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Training Veterinary Care Technicians and Husbandry Staff Improves Animal Care

Cynthia R Lockworth,* Suzanne L Craig, Jun Liu, and Peggy T Tinkey

Our animal care facility has always relied on an animal health team consisting of veterinarians, veterinary care technicians, and husbandry staff to provide a high level of animal care. As our rodent population increased, it became necessary to modify the roles and responsibilities of these staff members to accommodate the program's expansion. To accomplish that modification, we developed a training program that focused primarily on technicians by using a case-management algorithm. To support our technicians, we provided additional training to animal husbandry staff as they assumed the primary role in the initial assessment of the animals' health. After completing the training, technicians made the transition from simply identifying health issues to actually making decisions for treating and euthanizing rodents. This training program empowered all team members and resulted in a staff that could provide consistent, high-quality veterinary care more efficiently.

A successful animal care program in the research environment is contingent on well-trained animal husbandry staff and veterinary care technicians who can recognize common clinical signs in rodent colonies. The technicians and husbandry staff are an integral part of the animal care program at our institution, The University of Texas MD Anderson Cancer Center. However, due to attrition, rapid program expansion, and time constraints, training technicians and husbandry staff to equivalent levels of competency can be difficult, especially in a large program.

Within a 3-y period, our animal care program grew from 70,000 to 85,000 animals (primarily mice). To accommodate that expansion and provide optimal animal care, we reorganized our animal health team and instituted a new training program. Here we describe the reorganization and new training program in case reports of the small rodent colony and large colony facilities.

All animals in the animal care program were enrolled in protocols that had been reviewed and approved by the IACUC. The program of veterinary care, including systems used for monitoring animal health and treatment, were reviewed by the IACUC twice a year as part of the institution's semiannual animal care program review. Animals were maintained in AAALAC-accredited facilities and in accordance with current US Department of Agriculture, US Department of Health and Human Services, and National Institutes of Health regulations and standards.

The reorganization and new training program resulted in more efficient use of staff resources, an empowered staff, more consistent animal care, and improved animal health.

Case Report

Small barrier colony of rodents. Our animal care program included 3 primary job categories associated with the veterinary care of rodents. These categories included the veterinarian and veterinary resident, who were responsible for the provision and oversight of veterinary care for the rodent colony; veterinary care technicians, who were responsible for the supervised diagnosis, treatment, and euthanasia of animals; and husbandry staff, who primarily were responsible for the basic husbandry of animals and for the identification of health issues.

We implemented our training program in our small colony of barrier-only mice, which had grown from 15,000 to more than 20,000 mice over 3 y. We had increased staffing from 2 veterinary technicians to 3 and had increased our animal husbandry staff to address the increased workload. The veterinary technicians working in this small barrier colony each had several years of experience and had either achieved or were seeking AALAS certification at the Laboratory Animal Technician (LAT) level or above. Despite these actions, the technicians struggled to complete daily animal health rounds and had very little time to provide animal treatments or technical services.

Originally, animal husbandry staff in our animal care program monitored animals for health issues while changing out cages, but these staff members did not perform formal health checks on all animals. If a health issue was observed, husbandry staff members completed a morbidity–mortality slip (Figure 1) and placed copies on the cage and in a designated area. The veterinary technicians then returned to the animal colony, observed the animals noted by the animal husbandry staff, and performed health checks on every other animal in the room, seeking out additional health issues. Additional morbidity–mortality slips were generated by the veterinary technicians. At least once weekly, the veterinarian collected all slips submitted by the animal husbandry staff and veterinary technicians, examined the animals in each flagged cage, and made decisions regarding animal treatment and euthanasia. These decisions were logged on a spreadsheet and sent to the veterinary technicians for implementation.

This system worked well for many years, but over time we determined that our system should be reevaluated. The increase in animal population had far-reaching effects that resulted in reduced efficiency for both animal care staff and veterinarians.

Technicians were the first staff members to experience the effects of the expanding animal population. Technicians had reached a point at which they were unable to physically examine

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Department of Veterinary Medicine and Surgery, The University of Texas MD Anderson Cancer Center, Houston, Texas.
**Corresponding author. Email: crlockworth@mdanderson.org.*

every cage in their respective areas on a given day; far too much time was spent identifying health issues, and too little time was available for the treatment and disposition of animals. In addition, it became difficult for the technicians to fulfill technical services at the convenience of investigators. Most important, the technicians' potential capabilities, such as expansion of their role to include a greater capacity for making health-related decisions, were being underutilized due to these time constraints.

As the technicians' workload expanded beyond their ability to identify every health issue each day, more of this responsibility was shifted to the husbandry staff. The husbandry staff had received less training in identification of animal health issues but was required to submit morbidity–mortality slips for health issues seen while performing husbandry duties. The husbandry staff's lack of training resulted in inconsistent and, in some instances, overexuberant reporting. For instance, we found a disparity between the numbers of morbidity–mortality slips generated by the husbandry staff and the veterinary technicians. This disparity was especially evident in our mouse subcutaneous tumor models, a commonly used research approach at our cancer center. The IACUC had well-defined parameters to characterize acceptable endpoints for this model. Some of our technicians and husbandry staff were appropriately marking cages in which animals' tumor burdens needed to be assessed to determine whether the experimental endpoint had been reached; however, others were prematurely flagging cages containing animals with tumors that were just starting to grow. This premature flagging often generated numerous morbidity–mortality slips for cages with animals that did not need veterinary intervention. The lack of consistency in flagging became more evident with the growing demands on technicians' time.

Ultimately, the veterinarians' workload was affected. More and more hours were being devoted to rounds and fewer hours to other areas, such as clinical activities, administrative duties, training, and professional development. Thus, the ineffective distribution of effort limited the time available for proactive training and interaction with animal care and research staff and resulted in negative long-term effects on animal health and research.

Our goal was to develop and implement a training program that would redistribute case management activities, providing greater responsibilities to technicians and husbandry staff. Prior to the training program, baseline assessments of proficiency had been established; technicians were evaluated for 6 mo and found to be proficient in the identification of clinical signs in rodents and in the implementation of treatment orders recommended by the veterinarian. For instance, technicians were able to identify that an animal had a tumor but were unable to determine whether it met the criteria for euthanasia. Our aim was to build on this baseline competency of health-issue identification to produce a group of technicians that could translate identified clinical signs into treatment plans for the rodents.

As our animal population grew, we moved to new facilities with individually ventilated caging and an automated watering system. Our IACUC-approved cage-change interval for ventilated cages was lengthened to once every 14 d, and the use of water bottles was discontinued for most cages. The extended cage-change interval and decreased use of water bottles reduced by 50% the time and labor required for change-outs, creating time for the animal husbandry staff to become more involved in the process of monitoring the animals' health. The facility's veterinarian met with the husbandry staff and discussed the need for their increased participation in the overall health program of

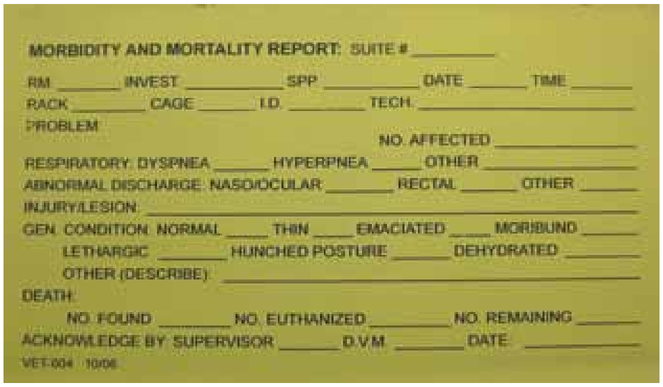
MORBIDITY AND MORTALITY REPORT: SUITE # ________
RM ______ INVEST. __________ SPP __________ DATE ______ TIME ______
RACK ________ CAGE ______ I.D. ________ TECH. __________________
PROBLEM
NO. AFFECTED ______________
RESPIRATORY: DYSPNEA ______ HYPERPNEA ______ OTHER ______________
ABNORMAL DISCHARGE: NASO/OCULAR ________ RECTAL ______ OTHER ______
INJURY/LESION: ____
GEN. CONDITION: NORMAL _____ THIN _____ EMACIATED _____ MORIBUND ______
LETHARGIC ________ HUNCHED POSTURE ______ DEHYDRATED ________
OTHER (DESCRIBE): ______________________________________
DEATH:
NO. FOUND ________ NO. EUTHANIZED ________ NO. REMAINING ______
ACKNOWLEDGE BY: SUPERVISOR ______ D.V.M. ________ DATE ____________
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Figure 1. Morbidity and mortality slip.

the colony. In the revised plan of participation, the husbandry staff became responsible for performing daily health checks for animals in every cage in their designated rooms or areas. Compliance was excellent initially, with the animal husbandry staff finding health issues and creating morbidity–mortality slips.

Over time, however, animal husbandry staff flagged fewer and fewer cages for health issues despite the colony's expansion. The husbandry staff for the small barrier colony not only processed and changed cages but, as part of their daily duties, also weaned and separated breeding mice. The veterinarian observed the animal husbandry staff while they worked and determined that completing morbidity–mortality slips was a time-consuming process. In consultation with the veterinary technicians, a new method of flagging cages was developed. When animal husbandry staff found health issues in the colony while performing their daily activities, they were instructed to flip cage cards upside down and cover them with yellow acetate. The yellow acetate served as an easily visible means for the veterinarian and technicians to determine that there was an issue with an animal in the cage that needed additional evaluation. In addition, the technicians created a short slide presentation of common health issues that they found in the animal colony. Every husbandry staff member that performed duties in the animal housing rooms viewed this presentation. The animal husbandry staff's participation in this training increased their compliance in the animal health program.

The technicians, as part of their routine duties, captured the information relating to the animals in the cages that had been flagged by the animal husbandry staff and returned to the facility to perform health assessments of these and other mice in the colony. The technicians created a spreadsheet that indicated the name of the principal investigator, cage identification number, room location, and condition of the animals that needed to be checked, as well as other pertinent information (Figure 2). Using the spreadsheet, the veterinarian then examined the animals in the cages flagged by both the veterinary technicians and husbandry staff and provided comments on treatments or other options. The technicians informed the principal investigators of the outcome of these veterinary rounds.

An important transition had taken place, in that the husbandry staff became responsible for all daily health checks in all rooms. As a result, the role of the technicians was refocused to twice-daily health checks of animals in only those cages flagged by the husbandry staff. This change permitted the technicians not only to increase their focus on technical services for investigators but also to increase their involvement and responsibility in the day-to-day decisions regarding treatment of the animals.

Room	P I	Cage card #	Rack	Location	Number	Condition	Comments
1.111	Jones	123456	1	7-2	2/3	fight wounds	
1.222	Smith	789123	3	3-5	2/3	excessive tumor burden	

Figure 2. Health rounds spreadsheet.

The veterinarian individually trained each technician to enter the colony, assess common clinical conditions, and perform treatments after notifying principal investigators of their options. The veterinarian, accompanied by a single technician at a time, discussed each case in the facility with the technician. Initially, the veterinarian looked at each animal and had the technician record comments and potential treatments. As they progressed through the facility, they switched roles, and the veterinarian recorded the comments and recommendations that the technician suggested, and they discussed each case.

In the following weeks, each technician who worked in the small barrier colony was trained in this manner. Once trained, the technicians were empowered to complete the spreadsheet, including the comments section. Occasionally, principal investigators or their staff disagreed with the treatment or recommendation that a technician had proposed. In that event, the veterinarian reassessed those animals and either recommended a change or supported the technician's decision. The technician was informed of each outcome. This method of animal health oversight has been in place for more than 1 y in the small barrier colony.

Large rodent colony. After determining that this method of using the animal husbandry staff and veterinary technicians to improve the care of the animals was successful, we were ready to have the staff who work with the larger population of rodents attempt to perform these tasks. Our large rodent colony had grown from 55,000 to more than 65,000 mice over 3 y and was separated into 4 different areas according to the health status of the animals and their usage. These housing areas included barrier, conventional SPF, conventional, and biohazard; 1 or 2 technicians are assigned to each housing area.

Several of the technicians assigned to this large-colony facility were less experienced than were the technicians in the small barrier facility. Of the 7 technicians in the large-colony facility at the time of training, only one had achieved AALAS certification at the LAT level.

The veterinarian determined that the most efficient approach to achieving the same competency level in all of the technicians at this facility would be to train them in 3 stages: group training, a combination of group and individual training, and individual training. Within this framework, an algorithm was created to serve as an illustrative case management guideline for the technicians.[6] The algorithm also provided a means of assessment of the technicians' progress by the veterinarian and an outline for the set of steps that each technician would take as they gradually assumed the responsibility for decisions regarding treatment and euthanasia. The goal was to allow the technicians to build and develop their comprehension of clinical signs and appropriate treatment plans, one level at a time. Once training was complete, each technician was able to assess a health issue and develop a plan of action that was both similar to that of all other technicians and consistent with that of the veterinarian. This transition had to be seamless, such that investigators' research would not be affected or disrupted.

Initially, the veterinarian devoted 1 h each week for 4 wk to the entire group of technicians. This group training provided an efficient introduction to treatment and euthanasia plans and to the refinement and synchronization of their clinical assessments. During group training, the veterinarian used both "cognitive apprenticeship" and "problem-based learning."[3] The veterinarian passed a cage with a rodent exhibiting a health issue to each technician, allowing time for each to give a verbal assessment of the health issue to the group. The veterinarian then provided feedback on their collective assessments and asked additional questions to encourage and develop their thought processes.[1,2,4] Additional group discussion followed, if indicated, and the case concluded when the veterinarian revealed the appropriate treatment or euthanasia decision.

The second stage of training continued the weekly group training sessions but expanded training to include 1-h individual sessions. This transitional period permitted additional time for feedback from fellow technicians but also challenged the technicians to think independently about their assessments and treatment plans to increase their confidence.[4] At this time, training with the algorithm was instituted.

The third stage of training involved exclusive one-on-one clinical assessments with the veterinarian. Each technician spent 1 h each week examining animals and providing their clinical assessments and treatment plans, followed by direct feedback from the veterinarian. Differences in assessments were discussed as opportunities to assimilate information, not as mistakes, with the greatest focus on developing overall diagnostic skills.[2,7] All health issues present in an area of the facility on a given week were reviewed. While addressing health issues, the algorithm provided the technician with direction and the veterinarian with a logical means of assessment of the technician through the progression of training.

Phase I of the algorithm (Figure 3) covered the basic clinical signs associated with abnormalities in body condition, hydration status, and mentation. Identification of these fundamental clinical signs was essential, because they often were associated with other health issues in later phases. In addition, our facility's standard treatment for these conditions was the application of gel pack and moist pellets—an important, yet benign, treatment that made a good starting point for the technicians. Once the veterinarian deemed that a technician was both consistent and knowledgeable regarding conditions in phase I, the technician was authorized to make treatment decisions in these cases.

Phase II of the algorithm (Figure 4) involved all common dermatologic conditions, ranging from barbering to necrotic tails. Because our facility treats many of these conditions, this phase required the greatest length of time for technicians to complete. The algorithm provided them with the descriptions of lesion severity (classified as mild, moderate, or severe) and potential outcomes based on this assessment; however, each technician needed to acquire a level of consistency in his or her examinations. Once approved by the veterinarian, the technician was able to make treatment decisions in all dermatologic cases.

Phase III of the algorithm pertained to tumor burdens (Figure 5). The maximum allowable size of tumors was determined by our IACUC. However, despite this limit, factors including body condition, presence of lameness, and tumor location might mandate earlier euthanasia; the technicians gained a thorough knowledge of these variables during this phase of training. After completing phase III, a technician was given authority to make euthanasia decisions.

At the conclusion of phase III, the veterinarian individually assessed the technicians, and once a consistent level of competency

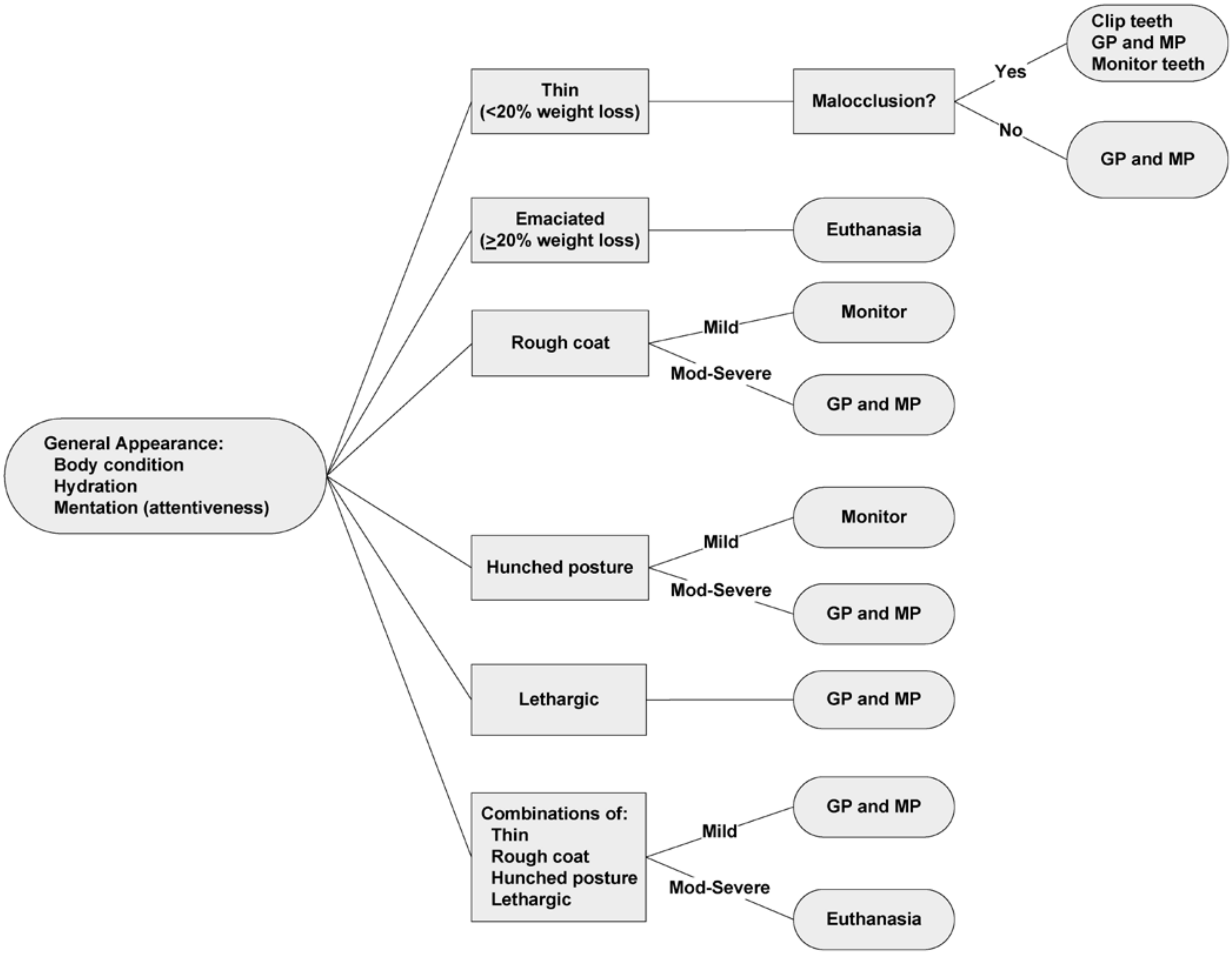

Figure 3. Phase II algorithm for the assessment of body condition, hydration status, and mentation. GP, gel pack; Mod, moderate; MP, moist pellets.

was established, approved the technicians to not only treat but also to euthanize animals in phases I and II that met the criteria for euthanasia.

Phases IVa (Figure 6) and IVb (Figure 7) included all other common conditions found in our colony, broadly categorized by body systems. These clinical observations ranged from phenotypes associated with the background strain of the mouse to breeding complications and experimentally induced conditions. Because the technicians had been evaluating these cases during all stages of training, both group and individual, most rapidly completed these phases.

Throughout the training phases, technicians gradually were given the authority to assess cases and make the important decisions needed to treat and euthanize animals (Figure 8). In our program, there were essentially 3 tiers of euthanasia. In the first tier, routine euthanasia included animals that met the criteria for euthanasia outlined in the investigator's IACUC-approved protocol or that were deemed necessary based on veterinary evaluation as outlined in the case management algorithm. For instance, routine euthanasia based on veterinary evaluation might include an animal's poor response to treatment for conditions such as ulcerative dermatitis. When routine euthanasia was indicated, investigators were notified 24 h prior to the disposition of these animals to allow time for final procedures or tissue collection, if needed. The second tier of decision-making authorized the technicians to euthanize animals on the same day (termed 'emergency euthanasia') without providing 24-h notice. Emergency euthanasia was indicated for animals found to be moribund, paralyzed, dyspneic, or impaired in their ability to obtain food and water. In the case of emergency euthanasia, an investigator was notified when the decision for euthanasia was made, but euthanasia was carried out on the same day without providing 24-h notice. The third and final tier included rare cases in which animals were found in an agonal state: euthanasia was performed immediately without prior notification of investigators, but veterinary approval was required to confirm that notifying the investigator prior to the euthanasia was not possible based on the animal's condition and welfare.

As a set of guidelines, the case management algorithm will continue to adapt to the needs of the veterinarian and technicians. The veterinarian will review the algorithm when a new technician is introduced or every 6 mo. In addition, should questions relating to case management arise, the algorithm will be reviewed and revised. A technician's uncertainty regarding the management of orphaned pups resulted in the most recent update to the algorithm (Figure 9).

While implementing the technician training program, the veterinarian instituted quarterly training with all husbandry staff to review identification of animal health issues. This training ensured that cases presented by husbandry staff to technicians

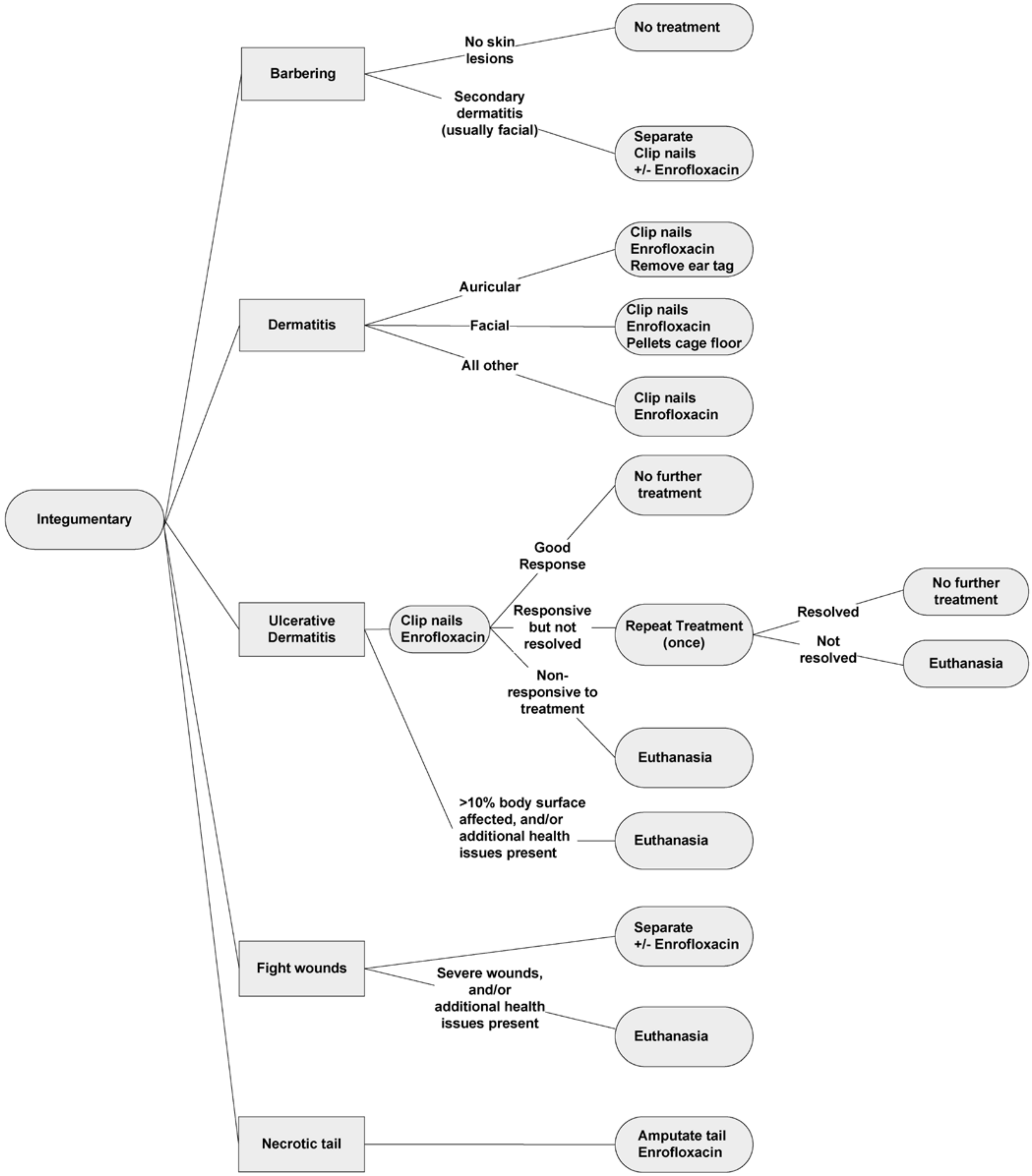

Figure 4. Phase II algorithm for the assessment of dermatologic lesions.

were valid cases that required treatment or euthanasia. Thus, improvements in the initial animal health identification by husbandry staff maximized the effort expended by the technicians.

Results

At the conclusion of all training phases, veterinary care technicians had met the goals of our program, as they had transitioned from their initial baseline skills of health issue identification to the knowledge and skills necessary to render final diagnoses and treatment plans. They were authorized to make decisions regarding the routine treatment and euthanasia of all rodent health issues in the facility. Treatments were administered immediately on examination by the technician, because a several-day delay (previously needed for the veterinarian to make rounds through the entire facility) was omitted. Moreover, with the more timely therapeutic intervention, animals with conditions conducive to

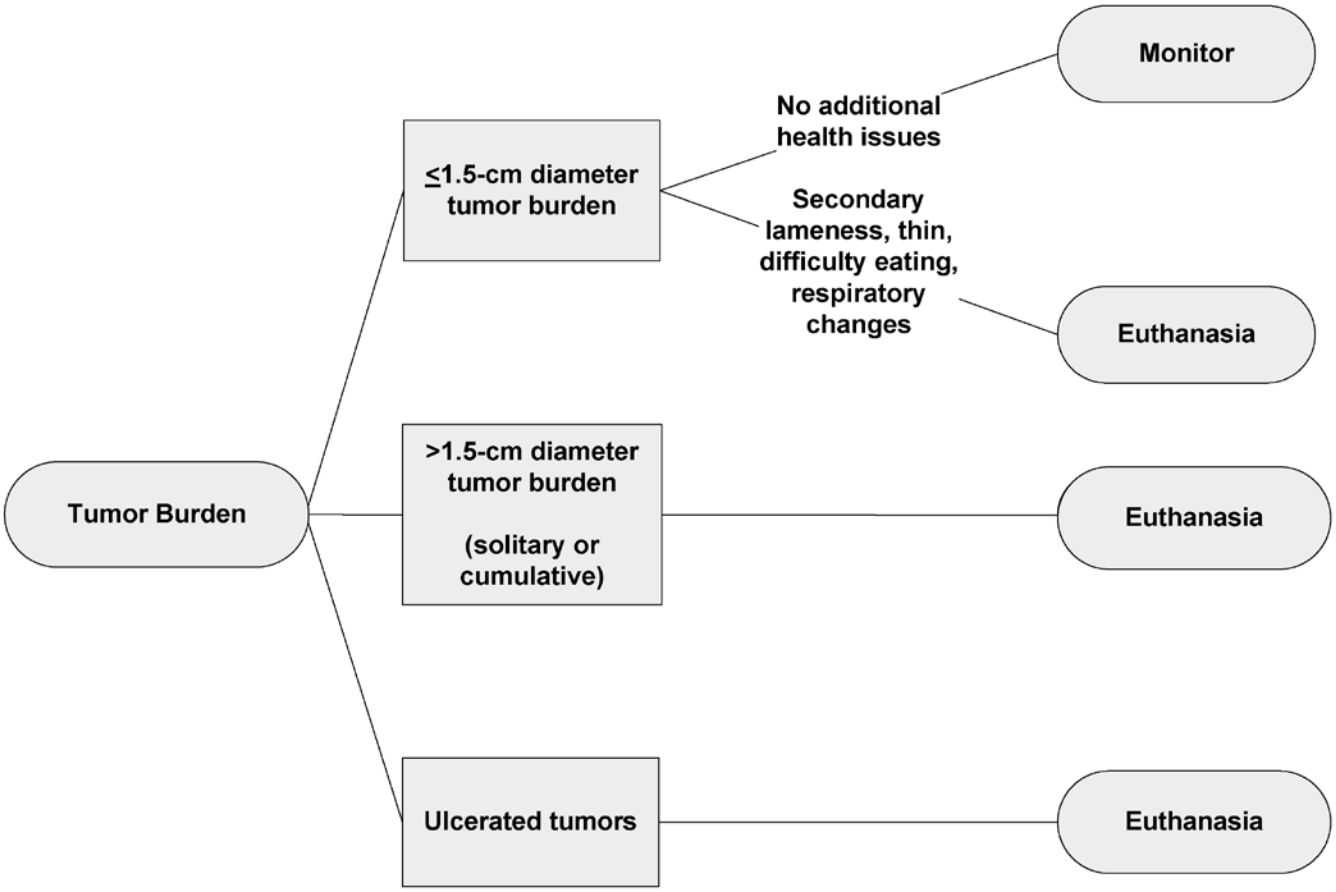

Figure 5. Phase III algorithm for the assessment of tumor burdens.

treatment would be more likely to respond, recover, and remain in the study. Similarly, because technicians could make immediate assessments, animals requiring routine euthanasia could be scheduled more rapidly, resulting in improved animal welfare. Finally, improved animal welfare and animal health likely will translate into improved data for investigators at our institution.

To determine whether benefits to animal health resulting from the training program could be demonstrated statistically, data were collected from 4 animal housing suites over a period of 2 y, including the 10 mo prior to implementation of the training program and the 10 mo after the last technician completed training. After completion of the training program, the proportion of cages with at least one animal found dead, at least one animal requiring euthanasia, or the combination of at least one animals found dead or euthanized, were significantly reduced ($P < 0.001$, 0.032, and 0.001, respectively; Table 1). Similarly, the proportion of cages with at least one dehydrated animal that required treatment with gel pack and the proportion of cages with animals needing overall treatment for dehydration or infection was significantly ($P = 0.002$ and 0.008, respectively) reduced after implementing the training program. In addition, improved efficiency and productivity of veterinary staff at all levels resulted from collective changes in husbandry practices and the animal health training program. Husbandry staff continued their fundamental role in animal husbandry but also assumed an expanded role in all preliminary identification of health issues in our rodent populations. Technicians transitioned from investing most of their efforts in identifying health issues to health assessment and treatment plans. The veterinarian currently spends 4 to 6 h per week performing health rounds and 1 to 2 h per week consulting with technicians on cases, resulting in 5 to 7 h of time devoted to these activities. Depending on the weekly caseload, this change has resulted in a nearly 50% reduction in time devoted to direct animal health activities, allowing that time to be focused on other vital endeavors.

Additional benefits to animal welfare arose from the training program. While being trained in the basics of animal health, technicians also learned about basic research procedures and guidelines. Technicians developed the background needed to make critical decisions and alert the veterinarian when potential instances of investigator noncompliance were observed, such as an unapproved surgical procedure.[8,10]

The first group of technicians completed the final phase of training in 14 to 16 wk. As new technicians entered our program and began individual training, the training time decreased to approximately 6 wk to achieve full competency. Once their training was completed, technicians were interchangeable and could move from one housing area to another to make treatment and euthanasia decisions. Investigators were not aware of the personnel change because of the uniformity in the technicians' assessments. Investigator concerns regarding treatment and euthanasia of animals were uncommon when the veterinarians were making all decisions and were equally rare once the technicians assumed their new role after completing the training program.

After the animal health training program was implemented, the veterinarian continued to perform weekly rounds and monitored all ongoing treatment and euthanasia plans. In the rare instance that the veterinarian felt a treatment was inappropriate or euthanasia was not warranted, the plan was changed.

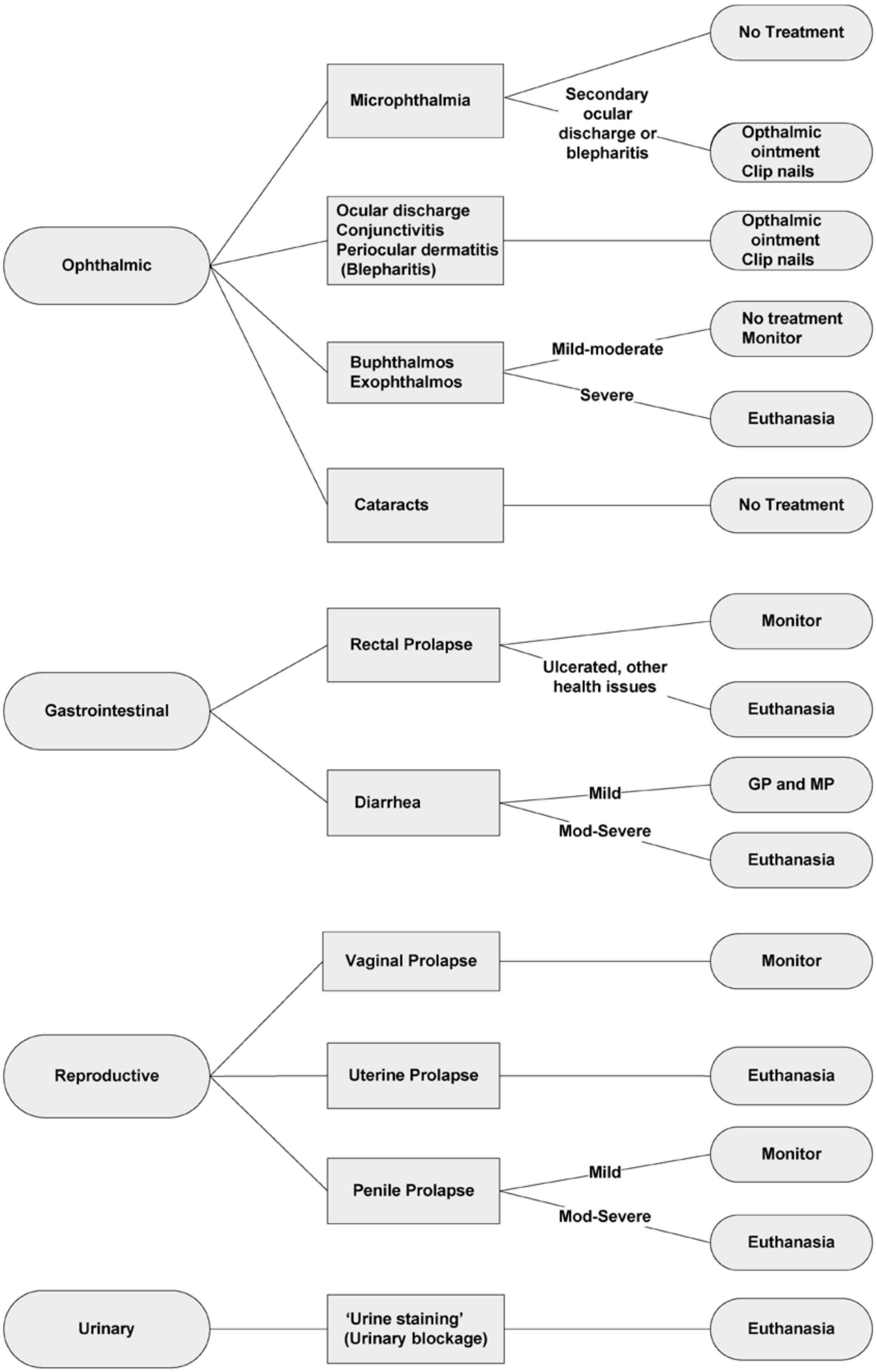

Figure 6. Phase IVa algorithm for the assessment of commonly encountered ophthalmic, gastrointestinal, and genitourinary system conditions. GP, gel pack; Mod, moderate; MP, moist pellets.

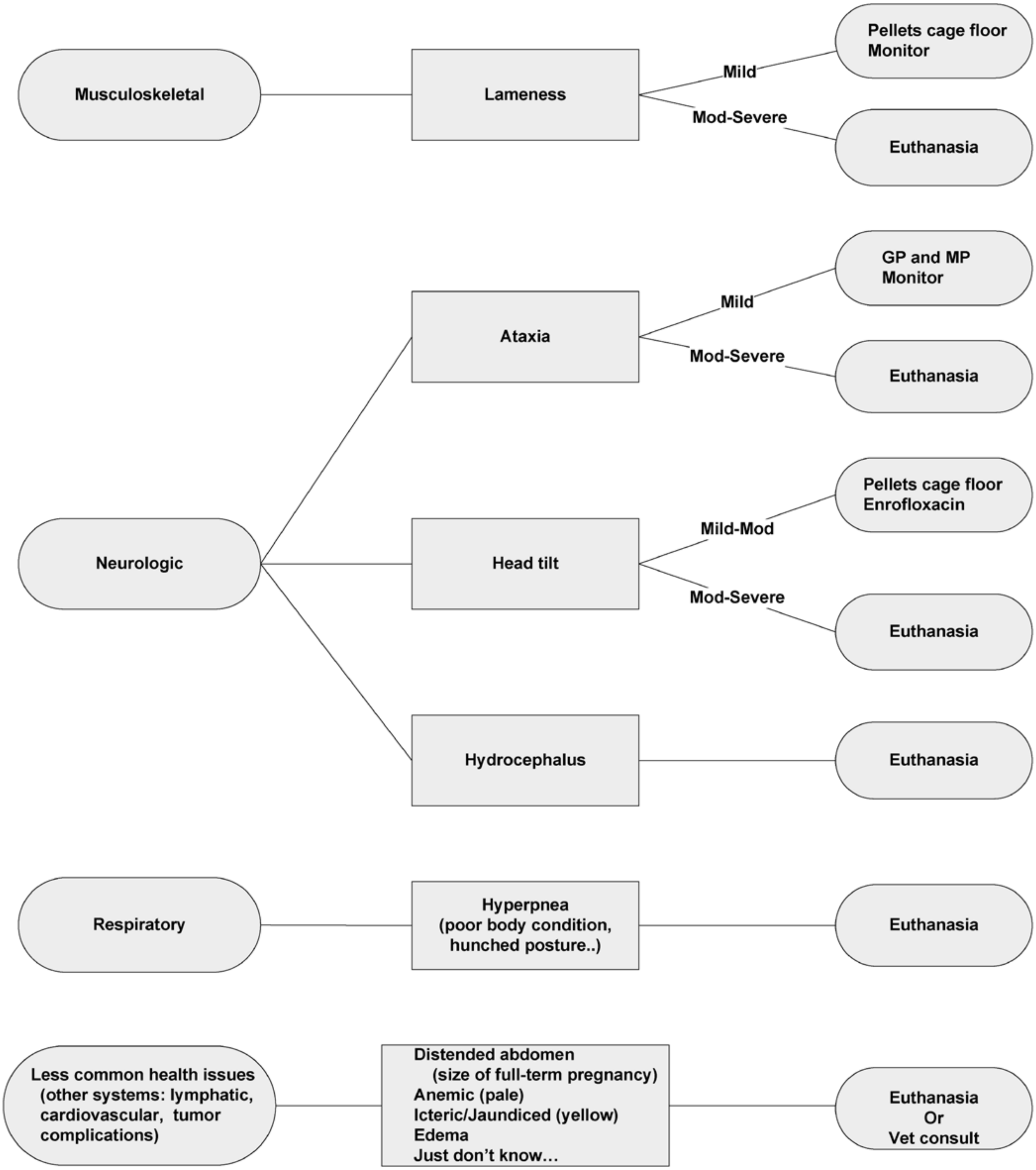

Figure 7. Phase IVb algorithm for the assessment of commonly encountered musculoskeletal, neurologic, respiratory, cardiovascular, lymphatic system and other conditions. Mod, moderate.

Continuous feedback was provided to the technicians, both individually and as a group. In addition, the veterinarian consulted with the technicians and animal husbandry staff; technicians were directed not to treat or euthanize an animal if they were not completely confident in their assessment. The veterinarian also examined these cases during rounds.

Discussion

Our training program empowered all team members and resulted in a staff that more efficiently provides higher quality veterinary care for the research animals in our institution. The effectiveness of our training program to produce veterinary care technicians and husbandry staff with high levels of performance, competence, and knowledge was assessed indirectly and subjectively by the veterinarian, according to previously

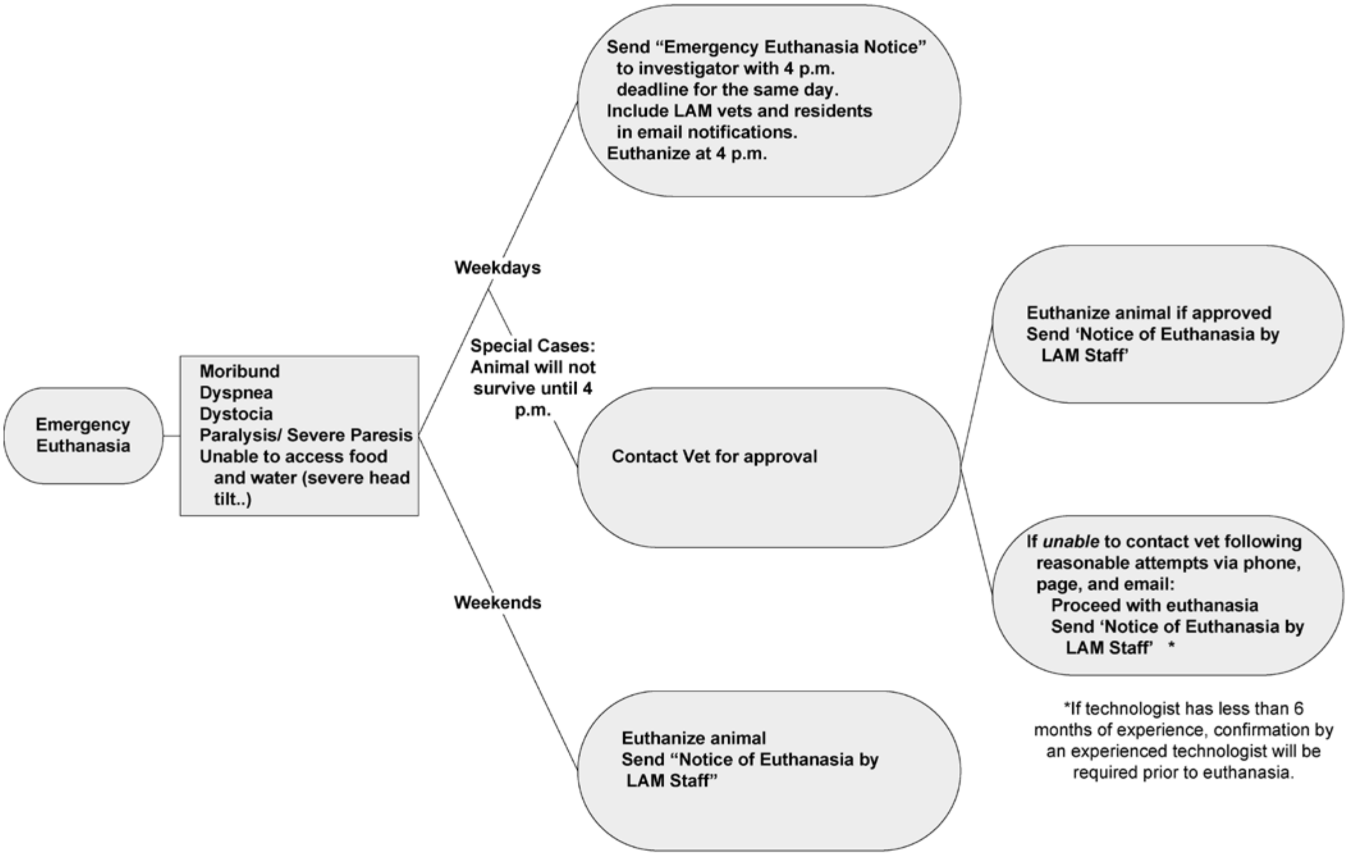

Figure 8. Emergency euthanasia algorithm. LAM, Laboratory Animal Medicine Section (rodents).

outlined strategies.[5] Knowledge was tested verbally, with questions relating to various health assessments and treatment options. Competence was evaluated as the veterinarian elicited responses regarding appropriate diagnostic and treatment plans from individual technicians while they were directly examining animals. The veterinarian used animal health records to assess the technicians' performance; the veterinarian also reviewed diagnostic entries and treatment plans generated by the technicians by comparing those plans with a cage-side exam of the actual animals. Although this method of assessment requires additional time, it is the most effective measurement of success in such a mission-critical function as animal care and welfare.[5]

In addition, data collected before and after the training program was implemented demonstrated the efficacy of the program. The total number of animal deaths, including both animals found dead and those requiring euthanasia, were reduced. Furthermore, although the number of cages with animals requiring antibiotics did not decline, likely due in part to the etiologies of dermatitis in rodents, the need for treating animals with gel pack did decline; this reduction may be due to the immediate identification and treatment of animals by technicians, which resulted in a better initial response to therapy.

Our animal training program has continued to evolve since its implementation. As new technicians begin their initial training, experienced technicians who have completed our training program will provide baseline training for those less experienced. After this initial introduction, our Educational Specialist, already functioning in other areas of educational development, will have been trained by the veterinarian to fill the one-on-one role previously performed by the veterinarian. Moreover, the Educational Specialist will provide additional didactic lectures in basic health assessments and conditions. The Educational Specialist will update the veterinarian (in the form of a checklist) as a new technician progresses through each training phase.[2] As done previously by the veterinarian, the Educational Specialist will maintain records of each new technician's progress and provide updates to the veterinarian.[9] In addition, the veterinarian will assess each new technician periodically to ensure that training remains consistent and will approve each technician's advancement at the conclusion of the final phase of training.

To date, 10 technicians have completed our training program successfully. We feel confident that this approach (using the algorithm as a guideline and supported and augmented by the case-based, cage-side training) will continue to train incoming technicians and husbandry staff efficiently and effectively to fulfill their vital role in our program.

Our facility was challenged by growth and expansion. In a careful, stepwise process, training of both husbandry staff and technicians reduced the pressures and stresses created by those demands. Facility changes that included individually ventilated caging and automated watering systems allowed health monitoring roles to be shifted, with basic preliminary assessments shifted to husbandry staff. Technicians then were able to expand their knowledge, using their skills to the fullest potential, as they moved through a carefully designed training program that gave them the tools to succeed in their new role. Empowerment of husbandry staff and technicians also modified the veterinarian's role. The veterinarian is now less involved in the day-to-day monitoring of animal health and has an expanded role in animal health oversight, consulting, and training. The veterinarian continues to examine animals but primarily as a means of technician assessment, resulting in a much more efficient use of all staff resources. Perhaps most

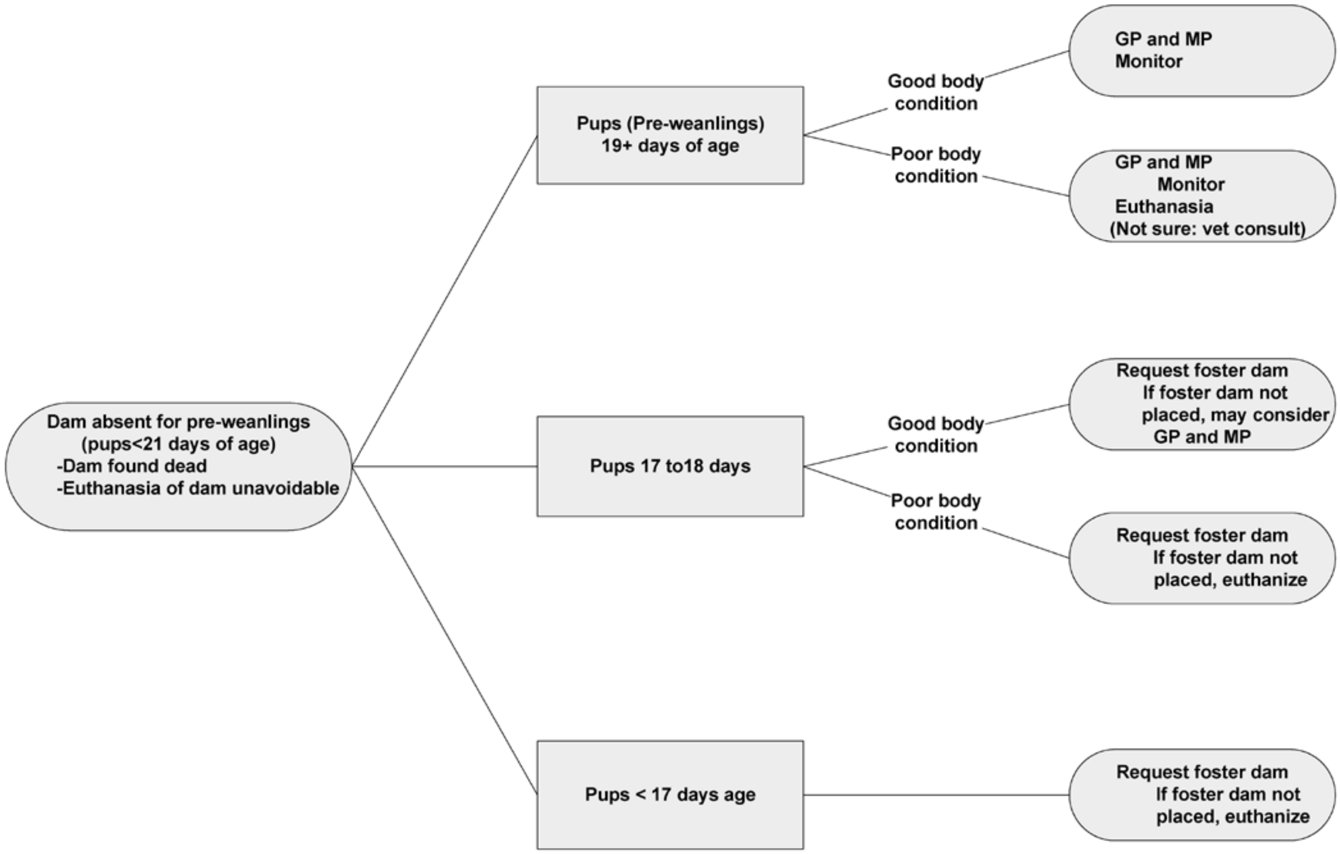

Figure 9. Management of orphaned pups and foster dams. GP, gel pack; MP, moist pellets.

Table 1. Summary of death and treatment rates (%; mean [1 SD]) per cage

	Before training	After training	*P*
Found dead	4.5 (1.2)	3.3 (0.8)	<0.001
Euthanasia	1.1 (0.6)	0.8 (0.5)	0.032
Total death	5.6 (1.2)	4.1 (0.9)	<0.001
Dehydration	2.0 (2.5)	0.7 (0.7)	0.002
Antibiotics	1.4 (0.9)	1.3 (0.6)	0.678
Total treatment	3.4 (3.1)	2.0 (1.0)	0.008

Four animal housing suites were followed for 10 mo prior to the implementation of the training program and 10 mo after the last technician completed training. Because random-effects models demonstrated that the effect of training did not vary by suite, the data of the 4 suites was pooled together to estimate the overall effect of training, yielding $n = 40$ for each time point. The average number of rodent cages in each of the 4 suites across all analyzed timepoints was 1880, 1828, 2141, and 2538; the average number of animals per cage varied from 1 to 5 for 3 suites but was 3 for the remaining suite. Death rate was defined as the proportion of cages with at least 1 dead mouse per 'cage card' per month; treatment rate was defined similarly. Two-sample *t* tests were used to determine differences in death and treatment rates before and after the training program. *P* values less than 0.05 were considered significant.

important are the benefits to animal health. Overall, the numbers of animal deaths and treatments have declined, because animals have been treated or appropriately euthanized in a more timely and efficient manner. Our entire program has improved as we have adapted to meet the needs of our ever-growing and evolving facility.

Acknowledgments

We thank the veterinary technicians and husbandry staff for their dedication to animal health and their significant contributions to this training program.

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