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Use of Personal Protective Equipment in an X-ray Room at a Veterinary Teaching Hospital

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Introduction

- Restraint during x-ray exposure is common

  Sullivan et al. (1957); Shirangi et al. (2007); Epp and Waldner (2012)

- Use of leaded personal protective equipment (PPE) varies with type of PPE
  - 86% frequently used leaded apron
  - 53% frequently used thyroid protector
  - 43% frequently used lead gloves

  Shirangi et al. (2007)

Introduction

Research question

What is the use of PPE in a veterinary college that trains veterinarians and veterinary technologists?

Introduction

Hypothesis

Use of PPE when holding an animal for x-ray studies during after-hours is lower than during regular working hours

Regular Working Hours	→	Medical imaging technicians and students
After-Hours	→	Doctors, ICU technicians and students

Introduction

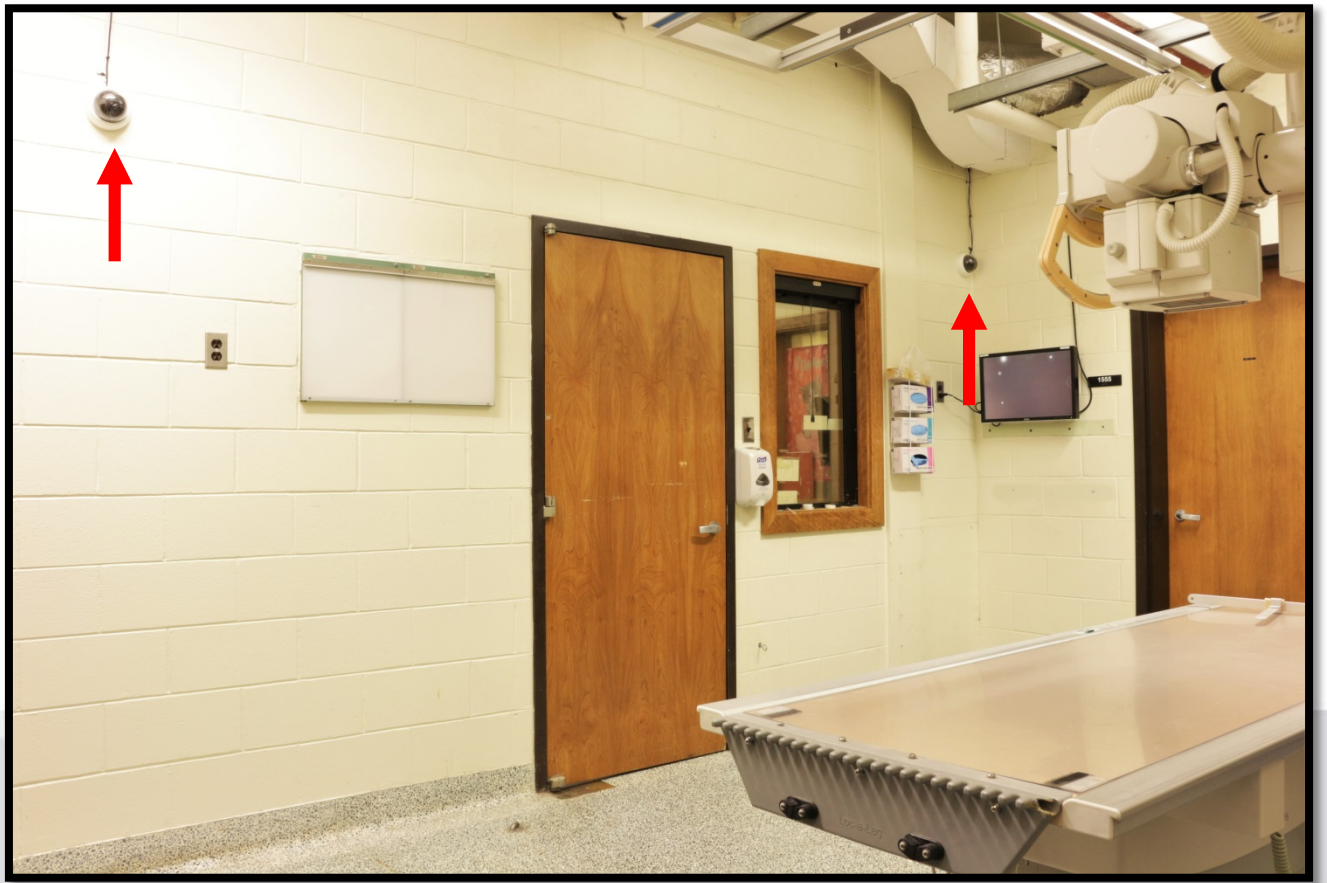
Objectives

- To describe worker use of leaded PPE (aprons, thyroid shields, gloves and eyeglasses) based on direct observation

- To compare observed worker use of PPE with self-reported worker use of PPE

Methods

- Use of PPE: 2 motion-triggered video cameras
- Workers approached and consent forms obtained

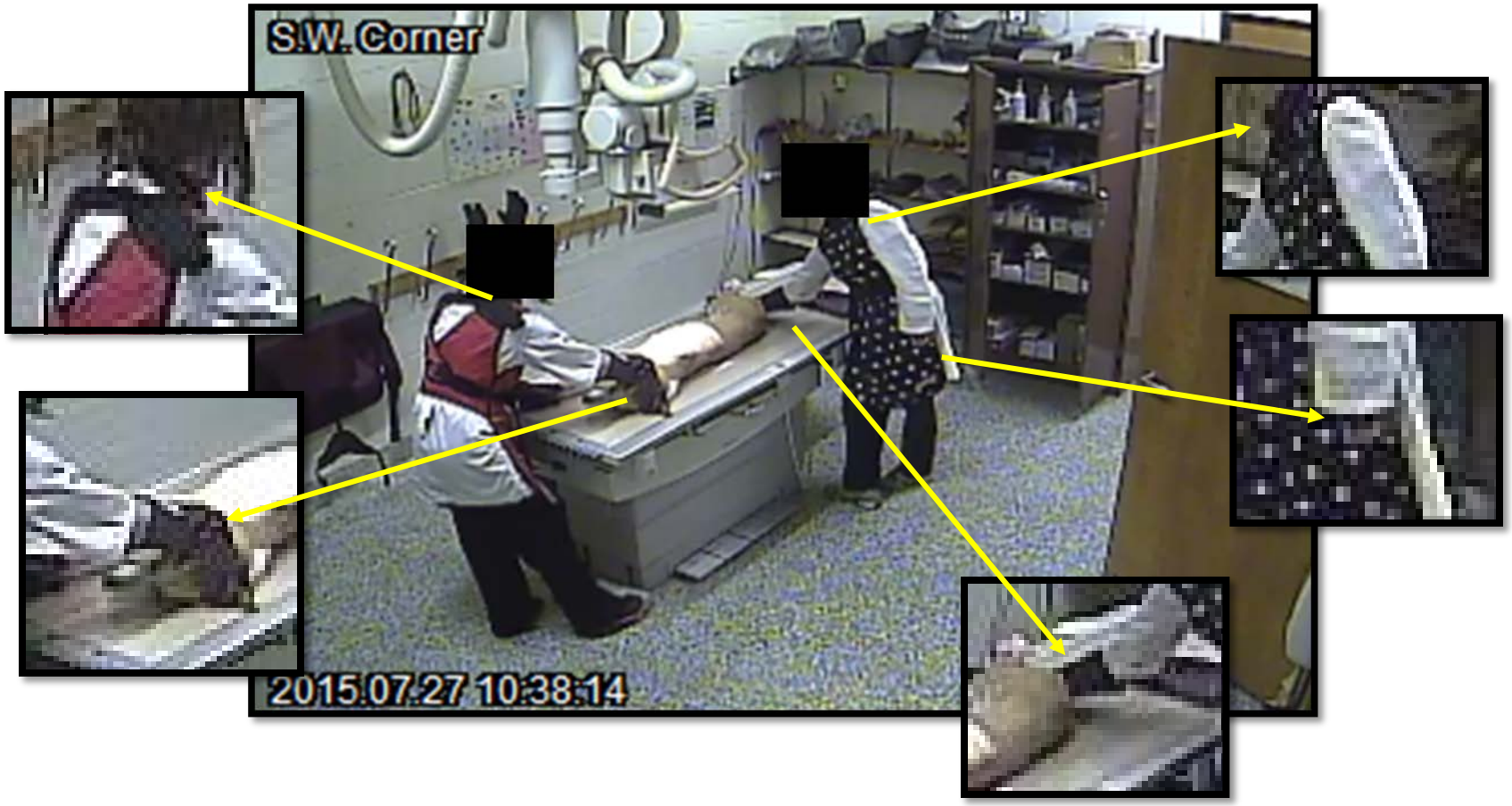


Methods

Data Collected

Patient Data	→	Signalment, sedation/intubation
Study Data	→	Study type, number of exposures, after hours/regular, gloves/fingers in field
Worker Data	→	Type of worker, use of apron, gloves, thyroid protectors, eyeglasses, # of people in room

Methods



Methods

Statistical analysis

- Logistic regression adjusted for repeated measures (individual workers) to assess factors affecting PPE use
- Generalized estimated equations with a Poisson distribution to assess factors affecting number of workers in the room
- Wilcoxon Signed Rank test to summarize differences between observed and self-reported behaviours

Results

Species	84%	(375/448)	Dogs
	16%	(73/448)	Cats
Use of Sedation or Anaesthesia	63%	(283/488)	Not sedated
	33%	(146/448)	Sedated
	4%	(19/448)	Intubated
Restraint	92%	(410/448)	Manual Restraint

Results

739 Exposures	61.7%	(456/739)	Regular working hours
	38.3%	(283/739)	After-hours
448 Studies	42.0%	(188/488)	Thorax
	26.6%	(119/448)	Extremity
	25.6%	(115/448)	Abdomen
	4.2%	(19/448)	Spine
	1.6%	(7/448)	Hip/pelvis
34 Workers	32.0%	(11/34)	DVMs
	29.0%	(10/34)	Non-Imaging technicians
	27.0%	(9/34)	Veterinary students
	12.0%	(4/34)	Imaging technicians

Results

Number of Workers in Room

739 Exposures	19%	(141/739)	No Worker
	13%	(96/739)	One Worker
	68%	(499/739)	Two Workers
	<1%	(3/739)	Three Workers

- No difference in number of workers between regular working hours and after-hours ($p = 0.76$)
- More workers in the room when animal was not sedated or anesthetized ($p < 0.001$)

Results

PPE Not Used

448 Studies	98.7%	(442/448)	No Eyeglasses
	46.7%	(209/448)	No Gloves
	0.4%	(2/448)	No Thyroid Protector
	0%	(0/448)	No Apron

Results

Use of Gloves

- Workers more likely not to wear gloves when imaging cats than dogs

  (OR 6, 95% CI 2-21, p = 0.005)

- Workers more likely not to wear gloves when acquiring a study of the abdomen

  (p = 0.01)

Results

Use of Gloves

- Gloves were <u>not</u> worn for 3.8% of studies performed during regular working hours vs. 93.9% of studies during after-hours

- Workers more likely to not wear gloves after hours than regular working hours

(OR 373, 95% CI 104-1344, $p<0.001$)

Results

Observed Versus Self-Reported

- Workers overestimated frequency of glove use ($p < 0.001$)
  - Observed median > 0% to ≤ 50%
  - Self-reported median > 50% to ≤ 75%

Conclusions

- Lead gloves are not consistently used by veterinary workers
- Use of lead gloves is overestimated by self-reporting
- Use of sedation or anesthesia reduces worker exposure to ionizing radiation

Self-Reported Use of X-Ray Personal Protective Equipment by Saskatchewan Veterinary Workers

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Use of leaded PPE and other behaviors during x-ray exposures in Saskatchewan veterinary workers involved in taking small animal x-rays (n = 331).						
	Always	**> 75%**	**50-75%**	**< 50%**	**Never**	**Not available**
Leaded PPE Use						
Apron	98% (325/330)	1% (3/330)	1% (2/330)	0% (0/330)	0% (0/330)	0% (0/330)
Thyroid Shield	88% (291/331)	5% (18/331)	2% (6/331)	2% (7/331)	2% (8/331)	< 1% (1/331)
Eyeglasses	3% (9/330)	0% (0/330)	1% (3/330)	1% (4/330)	34% (113/330)	61% (201/330)
Wear Dosimeter	41% (136/330)	18% (61/330)	11% (35/330)	17% (55/330)	5% (18/330)	8% (25/330)

Types and methods of leaded glove use by Saskatchewan veterinary workers during small animal radiography.					
	Always	**> 75%**	**50-75%**	**< 50%**	**Never**
How gloves are used					
Gloves used correctly*	8% (25/327)	12% (39/327)	14% (46/327)	40% (130/327)	27% (87/327)
No gloves	11% (35/327)	27% (88/327)	22% (72/327)	17% (57/327)	23% (75/327)
Type of gloves used					
Fully enclose hands	35% (96/272)	6% (16/272)	15% (41/272)	10% (26/272)	34% (93/272)
Open portion	31% (85/272)	5% (14/272)	19% (51/272)	8% (23/272)	36% (99/272)

Most common suggestions by Saskatchewan veterinary workers on increasing use of lead thyroid shields, eyeglasses and gloves during small animal radiography.	
	Worker Suggestions (number of workers making suggestion)
Gloves (n = 237 suggestions)	More flexible so easier to restrain animals (n = 188) Better fit for smaller hands (n = 25) Educate workers on risks of ionizing radiation (n = 22) Sedation of animals (n = 16) Make use mandatory for workers (n = 13)

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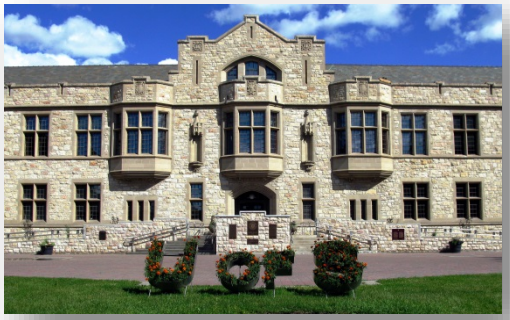

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