Public Veterinary Medicine: Public Health

Public health education on *Salmonella* spp and reptiles

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Each year in the United States an estimated 1.4 million people are infected with *Salmonella* spp, resulting in more than 35,000 culture-confirmed infections, 16,000 hospitalizations, and 500 deaths.[1] Although most infections with *Salmonella* spp in humans result in mild to moderate gastroenteritis, severe invasive infections resulting in meningitis, sepsis, and death may occur. Most *Salmonella* spp infections in humans are caused by eating food contaminated with the bacteria. Because *Salmonella* spp can often be found in the gastrointestinal tract of food-producing animals (ie, chickens, cattle, swine, and turkeys), humans often become infected by eating food of animal origin or produce that has been contaminated with animal manure. However, investigations of outbreaks and sporadic infections have revealed human cases of salmonellosis that occurred after direct or indirect contact with reptiles.[2,3]

Human cases of reptile-associated salmonellosis have been documented as early as the 1940s and 1950s.[4,5] In the early 1970s it was determined that pet turtles, particularly red-eared sliders, were responsible for an estimated 280,000 cases of salmonellosis each year in the United States.[6] This led to a 1975 ban of interstate shipment of pet turtles with a carapace length of < 4 inches.[7] Many states subsequently prohibited the sale of such turtles.[8] These actions limited the sale of turtles small enough to be easily placed in the mouth of a child. As a result, an estimated 100,000 fewer annual cases of turtle-associated salmonellosis occurred among children 1 to 9 years of age.[9]

With the increased ownership of iguanas and other reptiles in the 1990s, however, cases of reptile-associated salmonellosis again increased.[10] Many of these infections have been reported in infants and children who have not had direct contact with the reptiles involved. In a recent population-based control study, it was estimated that 6% of all sporadic human *Salmonella* spp infections in the United States were associated with the contact of reptiles,[a] suggesting that such contact may result in approximately 75,000 infections annually.

Reptiles have long been known to harbor *Salmonella* organisms as asymptomatic carriers that intermittently shed the bacteria in their feces.[11] Humans become infected when they ingest the contaminated feces of reptiles, which may occur by direct or indirect contact. Several routine precautions may be taken to reduce the risk of transmission of this disease to people who are exposed to reptiles.

In 1996, the Pet Industry Joint Advisory Council, in collaboration with the **Centers for Disease Control and Prevention (CDC)**, launched an educational effort for the prevention of reptile-associated salmonellosis outlining these precautions. Since 1997, the **Association of Reptilian and Amphibian Veterinarians (ARAV)** has been working in collaboration with the CDC to increase awareness among veterinarians regarding the risks associated with transmission of *Salmonella* bacteria from reptiles and amphibians to people. That collaboration has resulted in the formation of National Veterinary Guidelines and a client education handout.[12,13]

To support this effort, the ARAV has produced a client education brochure entitled *Salmonella Bacteria and Reptiles*[b] for distribution by veterinarians to clients, pet stores, herpetological societies, and human healthcare organizations. This brochure further defines the precautions that can be taken to reduce the risk of transmission of Salmonella from reptiles to people. Transmission can be easily prevented through appropriate hand washing after handling reptiles, reptile cages and equipment, or the stool of reptiles, as soap and detergents rapidly destroy *Salmonella* organisms. Reptiles should not have access to any area where food is prepared, and they should not be bathed in sinks or tubs used by humans. Water from the cage and any fecal material should be disposed of in the toilet rather than the bathtub or household sink.

Most people have a low risk of acquiring salmonellosis; however, infants, young children, and immunocompromised persons are at greater risk. For this reason, the CDC recommends that contact with reptiles be avoided by children less than 5 years of age and that households with children under 5 not own reptiles. People who are

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immunocompromised should avoid contact with reptiles entirely. The ARAV brochure is not meant to discourage reptile ownership but to provide client-friendly guidelines to reduce the risk of acquiring salmonellosis from reptiles.

All species of *Salmonella*, despite the source, represent an occupational hazard for veterinarians and their families. Multiple drug-resistant *Salmonella* infections have been reported in veterinary staff and in the children of veterinarians exposed to *Salmonella* organisms.[14] With an increase in the incidence of antibiotic resistance, it becomes even more important to educate veterinary staff and the public about the risks of exposure and preventative measures that should be taken to limit the exposure to *Salmonella* bacteria, specifically reptile-associated salmonellosis.

So how can we help? As veterinarians we have direct contact with clients in many ways. Distribution of the previously mentioned ARAV-sponsored *Salmonella Bacteria and Reptiles* brochures as well as other *Salmonella* spp client education handouts will help to inform the public. Also, many of us speak at community groups, schools, local veterinary medical associations, and herpetological societies. Each of these instances represents an opportunity to disseminate information about transmission of *Salmonella* spp and its prevention. As veterinarians, we have a responsibility as public health officials; this is especially true in relation to the preventable disease of salmonellosis.

[a]Mermin J, Hutwagner L, Vagia D, et al. *Salmonella* infections from reptiles in FoodNet sites: the resurgence of preventable illness (abstr), in *Proceedings*. 36th Annu Meet Infect Dis Soc Am, 1998.

[b]Bradley T, Angulo FL. *Salmonella bacteria and reptiles*. Brochure produced by the Association of Reptilian and Amphibian Veterinarians available from Lilia Boyer at 3454 Chasewood Dr, San Diego, CA 92111.

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