

Evaluation of Radiation Safety in 29 Central Ohio Veterinary Practices

SHERYL A. MORITZ, MS, JOHN R. WILKINS III, DRPH, AND WILLIAM D. HUESTON, DVM, PhD

Abstract: A sample of 29 veterinary practices in Central Ohio were visited to assess radiation safety practices and observance of state regulations. Lead aprons and gloves were usually available, but gloves were not always worn. Protective thyroid collars and lead glasses were not available in any practice, lead shields in only five practices, and lead-lined walls and doors in only two practices. Eighteen practices had none of the required safety notices posted. (*Am J Public Health* 1989; 79:895-896.)

Introduction

Exposure to ionizing radiation is a potentially serious occupational health hazard. At high doses it is carcinogenic, mutagenic, and teratogenic,¹ but the effects at low doses are much less certain.² The severity of the effects appears in most circumstances to be no greater than a linear relationship to dose with no threshold value. A major source of human exposure is the medical utilization of diagnostic and therapeutic radiography.¹ Veterinarians represent a subgroup of the population frequently exposed to occupational ionizing radiation. Widespread radiation exposure in the human medical profession has been minimized by specialization, but most veterinary physicians remain generalists.

The objective of our study was to assess the use of radiation safety features and the observance of state regulations in a sample of veterinary practices.

Materials and Methods

The sampling frame consisted of the 87 veterinary practices in Central Ohio having radiograph machines registered with the Radiologic Health Unit of the Ohio Department of Health. Central Ohio was defined as Franklin, Delaware, Licking, Fairfield, Pickaway, Madison, and Union Counties.

The sample size was calculated at 29 to estimate the proportion of the practices in which employees used protective equipment,³ with an accuracy of ± 15 percent and a 95 percent confidence interval. The sample size was increased by six to compensate for potential refusals. This sample of 35 practices was chosen using computer-generated random numbers.

A letter was sent to the owners of all 35 sampled practices during July 1987. Consent was sought in a telephone interview the following week. The owners of 29 practices agreed to participate. Three owners refused to allow a site visit, another one was ineligible because the practice had

been sold, and the final two were unreachable after numerous attempts over a two-week period.

The site visits were conducted during the last three weeks of August 1987. The first part of each visit consisted of a face-to-face interview about practice characteristics, personnel, and procedures used for taking radiographs. Next, a site evaluation was conducted looking at equipment, personal protection devices, and the posting of safety notices. A copy of the site visit results was left with each practice at the conclusion of the visit. The results of the site visits and interviews were analyzed descriptively.

Results

The radiation safety procedures used in the practices are summarized in Table 1. Although lead aprons and gloves were available in most of the practices, gloves were not always worn. The available aprons and gloves had been tested for leaks in only seven practices. Additionally, radiation safety training had been conducted in only 10 practices. Among the 16 practices in which film badges were worn, badges were shared by several individuals in three practices.

Collimators to narrow the x-ray beam and reduce the scatter radiation were used in 25 practices; diaphragms were used in three practices and cones were still in use at the one remaining practice. Diaphragms and cones are older methods of collimation that are no longer considered adequate to reduce scatter radiation. Techniques charts (to limit overexposure as a result of poor quality radiographs) listing the peak kilovoltage, the milliamperage, and the time of exposure necessary for taking all radiographs were available in 26 practices. Intensifying screens, which reduce the amount of exposure necessary to produce a radiograph, were available in all 29 practices. The walls and doors were lead-lined in the room containing the radiograph machine in just two practices, and in only five practices was a lead shield available for the employees to stand behind.

Three types of safety notices (the safe operating procedure, the machine registration, and a "Notice to Employees") are required to be posted near the radiograph machine according to the Ohio Administrative Code. The required safe operating procedure, which includes guidelines for taking radiographs and procedures for resolving questions and problems, was written for only eight practices. In only three practices was the safe operating procedure posted. The machine registration was posted in eight practices and the "Notice to Employees" was posted in five practices. All

TABLE 1—Summary of Radiation Safety Procedures Used in 29 Veterinary Practices in Central Ohio

Safety Procedure	% Used
Lead aprons and gloves worn	96.6
Film badges worn	55.2
Radiation safety training	34.5
Safe operating procedure written	27.6
Apron and gloves tested for leaks	24.1
Protective thyroid collars worn	0.0
Lead glasses worn	0.0

From the Departments of Preventive Medicine (Moritz, Wilkins) and Veterinary Preventive Medicine (Hueston), The Ohio State University. Address reprint requests to John R. Wilkins, III, DrPH, Associate Professor, Department of Preventive Medicine, Starling Loving Hall, 410 West 10th Avenue, Columbus, OH 43210. Ms. Moritz is currently an epidemiologist with the Commonwealth of Kentucky, Frankfort; Dr. Hueston is currently Chief Staff Veterinarian, USDA, Fort Collins, Colorado. This paper, submitted to the *Journal* September 13, 1988, was revised and accepted for publication February 2, 1989.

© 1989 American Journal of Public Health 0090-0036/89\$1.50

three of the required documents were posted in only three practices; none were posted in 18 practices.

Discussion

Veterinarians come in contact with many potentially harmful substances through their work. In this study and in a companion study,* exposure to ionizing radiation did not appear to be one of the most pressing concerns for many of the veterinarians. As suggested in similar studies completed in the 1950s,^{4,5} the small number of radiographs taken may account for the minimal exposure found in the companion study* rather than good protective techniques. In our study the amount of radiation protection available in the sampled practices appears to have been minimal.

Lead shields, protective thyroid collars, and lead glasses are examples of established protective equipment not frequently observed in this study. Additionally, lead-lined walls and doors in the room containing the radiograph machine would help reduce the exposure of employees working elsewhere in the facility.

Veterinarians need to strive for exposures as low as reasonably achievable (ALARA), a concept first proposed by the National Committee on Radiation Protection in 1954. This is an extremely important concept since it is generally believed that there is no threshold value for exposure to

*Moritz SA, Hueston WD, Wilkins JR III: Patterns of Ionizing Radiation Exposure among Female Veterinarians. (Manuscript in preparation.)

ionizing radiation. To attain this goal, protective equipment needs to be made available, maintained in good condition, and used properly and routinely. Additionally, the importance of adequate radiation protection should be continuously re-emphasized by veterinary professional organizations and colleges of veterinary medicine. Finally, regulatory agencies in each state need to ensure that all established guidelines for minimizing occupational exposure to ionizing radiation are publicized and enforced.

ACKNOWLEDGMENTS

The authors wish to thank Patricia Price for her general support. Appreciation is also extended to James Ashton and Dr. Melvin Moeschberger of the Biometrics Laboratory of the Department of Preventive Medicine, and to Kevin Dreisbach and Elyse Thomas of the Ohio Department of Health Radiologic Health Unit for providing technical support. The information in this paper was presented at the Ohio Veterinary Medical Association's Annual Meeting, February 1988.

REFERENCES

1. Pizzarello DJ, Witcofski RL: Medical Radiation Biology. Philadelphia: Lea & Febiger, 1982.
2. Gloag D: Risks of low-level radiation—The evidence of epidemiology. *Br Med J* 1980; 281:1479-1482.
3. Daniel WW: Biostatistics: A Foundation for Analysis in the Health Sciences. New York: John Wiley & Sons, 1983.
4. Sullivan RJ, Sachs M, Keene BA, Sussman O: A survey of x-radiation exposure in the practice of veterinary medicine. *Public Health Rep* 1957; 72: 883-887.
5. Abrahams A, Harris SJ, Paul I, Paul GW: Radiological hazards due to exposure to low-energy radiation in veterinarians. *AMA Arch Ind Health* 1956; 14:521-525.

New Rule Governs Graduate Fellowships for Nursing School Faculty

A rule governing grants for postbaccalaureate fellowships for nursing school faculty was proposed in the June 5 *Federal Register* by the Health Resources and Services Administration of the US Public Health Service.

Approximately 1,440 public or private nonprofit schools of nursing would be eligible to apply for grants to enable nursing faculty to:

- Investigate cost-effective alternatives to traditional health care modalities with special attention to the needs of at-risk populations;
- Examine nursing interventions that result in positive health status outcomes, particularly with regard to family violence, drug and alcohol abuse, women's health, adolescent care, and disease prevention; or
- Address other nursing practice areas considered by the HHS secretary to require additional study.

To be eligible for fellowship support under the proposal, a faculty member must expect to meet requirements for a master's or doctoral degree before the end of the grant's budget period and be conducting a substantial study, thesis, or dissertation in a specified area. The rule proposes that grants would be awarded first to support applications demonstrating special factors related to national needs, as announced in the *Federal Register*. Approximately \$1.1 million was appropriated for the postbaccalaureate faculty fellowship program in fiscal 1989.

For further information, contact Blake Crawford of the US Public Health Service. Tel: (301)443-3376.