Training Strategies for Animal Care Technicians and Veterinary Technical Staff

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Abstract

An institutional training program for animal care and veterinary technicians should be planned and implemented to provide these individuals with knowledge and skills for performing their duties within a laboratory animal care and use program. The complexity in the regulatory and scientific features of the animal research environment necessitates a strong training program on diverse topics according to staff duties. Orientation training should include ethics and compliance with relevant laws, policies, and guidelines. Depending on specific staff responsibilities, training may be general or in depth on topics of species-specific biology and behavior, animal facility equipment and operations, animal health procedures, animal research policies, occupational health and safety equipment and practices, computer usage, training, and management. Staff training should be an ongoing mission for incorporating new equipment, practices, and procedures in the laboratory animal program; for providing periodic refresher training to maintain a high level of staff qualifications; and for retraining when skills or knowledge are found deficient. Large institutions often have a dedicated training staff to implement the institutional training program.

Key Words: animal care training; certification; technician training; trainer; training coordinator; training manager; training program; veterinary technician training

Introduction

The publication _50 Years of Laboratory Animal Science_ (Stephens 1999) provides an historical account of the growth of the animal care technician’s role from 1950 (the time of the founding of the Animal Care Panel, now the American Association for Laboratory Animal Science (AALAS)) to 2000. In the span of 50 years, the animal care technician changed from someone who learned about animal husbandry on the job with minimal supervision and instruction, to a professional who is now recognized as a backbone of the entire research animal program (Stephens 1999). It is now acknowledged that technicians, along with their veterinary and scientific coworkers, are on a perpetual learning curve. Consequently, it is incumbent upon institutional management to develop technicians’ knowledge and skill set in a progressive manner (Stephens 1999).

Training in laboratory animal science has developed as the field has progressed. Increasingly, technicians are required to be informed of appropriate animal husbandry practices, the characteristics of a variety of laboratory animal species, and the use of modern technology (Stephens 1999). Because veterinary technicians are widely recognized as valuable personnel for animal research, training programs for veterinary technicians throughout the United States often include laboratory animal science courses in their curriculum. Although focusing on a private practice career, veterinary technology curricula provide knowledge and skills that transfer well to the animal research field. In addition, community colleges and technology training centers are beginning to develop curricula for training students for entry-level positions in laboratory animal care. Although these colleges and schools may be resources regionally for the hiring of trained technicians, many research institutions have instituted their own programs in order to train staff to fulfill the roles of animal care and veterinary technicians. In 1994, the Laboratory Animal Welfare Training Exchange (LAWTE) was founded to facilitate the exchange of materials between laboratory animal science trainers and other groups. Several laboratory animal organizations routinely include training-specific topics in their educational meetings.

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Abbreviations used in this article: 3Rs, refinement, reduction, replacement; AAALAC, Association for the Assessment and Accreditation of Laboratory Animal Care International; AALAS, American Association for Laboratory Animal Science; ABSL, Animal Biosafety Level; BMBL, Biosafety in Microbiological and Biomedical Laboratories; CD, compact disc; CDC, Centers for Disease Control and Prevention; DEA, Drug Enforcement Administration; DVD, digital video disc; IACUC, institutional animal care and use committee; LAMA, Laboratory Animal Management Association; LAWTE, Laboratory Animal Welfare Training Exchange; MSD, musculoskeletal disorder; NIH, National Institutes of Health; NRC, National Research Council; OSHA, Occupational Safety and Health Administration; PPE, personal protective equipment; SOP, standard operating procedure.
The impact of federal and local regulations as well as accreditation by the Association for the Assessment and Accreditation of Laboratory Animal Care International (AAALAC) should not be overlooked when examining effective animal husbandry and veterinary technical training programs. Regulatory authorities, accreditation groups, and contract clients require that animal care programs provide adequate formal or informal training for their personnel. When practices are deficient, stemming from inadequate training programs, an institution may face citations, fines, loss of accreditation, loss of grants or business, negative media reports, and adverse public attention. The objective of this article is to inform the reader of topics to include, at a minimum, in a comprehensive training program that will support an appropriate standard for animal care and use. We realize that animal care programs vary widely, therefore we encourage those individuals who develop and implement training programs to focus on creating programs that best fit the needs of their institution.

Scope of Training

Training programs for animal care and veterinary technical staff should be tailored to the types of responsibilities these individuals have in supporting the animal research program within the organizational hierarchy of the animal facility. Depending on the size and complexity of the animal facility, staff may be dedicated to a specific role or may fulfill multiple roles, which are typically characterized as follows:

- Technical—involving duties of caring for animals and performing basic procedures;
- Health Care—providing medical support to animals in quarantine, post-operatively, and with spontaneous disease;
- Mechanical and Sanitation Equipment—involving the mechanical operations of a cage wash and other related units;
- Administrative—including procurement of animals and resources;
- Training—providing training services for research and animal care staff; and
- Management—comprising staff supervision and facility management.

Training should be aimed at both the acquisition of knowledge and skills for completing specific tasks in the animal facility and the professional development of staff within the laboratory animal science field. Training for essential knowledge and skills to perform assigned tasks is an obvious priority. Training programs should be dynamic with built-in mechanisms for continual refinement and updates (known as continuing education) to reflect changes in the work environment such as new technologies, regulatory changes/updates, new biomethodologies or processes, new capabilities, and novel types of research. Although professional development may seem to be a second priority, it is of vital importance for staff to perceive themselves as pursuing a meaningful career with opportunities for advancement within the institution and the profession. In an animal research program, animal models and their care requirements are so highly specialized that a professional staff is a necessity at all operational levels within the facility.

Staff should embody professionalism in the performance of their duties and in their interactions with research staff. Given that training is a significant investment of time and labor, a ladder of career opportunity and advancement will greatly benefit the organization through a higher retention of highly trained staff in the animal facility unit. Organizations should consider supporting the participation of staff in a professional association such as AAALAS, which provides resources for professional development via educational resources and programs and certification programs. AAALAS educational materials are a foundation for the training of staff in key areas in laboratory animal science, and personnel who attain AAALAS certification enjoy professional recognition. AAALAS-certified technicians earn an average of 12% more than noncertified technicians (AAALAS 2005). AAALAS certification has been recognized by the National Institutes of Health (NIH) Office of Laboratory Animal Welfare (Potkay et al. 1995) and in the Guide for the Care and Use of Laboratory Animals (NRC 1996). Animal research institutions commonly require AAALAS certification for their staff as one of the criteria for hiring or promotion. As a result, more technicians pursue AAALAS certification each year. In Table 1, the number of annually certified technicians since 2000 is shown at each AAALAS certification level. Technicians with supervisory and managerial duties benefit from administrative training provided by the Institute of Laboratory Animal Management (an AAALAS program) and from certification as a Certified Manager of Animal Resources (a joint program between AAALAS, the Laboratory Animal Management Association [LAMA]), and the Institute of Certified Professional Managers.

Table 1 Number of technicians certifying annually with the American Association for Laboratory Animal Science at levels of assistant laboratory animal technician (ALAT), laboratory animal technician (LAT), and laboratory animal technologist (LATG)

<table>
<thead>
<tr>
<th>Year</th>
<th>ALAT</th>
<th>LAT</th>
<th>LATG</th>
<th>Totals</th>
</tr>
</thead>
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<td>406</td>
<td>170</td>
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<td>960</td>
<td>465</td>
<td>252</td>
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<tr>
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<td>520</td>
<td>228</td>
<td>1567</td>
</tr>
<tr>
<td>2005</td>
<td>1021</td>
<td>475</td>
<td>267</td>
<td>1763</td>
</tr>
</tbody>
</table>
Training Topics

Orientation and Ethics

It is essential to orient incoming employees regarding their role in a highly specialized field, which is underpinned by a web of regulations and accreditation standards. Orientation should also be provided for those with other types of work experience involving animals. Specifically, training should focus on the following important topics: (1) the purpose of biomedical research and testing, (2) the scientific and economic value of the animals as models within the context of research, (3) the relationship between the standards of animal care and health with the integrity of research data, (4) an introduction to the regulatory environment for animal research, (5) the public concerns over animal research, and (6) an overview of the responsibilities of staff at all levels in the research effort.

The ethics of animal research may be introduced through a discussion of the following key regulatory mandates that govern the conduct of animal care and use in research:

- Animal Welfare Act and Regulations
- Public Health Service Policy on the Humane Care and Use of Laboratory Animals
- National Research Council (NRC\(^1\)) Guide for the Care and Use of Laboratory Animals

In all three documents, guidance in animal research ethics focuses on a consideration of the alternatives to the use of animals—replacement, reduction, and refinement (the 3Rs\(^1\); Russell and Burch 1959). An introduction to these principles will help explain how the institution’s control systems for approving and monitoring the use of animals in the facility operate to support animal welfare within the context of research. Technicians’ roles may be related to the 3Rs principles according to each person’s position and responsibilities within the facility hierarchy. Staff trained to optimize animal welfare will be carrying out one or more of the 3Rs, as in the following examples:

- A **vehicle driver** would be expected to transport animals gently to minimize their stress during transit;
- An **animal procurement specialist** who accurately places an order for rodents will avoid a waste of animal lives if the wrong strain is received;
- An **animal care technician’s** attention to abnormalities in animal behavior or physical condition may lead to staff interventions, curtailing animal pain or distress; and
- A **veterinary technician** may contribute to a culture of caring for the animals by including animal welfare principles during the instruction of methodologies to researchers.

Another area of ethics training is the timely and appropriate reporting of perceived problems in animal care and use. Staff should be informed of the specific route for communicating concerns (e.g., to a supervisor, a veterinarian, the institutional animal care and use committee [IACUC\(^1\)], or other individuals). For new staff members who have had no prior research experience, it is helpful to prepare them for the fact that appearances are often not what they seem (i.e., that an unusual situation may be consistent with animal welfare standards, and that signs of pain and distress are subtle and easily overlooked unless knowledgeably scrutinized). New employees should be reassured when they report potential problems that they may trust the judgment of experienced and skilled staff in assessing the facts of the situation. These senior staff should have received training to treat all such reports seriously and equitably.

Basic Animal Facility Operations

Training in basic facility operations provides the foundation upon which an animal facility can successfully maintain disease-free animals and enable animal research to be performed with the highest quality of care. Animal husbandry staff must understand the fundamental differences between barrier and nonbarrier housing mechanisms when both types exist within one animal program. For both types of facility operations, training should cover the following topics (Littlefield et al. 1980):

1. Facility security including keys, key cards, key punch pads, video surveillance, palm/fingerprint scanners, iris scanners;
2. Traffic flow (i.e., path of travel for people, cages, animals, and equipment) for the facility and between other facilities within the animal program;
3. Mechanical operations and major fixed equipment (e.g., cage wash, bulk sterilizers);
4. Air flow, temperature and humidity controls, monitoring systems, and alarms;
5. Occupational health and safety programs and requirements including appropriate personal protective equipment (PPE\(^1\)) usage;
6. Communication procedures for management, veterinary staff, researchers, coworkers, maintenance staff, and occupational health providers;
7. Cleaning and sanitation procedures at levels of the primary enclosure, secondary enclosure, room, and facility; and
8. Waste disposal for animal-related, hazardous, and non-animal/nonhazardous waste.

The importance of traffic and air flows and procedures for preventing the spread of disease must be impressed upon staff working in barrier facilities. Related standard operating procedures (SOPs\(^1\)) should be used as training tools.

Animal Health Procedures

The key role of the laboratory animal technician is to safeguard the welfare of the animals while supporting the re-
search mission through daily activities of animal care and facility transport. Many animals have specialized care requirements as exotic species or because of immunocompromised status or other vulnerability (e.g., the risk for nonhuman primates of acquiring human diseases). Laboratory animal technicians operating at any level should be knowledgeable in these concepts and in any specific procedures for animal health care that are relevant to their duties.

A basic knowledge of species-specific behavior, biology, and care is inherent in the animal technician’s ability to perform the job well. Initial and ongoing training in these areas serves as the crux of the ability of personnel to recognize early signs of pain and distress in research animals. The cumulative expertise of senior animal care technicians, veterinary technicians, veterinarians, researchers, and scientists should be included in the overall training of animal care technicians on the different animal species. Cross-training animal care technicians in species-specific behavior, biology, and care is also needed to avoid problems when the primary technicians are away from the facility during weekends, holidays, vacations, and other leave. Special training will also be necessary when animal care technicians take on additional job roles or move to different facilities so that they are aware of different animal species and research procedures to which they may be exposed. When an unusual, novel, or potentially controversial research methodology is used by researchers, technicians may need training on the methodology, research purposes, and potential risks.

Animal receiving is the first place where animals may require health care intervention; these considerations have become more important where domestic and international animal shipments between institutions have become routine. The training of receiving technicians should cover shipment identification, handling, and routing of animals to housing areas or to quarantine facilities for veterinary evaluation, testing, and/or treatments. Receiving technicians should be trained on procedures for avoiding the transmission of infectious organisms between incoming or outgoing animal shipments. It is also important that they recognize situations in which animals may require veterinary care immediately upon arrival (e.g., if crates are damaged, transit time was excessive, or animals appear abnormal) and that they know the communication channels to quickly summon veterinary support.

Technicians who operate in the quarantine/containment facilities are often health care/veterinary technicians. These individuals should be knowledgeable about basic containment equipment (e.g., types of primary housing), the methods for controlling infections, containment procedures (including the sequence for accessing rooms and servicing shipment groups), the duration of confinement, the management of sentinel animals, and the use of PPE), and animal conditioning when necessary (Everitt and Schapiro 2006). Technicians should be competent in procedures for physical examination, biological sample collection and processing, diagnostic testing (e.g., tuberculin tests in nonhuman primates), medicating animals, and performing necropsies. They should also be prepared to handle the requests of researchers, as allowed, for access to the animals or biological samples while the animals remain in quarantine.

Veterinary technicians and other senior technicians have greater responsibilities in an animal health program in addition to the functions mentioned above. Generally, these staff members require the knowledge and skills to perform aseptic technique, monitor animals after surgery or on treatment, and support or conduct veterinary procedures for diagnosis, treatment, or surgery. Moreover, veterinary technicians’ duties often include instructing new researchers on anesthesia, aseptic technique, and monitoring animals perioperatively. Technicians who have completed a 2-year veterinary technology educational program have qualifications that are ideal for providing animal health support. For each species with which they work, technicians performing anesthesia should be knowledgeable in the practical pharmacology of the analgesics, anesthetics, and reversal agents used—specifically the route and dose of administration and type and duration of drug effect. Training should be ongoing as information becomes available on new drug agents, doses, and drug effects. Technicians should be trained on the observation of vital signs and the use of specific monitoring devices to assess the physiological status of animals under anesthesia. Knowledge of aseptic technique is essential and applicable to a variety of tasks such as sample collection, bandaging, endotracheal intubation, and surgery. Veterinary technicians are often called upon to perform more advanced procedures for biological sampling such as vascular catheterization and serial blood collections. A special area of training is the support of genetically engineered rodent neonates with medical or behavioral problems. Survival of these animals requires expert clinical management.

Veterinary technicians should be educated about the laws, regulations, and guidelines that govern animal medical records and related documentation (USDA 2000), and they must be trained to implement the corresponding institutional policies and procedures. Examples of procedures to be documented are physical examinations, vaccinations, diagnostic tests, anesthesia, surgeries, and necropsies. A valuable resource for guiding instruction about medical records and their components is the public statement by the American College of Laboratory Animal Medicine: Medical Records for Animals Used in Research, Teaching and Testing (ACLAM 2004). The public statement is also abstracted and summarized in the preceding issue of ILAR Journal (ACLAM Medical Records Committee 2007). In addition, veterinary technicians should be knowledgeable on the requirements for using only unexpired drugs and medical materials (e.g., fluids for injection and sutures) and for the appropriate disposal of these items when expired (Policy #3, USDA 2006). They should also know which drugs are controlled substances, per the Drug Enforcement Administration (DEA) and state and local laws, and be trained on record-keeping requirements for controlled substances. Some technicians may have a responsibility for distributing controlled analgesics and anesthetics for use in animals in
research laboratories under the terms of a DEA license that is maintained by a facility veterinarian or other institutional official. These individuals typically train other staff regarding compliance with these drug laws.

Recognizing Pain and Distress

Technicians who work with animals in any capacity should receive training on recognizing pain and distress appropriate to their level of interaction with the animals. The recognition of pain and distress in animals is an overarching necessity during the conduct of any task such as observing or feeding animals, administering treatments, and transporting animals around the facility. Staff should receive training on the normal appearance and behaviors of the species of animals under their care with a special focus on the abnormalities that occur most commonly. Animal care technicians who change cages should be trained to closely observe each animal they handle or view in its cage. They should have sufficient knowledge to recognize an abnormal appearance and/or behavior based on normal animals of the same species, strain, research group, and age.

New veterinary technicians may not have had training to work with a particular animal species used in research; however, with training on the unique biology, physiology, and behaviors of the laboratory animal species in use at the facility, these individuals can readily apply knowledge and skills learned in schooling and prior work experience to their duties of physical examination, animal monitoring, and veterinary care. Many resources (e.g., AALAS training manuals and online courses) are available to support the training for the species-specific recognition of pain and distress. Technicians should be trained on the institutional policies and procedures related to pain and distress, and on humane endpoints relating to causes that are common in the research (e.g., surgery, tumors, sample collection, animal identification methods, and infectious diseases). Training should include the institutional procedures of reporting and documenting observations of problems to supervisors, veterinary staff, and/or researchers; recognizing and addressing animal emergencies (e.g., poor vital signs, injury, escape); and handling special circumstances (e.g., animals found dead). Additionally, personnel should be informed about specific exemptions to humane endpoints approved on protocol for particular animals. A linchpin in addressing a situation involving humane endpoints is the rapid communication between the animal care technician, veterinary staff, and researchers to resolve the situation in a timely manner.

Animal Research Policies and Procedures

Technicians at all levels should be taught about the institutional research policies that control the use of animals and specify restrictions on procedures in the areas where these individuals work. Where these policies are derived from the NRC Guide for the Care and Use of Laboratory Animals or the Animal Welfare Act and Regulations, instructors are encouraged to show how these policies are tied to a federal mandate or guideline. Because animal care technicians work in the vicinity of the animals and are often the first to discover incidents of noncompliance, they should be taught the highlights of research policies, which may not relate to their duties but do relate to the work of others around them. For example, an animal care technician who does not perform surgery may become aware of animals that have been operated on in a manner that may not be in compliance with institutional policies or mandates. Having even a basic knowledge of each restriction specified in the policies will provide the technician with a means to monitor, in general, the activities occurring within the animal facility. For this reason, animal care technicians whose duties mainly comprise husbandry should receive general training on institutional policies for the following areas:

1. Animal restraint devices—common types, proper use, and limits in duration;
2. Food/water restriction—limits related to species and procedures for requesting, implementing, and discontinuing restrictions;
3. Animal identification—allowable methods by species, and interpretation of identification numbering systems;
4. Analgesia and anesthesia—requirements for other staff to alleviate animal pain, signs of pain related to species, and procedures for reporting an animal in pain;
5. Surgery—locations where survival and nonsurvival surgeries may be performed by other staff;
6. Animal monitoring—the responsibility of other staff for monitoring the animals on study (e.g., postsurgically) and the location of medical records; and
7. Euthanasia—allowable methods by species, proper technique, and recognition of improper technique.

In contrast, veterinary technicians and senior technicians typically have the responsibilities for carrying out various animal procedures and training others in these procedures. Therefore, they should be well trained with extensive detail on each of the institution’s animal care and use policies. Additional knowledge is needed by veterinary technicians on the following topics:

1. Sample collection—volume and frequency restrictions by species; DNA collection methods in rodents;
2. Analgesia and anesthesia—drug agents and methods for administering drugs, animal monitoring, and procuring and preparing pharmaceuticals;
3. Surgery—types of surgeries that may be performed and those for which aseptic technique is required; methods for instrument and materials sterilization, aseptic technique, and animal preparation;
4. Animal monitoring—methods of animal monitoring; completing and maintaining medical records;
5. Euthanasia—allowable methods by species, proper technique, and recognition of improper technique; and
6. Training—methods to train animal husbandry and research staff on appropriate animal care and use.

Animal husbandry and veterinary technical staff should be formally trained in specific research policies and regulatory requirements that directly affect their work. One example in this context is a Good Laboratory Practice regulated study, for which staff sign off on raw data and room environmental and animal care records to be archived. These individuals should be instructed on appropriate document control measures, signing procedures, and the study archival process.

Equipment

Ongoing technological advancements in laboratory animal science have introduced equipment of increasing specialization in all areas of animal care and use. Furthermore, some equipment includes sophisticated software for automatic and remote control. Examples include environmental monitoring systems, automatic watering systems, mechanical cage washers, automated bedding disposal and removal units, autoclaves or other sterilizing systems, laminar flow and biosafety cabinets, inhalant anesthesia machines, diagnostic analyzers and imagers, and patient monitoring devices. The complexity of some equipment systems has brought about a specialization in animal facility staff dedicated to the operation and management of cage wash units and facility operations, husbandry of special animal models (immunocompromised rodents and animals administered hazardous agents), anesthesia and surgical support, and diagnostic services. Surgical instruments and equipment require special knowledge for the proper use, safe handling, and disposal of reagents or other materials, and disinfection between uses, such that these items are often managed by veterinary technicians. Laboratory animal technicians require specific training on the operation, calibration, safety, and maintenance of any complex equipment they use in carrying out their duties. For high-cost systems, vendors are often called upon to deliver training at the time of installation and during scheduled follow-up visits.

Emergency Procedures

All animal care personnel should be trained on the scope of veterinary care and authority as well as what constitutes an animal medical emergency. These individuals should know what information to convey to the veterinarian so that he or she will be able to suitably attend to an emergency (Slauter 2003). Current veterinary contact information and emergency procedures should be posted visibly in animal facilities, and personnel should be trained on using communication systems (e.g., pagers) to contact veterinary staff (NRC 1997). The establishment of institutional SOPs on animal medical emergencies is an essential component of training in this area.

Animal facilities should have a disaster plan that documents procedures to follow for natural, technical, or civil emergencies (ARENA/OLAW 2002; NRC 1997). Institutions should ensure that all animal care staff members are well aware of the disaster plan and the policies and procedures to follow in case of facility emergencies. Institutions might convey the information by posting the procedures prominently in the facilities or by placing the procedures on the institution’s intranet or web site. Periodic tests of the disaster plan (simulated emergencies akin to fire drills) train and refresh personnel on appropriate policies and procedures (ARENA/OLAW 2002). Animal care staff should also be trained in the correct methods for testing emergency equipment so that they know their operations and maintain proper functioning (ARENA/OLAW 2002).

Occupational Health and Safety

According to the publication *Occupational Health and Safety in the Care and Use of Research Animals*, an effective occupational health and safety program is based on seven key factors: (1) knowing the hazards, (2) avoiding and controlling exposures, (3) training and education, (4) rules and guidelines, (5) consistency, (6) recordkeeping and monitoring, and (7) commitment and coordination (NRC 1997). The training and education of animal care personnel as part of an overall occupational health and safety program should include topics mandated by the Occupational Safety and Health Administration (OSHA\(^1\)), the hazards and risks associated with working in a laboratory animal facility, SOPs for working safely in the facility, and mechanisms for reporting exposures, injuries, or illnesses (NRC 1997). Many commercially available training products such as compact discs (CDs\(^1\)), digital video discs (DVDs\(^1\)), manuals, and online or didactic courses are available to fulfill OSHA training requirements.

OSHA-mandated training topics include emergency egress, hazard communication, laboratory standards/chemical hygiene, blood-borne pathogens (with exposure to human blood or blood products), respiratory protection, personal protective equipment, handling hazardous materials, handling hazardous waste, medical services, and first aid (CFR 2003; OSHA 1998; Wald and Stave 2003). Additional topics are included for specialized work environments (e.g., agricultural settings) (OSHA 1998). Training on the risks associated with working in a laboratory animal facility should focus on laboratory animal allergies, zoonotic diseases, physical hazards, and protocol-associated hazards.
Additionally, training programs should include information on the following topics: the risks of employees acquiring laboratory animal allergies and zoonotic diseases; clinical symptoms of disease entities; proper procurement, health status monitoring, and manipulation of animals to decrease risks; facility design and work practices that facilitate the protection of the workers; use of safety equipment and personal protective equipment to reduce or eliminate exposure; and the mechanism for reporting exposures or illnesses (Bush and Stave 2003; Wald and Stave 2003; Weigler et al. 2005). Training related to zoonotic diseases may best be approached on a species level so that staff members are educated on the risks associated with the specific species with which they work. Trainees should also learn that personal medical conditions such as pregnancy, immunosuppression, or any organ dysfunction may place them in a higher risk group for contracting zoonotic diseases or experiencing a more severe form of a zoonotic disease. To ensure the safety of personnel, individuals should discuss a medical condition with management and occupational health staff for the purpose of devising strategies to minimize risk (Hamm 2002).

Physical hazards in a laboratory animal facility include falls, sharps, bites, scratches, kicks, equipment (electric and mechanical hazards), repetitive motion, excessive noise, compressed gas cylinders, lasers, radiation, and caustic chemicals (NRC 1997). Basic safety training typically provided by institutional health and safety or human resources departments can address most of these hazards, which are inherent in any working laboratory; however, training for animal-associated risks is typically provided by animal facility staff or outside consultants with appropriate expertise.

Humane and proper handling of laboratory animals must be emphasized at all times throughout the training program in a comprehensive effort to decrease the risk of animal bites, scratches, and kicks (NRC 1997). This instruction should also include training on animal behavior, humane restraint (physical and chemical methods), barrier husbandry, sample collection techniques, animal transport, PPE, SOPs, and other animal handling methods in an effort to advance safe working practices (NRC 1997). Training is also essential to decrease the hazards associated with animal caging and to avoid injuries from such equipment. Special attention should be paid to the training of individuals working with nonhuman primates (NRC 1997). The great strength and dexterity of these animals in combination with the threat of lethal zoonotic diseases through splashes, bites, and scratches, as well as injuries from sharps and caging/equipment, warrant that animal care and research staff working with nonhuman primates be highly trained in the physical and chemical restraint of these animals, the proper use of PPE, and the animals’ zoonotic diseases.

For work in areas that have a high level of noise (e.g., in cage wash units, dog kennels, and swine rooms), it may be necessary for personnel to receive training as part of an OSHA or institutionally mandated hearing protection plan. This training should include the hazards associated with noise and the use of hearing protection devices (CFR 2003).

It is also important for occupational safety training to include ergonomic concepts and strategies for technicians whose jobs involve repetitive tasks and demands on strength and endurance, which are common characteristics of animal care functions. Basic components of ergonomics training include the risk factors for musculoskeletal disorders (MSDs), recognition of MSD symptoms, and training on new equipment designed to lessen the risk of development of MSDs (Kerst 2003; NRC 1997).

Training associated with protocol-related hazards such as new or unusual animal species, chemical or physical hazards, biological agents, and equipment should involve the collaborative efforts of researchers, veterinarians, animal facility managers, health and safety professionals, and the IACUC. Depending on the likelihood of exposure to the hazards, animal care and veterinary technicians should be trained on the risks, the control measures to reduce or eliminate the risks, and the clinical symptoms if exposure occurs. Often, mandated OSHA or other training on chemical hazards or biocontainment/biosafety training can be re-emphasized or expanded to encompass specific protocol-related hazards (NRC 1997).

During the training process, it is important for trainers to reinforce an institutional policy that negative consequences do not result from the reporting of actual or suspected exposures or confirmed illnesses. Workers who have either legitimate or unfounded ideas that reporting would result in punitive consequences may under-report incidents, which could ultimately lead to substandard occupational health and safety programs (Weigler et al. 2005).

Biocontainment/Biosafety Training and Select Agent Use

Training objectives for personnel who work in biocontainment and biohazardous research may be guided by the Centers for Disease Control and Prevention (CDC) and the NIH publication Biosafety in Microbiological and Biomedical Laboratories (BMBL) (HHS 1999). The BMBL includes details on animal biosafety level (ABSL) criteria, which include training and facility operations requirements.

At the time of writing this article, the BMBL is undergoing revision. Training topics to incorporate into programs at all ABSL facilities include practices and techniques required to handle potentially infected materials (HHS 1999). More specifically, a training program should include timely discussions of the administrative and engineering measures for reducing or eliminating personnel exposure to potentially hazardous agents. Institutional policies and procedures serve as the backbone of training on administrative measures and include the scope of the required biosafety training program, institutional biosafety manual, biosafety (or biohazard) committee operations and membership, applicable federal and local regulations, effective work practices
(SOPs), and the proper use and provision of appropriate PPE. Typically, technicians should receive detailed instruction regarding hand hygiene, signage, sharps precautions, specific equipment usage, disinfection/sterilization, biohazard waste management, and shipping of biologicals. Employees must also be trained on how to properly handle accidental exposures, first aid, reporting exposures, and obtaining medical assistance (Hamm 2002). Senior technicians should also be knowledgeable about engineering measures such as ventilation and exhaust systems within the facility, directional air flow, air filtration mechanisms, and the proper use of biological safety cabinets. Intrinsic to a biosafety training program is the necessity of integrating periodic updates into ongoing employee training (HHS 1999). Guidelines suggest the ongoing use of signs, posters, newsletters, mass e-mails, web site postings, and other forms of communication to relay new information (NRC 1997).

Recent increases in funding availability for facility construction and research into bioterrorism and emerging infectious diseases have resulted in a greater need for training related to specific agents and toxins. Explicit regulations exist from both the CDC and USDA/APHIS for training in select agent and toxin usage (CFR 2005a,b; Gonder 2005). According to these sources, individuals must receive training on biosafety and biosecurity before they are allowed access to areas where select agents are used. This training should focus on the needs of the individual, the type of work, the risks posed by the exact select agent or toxin being used, facility security, and emergency procedures.

Initial employee training may be approached by several different methods including electronic training and didactic sessions. However, the use of a mentor or “buddy system” for training individuals on biosafety-related topics has been found to be particularly useful and is recommended (NRC 1997). Hands-on and techniques training can often be accomplished using dry runs with nonanimal models or in facilities with a lower biocontainment level (Tate 2006). Annual refresher training and documentation of the training are also required (see sections below). Due to the relative scarcity of individuals willing and able to work at higher level biocontainment facilities (ABSL-3 and ABSL-4) with select agents and toxins, training must be thorough and carefully thought out, and attention must be paid to retaining high-quality personnel (Jaax 2005). Because of the frequent developments in the area of regulations and compliance for those dealing with select agents and toxins, it is imperative for facility management to stay current with regard to applicable regulations and guidelines and to modify training programs and materials as appropriate (Jaax 2005).

Soft Skills

Laboratory animal facility management is often tasked with providing or coordinating employee training related to soft skills. Employee training in hard skills (i.e., technical requirements of the job) is complemented by soft skill training (e.g., communication, management, leadership, cultural awareness), and both serve to round out the employees’ attributes and make them more valuable to the institution. Some training sessions may be necessary for individuals in supervisory roles and those working toward leadership positions. The important motivational factors among animal caretakers and technicians are interesting work with a variety in tasks plus a potential for promotion and growth (Chick 2006). Soft skill training can help management promote these motivational factors and improve employee performance and productivity. Overall professional development of employees can be supported by incorporating and encouraging the inclusion of these topics in training curricula.

Soft skills training is typically available from sources external to the animal facility (e.g., a human resources department or a training services organization). For this reason, leave time and/or funding may be needed to support participation in these types of training sessions. Typical topics include computer usage, management, team building, English as a second language, communication, dealing with difficult people, customer service, diversity, basic science and mathematics, and time management.

Off-site sessions organized as educational workshops or incorporated into professional meetings (e.g., AALAS, LAWTE, or LAMA) are also beneficial and can be departmentally funded (Hammer and Fortier 2005). Individuals who wish to pursue or finish formal educational programs in the area of management or the biological sciences should be encouraged to take advantage of institutional educational assistance and/or tuition reimbursement programs. Large organizations and corporations may direct the creation of specific online modules in various subject areas depending on institutional needs. Utilizing such courses can decrease the burden of the animal facility management in providing this type of training to employees while simultaneously deriving benefits such as improved performance, enhanced goal setting, and superior team work.

Refresher Training and Retraining

The training program should include a component of routine refresher training to keep staff current on updates in knowledge, practices, procedures, and, most importantly, safety-related topics (Goral 2005). For routine training, the term “refresher training” is preferred because it may be more appealing than the term “retraining” (Pritchett 2003). As described above, updates can be communicated many ways such as in newsletters, posters/flyers, e-mails, and staff meetings. Formal refresher training should be planned and scheduled regularly with timely and relevant topics (e.g., institutional policies, animal welfare mandates, occupational health and safety, and select agent use), which are likely to change frequently. We endorse others’ recommendations for annual refresher training for occupational health.

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and safety and select agents (Hamm 2002; Swearengen 2006). Refresher training should also incorporate “core ideas” such as ethics, institutional mission, and reporting animal welfare concerns (Pritchett 2003). Based on our experience, refresher training on animal welfare regulations and institutional policies is frequently expected at 3-year intervals, but the interval can be highly variable due to institutional change, subject matter, and past experiences. Organizations such as AAALAC will typically request a laboratory animal facility’s plan for providing ongoing refresher training to personnel on pertinent topics. Refraining generally refers to corrective training for noncompliance and work performance issues among staff members. Refraining should be as thorough as initial training. In many cases, an in-depth second presentation of initial training information is needed so that staff can fully understand the proper policies and procedures to avoid subsequent repetition of mistakes.

Sources of Training Materials

Sources of training materials continue to grow as the laboratory animal science field expands. A variety of materials are currently available in different formats and include the following:

1. Texts such as the AALAS certification training manuals can be used as self-study tools and resources for certification preparation classes.
2. Online modules and other electronic media are often used as training tools. To ensure success with these media, the institution must make certain that the technicians have the computer skills, access to computers, and time allotted for the necessary study time.
3. Workshops and conferences afford valuable training opportunities as well as motivational tools for staff members. Meetings held by AALAS branches and districts are inexpensive and conveniently close for local staff, and attendance may satisfy some mandatory training. Attendance may be supported by the institution as a reward to staff or on a rotational basis. An added benefit from attending these programs is the exposure of technicians to novel concepts and procedures that can be implemented to improve the institutional program.
4. A variety of consultants are available for AALAS certification and procedural training. Hiring experienced consultants to provide training can constitute an efficient use of time and labor and be cost effective for training technicians as rapidly as possible.
5. Large laboratory animal science programs at universities, corporations, or government organizations typically provide training as one of their services. Human resources, health and safety, and other departments can also be tapped as sources of training materials and trainers.

Training Documentation

Many regulatory agencies and published guidelines specify the need for training documentation (e.g., ARENA/OLAW 2002; Slauter 1999). Training documentation should comprise a report of activities in all types and methods of training and should include refresher training and retraining (Pritt et al. 2004). In such documentation, institutions typically include the date of training, name of the trainee, name of the trainer and/or training modality, presentation title and/or general training content, and management acknowledgment. Computer platforms that are learning management systems can help institutions maintain up-to-date training records. Training documentation on the use and handling of select agents and toxins must consist of the name of the individual being trained, the date of the training, a description of the training provided, and the means used to verify that the trainee understood the material (e.g., a quiz).

Staff Trainers

The breadth of knowledge and skills required for the work of animal care and veterinary technicians necessitates an extensive training, which in turn calls for a high level of expertise in those who deliver that training. Furthermore, the mandated standards for the humane care and use of animals in studies add another demand on staff to undertake the responsibility of training investigators. Often in smaller institutions, senior technicians, veterinary technicians, supervisors, managers, or veterinarians assume double duty both in fulfilling technical duties and in providing training services to facility staff and investigators. More and more, however, large animal research programs are dedicating staff positions wholly to training functions. As a result, the sophistication in animal research support has launched the profession of training coordinator and other positions such as trainer, training specialist, and training manager in the laboratory animal welfare field. Individuals with these job titles may be veterinarians, technicians promoted from within the facility, or highly qualified technicians hired into the role. With the primary responsibility of coordinating and conducting training activities, many of these individuals also may devote a portion of work time to technical duties in the animal facility.

A checklist of criteria to aid institutions in defining the training coordinator position is available in the literature (Kennedy 2002). The technical qualifications for a training coordinator derive from the length and type of work experience in the field. Ideally, a training coordinator should be experienced in working with the types of species used in the program and in the types of research environments in place at the institution. Excellent interpersonal skills and a helpful attitude are necessary features of an effective training coordinator to support other staff in acquiring needed skills and in attaining professional development. Other important qualifications are the ability to teach, to impart technical
knowledge and demonstrate procedures clearly and precisely, and to communicate effectively through adjustments in the speaking and teaching styles for trainees of diverse technical, educational, and cultural backgrounds that range from entry-level animal care staff to investigators with advanced academic degrees and including non-native English speakers. In addition, computer skills are often a necessity in training positions because a substantial amount of training material is electronic in nature, and new online materials are constantly becoming available via the Internet or on CD/DVD.

Laboratory animal welfare trainers and training coordinators generally enter the training field well qualified in the technical aspects of the concepts and procedures to be taught. The challenges these individuals face are the acquisition of teaching skills both for one-on-one training and for lecture presentations because most of these individuals lack professional training and experience in adult training concepts and skills. Organizations such as LAWTE, national AALAS, AALAS branches, and LAMA offer conference programs on adult training, often titled as "train-the-trainer" programs. As a membership organization for trainers, LAWTE provides particular benefits for the exchange of training-related information and materials via its listserv and conferences. The American Society for Training and Development offers train-the-trainer publications and convenes a conference on the technology of training, which is held jointly with the Society for Applied Learning Technology. In the interest of professional development in the education field, trainers should consider taking online or classroom courses on adult education at nearby colleges and universities.

Conclusion

For both regulatory/accreditation compliance and the effective support of research, the appropriate care and use of laboratory animals necessitate a highly trained and motivated staff. Institutions have the responsibility for providing animal care and veterinary technicians appropriate training on topics of regulations and ethics of animal research; species-specific biology and husbandry; procedures of animal use; animal welfare in research; facility equipment, operations, and monitoring; and occupational health and safety equipment and practices. Having a dedicated training staff supports the successful implementation of an institutional training program.

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