Workplace Safety - Part I (from Zookeeping An Introduction to the Science and Technology)

Ed Hansen*

Animal facilities attract ***positive*** attention and headlines for animal births, new enclosures, conservation programs, and green practices. Also, when a keeper has a serious or fatal accident, the facility and the profession receive ***negative*** press attention. A comprehensive safety program addresses and acknowledges the reality that an incident or accident will occur.

New keepers will witness both good and bad. The goal is to lessen the frequency and seriousness of such incidents by taking reasonable and correct precautions, and providing frequent and meaningful training on the hazards in your job. The benefit to you as employee is a healthier and safer working environment. The benefit to your boss (employer) is a smaller risk of accidents or incidents. Both employee (you) and employer (boss) must understand that a safety program is a document that can save your life, your colleagues lives, the animals lives and the structures in your zoo.

Zoos and aquariums experience frequent collection and personnel changes and often need employees to move or rotate through different areas of the zoo. Keepers may not be performing the same task all the time. For these reasons, a safety program must be updated frequently to keep up with the animal collection changes, staff changes, and realities of a business that needs staff every day of the year.

The safety program should be managed by someone who will update critical information, policies, and procedures on a frequent basis. He or she should ensure that the information is communicated to the animal keepers and staff both verbally and in writing. This task may be delegated to a curator, secretary, or safety committee. Every employee should receive important information regarding safety in memos, hazard reports, notebooks, or bulletin or white boards. Safety committees made up of both managers and workers are a very effective tool in any zoo or aquarium facility. Safety committees may provide needed expertise in the investigation of any accident and may help to determine the root cause. The committee should focus on the cause and prevention of accidents rather than the persons who caused it. Another person should handle discipline, if required.

Working safely around exotic animals begins with the research and education process. All keepers—especially new keepers must acknowledge the danger, strength, intelligence, and in some cases unpredictable behavior of the animals.

The bridge between textbook learning and application of husbandry, training, and safety techniques begins with employee orientation and training. During the orientation process, the zoo should provide new keepers should receive a copy of the facility's safety program and specific training on safety procedures. Most of these basic procedures will be discussed in the following section on applied keeper safety.

A facility that focuses on employee safety and has an excellent safety record will spend what seems (to the new keeper) an inordinate amount of time on safety-related topics. A comprehensive written safety program combining classroom and field training will provide a knowledge foundation for the keeper's entire career. A progressive keeper will continue to learn and apply safety knowledge and techniques. Concentration is to the key to safety, and a keeper must stay vigilant and never let his of her guard down, or else the result may be catastrophic.

ZOONOTIC DISEASES

A zoonotic disease (Hansen 2008) is any illness that passes from animal to human. The list of zoonotic diseases is long and scary. It helps to understand the chain of events that may lead to illness. For example, the common cold virus is transmitted from person to person through contact. Other diseases or illnesses require only casual contact or a disease vector. Most zoonotic disease transmission results from a combination of human host, disease, and environmental factors. **Keepers must recognize that when it comes to zoonotic disease, they hold the keys to prevention.**

The keys are **good hygiene and safe work practices** including the wearing of appropriate personal protective equipment. When keepers first enter into the profession, the possibility of acquiring an illness from an animal may be of great concern to them.

To avoid the primary mode of disease transmission, keepers should
- wash their hands frequently with soap and water
- concentrate on cleaning under fingernails and the back of the hands.
- hand washing with an application of hand sanitizer (disinfectant) to kill any remaining bacteria, virus, fungi, or parasites.

Soap and water removes a large percentage of the bad stuff keepers get on their hands but disinfectant will get better. Cleaning his uniform is the Keepers' responsibility and their families should be protected by washing keeper uniforms separately from family laundry to prevent transmission of zoonotic disease.

It is always wise to monitor the health and well-being of the animal collection and to know which types of zoonotic diseases are most likely to be passed between keepers and animals at the zoo.

****American Association of Zookeepers, Topeka, Kansas 66614, USA.***

This book was edited by Mark Irwin, John Stoner and Aaron M. Cobaugh.

In some countries zookeepers are from rural areas and own domestic livestock. Some have constructed a small house with a shelter for their animals attached. In such a situation the zookeeper should take extraordinary precautions not to carry germs either from zoo to home or home to zoo!

Zookeepers should always consume their food away from the work environment in an area designated specifically for eating and drinking.

HAZARD COMMUNICATION

There are international systems for hazard communication used now, such as the "Work Place Hazardous Materials Inventory System (WHMIS)". Hazard Communication (HazCom) Standard is an similar system used in the USA to provide employees with "right- to-know" safety and health information regarding chemical use in the workplace.

Keepers work in a complex environment surrounded by quaternary ammonium and phenols for enclosure surfaces, and the old standby disinfecting agent, bleach—lots of it. Include the daily exposure to veterinary compounds, antibiotics, steroids, dewormers (anthelmintics), and a host of topical wipes and ointments. Now mix with the occasional radiograph (X- ray), and animal keepers are exposed to a daunting array of chemical and environmental hazards. Keepers must quickly learn the differences between cleaning, sanitizing, and disinfection.

- Cleaning is the act of physically removing unwanted material through means such as hosing or raking an area.
- Sanitizing is the application of a chemical to enhance the act of cleaning, and will result in a kill rate for simple bacteria of up to 99.999%.
- Disinfection is the application of a specialized chemical that will kill 100% of bacteria, virus, fungi, and other microorganisms.

Disinfection in a zoo or aquarium, outside the veterinary surgical suite, is virtually impossible to achieve. Both sanitizers and disinfectants are products regulated by the governments that establishes rules that govern these products, including their testing, claims, and direction for use.

A disinfectant must completely eliminate all the organisms listed on its label. These organisms are not limited to bacteria, but could include viruses and fungi. Sanitizers need not eliminate 100% of all organisms to be effective, nor are fungi or viruses ever included in a sanitizing claim. For food contact surfaces, a sanitizer must reduce the bacterial count by 99.999%.

Keepers clean every day, and they will often apply liberal amounts of chlorine bleach (sodium hypochlorite), a readily available product sold in solution (3.2% and higher), thinking that they are disinfecting holding area floors, platforms, and enclosure furniture. Keepers will also apply granular chlorine, which is sodium or calcium hypochlorite (bleach) in powdered form, to holding areas. Granular chlorine is designed by the manufacturer to be used as a broadcast agent in pools for chemical disinfection and control of algae growth.

Both practices are dangerous, as any form of chlorine, including chlorine bleach, reacts with ammonia (in urine/ feces) and may result in a dangerous and noxious chemical reaction. Chlorine bleach and granular chlorine by themselves have acute and chronic effects on the user's lungs, and damage to the eyes and skin is frequent due to splash and "dust" exposure.

To achieve effective sanitization, chlorine bleach or chlorine products must be used in **proper dilution** and must be left on the surface being cleaned according to the manufacturer's specification for dwell time (sometimes called "contact" or "kill" time) prior to rinsing. Chemical disinfection of porous surfaces, such as floors and platforms, is literally impossible without the use of heat (steam) or of powerful disinfecting agents that, if not properly diluted and completely rinsed away, would be harmful to the animals.

Keepers are normally required to dispense medication in pill or liquid form to the animals under their care. They usually buy disinfecting chemicals: chlorine and bromine for pools, accomplish this by "hiding" or disguising the pill or liquid in a favored food item of the animal.

Keepers are also asked to apply ointment or similar substances to tractable (compliant or trained) animals. A pharmacist will never handle a pill, liquid, or ointment. The primary reason, of course, is hygiene (somebody is going to swallow that pill or liquid and apply that ointment to their body). Another primary reason is that **pharmaceutical compounds can be absorbed through the skin** and eventually, with constant handling of drugs, a toxic reaction with the body may result in illness or other side effects.

Handling pharmaceuticals, including topical sprays, should require the use of personal protective equipment in the form of disposable gloves. After dispensing medications, keepers should wash their gloved hands before removing the gloves, and again after removing them.

When a radiograph (X- ray) needs to be obtained, keepers may be required to assist in the restraint or positioning of the animal. Proper protective equipment such as lead gowns, gloves, glasses, face shields, and thyroid protection must be worn. Disease, such as various cancers, can be traced to cumulative exposure over the course of an employee's career to radiation from X-rays, so keepers should always wear protective clothing. *This is why there is a section on Personal Protective Equipment. Although such clothing is either non-existent or too costly for the zoo to provide in developing countries, the zoo and its keepers may innovate with local materials to try and be safer.*

PERSONAL PROTECTIVE EQUIPMENT

When a potential work hazard is recognized, changes should be made to routines and practices that will protect keepers. There is a recognized hierarchy of response to potential safety hazards:

- policy
- engineering
- personal protective equipment (PPE).

A zoo or aquarium could, for example, set a policy that keepers would not be allowed in the X-ray room to position or restrain a sedated animal for the X-ray procedure. This policy would not work, however, as the animal must be positioned correctly to obtain optimum X-ray results. An engineered solution would place the keeper behind a lead barrier similar to a device seen in human hospitals. But this won't work either, for the same reason: the animal needs to be manually held in position. **This leaves the only practical solution, which is to protect the keeper with personal protective equipment (PPE)**. However even PPE is always the last resort, because of a greater risk of error. For example, PPE may be forgotten, damaged, worn incorrectly, or ineffective for a particular hazard. A hazard assessment, normally conducted by safety personnel, supervisor, or a safety committee is conducted on each work process, and PPE is assigned as required. For keepers the hazard assessment is quite basic and includes that listed in Table 7.1. Under specific medical circumstances, a keeper may need to wear a respirator in order to perform the essential job functions. Other keepers may have medically diagnosed allergies that require the use of a respirator or dust mask to reduce nuisance dusts and fumes.

New employees in any profession may tend to take their health for granted and keepers are no exception. Our well-being and ability to rebound from injury is something we may rarely if ever consider. However, if keepers take the time to consider how their difficult profession wears on the mind and body and thus plan for the future, their careers can be long and fulfilling.

Keepers are industrial athletes and should always warm up prior to any event. The start of the workday and the return from lunch break should be treated in a similar manner. Back injuries are debilitating and possibly career-ending.

Stretching and movement prior to throwing of hay bales or restraint of an animal will help to keep a keeper healthy and fit. While keepers are subject to hand and arm injuries from the repetitive motions of raking, hosing, and using a shovel, the largest risk factor involves the back. Every aspect of a keeper's job has an impact on the muscles of the back. When a keeper is loading a wheelbarrow shoveling, crossing barriers, climbing ladders, or even just walking on wet, icy, or uneven surfaces, the risk of sustaining an injury to the back or neck is significant.

Table 7.1: Personal Protective Equipment (PPE) is listed by the USA Occupational Safety and Health Administration (OSHA)

Body part	Hazards	PPE
Hands	Cuts, abrasions Disease, chemicals, drugs	Leather gloves Latex/rubber gloves
Eyes	Dusts, debris, chemicals, Animal fluids	Safety glasses Face shield
Feet	Crushing Water, chemicals, feces	Steel-tied shoes Rubber boots
Ears	Animal/Machinery noise	Hearing protection
Skin[1]	Sun exposure	Sunscreen

[1]A face shield, which protects the skin and mucous membranes (nose and mouth) in addition to the eyes, may be necessary where fluid splash may be encountered, to minimize the risk of viral disease transmission (from macaques), or when working with venomous animals.

[1]Steel-toed shoes, boots, and rubber boots are designed to prevent crushing injuries to or amputation of the toes, and are normally recommended for keepers of hoof-stock or elephants. This type of safety shoe is also available with steel shanks to prevent puncture injuries to the bottom of the foot.

[1]The wearing of hearing protection (earplugs or earmuffs) to reduce ambient noise must be balanced against the keeper's need for awareness of the surroundings and/or of radio transmissions.

[1]Under specific risks of viral or bacterial transmission of disease, skin may need to be protected by long sleeves, long pants, or other protective covering such as coveralls or disposable suits.

Editor's Note:

The chapters in the Zookeeping book may be difficult to absorb due to the vast difference between zoos on different continents and their animal care and procedures. Another obstacle is that in countries such as India and the surrounding countries in the region of South Asia, most of the keepers speak local language which adds another difficulty.

I must apologise to Ed Hansen as I have frequently changes his wording or left out some paragraphs that would not be easily understood in India or Bangladesh, etc.

We will continue to run these articles from Zookeeping in ZOOS' PRINT in this manner.

- Sally Walker

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