



## Dog-bites, rabies and One Health: Towards improved coordination in research, policy and practice



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### ABSTRACT

Dog-bites and rabies are neglected problems worldwide, notwithstanding recent efforts to raise awareness and to consolidate preventive action. As problems, dog-bites and rabies are entangled with one another, and both align with the concept of One Health. This concept emphasizes interdependence between humans and non-human species in complex socio-ecological systems. Despite intuitive appeal, One Health applications and critiques remain under-developed with respect to social science and social justice. In this article, we report on an ethnographic case-study of policies on dog bites and rabies, with a focus on Calgary, Alberta, Canada, which is widely recognized as a leader in animal-control policies. The fieldwork took place between 2013 and 2016. Our analysis suggests that current policies on rabies prevention may come at the expense of a 'bigger picture' for One Health. In that 'bigger picture,' support is needed to enhance coordination between animal-control and public-health policies. Such coordination has direct relevance for the well-being of children, not least Indigenous children.

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### 1. Introduction

In this article, we point to a need for inter-sectoral and multi-jurisdictional coordination with respect to rabies and dog-bites. In doing so, we build on the observation that the social sciences remain under-represented in the One Health literature (Friese and Nuyts, 2017), even as this journal has played leadership roles in elevating social science in One Health research. As a concept, One Health refers to interdependence between humans and non-human species in complex socio-ecological systems (Zinsstag et al., 2011). *Social Science & Medicine* began to publish contributions regarding One Health, social science and social justice in 2009 (Rock et al., 2009; Singer, 2009), and a One Health special issue appeared in 2015 (Craddock and Hinchliffe, 2015). That special issue focused on efforts to halt the spread of zoonotic infections, reflecting current trends in One Health applications and critiques

(Friese and Nuyts, 2017).

The present article expands the scope of social science contributions to One Health scholarship, by considering dogs, rabies, human injuries, and public policies as entangled phenomena. In other words, none of these things truly exists as discrete entities or variables, such that 'life is the ongoing, dynamic result of human and nonhuman interactions over time' (Nading, 2013, 60). Dog-bites can spread rabies and other zoonoses; dog-bites routinely cause injury; and the risks for rabies and for dog-bites are unevenly distributed, geographically and socio-economically, largely due to policy influences. By implication, policies addressing dogs, rabies and dog-bites ought to complement one another.

Below, we present an ethnographic case-study in which we seek to assess the extent of policy complementarity as regards dog-bites and rabies. By attending to the current situation in Canada, we seek to illustrate the value of relational coordination (Gittell, 2011) with respect to the tasks entailed in both rabies prevention and dog-bite prevention. We also call for ontological coordination (Mol, 2002), so that professional practice and information systems duly reflect overlapping risks within living systems (Hinchliffe and Whatmore,

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2006). But first, we provide some background information on rabies and injuries from dog-bites.

## 2. Background

Under the auspices of the United Nations' Millennium Development Goals, infectious diseases such as HIV, tuberculosis and malaria have dominated global health policies and programs. As the United Nations has sought to reorganise its activities around the recently-ratified Sustainable Development Goals, 'neglected diseases' are now firmly on the agenda (UN, 2015). Accordingly, the WHO (2016a) recently endorsed a plan to eliminate human cases of rabies by 2030. And yet, given that rabies is a zoonotic disease, such a plan cannot be effectively deployed without drawing upon the One Health concept and without attending to the multi-species entanglements that surround rabies.

One Health has intuitive appeal, but applications will never be straight-forward. To date, most One Health applications have targeted non-human species, so as to reduce the incidence of infectious disease in human populations (Friese and Nuyts, 2017). Prevention of infectious diseases in people is complicated enough, but insufficient, both practically and ethically. Hence we extend the distinction in public health between 'mere prevention' and 'health promotion' to One Health. Unlike most efforts to stop people from developing zoonotic infections, One Health promotion entails policy-guided programs and services to alter interactions throughout complex systems, for mutual benefit amongst humans and non-human species (Rock, 2016; Rock et al., 2015; Rock and Degeling, 2015, 2016). That said, when seeking to promote One Health, a series of challenges beset coordination across academic disciplines, professions and policy realms (Degeling et al., 2015; Hinchliffe, 2015; Rock et al., 2009).

In keeping with conceptualizing One Health promotion in terms of complex systems, the WHO (2016a) has recommended improved coordination for the sake of rabies prevention. More specifically, the WHO (2016a) has pressed for concerted efforts to improve access to post-exposure prophylaxis (PEP), but also to decrease reliance on PEP by expanding the reach of programs to vaccinate dogs against rabies. A related WHO (2017b) report has endorsed dog-bite prevention as essential to rabies prevention. This latter report endorsed educational interventions as well as veterinary services, specifically rabies vaccinations and sterilization surgeries (to help prevent dog-bites, via dog population control). We reference this holistic approach throughout the analysis that follows, by considering rabies and dog-bite policies in Canada. Our approach to One Health promotion, however, explicitly attends to animal welfare along with social welfare (Rock et al., 2015; Rock and Degeling, 2015).

The World Health Organization (WHO, 2013) justifiably characterizes rabies as a 'neglected disease of poor and vulnerable populations.' Globally, more than 55,000 people die annually from rabies (Hampson et al., 2015; WHO, 2013). Rabies deaths are gruesome, and about 40% of the fatalities occur in children (WHO, 2016a). Worse yet, deaths from rabies represent needless suffering, given that '[r]abies elimination is feasible by vaccinating dogs' (WHO, 2013). The WHO takes this stance on prevention because dog-bites almost always account for rabies incidence in people. In fact, experts believe that dog-bites account for more than 99% of all instances of human exposure to rabies (WHO, 2013).

Each year, to prevent rabies, more than 15 million people worldwide receive PEP following dog-bites (WHO, 2016a). PEP for rabies is efficacious (Crowcroft and Thampi, 2015; Hampson et al., 2015), yet PEP is not always available or completed, especially in low-income and remote settings (Hampson et al., 2015). Besides the expense of PEP supplies, PEP administration is time-sensitive

and time-consuming for professionals, patients and families. The WHO (2017a) recommends immediate cleansing of the wound followed by vaccine therapy, then administration of rabies immunoglobulin; current standards call for at least four intramuscular doses to be administered by a trained professional over a period of four weeks. Patients, families and providers may feel distress during the course of post-exposure risk assessment and PEP administration (Cleaveland et al., 2006), adding to the reasons why systematic vaccination of dogs against rabies is preferable to systematic reliance on PEP to prevent rabies in people (WHO, 2013). Furthermore, unvaccinated dogs suspected of rabies exposure, as well as dogs whose vaccination status is uncertain, may be killed to prevent further spread of the disease. Ethical questions regarding animal welfare and culling are therefore relevant to rabies control (Cleaveland et al., 2006; Degeling et al., 2016).

The WHO (2015) estimates that dog-bites account for injuries in the tens of millions, year after year. And as with rabies, most dog-bite victims are children (WHO, 2015). In biomedicine, the term 'injury' refers to energy transfers in amounts or at rates that exceed the threshold for tissue damage (Baker et al., 1992, v; Haddon, 1980). We acknowledge, however, that this way of thinking about injury downplays psychosocial impacts (Langley and Brenner, 2004), which can be profound in dog-bite threats or injuries (Boat et al., 2012; Boyd et al., 2004). Nevertheless, dog-bite surveillance is so rudimentary that the WHO (2015) cannot report on the global incidence of injuries from dog-bites, never mind point to policies and scalable programs to prevent their occurrence. By public-health surveillance, we mean the 'systematic ongoing collection, collation and analysis of data and the timely dissemination of information to those who need to know so that action can be taken' (Last, 2001, 174). Accordingly, the WHO (2015) recommends initiatives to 'determine the burden and risk factors' for dog-bites, to strengthen 'emergency response services,' and to promote 'research ... on effective prevention interventions and populations most affected.'

Even in countries such as Australia and Canada, where the infrastructures to support healthcare and public health are sophisticated, dog-bite surveillance and research remain under-developed (Ozanne-Smith et al., 2001). Preventive education is routinely recommended to lessen the incidence and impact of dog-bites (e.g., WHO, 2017b), but evaluations have tended to be small in scale. A systematic review of educational interventions targeting children and youth identified only two studies that met the inclusion criteria on research design (i.e., randomized controlled trials or controlled before-after studies); and neither study measured dog-bite incidence as an outcome (Duperrex et al., 2009). The authors concluded, 'Education of children and adolescents should not be the only public health strategy to reduce dog bites and their dramatic consequences' (Duperrex et al., 2009, 2). Policy research and reforms also deserve consideration (Ozanne-Smith et al., 2001).

## 3. Methodology

This article derives from an ethnographic approach to case-study research on public policy (Agar, 2006; Wedel et al., 2005). By 'public policy,' we mean 'a formal decision or plan of action that has been taken by, or has involved, a state organisation' (Richards and Smith, 2008, 1). More specifically, we report on research that aimed to distil best practices for promoting One Health via animal-control policies. By 'animal control,' we mean efforts to regulate interactions amongst humans and non-human animals within a defined territory (Aronson, 2010). The University of Calgary's Conjoint Health Research Ethics Board approved this study.

Three cities and five towns in the Canadian province of Alberta participated in our study. In Alberta, municipal councils may adopt

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