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The Role of Clinical Veterinary Medicine in the Assessment and Treatment of Laboratory Animal Distress

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Introduction

It is doubtful that the scientific community will ever arrive at a consensus definition for distress as it may be attempted for the purposes of improving animal welfare in and across the myriad of research, testing and teaching facilities in the United States and throughout the minuet of protocols that exist for animals. The stakeholders in this attempt can however address most causes of physiologic distress by instituting time-honored veterinary and agrarian approaches to animal surveillance. In this manner, the majority of individuals who participate in responsible and humane animal care might be assuaged in that a condition of maximum wellness exists for most animal research subjects. This author proposes a fact-based individualized and systematic approach to screening animals for homeostatic disequilibrium. In the clinical veterinary world, this process is called a SOAP (subjective, objective, assessment, plan)-process. The SOAP process can reasonably be implemented at the individual and group level.

Approach

Systematic animal surveillance systems are inherently melded into much of what civilized agricultural communities and programs do. If one assumes that most animals can achieve general psychological and physical wellness when held captive in research settings, then one can try to provide all animal subjects certain basic needs such as social and environmental enrichment and physical comforts. When an animal care program is reasonably certain that such needs and comforts are met, then one can take a more pragmatic approach to detecting most forms of distress which may result thereafter.

A farmer learns for example that a herd animal is not feeling well because he/she has a frame of reference for normal that is a result of many observations in many animals over a long period of time. Good farmers learn that astute observations about animal behavior and patterns of activity are often early indicators of impending illness and that the ability to detect such deviations early often prevents the severity of the illness or even permit an intervention which will prevent it from occurring**.**

Before understanding what might constitute a deviation from homeostasis, one must understand what is normal for the species, subspecies, and the individual. Recently, emphasis has been placed on understanding what constitutes a normal animal for the purposes of fully understanding what also constitutes abnormal in that individual, group, or species (Karas, 2000; Troy, GC VMRCVM)

The Physical Examination

A physical examination of an individual animal or group of animals and its (their) environment is best achieved in two portions. The first portion of the exam is to observe the animal from a distance. This is so as to avoid influencing behavioral and physical signs that might be produced by excitement, fear, or anxiety. Important aspects of the subjective observation include but are not limited to:

- Attitude
- Posture
- Gait
- Vocalization
- Defecation
- Urination
- Appetite
- Thirst
- Play

Observers should become familiar with species and individual patterns of behavior, posture, head and ear carriage, body symmetry and patterns of movement in the open field setting. Following this portion of observation, observers may also get close enough to observe respiratory rate, rhythm and character at rest. This is an important objective assessment, best done when the animal is not aware that it is being observed.

As the animal is restrained or observed from a close angle, the observer must then establish a systematic process for examination so that important details are not missed. This is also a good practice in order to familiarize the animal(s) with the process of examination. In general, most veterinarians prefer to begin at the head of an animal and work progressively backwards. In short, the objective indices of the physical examination comprise the objective portion of the SOAP method and will be detailed by exemplar later in this manuscript. Those that are possible depend upon the species, vascular access, available diagnostic equipment and normal values for that species.

Trending

An essential portion of any humane animal program is the ability for all responsible persons to adequately trend an individual or group for physiologic, behavioral, and physical changes. If this is to be performed correctly, all responsible persons should have adequate training and follow through. Following the examination, the results are tallied systematically across each individual or group of individuals into tables of information that can be easily retrieved and interpreted by multiple individuals who might have cause or responsibilities within the animal program. A common problem in animal facilities is isolation or limitation of information to a select person(s) so that when something is observed that is thought to warrant humane intervention, location of the past observations about the animal is not possible. Ready access to information as well as the trend of similar information from all time points since the animal was last observed to be normal is paramount in determining whether or not distress has occurred.

Understanding and Observing for Primary vs. Secondary or Tertiary Signs

In the author's experience, the best practice for predicting and addressing distress in animal experimentation is a practice of predicting outcome. Risk in terms of distress can be foreseen in most cases because some knowledge about a drug, device or technique is usually known at the cellular and sometimes even whole animal level. In the United States, animal welfare regulations require a literature search using keywords in order to identify possible alternatives to animal models. This can also be an opportune time to identify other animal or cell models for which previous experience with the technique, drug or device already exists. The author has coined this a "complimentary search". The complimentary search assumes there are no good alternatives to animals and that the experiment will proceed. The SOAP is made easier by

developing a set of expected outcomes and then forecasting primary, secondary and tertiary events as they occur.

Example

An investigator proposes a new drug therapy to improve a rat model of congestive heart failure. The drug has already been tested and found non-toxic in the rat. The investigator must now prove the drug is efficacious. It is anticipated that, minimally, the controls (untreated) will likely experience congestive heart failure. What is the best approach to mitigating distress for the procedure? The author assumes the drug will not be efficacious. It will also be true that the controls will likely suffer distress at some point in the animal study. From this point one can work backwards to establish primary, secondary or tertiary signs that might be anticipated along the way. The predictions are mapped in Table 1.

After the consulting veterinary review is summarized or sketched in Table 1, investigators and their veterinary staff may then begin to determine what might be possible to monitor in order to intervene. The table is expanded to reveal details of detection that will aid in the objective examination.

Conclusions

It is unlikely that in the present decade an agreement will be reached about what constitutes distress or that a single method for the comprehensive detection of distress can facilitate stressful events and outcomes in advance of all experimental protocols. A respectable start would be to ensure that the steps discussed in this presentation assure individuals and programs who wish to mitigate such outcomes a method by which most stressful incidents can be detected early so that appropriate intervention strategies can develop.

References

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