



Chemotherapy Safety

in Small Animal Practice[©]

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Chemotherapy is becoming more widely available in companion animal practice. This is in part due to the strengthening of the human-animal bond. Pets have now reached family member status, and as a consequence, pet owners wish to prolong cancer patient survival time and preserve quality of life. However, chemotherapy agents are cytotoxic and thus have associated health risks in both the occupational and family settings. A preliminary survey of 13 questions addressing chemotherapy safety in companion animal practice was distributed to a number of oncology practices in the United States. The survey revealed key areas of strength and weak-

ness pertaining to chemotherapy safety in companion animal practice. This article summarizes chemotherapy safety issues and provides guidelines for the implementation of a safe chemotherapy protocol.

In recent years, companion animals are living longer lives and playing more significant roles in family life. For these reasons, pet owners have become more willing to explore various cancer treatment options for their animals. It is now known that an increasing number of companion animal veterinarians are offering chemotherapy in the small animal practice setting.¹ It is also known that cytotoxic agents have a

very narrow margin of safety and therefore carry a relatively significant occupational hazard. Short term effects of exposure to cytotoxic agents have been studied and include lightheadedness, headache, nausea, hair loss, and skin irritation.² Long term effects of exposure have not been extensively studied, but it is generally suspected that cytotoxic agents are mutagenic, teratogenic, cause fertility impairment, and are included on lists of known or suspected human carcinogens.¹

Exposure to cytotoxic agents can occur through the inhalation of aerosols, by accidental ingestion, and by absorption through the skin and mucus membranes. In an occupational setting, accidental exposure occurs mainly through drug preparation, administration, and handling of patient waste. From a public health standpoint, clear guidelines are necessary for each stage of cytotoxic drug handling in order to protect the health of the humans involved in each of these procedures. In the United States, these guidelines are developed by the National Institute for Occupational Safety and Health (NIOSH) and in Canada they are governed by Canada's National Centre for Occupational Health and Safety (CCOHS).

Preparation of Cytotoxic Agents

- Always wear proper personal protective equipment when handling/preparing chemotherapy drugs
- Store drugs in their original packaging
- Store drugs in a dedicated fridge
- Prepare drugs in a biological safety cabinet or low traffic area
- Label prepared drugs appropriately

There are a number of important safety guidelines to follow when receiving, stor-

ing, and preparing chemotherapy drugs. Two pairs of latex gloves must be worn when unpacking drugs upon receiving them in the clinic, as it has been found that packaging material may contain harmful drug residues. For this reason, drug packages should also be stored in sealed plastic bags. Ideally, cytotoxic agents should be stored inside their original packaging in a dedicated refrigerator away from other drugs and animal feed.⁴

Drug mixing and compounding should be carried out by a trained professional within the confines of a class II or III biological safety cabinet if at all possible. The unit should ideally have a laminar flow pattern and a HEPA filtration system, preferably vented to the outdoors. The cabinet should also be located in a low-traffic area and away from strong drafts that may aid in aerosolization and dispersion of fumes. If a biological safety cabinet is not available due to financial constraints, the use of a respirator mask containing a HEPA filter is strongly recommended.⁵

Hazardous drugs should be prepared aseptically by a staff member wearing personal protective equipment including two pairs of unpowdered latex gloves or special chemotherapy gloves, a long-sleeved waterproof gown fastened in the back, eye protection, shoe and hair coverings, and a respirator (HEPA) mask. Ordinary surgical masks do not offer sufficient protection against aerosolized compounds.⁵ It has also been recommended that gloves be changed every 30 minutes during batch compounding.³

Drug preparation should take place on a disposable plastic-backed absorbent pad within the biological safety cabinet, and this should be changed with each use. A number of sources advise that syringes only be filled two-thirds full, in order to reduce the likelihood of spills if the plunger becomes separated from the syringe.^{3,6} When the drugs are ready for use, they

should be labeled with appropriate patient information and biohazard stickers.

Administration of Cytotoxic Agents

Before administering a chemotherapeutic agent to an animal, most sources recommend that a dosage calculation be rechecked by at least two individuals within the private practice setting.¹ This is mainly due to the very narrow therapeutic window of antineoplastic agents.

A number of cytotoxic drugs, especially doxorubicin and vincristine are vesicants that cause extensive tissue necrosis if extravasation occurs, or if the drug accidentally comes into contact with skin.⁴ It is for this reason that administration equipment should be primed and examined for leaks prior to treatment. Intravenous lines and catheters must also be flushed with saline following administration in order to remove drug residues.² In addition, plastic-backed absorbent pads and alcohol-dampened gauze pads should be placed near the injection site to catch any drips that might seep out of the needle hole.¹

The potential routes of exposure are the same for both preparation and administration of cytotoxic drugs; therefore protective equipment must be used by hospital staff during drug administration. Recommended protective clothing includes a long sleeved waterproof gown, two pairs of powder-free latex gloves worn over the gown cuffs, eye protection, and a respirator mask containing a HEPA filter.⁶ In order to lessen the likelihood of accidental spills and leaks, administration of chemotherapy drugs should be carried out in a relatively low traffic area where there will be minimal interruptions.

Following drug administration, used syringes should be disposed of uncapped and needles left in place to minimize

the risk of accidental exposure through needlestick injuries. Syringes and needles should be placed directly into a sturdy sharps container that has been specifically set aside for cytotoxic waste.⁴ Also, all used IV tubing, gauze, absorbent pads, gowns, and gloves should be sealed in clearly labeled plastic bags. All contaminated waste must be disposed of according to the hospital's hazardous waste management plan.⁶

Nursing Care

It is important to note that the hospital staff members preparing and administering cytotoxic drugs are not the only persons who may be exposed to these agents. Kennel staff as well as pet owners and their families also incur a significant risk for exposure. Following a chemotherapy treatment, an animal may excrete toxic

drug metabolites for a period of several days. The main route of excretion for these compounds is through the urine or feces.² It is therefore imperative that recommendations be followed when dealing with patient bodily waste.

Within the hospital setting, the cages of patients receiving chemotherapy should be clearly labeled with an identification tag. Feed bowls and bedding should be washed separately to reduce contamination of other hospital supplies. It has been suggested that laundry be washed twice with regular detergent. Also, gowns and two pairs of unpowdered latex gloves should be worn when cleaning the cages of animals that have received chemotherapy drugs during the previous 48 hours.⁴ Dogs that have received chemotherapy may also be walked outside in an area away from other hospital patients.

Hazardous drugs should be prepared aseptically by a staff member wearing personal protective equipment.



If an animal is to be discharged shortly after treatment, guidelines for safe handling of patient waste should be clearly communicated to the pet owner. Ideally, these guidelines should be in a written format so that the client and his or her family can refer to the information at home. The veterinarian should stress the importance of wearing gloves when cleaning up after the pet, as well as proper hand-washing and waste disposal. Some good advice to give pet owners, for instance, is to "contain and absorb rather than dilute and distribute pet waste."⁴ A follow-up call by a technician would be a thoughtful gesture in order to answer any questions or concerns the client may have.

Accidental Exposure and Spills

Even if a small animal practice follows suggested guidelines closely and carries out chemotherapy treatments with extreme caution, there is always a risk for accidental exposure. If cytotoxic agents come into contact with the skin, the area should be immediately washed with soap and copious amounts of water. If there is accidental exposure to the eyes, it is recommended that the eyes be flooded continuously for at least five minutes. Due to the fact that chemotherapy is usually given intravenously, needlestick injuries are a concern to the personnel administering the drug. In these circumstances, the area should be washed immediately and bleeding should be encouraged by squeezing.⁶ Any incident involving a hazardous drug coming into accidental contact with the skin or mucus membranes should be well documented, and medical advice should be sought at the earliest convenience.

Any facility using cytotoxic agents on a regular basis should be in possession of a commercial spill kit with clear instructions located near drug preparation and administration areas. If a spill were to occur, personal protective equipment including a wa-

terproof gown, double latex gloves, splash goggles, and a respirator are to be worn by the person cleaning. Before decontaminating the area, it is necessary to contain the spill. If it is a liquid spill, this may be carried out by a plastic backed absorbent pad. A spill of solid material requires the use of damp absorbent gauze pads in order to decrease aerosolization. After the spill is contained, the entire area must be decontaminated. Household bleach has been suggested as a cost-efficient and suitable agent for decontamination of a number of cytotoxic drugs currently used in companion animal medicine, including vincristine, carboplatin, and cisplatin.³ It is important to note that before any type of decontamination is carried out, one should consult the appropriate MSDS information for the hazardous drug in question. Following decontamination, the spill area should be washed well with detergent and water. Any used cleaning materials should then be disposed of in the appropriate "cytotoxic waste" receptacle.¹

Chemotherapy Safety in Small Animal Practice

A preliminary survey of 13 questions was developed in order to assess the existence of chemotherapy safety measures within companion animal practice in the United States. The surveys were sent by electronic mail to 13 board-certified veterinary oncologists that were offering chemotherapy treatments on a daily basis within their practices. The questions were presented in a "yes/no" and short answer format, and addressed a number of safety issues concerning the storage, preparation, and administration of cytotoxic agents. Nursing care of chemotherapy patients as well as client education was addressed. Of the 13 surveys that were distributed, nine responses were returned. The results were not statistically significant due to a small sample size. However, the survey did identify areas of strength and weakness

SAMPLE INSTRUCTIONS TO PROVIDE TO CLIENTS

Chemotherapy Safety at Home

We are happy to tell you that _____ (name) _____ is ready to return home with you and your loved ones. _____ (name) _____ has received chemotherapy today as part of his/her cancer treatment plan, and further treatments may be required in the near future.

Chemo drugs: Some things to consider

Chemotherapy drugs are meant to destroy cancer cells, but they are capable of harming healthy cells in the process. Chemo drugs are cleared from the body through the urine and feces. This occurs for a period of time following each treatment. If healthy humans and animals are repeatedly exposed to chemotherapy drugs or their breakdown products, we can become sick.

In order to protect yourself and your loved ones, we recommend that you handle (name) 's bodily fluids with care for 2 days following each chemotherapy treatment. It is important to wear protective gloves when cleaning up urine or feces, or when handling soiled bedding or toys. Latex or nitrile gloves may be used and disposed of right away, followed by careful handwashing. It is also a good idea to make sure that any soiled bedding and /or toys are washed separately with plenty of hot water and detergent. Accidents may be safely cleaned up using a household bleach solution (1 part bleach to 10 parts water) while wearing your protective gloves. You may also want to consider walking _____ (name) _____ in an area away from other animals during the two days following his/her chemotherapy treatment.

We wish you and _____ (name) _____ the best during this time. If you have any further questions, please do not hesitate to give us a call. _____ (name) _____ is a wonderful patient, and we look forward to seeing you again!

Sincerely,

Doctor Name and the staff of _____ Animal Hospital

***Note: If the instructions are for a cat, tips for safe litter box cleaning can be substituted for dog walking tips.*



If an animal is to be discharged shortly after treatment, guidelines for safe handling of patient waste should be clearly communicated to the pet owner.

pertaining to chemotherapy safety in the small animal practice setting.

The majority of practices surveyed had dedicated refrigerators for the storage of cytotoxic agents, as well as dedicated areas for chemotherapy drug administration situated away from high-traffic areas of the facility. Most practices also contained a biological safety cabinet with a compliant hood for the preparation of cytotoxic drugs. Personal protective equipment (ie. chemotherapy gowns, gloves, and eye protection) was offered in all practices, but there was some variation in which items were worn in various situations. For example, the class of drug being handled sometimes warranted the use of more personal protective equipment. Almost all of the practices surveyed had access to

a commercial chemotherapy spill kit, and appropriate disposal methods for cytotoxic waste were in place at most facilities.

A few potential areas for improvement were also identified. Written information for clients on the hazards of cytotoxic drugs was offered in some clinics, but not all. This is extremely important because clients may be exposed to drug metabolites in the bodily secretions of chemotherapy patients for several days following treatment. Written policies for kennel staff and other hospital assistants concerning the risks of coming into contact with cytotoxic waste should also be made more widely available. Finally, hospital staff members can benefit from specialized training programs about handling chemotherapy drugs and cytotoxic waste.

Conclusion

When carried out in a safe manner, chemotherapy is a viable option for certain types of cancer seen within the small animal practice setting. It is imperative that animal hospital employees are properly trained in the handling of these hazardous compounds, ensuring guidelines are consistently followed. Client education on the hazards of cytotoxic agents in the form of readily available, written materials is also paramount. Ongoing education will also be necessary for veterinarians as research uncovers more of the long term effects of exposure to chemotherapeutic drugs and other cytotoxic agents.

References

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Chemotherapy Safety Quiz

1. Which is not a short term affect of exposure to cytotoxic agents?

- a. Lightheadedness
- b. Teratogenic affects
- c. Headache
- d. Skin Irritation

2. How often should gloves be changed during compounding?

- a. Every 30 minutes
- b. Every 60 minutes
- c. It isn't a necessary precaution.
- d. Every 15 minutes

3. What should be worn while compounding?

- a. Long sleeve waterproof gown fastened in the back
- b. Eye protection
- c. Shoe and hair covering
- d. Respirator (HEPA)
- e. Unpowdered latex gloves
- f. All of the above

4. How many pairs of unpowdered latex gloves are suggested to be worn when compounding, administering, and dealing with waste from an animal recently exposed to cytotoxic drugs?

- a. 1 pair
- b. Gloves are not recommended
- c. 4 pairs
- d. 2 pairs

5. What is something that should be done in the case of a needlestick injury where the syringe has been exposed to cytotoxic drugs?

- a. Rinse and stop the bleeding immediately.
- b. Rinse well and encourage bleeding by squeezing.
- c. Clean with an alcohol wipe and allow injury to stop of its own accord.
- d. Clean with an alcohol wipe and stop the bleeding immediately.

6. What household agent has been suggested as a cost-efficient and suitable agent for decontamination of a number of cytotoxic drugs?

- a. Laundry Detergent
- b. Windex
- c. Hand Sanitizer
- d. Bleach

7. From the oncologist who responded to the survey in this article, what suggested safety procedures were most board-certified oncologist lacking?

- a. Proper protective gear
- b. Proper storage
- c. Proper client education
- d. Proper administration of cytotoxic agents

8. Within what time frame are animals that have been exposed to cytotoxic chemicals still likely to excrete toxic drugs' metabolites?

- a. 48 hours
- b. Several days
- c. 24 hours
- d. 78 hours

9. In what ways can accidental exposure to cytotoxic drugs occur in an occupational setting?

- a. Preparation of drugs
- b. Administration of drugs
- c. Handling of patient waste
- d. All of the above

10. When discharging an animal shortly after treatment, in what ways should the pet owner be informed?

- a. Verbal only
- b. Verbal and written
- c. Written only
- d. The pet owner can look it up online

This article is worth one credit from Kansas State University and will be accepted for grading through December 31, 2009. To receive credit, either complete the quiz online at www.VetMedTeam.com or complete the hard copy on page 50 and submit per the instructions.

