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**Contents:            Transcript**

## **Application of the AVMA Guidelines for the Depopulation of Animals to Biomedical Research**

*Speakers:*

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- Jennifer Pullium, MVB, DACLAM, New York University School of Medicine
- Axel Wolff, MS, DVM, NIH, Office of Laboratory Animal Welfare

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### **Slide 1 (Application of the AVMA Guidelines for the Depopulation of Animals to Biomedical Research)**

>>Neera: Hello. Today is Thursday September 26, 2019. I am Neera Gopee, Director of the Division of Policy and Education at OLAW, and today it is my pleasure to welcome our speakers, Drs. Samuel Cartner, Jennifer Pullium, and Axel Wolff, to the [OLAW Online Seminars](#) to present **Application of the AVMA Guidelines for the Depopulation of Animals to Biomedical Research.**

Dr. Samuel Cartner is the Associate Vice President for Animal Research Services and Director of the Animal Resources Program at the University of Alabama at Birmingham (UAB), in Birmingham, Alabama. He received his DVM from Auburn College of Veterinary Medicine and PhD from UAB and is a Diplomat of the American College of Laboratory Animal Medicine. He is the chairperson of the laboratory animal working groups on both of the American Veterinary Medical Association (AVMA) Panels on Animal Euthanasia and Depopulation.

Dr. Jennifer Pullium is the Senior Director, Division of Comparative Medicine and Associate Professor, Pathology at New York University (NYU) School of Medicine. She is a Diplomat of the American College of Laboratory Animal Medicine. She did her residency training at Emory University and was Associate Director at Mt. Sinai prior to joining NYU. After leading the response to Hurricane Sandy, she became co-founder of Leadership for Disaster Response, which provides emergency response training throughout the US and select foreign locations.

Dr. Axel Wolff, currently serves as Deputy Director, in the Office of Laboratory Animal Welfare (OLAW). At OLAW he has also served as the Director of the Division of Compliance Oversight and as a Senior Assurance Officer. Prior to joining OLAW, Dr. Wolff was the director of the Veterinary Resources Program, in NIH's intramural biomedical research support program. Dr. Wolff's interest in unique research animals has involved him in work with armadillos, chimpanzees, and fruit bats as well as the more common species.

It is my pleasure to welcome you to the [OLAW Online Seminar](#) and now to hand the microphone over to Axel.

### **Slide 2 (PHS Policy and Euthanasia)**

>>Axel: Thank you Neera. Since its inception, the [PHS Policy on Humane Care and Use of Laboratory Animals](#) in Section IV.C.1.g. has stated that "methods of euthanasia will be consistent with the recommendations of the [American Veterinary Medical Association \(AVMA\) Panel on Euthanasia](#), unless a deviation is justified for scientific reasons in writing by the investigator." The footnote to this citation also states that AVMA Guidelines for Euthanasia of Animals: using 2013 Edition or succeeding revised editions.

### **Slide 3 (AVMA Guidelines for the Depopulation of Animals: 2019 Edition)**

In 2019, the AVMA published the [Guidelines for the Depopulation of Animals](#) to guide veterinarians in making humane decisions when large numbers of animals must be killed quickly in response to a disease outbreak or natural disaster. The term depopulation refers to the rapid destruction of a population of animals in response to urgent circumstances with as much consideration given to the welfare of the animals as practical.

### **Slide 4 (AVMA Guidelines for the Depopulation of Animals: 2019 Edition and the Disaster Plan)**

While the majority of laboratory animal facilities will never face a situation requiring depopulation, it is recommended that the disaster plan include contingencies for applying the Depopulation Guidelines in an emergency. Sam will now discuss the AVMA Depopulation Guidelines in greater detail.

### **Slide 5 (Depopulation of Laboratory Animals)**

>>Sam: Thank you Neera and Axel for the introduction. I want to start with a little background information about the guidelines, and some general information about the guidelines and how they are applied broadly to all species. I'll give an example of why these guidelines are so important, and then I'll spend the rest my time reviewing the guidelines on depopulation and how it applies to laboratory animals and hopefully stimulate some thoughts about how the guidelines might be applied in your environment.

### **Slide 6 (Humane Endings Guidance: What is it?)**

The AVMA has sponsored three sets of guidelines pertaining to the humane killing of animals. Most of us are familiar with the Guidelines on Euthanasia, which was released in

2013, or last edited in 2013. These guidelines are currently under review by stakeholders until the end of next month, and hopefully the new edition will be released early next year.

In the euthanasia document, euthanasia is defined as "A method of killing that minimizes pain, distress, and anxiety experienced by the animal prior to loss of consciousness and causes rapid loss of consciousness followed by cardiac or respiratory arrest and death." The Panel on Euthanasia recognized that there was a need to address and evaluate the methods and agents that veterinarians might encounter when animals are killed under conditions where meeting this definition may not be possible. They made a deliberate separation of euthanasia from humane slaughter and depopulation, and coined the term "humane endings" for referring to all killing in these three areas.

The [Guidelines for the Humane Slaughter of Animals](#) was published in 2016 to assist those professionals working in the meat processing industry.

But the professionals that were responding to environmental disasters or disease outbreaks pointed out that there are situations where resources and time are limited that neither of these two guidelines met their needs. Thus, after much deliberation, the most recent document Guidelines for the Depopulation of Animals was published on April 2019. This is the subject of our presentation this morning. I will present a brief overview and focus on depopulation in a lab animal environment.

### **Slide 7 (Humane Endings Guidance—Depopulation: What is Depopulation?)**

As mentioned in the introductory slides by Axel, depopulation refers to the rapid destruction of a population of animals in response to urgent circumstances with as much consideration given to the welfare of the animals as practical. Depopulation may employ euthanasia and slaughter techniques and this outcome is often preferable for humane reasons.

But not all depopulation methods will meet the [AVMA] criteria for euthanasia or slaughter because under urgent circumstance options may be limited, and risks of more serious suffering by the animals and other animal and human populations they may contact may be [at significant risk]. Depopulation balances the need for rapid response and prevention of further suffering with the most humane method of death possible. Past crises have taught us that doing nothing can result in greater animal suffering and endanger animal caretakers and rescuers.

### **Slide 8 (Humane Endings Guidance—Depopulation: Classifying methods: Preferred)**

Depopulation methods are organized into different categories than the AVMA Guidelines for the Euthanasia. Those categories are Acceptable, Acceptable with Conditions, and Unacceptable.

The depopulation categories are Preferred, Permitted in Constrained Circumstances, and Not Recommended. The Preferred methods are given highest priority and should be utilized preferentially when developing emergency response plans and when circumstances allow reasonable implementation during emergencies. So, the method you include in your emergency plan should be from this category. Most, but not all, of the methods in this category come from the AVMA Guidelines on Euthanasia or from the Humane Slaughter of Animals.

**Slide 9 (Humane Endings Guidance—Depopulation Classifying methods: Preferred in Constrained Circumstances)**

When Preferred methods become unavailable, one of the main options is the relaxing of conditions that would typically apply for the use of euthanasia techniques. These methods are categorized as Permitted in Constrained Circumstances. The goal would be to improve these techniques or conditions such that a preferred method could be used.

**Slide 10 (Humane Endings Guidance—Depopulation: Classifying methods: Not Recommended)**

Not recommended methods should be considered only when circumstances preclude the reasonable implementation of any of the Preferred or Permitted in Constrained Circumstances method, and when the risk of doing nothing is deemed likely to have a reasonable chance of resulting in significantly more animal suffering than that associated with the proposed depopulation technique.

Examples of such situations include, but are not limited to, structural collapse or compromise of buildings housing animals, complete inability to safely access animals for a prolonged period of time, or any circumstance that poses a severe threat to human life.

Please note that Not Recommended **DOES NOT** mean Unacceptable. If the Panel found a particular method of technique to be completely unacceptable under any circumstances, then it is explicitly stated that the technique or method is Unacceptable.

So, let's move on to an example of where these guidelines are really important.

**Slide 11 (Depopulation—Examples: Low-medium expansion foam for poultry)**

One of the driving forces to review humane killing methods and develop guidelines for devastating events was the avian influenza outbreak in the United States in 2014-2015. It was the most catastrophic and expensive animal disease that the United States had experienced. Efforts to control the disease resulted in depopulation of 7.5 million turkeys and 42 million layer and pullet chickens with a total economic impact of \$3.3 billion. Field responders were over whelmed and under resourced.

In a situation where entire houses of floor-reared poultry must be depopulated, the Preferred methods include water-based foam (firefighter's foam). The foam can be

delivered with either nozzles or generators. This method cannot be used in a raised cage housing system.

Permitted in Constrained Circumstances methods include ventilation shutdown plus a secondary method such as controlled demolition, exsanguination, or decapitation or cervical dislocation. The use of ventilated shutdown alone is not recommended.

I'd like to refer you to the presentations of the [2018 Humane Endings Symposium](#) that are on the AVMA website for more information about examples of recent disasters that required depopulation of animals such as the 2016 hurricanes and floods in Louisiana and Texas and the Great Plains wild fires in Kansas and Oklahoma. All resulted in suffering of significant numbers of animals. To access this on the website, you may have to get an attending veterinarian, as I think it is limited to AVMA members.

### **Slide 12 (Planning for Emergency Killing in Research Settings)**

As depicted by the previous slide, it was the professionals responding to natural and man-made disasters that really led the effort to develop the Guidelines for Depopulation. However, as laboratory animal professionals, we can easily imagine, and as some of our colleagues have experienced, such emergencies might require implementation of these guidelines in a laboratory animal biomedical research environment.

Several of the next set of slides are from a presentation that Dr. Mike Huerkamp presented at the Humane Endings Symposium sponsored in Chicago last fall that I mentioned. They focus on depopulation of laboratory animals. We will end with a scenario that might give us some thought about planning and preparation.

### **Slide 13 (Acknowledgements)**

The Laboratory Animal section of the Depopulation Guidelines was co-authored by several recognized experts in our field. You will recognize some of the names on this screen. I also want to acknowledge contributions by the AVMA staff and others who have provided some of the images you're seeing in these slides.

### **Slide 14 (Depopulation—Small laboratory and wild-caught rodents)**

The Preferred methods for depopulating rodents are those considered Acceptable or Acceptable with Conditions by the Euthanasia Guidelines. The most common method of euthanasia in the laboratory setting is overdose with an inhalant agent such as carbon dioxide or isoflurane.

For depopulation in constrained circumstances, it is justifiable to combine cages of rodents preferably without overcrowding or fighting and immediately before gas exposure. Ideally, animals should not exceed a confluent monolayer. The Guidelines recognize that pre-charged chambers have advantages in emergency situations.

### **Slide 15 (Depopulation—Laboratory dogs, cats, ferrets, rabbits, sheep, goats, and swine)**

The Guidelines for Depopulation state that the Preferred methods for larger mammals are the methods considered acceptable by the Euthanasia Guidelines which would most likely be injectable euthanasia solution or anesthesia followed by a physical method or intravenous or cardiac injection of potassium or magnesium salts.

Permitted in Constrained Circumstances include the use of effective compounded or non-pharmaceutical-grade, expired anesthetic or euthanasia agent. These agents should be determined to be effective by the attending veterinarian. Also remember that these guidelines allow needles to be reused up to five times or until dull.

### **Slide 16 (Depopulation—Nonhuman Primates)**

The guidelines for nonhuman primate depopulation are the same as for larger mammals with the addition of gunshot by experienced personnel with the appropriate equipment and environment (such as in outdoor corrals). While we didn't discuss gunshot for livestock maintained outdoors in the Laboratory Animals section of the Depopulation Guidelines, it is discussed in other sections of the guidelines, along with other appropriate methods such as penetrating captive bolt.

### **Slide 17 (Depopulation—Aquatic Vertebrates)**

Many biomedical research facilities have multiple species of frogs and fish. Zebrafish are now our second most frequently used animal model thus we need to give them serious consideration. Any of the methods considered Acceptable by [the AVMA] euthanasia guidelines [Guidelines for the Euthanasia of Animals] would be the preferred methods for depopulation such as rapid chilling for tropical fish, which a zebrafish is. Non-tropical fish and amphibians should be euthanized by anesthetizing followed by an adjunctive method. Cold water and larger species of aquatic vertebrates may be depopulated by methods considered Acceptable with Conditions in the euthanasia guidelines such as pithing, blunt force cranial trauma, and decapitation by skillful operators.

And again, Permitted in Constrained Circumstances would allow the use of effective compounded or non-pharmaceutical-grade or expired anesthetics.

### **Slide 18 (Depopulation—Avian and Poultry)**

The recommendations for the depopulation of avian and poultry species are the same as other species. One unique position in this section is methods considered Unacceptable in the AVMA Guidelines for Euthanasia (such as thoracic compression) remain unacceptable for depopulation. So, this method is labeled Unacceptable...remember Not Recommended may be considered under depopulation conditions but Unacceptable is always Unacceptable, even under depopulation conditions.

### **Slide 19 (Depopulation—Special Considerations)**

There may be circumstances that require special considerations. In all cases, personnel safety is the first consideration.

Equipment needs to be available for the safe handling of these animals, such as nets, catch poles, snake hooks, or darting apparatuses. Animals exposed to BSL3 or 4 agents should have methods considered that do not require responder personnel to enter primary containment. Neonatal animals should follow [AVMA] Euthanasia guidelines for both altricial and precocial young, with altricial young being depopulated with physical methods such as hypothermia if they're less than seven days of age, decapitation, cervical dislocation, high concentration of inhalant anesthetics or anesthesia followed by an adjunctive method. Precocial young should be euthanized as adults of the same species. Embryonated poultry eggs may be depopulated by cooling at 40 degrees Fahrenheit for four hours or freezing before hatching.

### **Slide 20 (Agricultural vs. Laboratory Settings)**

So now that we have some background and basic information about the Depopulation Guidelines, I would like to see how they might be applied in our laboratory animal, biomedical research environment. I will first review how our setting is quite different from farm and agricultural animal production operations and then discuss some common-sense things that we might want to think about.

### **Slide 21 (Facility & Program Attributes—Research Facilities)**

Most biomedical research facilities have significant differences from farm production operations. Here is the list of attributes of animal research facilities that I will briefly review. I hope it gives you an idea what to think about in your own situation for a disaster response.

### **Slide 22 (Facility & Program Attributes—Physical Plant)**

Most research facilities are well designed and constructed to resist many natural and manmade events. Most have either their own institutional power plants or substations in close proximity with emergency power and water source. It is common for our facilities to be in the basement: which means that they may be most resistant to wind damage and last to run out of municipal water, but the first to flood.

### **Slide 23 (Facility & Program Attributes—Distance Matters)**

Unlike farms and poultry operations that are often in close proximity with open boundaries to each other, many biomedical research institutions are distanced from each other. And even if another institution with laboratory animals is close by, they are usually contained in separate buildings, so the risk of cross contamination is minimized.

### **Slide 24 (Facility & Program Attributes—High Value Census)**

Many animals at biomedical institutions have a high value. It's not uncommon for genetically modified mice to cost \$7-10K to make. But we can cryopreserve them. Thus, the cryopreservation equipment and room becomes a valued room that needs to be protected.

### **Slide 25 (Facility & Program Attributes—Dense, Mobile Populations)**

In research facilities we often have a very high density of animals with over 30 mice per net square foot using our individually ventilated caging systems. It's not uncommon to have over 50,000 mice in a single building and over 100,000 mice per institution. It's also helpful that many of our caging systems are on wheels and can be moved unlike the pig operation I'm showing in the lower left-hand corner – the photograph from Hurricane Florence in Kinston, North Carolina in September of 2018.

### **Slide 26 (Facility & Program Attributes—Epizootics)**

Unlike large animal farms we have the greater ability to control outbreaks due to our isolated housing of small numbers of animals. I'm comparing our caging system to the large swine operation on the right.

### **Slide 27 (Emergency Planning—Regulations and Requirements)**

Research entities are expected to have disaster plans which deal with potential threats to their animal colonies. Two of the 37 "must" statements that are in the 220-page [Guide](#) require disaster and depopulation plans.

A component of these plans may involve ranking animals by value and importance in research programs, so that the least valuable or most easily replaced animals are euthanized first, and the most valuable, rarest, or most difficult to replace, are euthanized last. Institutions should outline ways in which these decisions can be made as needed without the need for communication with investigators or upper administration when such communication may be interrupted.

### **Slide 28 (Attending Veterinarian)**

Maybe one of the most dramatic differences in the biomedical research and laboratory animal field is the requirement for an attending veterinarian who has complete authority and responsibility of the care and disposition of the animals at a research institution.

Because of this authority, the Depopulation Guidelines allow for the attending veterinarian to judge the effectiveness of the use of compounded, non-pharmaceutical-grade agents and those that have exceeded their expiration date and if they're deemed effective, they can be deployed in the depopulation event. Needles and syringes may be reused up to 5x or until dulling is noted.



Note that as in the Depopulation and the Euthanasia Guidelines, 70% ethanol by IP injection can be utilized in small mammals weighing less than a half a pound. In an environment where ethanol may be abundant, this may be very helpful. Ethanol has been shown to result in death in 2-5 minutes.

### **Slide 29 (Disaster Response Plan)**

So, now let's think about developing our disaster response plans. I'm not going to review each of these steps, but it's just a reminder that you have several stages in the disaster plan. There is the prevention and mitigation, preparedness, response, and recovery. And so it's a cycle of events.

### **Slide 30 (Hazard and Vulnerability Assessment Tool)**

One of the first steps in preparation is to determine the greatest threat to your institution. This is a great tool that Emory University uses. It ranks the potential threat, its probability of occurrence, its severity of impact to human, property, and business, and how well you can prepare and respond. Their analysis is almost identical to ours at UAB with tornado being by far our greatest risk, followed by an ice storm, or something, such as a pandemic disease, that would disrupt critical resources such as water and food delivery.

### **Slide 31 (Research Institution Census)**

The risk analysis should also include and consider the species and number of each species at your institution. Most academic institutions have a census ranking that looks similar to this. Grouping these species or similar techniques for depopulation are used, they are basically grouped in the categories presented in the Depopulation Guidelines. For small mammals you will need a lot of CO<sub>2</sub>. For aquatics you will need immersion agents and ice. For larger mammals, you will need injectable anesthetic and euthanasia agents. Other species may require special preparations.

### **Slide 32 ("Big Academe" Scenario)**

While tornados may be the highest risk of a disaster in the Southeastern United States, it is probably not the highest risk for depopulation as it's damage would probably be limited to a few facilities, and animals in the damaged facilities would be euthanatized when access is allowed. A pandemic flu scenario might result in resources such as food, water, and personnel being limited. Depopulation may be determined to result in the least animal suffering.

Dr. Huerkamp did the math and determined that if euthanasia chambers were used to depopulate 20,000 cages of mice and you had seven chambers and if you could consolidate 60% of the cages into monolayer cages, you could depopulate 12,000 of those 20,000 in five hours with five tanks of CO<sub>2</sub>. But the remaining 40% (or 8,000 cages) of incompatible mice would take an additional 40 hours and 16 additional tanks, for a total of 45 hours and 21 tanks.

He did the same calculations if you prefilled 35-gallon waste containers, and if you had 20 stations and 40 employees operating continuously. He calculated that it would take 20 hours and about 20 50 lb tanks of CO<sub>2</sub>.

### **Slide 33 (Sizeable Populations of Large Animals)**

Special situations, such as a large number of large mammals as you might have in a nonhuman primate center which might have as many as 3,000 nonhuman primates. In such a situation you might need to stockpile 250 bottles of Telazol or ketamine for anesthesia.

### **Slide 34 (No title: bottles of Vedco)**

And up to 50 bottles of euthanasia solution (100 ml bottle).

### **Slide 35 (Conclusions)**

So in conclusion, I would like to emphasize that complete depopulation of large biomedical research institutions is unlikely due to the rapid onset of most disasters and the fact that most of our facilities are designed to withstand the most common natural or manmade events.

In most events, the depopulation of laboratory animals on a wide scale can be accomplished using, and sometimes adapting and adjusting, the methods of the Panel on Euthanasia or Humane Slaughter guidelines. The attending vet can assess non-pharmaceutical-grade and expired drugs and approve the reuse of needles. The required institutional disaster plans should include inventory evaluation and advocacy of cryopreservation.

So with that, I'd like to hand the presentation over to Dr. Jennifer Pullium.

### **Slide 36 (Disaster Response and Recovery)**

>>*Jennifer*: Thank you, Sam. I'm going to talk about the experience of New York University Medical School with Superstorm Sandy. And just to keep you oriented, in this particular disaster, we didn't need to use depopulation, but I will discuss our response, and at the end I'll briefly mention how the AVMA Guidelines would have been applied in our situation.

### **Slide 37 (Topics Covered)**

Today I'm going to talk about our response during the disaster including the incident command and both animals and staffing for the vivarium. Then I'll move on to disaster recovery with short term measures as well as other considerations and what we can do to really plan for a disaster.

### **Slide 38 (Hurricane Sandy Photo)**

First, a little bit about the storm itself. So NOAA has a scale that they use to measure the kinetic energy of storms. Prior to Sandy in 2012, the scale was 0-5. After Sandy, they had

to change it to 0-6, with Sandy being at 5.8. That's 429 terajoules, which is about 2.7 times that of [Hurricane] Katrina and the equivalent to about five Hiroshima bombs. The building where we sustained the losses was designed to withstand a storm surge 20% greater than the largest surge in recorded history in New York City. We had minutes to evacuate the staff in the vivarium, and just for the record, the generators were on the roof, it was the fuel tanks that were in the basement per New York City code, as diesel tends to explode.

### **Slide 39 (Metal Door Photo)**

This is my one gratuitous photo showing what water can do to a steel door.

### **Slide 40 (Incident Command)**

Leadership for the animal program was incorporated into the overall incident command for the medical center. It included some participants that I expected, like facilities, environmental health and safety, IT, institutional senior leadership, and PR. But it also included people that I didn't expect but were critical, like purchasing and human resources. Having the VP for HR was great when I had two guys from cagewash threatening to walk off the job and not participate in managing the disaster.

### **Slide 41 (Responsibilities)**

Even though all these people were there, at the end of the day, you are responsible for your own area. You can't assume that everyone will or is able to drop everything and assist you. When we needed sandbags, I made a formal request to the incident command – people who were busy trying to figure out what to do about all the patients in the hospital. The way I ended up getting sandbags was when my staff went outside and stole them off a pallet. You need to ensure that multiple people are capable of leading the disaster response. Don't assume that the Director or the AV will be onsite.

### **Slide 42 (Responsibilities... *continued*)**

In a disaster, issues that would have previously required multiple meetings and much hand wringing now just require decisions. And remember, indecision is a decision. We saw this difference between clinical and research staff. For clinicians, it doesn't matter if it's animals or humans, we're trained for medical emergencies, ABC, is the airway clear, is it breathing, etc. For PhD's, they're trained to gather all the information, ponder all the options – in a disaster, there's just no time for that.

### **Slide 43 (Vivarium)**

When it comes to the vivarium, personnel safety comes first. It's inappropriate to ask or expect that people risk their own lives in order to rescue research animals. Be aware that if the disaster affects one area more than others, you may have people working in an unfamiliar site, so make sure ahead of time that everyone knows the emergency egress for each potential site. We began by rounding all the animal facilities and satellites, checking animal health, food, water, bedding, temperature, and relative humidity. We had already, as part of our disaster plan, stockpiled food and bedding. Remember I said I was

surprised at the need for the purchasing department to be part of the incident command? Think about how we order things – by phone or online. When you have no phones and no internet, how do you get things? I needed water, and I got it by grabbing the purchasing guy by the shoulders and telling him to get me water. The only water he could get was a hundred 5-gallon jugs of water cooler water, but we made it work.

**Slide 44 (Vivarium...continued)**

Consider having a stash of cash. I know of one facility where the only way they could get dry ice for freezers was to drive up to the Bronx and pay some guy \$1500 in cash for as much dry ice they could shovel into the back of their pickup. Again, no power, no ATMs. We relocated some satellite-housed animals to more central locations to make it easier to take care of them. Again – no discussion, no meetings, just decisions. Store emergency supplies in multiple locations. Just because someone told you the mag locks on your storage rooms will fail open doesn't mean they will.

**Slide 45 (Vivarium...continued)**

One thing that we struggled with was at what point do you allow environmental parameters outside the *Guide* or Animal Welfare Act regs before euthanasia? Days? Weeks? Assuming the animals are clinically normal, are you really going to euthanize everything because there are no air exchanges, but the temperature and relative humidity are OK? We never came up with an answer for this, but based our decisions on animal health and never ended up having to euthanize en mass.

**Slide 46 (Vivarium...continued)**

Just because the storm or disastrous event has passed, doesn't mean the disaster is over. A couple of weeks after the storm, it became clear that another building was not going to resume utilities any time soon. This building had about 4,000 cages, eight different species – all of our covered species – belonging to about 50 PIs. And oh, by the way, winter is coming. This is why it's important to have a good relationship with neighboring institutions and to know what's available.

**Slide 47 (Smilow Rescue)**

There was one bright spark in all of this. Smilow is the building where we sustained the losses. Due to the presence of diesel fuel, the folks that were doing the cleanup were hazmat-type guys used to cleaning up things like the BP oil spill. About 10 days after the storm, we got reports that they heard movement in the upper rows of the rooms. These rooms had ventilated caging bolted to the walls, allowing the racks to be taller, but requiring a ladder to reach the upper rows. This means that the researchers never used them. Prior to the storm, we moved the lower cages to these upper rows, but we were still shocked given everything that happened – including no ventilation for 10 days – that anything could still be alive. I sent someone from my staff to get first-hand proof, and he came back and said they handed him a cage...it was a mom with a litter, and they were fine. So now what do we do?

### **Slide 48 (Smilow Rescue photos)**

Well, here's an example of what the room looked like, except instead of animal care staff, we have this guy. These are the upper rows that I'm talking about. Now the facility is still hazardous to be in. We have about a foot of diesel oil on the floor, leading to very slippery conditions, except for folks that are used to working in this type of environment. First, we had to wait until it got dark. We had no idea how many cages would be OK – maybe it would be just a few. We had people wandering around everywhere and hearing that animals in this building were alive would have created pandemonium.

So when it got dark, we had care staff, vet techs, a veterinarian, and IACUC staff positioned in the ceiling above. We were fortunate to have this interstitial space. The hazmat guys volunteered to stay overtime to help us and be in the rooms. The only way for our guys to get access to the animals, was to cut a hole in the ceiling of each room, pass a basket down to the guys below, and have them load up three cages at a time and pass them back up to be triaged.

Then the cages were passed to care techs who ran the equivalent of eight city blocks to get them to secure housing space. This went on through the night until they had rescued 600 cages of healthy mice – about 10% of the total population. Obviously, these animals had been through a lot and weren't going to be good experimental candidates, but they were used to rederive valuable and unique genetically modified strains that many PIs thought were gone forever.

### **Slide 49 (Staffing)**

Now speaking of staffing, don't assume that people will come to work just because you call them essential personnel. It's important to have an effective disciplinary program. Have people stay onsite in advance if possible. We had hotel rooms that we never saw, and thankfully the hospital cafeteria was able to feed everyone. Satellite phones may be useful, but in an urban environment, it can still be challenging to get them to work.

### **Slide 50 (Press)**

Now I want to say a few words about the press.

### **Slide 51 (Press...continued)**

So, myths from my residency training. Lab animal vets don't speak to the press. Your PR people will take care of everything – just give them a briefing about animal research. What I learned the hard way: no one knows your operation as well as you do. A briefing to PR folks is not going to be enough, and if you want something done right, do it yourself (with PR there with you).

### **Slide 52 (Press...continued)**

The news cycle isn't aware that you've been working almost 48 hours with no sleep. "Not available for comment" means "Not sitting by the phone with nothing to do but answer endless questions." Encourage staff not to read internet comments. There's nothing

valuable there. And if you still think briefing PR folks is enough, try this experiment. Get the entire PR department together (it has to be everyone because you never know who will be around in a disaster) and tell them everything you think they need to know. Then, a few months later, have a colleague pepper them with questions that they think a reporter will ask. See what happens.

### **Slide 53 (Personnel)**

Moving on to personnel. So now you're all members of a club no one ever wants to belong to. Staff need to find a way to communicate this fact to outsiders, especially family members. No one who wasn't there is ever going to know what we went through, and that's OK. We have each other for support. In addition, I mandated that everyone go to PTSD counseling (that's still a work in progress, as you can tell). We all went together the first time. Look for hidden opportunities with previously difficult staff members. Remember the people who were going to walk off the job the night of the storm? Those were the same two guys who volunteered to participate in the rescue and ran the eight city blocks over and over all night. Look after each other. Make sure people are eating, sleeping, that their home is OK because sometimes it wasn't. Again, this is in the aftermath phase, not right in the middle of the disaster.

### **Slide 54 (Recovery: Short-term Measures)**

Now on to recovery. When it comes to replacing animals, obviously cryopreservation helps. However, it's not the be all end all. You still have to have somewhere to put them. Replacing housing is much more difficult. Temporary options include leasing space from neighboring institutions or offsite at vendors. Again – you'd better hope you've been nice to people.

### **Slide 55 (What can we do to really plan?)**

But what can we do to really plan? We talk a lot about disaster plans, and we all have written plans, but is that enough? We have our written plans, and when we want to get fancy, we do tabletop exercises. But I'll tell you that tabletop exercises are not enough. What do you do—you sit around a conference room table drinking coffee, eating doughnuts, talking about what you would do if the building caught on fire? That's just a reading comprehension test of your disaster plan. It doesn't tell you how anybody would perform in an actual emergency. The best written plan in the world isn't worth the paper it's printed on if you don't have highly capable people to carry it out.

What we discovered and use to this day are Tactical Decision Games (or TDGs). They were developed by the military and adapted for civilian use by industrial psychologists in Aberdeen, Scotland. They use them for things like nuclear power, where you can't simulate a disaster, but failure is not an option if you have one.

### **Slide 56 (What can we do to really plan?...continued)**

What really matters, and what TDGs evaluate, are the human factors, or non-technical skills. We contracted with the folks in Scotland to create lab animal specific scenarios.

Participants are given an emergency scenario and asked to make decisions under stress. We don't like to divulge all the secrets to creating this stress, but some examples are distractions, time limits, and some role play. We recommend this for all levels of employees. As we learned the hard way, the people you don't expect to step up and be awesome may be the very ones you depend on and vice versa. Just because someone has a certain title and salary, doesn't mean they won't be hugging themselves in a corner during a disaster. We call our group Leadership for Disaster Response (LeDR) and continue to use this type of training with our staff as well as outside groups.

### **Slide 57 (Depopulation guidelines)**

How would the AVMA depopulation guidelines have affected our response to Sandy? As I said, we were fortunate, in that, we did not have to depopulate for Sandy. Some of the guidelines that may have been useful if we did have to depopulate include: combining cages of mice for euthanasia, perhaps combining them into large containers that aren't mouse cages. If we had to depopulate a lot of large animals, maybe using all available pentobarbital – even if it's not in-date, and we may have re-used needles until dull.

And with that, I'll hand the presentation back over to Neera for questions. Thank you.

### **Slide 58 (References)**

>>Neera: Thank you, Sam, Jennifer, and Axel. That was excellent and interesting. This slide lists all of the references that both Sam and Jennifer referred to during their respective presentations.

### **Slide 59 (Questions)**

I am sure the listeners have a lot of questions. Listeners, please type your questions into the chat box on your webinar screen. OLAW may edit the questions for clarity, duplication, and fidelity to today's topic. We will start with a few questions that we received prior to the webinar.

### **Slide 60 (Question 1)**

First question: How can depopulation be accomplished to minimize compassion fatigue?

Jennifer, would you like to answer this one?

>>Jennifer: Sure. I think it's important to think about – ahead of time if possible – how many hours are going to have to be spent on depopulation, look at the size of the labor pool that you have, and consider even folks who obviously are trained to carry out the depopulation, but maybe wouldn't generally be in their job description. So trying to equally spread out the work between not just the care staff that would typically do it, but also supervisors and veterinarians, and any other types of managers or leaders who have the training, but may not initially be your go-to people, consider having them play an active role in the depopulation as well so it's not limited to a certain number of people.

I know also trying to, again, qualified by saying everyone has to be properly trained, but try and maybe not have the people who are responsible for the area be the first ones that you go to. So say you have to depopulate some large animals, if you have technicians that are trained in that but predominately responsible for a different species, maybe have them do it so that the person isn't put in the position to euthanize animals that they've spent all this time taking care of. This may or may not be possible, but it's something to consider.

>>*Neera*: Thank you, Jennifer.

### **Slide 61 (Question 2)**

So our second question is: Who should be included in the decision to depopulate?

Sam, would you like to give this one a shot?

>>*Sam*: Sure, and I think Dr. Pullium alluded to it some in her presentation. A lot of it depends on how much time you have and whether or not you have the ability to communicate with different parties. In a best-case scenario, the attending veterinarian would discuss with the primary investigators and the institutional official about ending decisions. Of course, media relations should be informed, but they are not necessarily involved in making the decision. It is most likely that these parties could not be reached in a timely manner and the attending vet is ultimately responsible for the welfare of the animals and would ultimately make the decision in this type of event.

>>*Neera*: Thank you, Sam.

### **Slide 62 (Question 3)**

Question three. One interested person, individual, asked if we can please talk more about networking with other nearby institution during an emergency.

Jennifer and Sam, how do you initiate and maintain arrangements so that they are in place when a disaster occurs? Jennifer?

>>*Jennifer*: Well, what I would say what is most important is the personal relationships that you have with the people at other institutions. No matter what MOU the lawyers get signed, there will always be a clause that the other institution will help "unless they have no space or unless they don't have the resources." Having a great personal relationship will increase the likelihood that other institutions will go out of their way to try and help.

>>*Neera*: Sam, would you like to add anything to this?



>>*Sam*: Yes. I might add that it might not always be an institution that's close to you. I know here at UAB we have an MOU with another institution that's close to the coast that we would serve as their alternate housing site for valuable species of animal model. And so we have that in place, but we're not close to each other.

>>*Neera*: Okay. Thank you.

### **Slide 63 (Question 4)**

So the fourth question is: Can you share some strategies for developing talking points on depopulation for media communications?

Sam, would you like to go first?

>>*Sam*: Well, I think we all know that we need to have a great relation with our media relations group and that we need to meet with them early and often. And I would say at least annually about developing talking points as part of your disaster planning. We shouldn't wait until the emergency happens. And, of course, the talking points should emphasize the institution's commitment to animal welfare and the importance of animal research to animal, human, and environmental health.

>>*Neera*: Jennifer?

>>*Jennifer*: In addition, I would make sure that you establish with your media relations that where time allows, the director of the animal resources program should review any media responses before they go out or be present with media relations during the interview. Make sure they have your cell number, et cetera.

>>*Neera*: Ok, thank you.

### **Slide 64 (Questions)**

So we have some questions that have come in from the audience. Jennifer, this one is specifically for you.

[Question 5]

Why did you have to wait until dark to rescue mouse cages?

>>*Jennifer*: Because – first of all, it was November, so dark came pretty early. But we had a lot of researchers and other employees that were literally just wandering the halls and the lobby because they didn't really know what to do with themselves after what just happened. And we didn't want them to see us hauling cages around out of this building because we didn't want them trying to get into the building, it wasn't safe for them, and so we just wanted to be able to have some privacy to go in and do what we needed to do safely for us and the animals.

>>*Neera*: Okay. Sam, I have one question here for you.

[Question 6]

Will IP ethanol be permitted for depopulation of mouse colonies in the upcoming AVMA revisions?

>>*Sam*: Yes. The use of ethanol is already in the 2013 edition of the AVMA Guidelines on Euthanasia. And it is still going to be in there in this next edition.

>>*Neera*: All righty. So stay tuned. I have one final question for Jennifer.

[Question 7]

Can you discuss how one might plan to be the institution that aids another institution with housing in a disaster or emergency?

>>*Jennifer*: Say that one more time? Oh, how you might be the helper.

>>*Neera*: Right.

>>*Jennifer*: So for example, I mean, I even think about this for myself right now, if somebody called me today, I know exactly where I have space. I know exactly what type of animals I can take in there, what health status they would have to be. I know what transportation of animals, services that I would have – I have a van I could help transport. So I think just sort of take stock of your space and your resources and know what you would have to share. Maybe it's sharing staff. I mean, it could be anything.

>>*Neera*: Okay. Well, we've come to the end of the questions. These are all interesting questions, for such a hot topic. If you listeners think of additional questions in the next week or two as you reflect on this webinar, please send them in to us and we will impose on Sam, Jennifer, and Axel to answer them, and we will amend our transcript to include our response to these questions and it will be posted on our OLAW website [[Webinars and Podcasts](#)]. My thanks to all of you – Sam, Jennifer, Axel, and especially our participants. You have all been incredibly generous with your time and we appreciate it.

>>*Jennifer*: Thank you.

>>*Neera*: We look forward to meeting with you again at our next OLAW Online Seminar on December 5, 2019, where OLAW, USDA, and FDA representatives will discuss the next steps that will be taken based on the [final report](#) of the [21st Century Cures Act](#). Goodbye!

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