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BRIEF REPORT

Zoonosis and veterinary waste disposal in rural practice

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Rural veterinary practice;
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Abstract The objectives of this study were to estimate: (a) the frequency of zoonoses in large animal veterinarians from rural areas of the province of Buenos Aires, Argentina, and (b) to describe the use and disposal of personal protective equipment (PPE) and selective veterinary clinical waste. A cross-sectional study was carried out on large animal veterinary practitioners in the Province of Buenos Aires (n = 106). One third (29.2%) of them had been diagnosed with a zoonosis by laboratory-methods, being brucellosis the most frequent (22.6%). The more years passed since their graduation, the greater the chances of becoming ill ($p < 0.001$). Gloves were the most adopted PPE; however, other elements had little or no use at all. Older and experienced professionals used PPE less frequently than young inexperienced practitioners. Some PPE was frequently reused and the final disposal of veterinary waste was often inappropriate. A change in behavior is an urgent need to preserve not only the veterinarians' health but also their families' wellbeing and to ensure proper disposal of potentially hazardous waste.

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PALABRAS CLAVE

Práctica veterinaria rural;
Zoonosis;
Disposición de desperdicios veterinarios

Zoonosis y disposición de desperdicios veterinarios en la práctica rural

Resumen Los objetivos de este trabajo fueron los siguientes: a) estimar la frecuencia de zoonosis en veterinarios de grandes animales que desarrollan su labor en la provincia de Buenos Aires; b) describir el uso y la disposición de los elementos de protección personal (EPP) y otros residuos generados durante el trabajo de estos veterinarios. Para ello se realizó un estudio transversal en una muestra de 106 profesionales. En un tercio de ellos (29,2%) se había sido diagnosticado por métodos de laboratorio alguna zoonosis; la brucelosis fue la más frecuente (22,6%). Se encontró que a mayor tiempo transcurrido desde la graduación, mayor era la probabilidad de enfermarse ($p < 0,001$). Sobre la base de las respuestas obtenidas en cuestionarios

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estructurados, se determinó lo siguiente: que los guantes fueron el EPP más adoptado, mientras que otros elementos tuvieron escasa o nula adopción; que los profesionales de mayor edad y experiencia usaron EPP con menos frecuencia que los practicantes más jóvenes e inexpertos; y que algunos EPP se reutilizaban con frecuencia y que la eliminación final de los desechos veterinarios fue a menudo inapropiada. Considerando estos hallazgos, es claro que se requiere un cambio de comportamiento para preservar no solo la salud de los veterinarios, sino también para asegurar el bienestar de sus familias y garantizar la eliminación adecuada de los residuos potencialmente peligrosos.

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Clinical veterinarians are exposed to a high risk of occupational accidents and diseases.¹³ Although veterinarians in Argentina have a high risk of contracting zoonoses, the adoption of safety practices is scarce, and the final disposal of labor-related waste such as needles is often questionable.^{1,2,7,13,14} A variety of laws and regulations to ensure proper disposal of potentially infectious waste have been enacted in many countries. Infection control precautions are well established for human health care centers and are subject to constant reviews ensuring that objectionable waste will not pollute the environment.^{5,15} Veterinary waste is potentially harmful to human health and should be handled as regulated veterinary medical waste.³ However, veterinary waste is not always included as health care waste and has been neglected as a contributor to the hazardous waste stream. Although veterinarians are generators of waste, there appears to be little awareness and even less compliance of the existing legislation.⁶ In Argentina, National Law No. 24051/91 and most of the provincial legislation deal with the clinical residues of medical care provided in hospitals, medical centers and clinics for human and animal health. However, some provinces only refer to establishments of health and others with similar characteristics, without being explicit in the definition.⁴ The objectives of this study were to estimate: (a) the frequency of zoonoses in veterinarians practicing on large animals in rural areas of the province of Buenos Aires and, (b) to describe the use and disposal of personal protective equipment (PPE) and selective veterinary clinical waste.

An observational cross-sectional study was conducted on veterinarians practicing on large animals all over the province of Buenos Aires, Argentina. One hundred and six workers (absolute error: 6.9%, confidence level: 90%, expected frequency: 30%^{7,12}) were selected by simple random sampling from the list of registered professionals provided by the Colegio de Veterinarios de la Provincia de Buenos Aires ($N = 951$) (Fig. 1). Every contacted veterinarian was willing to collaborate with the study. However, three of them could not be reached and 15 did not work on large animal practice any longer and had to be replaced. Data were collected through personal and telephone interviews using a structured questionnaire. Systematic errors may have had an impact on the final results, namely selection, classification and memory bias were discussed in previous papers.^{7,12}

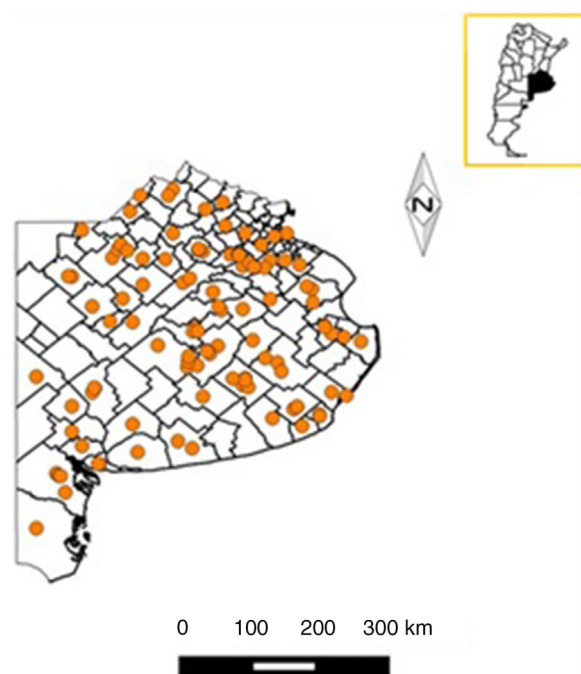


Figure 1 Spatial distribution of the veterinarians of large animals practice who were selected in the Province of Buenos Aires, Argentina ($n = 106$).

Statistical analyses included χ^2 , Fisher's exact test, odds ratio (OR) and 95% CI and the Student's t test, using the InfoStat[®] program. In order to calculate the OR, continuous variables were transformed into dichotomous variables using the median as the cut-off point.

Respondents were 45 ± 11.6 years old and had graduated 20 ± 12 years previous to the interview, while 90.6% were men. One third (29.2%) had been diagnosed by laboratory-methods with a zoonosis (brucellosis 22.6%, dermatophytosis 4.7%, scabies 3.8%, anthrax 2.8%, hydatidosis 1.9%, staphylococcosis 0.9% and trichinosis 0.9%). All those affected by brucellosis worked with cattle but not with pigs or goats. Brucellosis frequency in veterinarians varies in different regions of Argentina and it has been associated with cattle production. The more years passed since graduation, the longer the exposure time and the greater the chances

of becoming ill.⁷ Veterinarians who had suffered brucellosis had more years of professional practice ($p < 0.001$). Those respondents with more than 18 years of professional experience had 5.6 (95% CI 1.9, 16.6) times more risk of suffering from the disease than those under 18 years of experience. Variations in the frequency of brucellosis in large animal practitioners are also related to the variation of the disease in cattle. In Santa Fe province, the true incidence rate of the disease in rural veterinarians decreased, coinciding with the control and eradication scheme of bovine brucellosis.⁷ Gloves were the most adopted PPE; however, other elements had little or no use at all. Veterinarians "always" wore gloves and goggles for clinical examination (74.5 and 1%), surgery (80.6 and 10.8%) and necropsy (98 and 13.1%) respectively. While nine out of 10 interviewees (89.2%) "always" wore gloves for rectal palpations, breathing masks were neither worn for clinical examinations nor surgeries. In necropsies, only 9.1% wore disposable overalls, 2% wore face masks and none of them wore anti-cut gloves. Professionals who "always" wore gloves had graduated fewer years before than those "sometimes" or "never" wearing gloves (surgery $p = 0.008$, rectal palpation $p = 0.026$, necropsy $p = 0.012$). Working experience is not a protective factor in the practice of veterinary medicine. Older and experienced professionals tend to use PPE *in labore* less frequently than young inexperienced practitioners.¹³ Veterinary practice exposes veterinarians to health risks.¹³ The majority of the respondents admitted taking risks against their own safety in their daily work ("yes, constantly" 67.9%, sometimes 25.5%, "no, never" 6.6%). However, this perception was not associated with PPE adoption. Several types of clinical veterinary waste such as needles and syringes are potentially harmful to human health and should be decontaminated prior to disposal.³ However, breathing masks, disposable overalls, syringes and hypodermic needles were not always discarded (Table 1).

More than one out of ten professionals did not always discard disposable scalpel blades, and this figure rose up to one out of five interviewees in the case of disposable needles. Reuse of these elements is a common practice in

large animal medicine,¹⁶ where puncture wounds are very frequent.¹⁰ Recapping used needles and lack of reliable disposal containers are known risk factors for needlestick injuries.¹³

The necropsy knife must be washed, disinfected and left aside not to be used for other activities.¹ However, 17.2% of the respondents used this element for other tasks and four of them did not disinfect it after used. Many health risks have their origin in individual behavior and it is the individual himself who must deal and control them to a great extent. Nevertheless, one in four professionals "sometimes" or "never" washed and disinfected the necropsy knife and five of the 17 professionals who used it in other activities "sometimes" ($n = 3$) or "never" ($n = 2$) disinfected this tool. Two interviewees admitted using the necropsy knife "to prepare meals" or "to eat barbecue".

Bacterial contamination can survive in clothes and is recoverable by brief contact over substantial periods of time. When contaminated surfaces or clothes come into contact with the hands or even stainless steel utensils, organisms can be transferred in sufficient numbers to represent a potential hazard if in contact with food.⁸ However, 37% of respondents did not replace their work clothing until the scheduled time for washing, regardless of the number of days used or the activity performed. Most respondents washed workwear at home, but three out of 10 did not wash it separately from other clothing, and 28.3% "sometimes" or "always" added disinfectants. However, it must be noted that detergent washing produces only limited reductions in microbial contamination and clothes and that some chemical disinfectants such as hypochlorites may be unreliable when cloths are heavily contaminated.⁹ Work shoes can be contaminated with pathogens and be vehicles for diseases. Nevertheless, only 46.2% of the respondents "always" washed work shoes at the end of their daily activity. This contrasts with safety recommendations, which suggest removing the remains of soil and organic material from the shoe, cleaning it with a brush and water, and disinfecting it with iodine solution before leaving the farm.¹¹ On the one hand,

Table 1 Final disposal of veterinary inputs by large animal practitioners, province of Buenos Aires.

Element (n of answers)	Action	Frequency (%)		
		Always	Sometimes	Never
Latex gloves (105)	Elimination	100	0	0
Rectal palpation gloves (101)	Elimination	99.0	1.0	0
Breathing mask (20)	Elimination	60.0	10.0	30.0
Disposable overall (17)	Elimination	29.4	35.3	35.3
Disposable needle (106)	Elimination	80.2	18.9	0.9
Disposable syringe (106)	Elimination	54.7	44.3	0.9
Scalpel blade (102)	Elimination	86.3	13.7	0.0
Necropsy knife (99)	Washing	90.9	6.1	3.0
	Washing and disinfection	74.7	12.1	13.2
	Used for other tasks	7.1	10.1	82.8
	Washing separately	70.8	11.3	17.9
Workwear (106)	Washing and disinfection	15.1	13.2	71.7
	Washing away from home	9.4	1.9	88.7
	Washing	46.2	33.0	20.8

veterinarians should keep in touch with their state and local organizations. On the other hand, veterinary medical associations should monitor state and local norms to influence decisions that affect veterinarians and to keep their members informed of changing requirements.³ In conclusion, veterinarians may have become the main victims of their lack of observation of minimum prevention norms. Occupational diseases do not occur at random nor are natural events of inevitable occurrence. A change in behavior is an urgent need to preserve not only veterinarians' health but also their family wellbeing and to ensure proper disposal of potentially hazardous waste.

Conflicts of interest

The authors have no conflicts of interest to declare.

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Appendix A. Supplementary material

Supplementary material associated with this article can be found in the online version at [doi:10.1016/j.ram.2018.08.004](https://doi.org/10.1016/j.ram.2018.08.004)

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