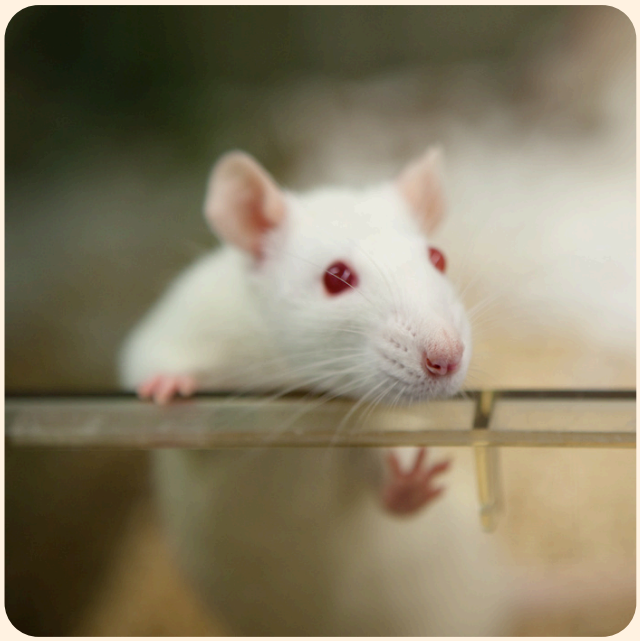
RSPCA ANIMALS IN SCIENCE

Animals in Science Department
Resources for AWERB members
May 2025

Avoiding mortality in animal research and testing

Aim of this resource

To help AWERBs to discuss practical approaches for avoiding animal mortality that could feasibly be prevented.



Relevant AWERB task

Advising staff on animal welfare and the application of the 3Rs; establishing and reviewing operational processes in relation to animal welfare; following the development and outcome of projects to identify and advise on elements that further contribute to the 3Rs.

Recommendation

Use this resource to stimulate discussion, review current in-house strategies, and identify new approaches for avoiding mortality in animals.

The issue

When an animal dies unexpectedly in a research environment, not only is an animal's life lost, but data and resources are also often lost, raising important animal welfare and ethical issues. Unpredicted deaths may occur in animals kept for breeding or those used in procedures (e.g. disease 'models'). These deaths are usually preceded by suffering - which is assumed to be severe if an animal is 'found dead' unless an informed decision can be made that severe suffering did not occur before death.

Mortality should therefore be closely monitored, challenged and avoided wherever possible. AWERBs should play a fundamental role in establishing and reviewing internal operational processes regarding monitoring, reporting and follow-up in relation to animal welfare. They can instigate or conduct reviews of current in-house welfare assessment protocols, to evaluate how effective they are at detecting early indicators of mortality. Better understanding of the causes of death, identification of early signs of potential mortality, and implementation of intervention strategies can all be effective in preventing animal deaths.

Key points:

- Animals can experience suffering when they die unexpectedly (e.g. during a procedure, or when they are 'found dead'), or when the death of the animal is used as the endpoint of a study (e.g. in some regulatory testing).
- It is important to actively decide to work together to reduce mortality at the establishment, with a clear strategy. Institutions could set out targets relating to specific strains or procedures, or even consider setting themselves the goal of achieving zero avoidable mortality.
- Periodically reviewing welfare assessment protocols, including indicators and timing and frequency of observations, can determine if indicators of mortality are being missed.
- When designing an experiment, researchers should clearly define humane endpoints to ensure that pain, suffering and/or distress are prevented or alleviated, while still achieving experimental objectives.
- AWERB members could suggest that scientists undertake pilot studies (or studies in parallel) to identify approaches to predicting and avoiding mortality.
- Reviewing staff training should reduce the risk of mortality. All relevant staff should be adequately trained and competent in three areas; conducting procedures, welfare assessment, and humane killing.
- Monitoring protocols should be regularly reviewed, which may require investment in animal monitoring.
- It may be necessary to develop in-house data and/or record mining. Information, data and records that can help to avoid mortality may already be available, and if they are not, it is helpful to consider whether these could be feasibly obtained.

For more information, see our Avoiding Mortality report.

Background information:

- **Animals can experience suffering when they die unexpectedly (e.g. during a procedure, or when they are 'found dead') or when the death of the animal is used as the endpoint of a study (e.g. in some regulatory testing).** Under European [1] and UK [2] legislation, death as an endpoint of a procedure must be avoided as far as possible and replaced by early and humane endpoints, which yield more valuable data and can be defined by using biomarkers and clinical signs. This resource focuses on preventing unexpected deaths.
- **It is important to actively decide to work together to reduce mortality at the establishment, with a clear strategy. Institutions could set out targets relating to specific strains or procedures, or even consider setting themselves the goal of achieving zero avoidable mortality.** Presuming that a certain level of mortality is 'acceptable' (e.g. within a certain strain, or procedure), removes the incentive to challenge the status quo and make further efforts to reduce mortality.
- **Periodically reviewing welfare assessment protocols, including indicators and timing and frequency of observations, can determine if indicators of mortality are being missed.** This will help to indicate whether monitoring could be more effective and timely, to help refine and implement humane endpoints and other interventions. To define robust indicators of future mortality, those that occur most frequently in the literature are body temperature, body weight and difficulty in rising or locomotion [3]. Using a combination of indicators has also proven to be effective, such as temperature and body weight [4-7], and body temperature alongside physical activity and food and water consumption [8,9]. The current state of knowledge regarding the assessment of pain, suffering and distress can inform the review of welfare assessment records. Assessment protocols and recording systems should be tailored to the species, protocol and circumstances, with input from Named Persons including the Named Information Officer. If there is a risk of mortality, or deaths have occurred, reviewing welfare assessment should be allocated adequate time, resources and input from people with relevant expertise. Examples of resources to help review welfare assessment are publicly available [10-13].
- **AWERB members could suggest that scientists undertake pilot studies (or studies in parallel) to identify approaches to predicting and avoiding mortality.** Ideally, these studies should:
  1. Be designed so that the generated data could be incorporated into data from the main experiment, to avoid additional animal use.
  2. Have clear objectives that will help to identify logistical, scientific and animal welfare issues that may arise in subsequent experiments. The PREPARE checklist for designing animal experiments [14] and the NC3Rs Experimental Design Assistant [15] can be helpful with respect to planning pilot studies.
- **Reviewing staff training should reduce the risk of mortality. All relevant staff should be adequately trained and competent in three areas:**
  1. Training in conducting procedures, including restraint, dosing and sampling, sedation, local and general anaesthesia, and surgery (EU training modules 7, 8, 20, 21 and 22; part of UK module PIL A - theory and skills, species specific -, UK modules PIL B, and PIL C). For procedures with an additional risk of mortality, or where the impact is difficult to predict, special training needs should be identified by personnel such as supervisors, veterinarians, senior animal technologists or those appointed to a role that specifically oversees training needs.

2. Training in welfare assessment: EU Module 5 (part of UK module PIL A - theory, species specific), on recognising pain, suffering and distress, provides an introduction to the topic, but is not tailored to achieving competence in monitoring models where there is the risk of mortality or significant suffering. Trainers should ensure appropriate competence in welfare assessment tailored to procedures that carry a significant risk of mortality, or severe suffering, or if adverse effects are unknown.
3. Training in humane methods of killing, which is covered in EU module 6 (UK module K - theory and skills, species specific). In all instances, humanely killing animals should be straightforward and undertaken with minimal delay. Where there is an increased risk of mortality, and animals may rapidly become moribund and die, it is essential to ensure that processes are in place to identify at any time, within minutes, a person who can competently kill a suffering animal.

Even experienced personnel may struggle to stay up to date with current methods and thinking – so using new materials to question current practice should not be seen as 'conflict', but viewed positively as an integral part of the Culture of Care [16].

- **Monitoring protocols should be regularly reviewed, which may require or consider investment in animal monitoring.** Software and hardware technologies are rapidly developing, providing new opportunities to increase the frequency and level of observations, and to seek earlier indicators of ill health. When using animal monitoring technologies, additional harms should not be imposed on animals (e.g. products that require single housing of social animals or do not permit enrichment should be avoided). Harms caused by invasive elements should be considered against the benefits of increased ability to implement humane endpoints (e.g. body temperature can be monitored using an implanted telemetry deceive or RFID chip, which is an invasive procedure, but may be justifiable if accurate and timely data can be used to prevent severe suffering and mortality).
- **It may be necessary to develop in-house data and/or record mining. Information, data and records that can help to avoid mortality may already be available, and if they are not, it is helpful to consider whether these could be feasibly obtained.** This can be done on several levels:
  1. Regularly discussing fates of animals with the local AWERB (or similar body) , including animals 'found dead', can help to identify causes of mortality and possible approaches to preventing these.
  2. Regular, structured reviews of welfare assessment records and outcomes can help to identify reliable predictors of mortality.
  3. Databases used to record data from animals can be a substantial resource for understanding mortality, but the analyses will be limited by the quality and the richness of the data input. Therefore, adequate commitment and resources are essential to collect good-quality data, and complete and accurate use by all relevant staff will derive maximum value and minimal bias from the data.
- **Use our useful flowchart to easily follow these steps to avoiding mortality in animal research and testing.**

For the list of references, click here.

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