To its considerable credit, Murdoch then responded positively by introducing Australia's first formal policy allowing conscientious objection by students, agreeing to provide them with humane learning and assessment activities on request. Similar policies have since been adopted by other universities within Australia and abroad.

In 2000, a classmate and I became Western Australia's first veterinary students to win the right not to have to kill animals in our fourth-year terminal surgical laboratory classes, under Murdoch's conscientious objection policy.

To my knowledge, ours was the only alternative veterinary surgical course worldwide in which the academics charged with providing non-harmful practical instruction refused to do so, because of their opposition to the concept, instead requiring students to arrange their own instruction outside the university in private clinics and animal shelters.

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Despite this, we succeeded, gaining five times the surgical experience of our classmates who killed to obtain their degrees. Included were 21 dog and cat spays. It felt wonderful to be contributing positively towards the dog and cat overpopulation problem through neutering, thereby preventing unnecessary deaths, instead of causing them during our surgical training.

Since then, veterinary student colleagues at all of Australia's other established veterinary schools have experienced similar opposition when requesting humane learning methods. Some were nevertheless successful, with the result that by 2005 the first students had graduated from all four established Australian veterinary schools without killing animals during their surgical training. The University of Sydney went further, entirely eliminating all terminal surgical laboratories in 2000.

Faculty opposition to humane teaching methods is by no means a uniquely Australian phenomenon. In 2002 the United States Department of Agriculture cited nearly every US veterinary school for non-compliance with the federal Animal Welfare Act.

Most citations were for failing to search for alternatives to harmful or lethal animal use, or for failing to provide adequate explanations as to why non-harmful alternatives were not used (Anon, 2005).

Some interesting psychological phenomena may explain the marked resistance of some faculty members to humane teaching methods. Maintenance of a belief in their invalidity may be necessary to avoid personal guilt associated with the large-scale killing of animals in veterinary courses. Gruber and Dewhurst (2004) further asserted that: "Human vanity is also a factor that should not be underestimated. For many university teachers it is not acceptable to diverge from the methods one was taught and which one has always used in a life of teaching. Aversion towards accepting alternatives that were not developed in one's own country also plays a role."

Systematic reviews of veterinary student learning outcomes

Nevertheless, the reasons most commonly cited by academics opposed to humane teaching methods are concerns about their educational efficacy. Accordingly, it was refreshing to see the recent systematic review by Patronek and Rauch (*JAVMA*, 2007) of studies of biomedical student learning outcomes achieved by humane teaching methods in comparison to terminal live animal use.

Five studies examined veterinary students, of which two resulted in superior, and three resulted in equivalent learning outcomes, when alternatives were employed in surgical and physiology teaching laboratories. Patronek and Rauch concluded that "alternatives are a viable method of instruction in the field of biomedical education".

Non-terminal harmful animal use was



Beneficial surgery: a student (left) learns by assisting with spinal surgery on a dog.

not considered, however, such as equine nasogastric intubation when conducted by novices, and repetitive bovine rectal palpation.

Consequently, I conducted a more comprehensive systematic review of studies of veterinary student learning outcomes (Knight, 2007). Nine of 11 studies assessed surgical training: 45.5% (5/11) demonstrated superior learning outcomes using more humane alternatives. Another 45.5% (5/11) demonstrated equivalent and only one (9.1%) demonstrated inferior learning outcomes.

Twenty-nine papers in which comparison with harmful animal use did not occur illustrated additional benefits of humane teaching methods, including: time and cost savings, enhanced potential for customisation and repeatability of the learning exercise, increased student confidence and satisfaction, increased compliance with animal use legislation, elimination of objections to the use of purpose-killed animals, and integration of clinical perspectives and ethics early in the curriculum.

These studies may be viewed at www.HumaneLearning.info 'studies'.

Other advantages of humane teaching methods

Besides saving substantial numbers of animal lives, humane teaching methods increase compliance with legislative requirements to minimise harmful animal use.

Additionally, some evidence indicates that veterinary education may result in the decreased likeliness of students to view animals as sentient, in decreased empathy towards animals, in decreased propensity to administer peri-operative analgesics and in impedance of moral reasoning ability (Self *et al*, 1991 and 1996; Hellyer *et al*, 1999; Paul and Podberscek, 2000; Levine *et al*, 2005).

Along with inadequate curricular attention to animal welfare science, the human-animal bond and the development of critical reasoning ability and ethics (Self *et al*, 1994; Williams *et al*, 1999), the harmful use of animals within veterinary education are likely causes (De Boo and Knight, 2005 and 2006).

These desensitisation-related phenomena may represent psychological adaptations enabling students to withstand psychological stresses resulting from curricular requirements to harm sentient creatures in the absence of overwhelming necessity (Capaldo, 2004). Consequently, the replacement of harmful animal use with humane teaching methods is likely to result in veterinarians with more positive attitudes towards animal welfare, which is likely to directly benefit their animal patients.

Conclusions

The evidence clearly demonstrates that veterinary educators can best serve their students and animals, while minimising financial and time burdens, by introducing well-designed teaching methods not reliant on harmful animal use.

Five studies examined veterinary students, of which two resulted in superior, and three resulted in equivalent learning outcomes, when alternatives were employed in surgical and physiology teaching laboratories.

Students should not be required to mount lawsuits before veterinary schools allow the use of humane teaching methods. It is no longer necessary to harm animals in veterinary education, if ever it truly was. And when the necessity is removed from a necessary evil, all that remains is the evil.

■ Further information about humane teaching methods in veterinary education is provided by Jukes and Chiuiia (2003) and at www.vetmed.ucdavis.edu/Animal_Alternatives, www.clive.ed.ac.uk, www.HumaneLearning.info and www.EURCA.org.

Synopses of surgical simulators designed primarily for medical students and practitioners are provided at www.virtualsurgery.vision.ee.ethz.ch.

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