ASSESSING PAIN, SUFFERING AND DISTRESS IN LABORATORY ANIMALS: AN RSPCA SURVEY OF CURRENT PRACTICE IN THE UK

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Abstract *Animal Welfare 2003, **12**: 517-522*

A survey was undertaken to evaluate how animal discomfort, pain, suffering and distress are recognised and assessed in UK scientific procedure establishments. In total, twenty-eight establishments were visited between 1999 and 2001 and 137 people participated, including animal technicians, veterinarians and scientists. The full results, conclusions and recommendations of the survey have been published elsewhere (Hawkins 2002). The study showed that people are concerned about animal suffering, want to be able to prevent and alleviate it, and are aware that there are a number of practical problems that need to be overcome. These include animals concealing clinical signs, which leads to difficulties in detecting incipient discomfort and distress, and human subjectivity when assessing animals. The clinical signs used as indicators of potential pain, suffering and distress are largely subjective. Participants at all establishments agree that a 'team' approach to animal monitoring is the best way to ensure consistency and effectiveness. All twenty-eight establishments use clinical observation sheets to assist with animal assessment and monitoring, nine also use score sheets and seven use computerised data management systems. This paper concludes with recommendations based on the survey findings, with respect to monitoring techniques, assessment protocols and training issues, which aim to facilitate more effective animal assessment and monitoring.

Keywords: *animal monitoring, animal welfare, humane endpoints, pain assessment, pain scoring, refinement*

Introduction

This paper sets out the relevant results of a study designed to review how animal well-being and discomfort, pain, suffering or distress are currently recognised and assessed in designated research and testing establishments in the UK. The survey aimed to establish current practice with respect to animal monitoring and also to examine a broader range of factors with a direct bearing on the ability of individuals and establishments effectively to minimise animal suffering. These include the training of animal users and/or carers, the role of committees such as the UK Ethical Review Process, and dissemination of information about good practice. The full results, conclusions and recommendations of the survey have been published elsewhere (Hawkins 2002).

Method

The survey was carried out between 1999 and 2001. Twenty-eight UK research and testing establishments, comprising almost 11% of all establishments designated under the *Animals (Scientific Procedures) Act 1986* in the UK at that time, were visited. These included universities, fundamental research establishments, pharmaceutical companies and contract research organisations. A total of 137 people took part, including scientists, animal technicians and veterinarians. A questionnaire was used as a basis to discuss issues relating to the assessment and management of adverse effects. Respondents were also asked which kinds of recording technique were routinely used at their establishment, including the commonly used methods set out below.

Clinical observation sheets

These are used to note objective measures such as body weight and for logging inspection times and any observed adverse effects. Sheets used to record clinical observations have a relatively simple format which permits the entry of 'free text', ie written descriptions of any changes or clinical signs.

Score sheets

The principle of using numerical 'score sheets' for noting and assessing clinical observations was originally suggested by Morton and Griffiths (1985). The concept has subsequently evolved and become more flexible. Binary score sheets have been introduced, where clinical signs are marked as *present* or *absent*, and numerical scores are frequently not required (Morton 1998; Morton *et al* 2000). The sheets need to be regularly reviewed so that signs frequently noted in the text boxes can be added to the list and those that are infrequently observed can be removed. Where score sheets are routinely used, benefits are said to include closer observation of all animals, increased consistency of monitoring, more effective staff training and motivation, and improved recording of the effects of drugs such as analgesics. For examples of clinical observation sheets and score sheets that can be downloaded and edited to suit different studies, see http://www.lal.org.uk/pain.

Data management systems

These are commonly used in toxicology and safety testing. These systems operate in a similar manner to score sheets and include lexicons with lists of terms for observations of environmental conditions and clinical signs, entries for dose routes and levels, and boxes for free text. Free text is generally used more frequently to describe clinical signs in larger animals (eg dogs, primates) than in rodents.

Results

The survey generated a great deal of information. Those results most relevant to the present workshop are summarised below; the full survey report including all of the results can be downloaded at http://www.lal.org.uk/pain.

1. Recognising the potential for suffering

Almost all respondents (97%) assume that animals do or may experience adverse effects to some extent, either during or as a result of procedures. These include pain, suffering and distress, ranging from mild discomfort, emotional stress (eg resulting from handling for

administration of substances) or 'feeling sick' through to higher levels of suffering, such as post-surgical pain.

2. Recognising 'normal' animals

Almost everyone believes that the ability to recognise a 'normal' animal is a fundamental skill that has to be present or learned in order to recognise an 'abnormal' animal. In practice, where the health and welfare of stock animals (ie those not undergoing procedures) is believed to be acceptable, any differences in animal behaviour or physiology during or after procedures would indicate a departure from this baseline standard of well-being. This could signify that animals are suffering and require further attention or intervention.

3. Commonly used clinical signs

The most important core criteria for assessing well-being are considered to be simple, objective and non-invasive (eg body mass measurement). However, the most commonly used clinical signs are subjective (Table 1). Changes in the cage environment are also used to monitor animals in some facilities; for example, abnormal faeces, vomit, blood on bedding, and reduced use of cage additions such as nesting material, cardboard tubes and chew sticks, are all causes for concern. In these cases, the cages must be cleaned by those responsible for monitoring the animals' well-being so that important indicators of suffering are noted and not discarded.

Table 1 Clinical signs commonly used as indicators of potential pain, suffering or distress.

Clinical sign	Examples given by interviewees
Objective signs	Body weight; food consumption; water consumption; body temperature (telemetered or measured with thermometer); experimental variables (eg telemetered heart rate).
Behaviour	Normal and provoked behaviour; degree of interaction with conspecifics; irritation at injection sites; vocalisation; grinding teeth; writhing; tremors; lethargy; unusually aggressive behaviour; 'not bouncy' (dogs); 'wary', staying at back of pen or cage.
Discharges	Nasal discharge; salivation; porphyrin staining (rats).
Movement	Locomotion (staggering, laboured gait, ataxia); movement impeded by tumours.
Physical signs	Altered respiration rate; brightness/dullness of eyes; ulceration of tumours; estimated body temperature (whether 'cool to touch', pale/red extremities); signs of wound infection.
Posture	Hunching; differences in resting posture (to find comfortable position); head down (sheep).
Skin/coat	Piloerection ('starey' coat); not grooming/stained coat; hair loss; colour of skin; 'saggy' skin (dehydration); whether grooming normally.
Other	'General appearance'; changes in food and water consumption; presence of pain on moving; 'just not right'.

4. Assessment and recording techniques used in practice

A range of different techniques is used to aid the recognition and monitoring of adverse effects. The percentage of institutions using each method is shown in Figure 1, divided into establishment types.

5. A team approach

All establishments visited hold the view that a 'team' approach is the best way to ensure consistency and effectiveness in the management of adverse effects. It is considered essential

that the team involves technicians, scientists and veterinarians on equal and complementary terms. All types of establishment find that scientists' competence and attitude can vary widely, so veterinarians and technicians believe that a very important part of their role is to provide a consistency of care and attention. The overwhelming consensus among all types of establishment is that animal technicians are most competent at detecting adverse effects early because they have the most experience and know animals best, both at a species and sometimes at an individual level. An effective team approach is generally (but not always) said to be successfully achieved.

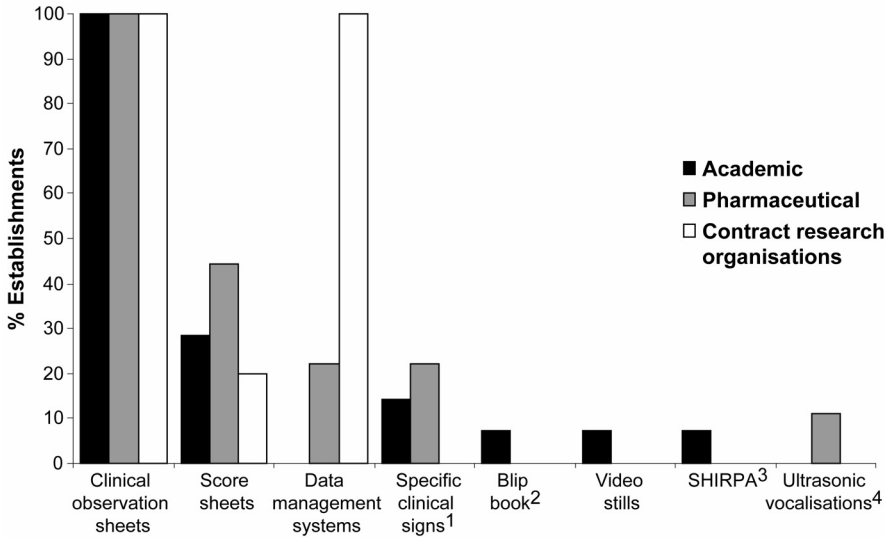

Figure 1 **Techniques routinely used for recognising and recording adverse effects. [1]Specific clinical signs are sometimes used to infer animal well-being (eg in enzyme deficiency disease studies, the ability of mice to cross a bar without falling can indicate levels of suffering as well as disease progression). [2]A 'blip book' is used to record unpredicted phenotypes in transgenic animals. [3]SHIRPA (see footnote[1]) is a protocol for assessing the phenotype of genetically modified or mutant animals, which may indicate that animals are experiencing pain, suffering or distress, although this is not its primary function. [4]Ultrasonic vocalisation by rats is made audible using a bat detector (NB such vocalisation is difficult to interpret and relationships have not been comprehensively established between vocalisation patterns and possible suffering or distress).**

6. Training issues

The content, training aids and time allocated to teach those responsible for monitoring animals how to recognise pain, suffering and distress are very consistent between establishments, because of the narrow subject area and the lack of suitable training material. The paucity of training aids is problematic in that trainees are taught to recognise 'normal' animals but then have to identify suffering animals in practice. Respondents believe that

[1] SmithKline Beecham Pharmaceuticals; Harwell MRC Mouse Genome Centre and Mammalian Genetics Unit; Imperial College School of Medicine at St Mary's; Royal London Hospital, St Bartholomew's and the Royal London School of Medicine; Phenotype Assessment.

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more training is required particularly in the legal requirements for pain relief and humane endpoints (to make everyone aware that technicians are empowered to implement the law); and, largely for scientists, in animals' basic requirements and behaviour, including signs of pain, suffering and distress.

7. Practical problems

Most people feel confident that pain, suffering and distress are effectively detected within their establishments, but also believe that the ability to recognise 'normal' animals and suffering at any level is neither easy nor quick to learn. An ability to empathise with animals and a positive attitude toward them are both essential, but sufficient experience and the *time to monitor animals properly* are also vital. Some factors that are regarded as particularly difficult to overcome, even if all of this is achieved, are set out below.

7.1 Animals concealing discomfort, pain or distress

A fundamental problem with devising or using any assessment system is that many animals do not readily exhibit clinical signs. In general, the well-being of 'prey' species, including rabbits, rodents, horses and sheep, is regarded as being much more difficult to assess than that of 'companion' (predator) species, such as dogs and cats. In rabbits and rodents, this is due not only to the instinctive concealment of evidence of physical stress or injury (rodents are sometimes described as 'tough', 'resilient' or having a 'high pain threshold'), but also to the comparatively larger numbers in which they are used and kept (see also Hawkins *et al* 2002). In addition, pain-associated behaviours in nocturnal animals such as rats and mice may not occur during the day or evening (eg Wallace *et al* 1990), but very few establishments monitor animals throughout the night when such behaviours are far more likely to be apparent.

7.2 Detecting incipient pain and distress

It is considered very difficult to assess the gradual onset of discomfort, pain or distress, such as that resulting from tumour growth or from the toxic effects of a substance. This is regarded as very different from predictable and acute adverse effects, such as post-surgical pain. People frequently describe a continuum, from stress to distress to discomfort to pain; whereas severe pain can easily be diagnosed (eg by audible vocalisation in rats), moderate pain is much more difficult. These observations are borne out by the clinical signs listed in Table 1, many of which are indicators of rather more substantial adverse effects than mild or moderate pain, suffering or distress (FELASA 1994; Jones *et al* 1999).

7.3 Human subjectivity

There is an extremely widespread belief that a good animal technician will always know when an animal is suffering and be able to detect an animal in distress very quickly. Although this belief is strongly held by technicians, veterinarians and scientists, there does not appear to be any evidence to substantiate this. Statements are frequently made to the effect that experienced technicians can tell by eye or feel whether animals have lost weight, or tell a sick animal 'at a glance', yet this is rarely challenged or evaluated.

Conclusions and key recommendations

The survey demonstrates that people are very concerned about animal suffering, want to be able to detect and alleviate it effectively, and are aware of the practical problems involved. The full report includes a range of recommendations that aims to assist in the development

and implementation of better ways of assessing and monitoring animals; relevant key recommendations are summarised below. Scientists, veterinarians, animal technicians and all others directly or indirectly responsible for monitoring animals and minimising their suffering need to:

- be open to the use of a broad range of techniques for assessing and monitoring animals;
- always be prepared to try new methods, but approach all techniques for assessing animals critically and evaluate their efficacy in practice;
- use binary score sheets more widely to assess animals and to record observations more effectively; regularly review score sheets and use them to review training, experimental and pain-management protocols;
- ensure that an integrated monitoring team is in place, which includes people with the expertise required to monitor animals effectively and make decisions rapidly;
- make sure that the expertise and judgement of animal technicians is respected and that they have the resources they need to implement good practice and try new techniques;
- help ensure that training modules addressing animal assessment are comprehensive, tailored to individual projects and contribute towards a good 'culture of care';
- make sure that there are sufficient staff and resources to monitor animals effectively.

References

FELASA Working Group on Pain and Distress 1994 Pain and distress in laboratory rodents and lagomorphs. *Laboratory Animals 28*: 97-112

Hawkins P 2002 Recognising and assessing pain, suffering and distress in laboratory animals: a survey of current practice in the UK with recommendations. *Laboratory Animals 36*: 378-95 (this version of the survey report includes a summary of the results; the full report can be downloaded from http://www.lal.org.uk/pain)

Hawkins P, Roughan J, Wilson A, Sales J, Clarke K, Warn P, Thornton P, Jennings M and Hubrecht R 2002 Assessing rodent wellbeing: Report of the 2001 RSPCA/UFAW Rodent Welfare Group meeting. *Animal Technology and Welfare 1*: 3-12

Jones H R P, Oates J and Trussell B A 1999 An applied approach to the assessment of severity. In: Hendriksen C F M and Morton D B (eds) *Humane Endpoints in Animal Experiments for Biomedical Research* pp 40-47. Royal Society of Medicine Press: London, UK

Morton D B 1998 Implementing assessment techniques for pain management and humane endpoints. In: *Proceedings for 'Pain Management and Humane Endpoints'*, available at http://altweb.jhsph.edu/meetings/pain/morton.htm

Morton D B, Ambrose A, Leach M C, Kelly J and Poirier G 2000 Adverse effects — recognition and assessment, and humane endpoints. In: Balls M, van Zeller A-M and Halder M (eds) *Progress in the Reduction, Refinement and Replacement of Animal Experimentation* pp 1083-1093. Elsevier: Amsterdam, The Netherlands

Morton D B and Griffiths P H M 1985 Guidelines on the recognition of pain, distress and discomfort in experimental animals and an hypothesis for assessment. *Veterinary Record 116*: 431-436

Wallace J, Sanford J, Smith M W and Spencer K V 1990 The assessment and control of the severity of scientific procedures on laboratory animals. *Laboratory Animals 24*: 97-130