Reptile-associated salmonellosis in residents in the south east of Ireland 2005–2007

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Introduction

Salmonella can be spread through contaminated food, person-to-person transmission, waterborne transmission and numerous environmental and animal exposures. Reptiles (e.g. turtles, lizards, snakes, tortoises, terrapins) serve as reservoirs of *Salmonella* and can shed *Salmonella* organisms in faecal material. Over 2,460 serotypes of *Salmonella* have been identified and many serotypes have been associated with reptiles. [1] In the United States, an estimated 36% of households own at least one reptile and it has been estimated that 70,000 people contract salmonellosis through contact with reptiles each year.

In 2006, 422 cases of salmonellosis were notified in Ireland, a crude incidence rate of 10.0 per 100,000 population. [2] Sixty-five different serotypes were identified by the Irish National *Salmonella* Reference Laboratory (NSRL) in 2006, of which *S. enterica* subsp. *enterica* serovar Enteritidis and *S. enterica* subsp. *enterica* serovar Typhimurium accounted for 60% of cases of human isolates. [2]

Methods

Although in Ireland, there is no national enhanced surveillance programme for human salmonellosis, in Health Service Executive (HSE), South Eastern Area, a surveillance questionnaire is administered to each case as part of the public health measures taken to prevent and control the disease.

Following notification of a number of cases of salmonellosis in young children, including a three-week old baby, all cases of salmonellosis notified to HSE South Eastern Area from 2005 to 2007 were reviewed. In each case, a medical officer had spoken with the family about the risk of salmonellosis associated with reptiles. It was noted that the parents of the three-week-old child had a pet snake, and as this was a recent case, snake faeces and environmental samples from the snake's tank were obtained for *salmonella* testing.

Results

A total of 120 cases of salmonellosis were notified in the south east of Ireland between 2005 and 2007. Of these, there were six episodes of salmonellosis (5%) in five individuals who had contact with reptiles. While the associations were not definitively proven, all cases had a history of direct or indirect contact with reptiles and all were infected with serovars previously associated with reptiles. [3-8]

Case reports

Case 1

In January 2005 an 11-year old male was admitted to hospital with bloody diarrhoea, vomiting, fever, nausea, abdominal pain and haematuria. He was hospitalised for three days and a stool sample tested positive for *S. enterica* subsp. *enterica* serovar Minnesota. He had been ill the previous month with one episode of colicky abdominal pain and blood in the urine. The boy had direct contact with a number of pets; an iguana which he bred, two Persian cats and two rabbits. The only other possible risk factor was a take-away meal of chicken nuggets eaten five days before the case was admitted to hospital. The boy's mother and sister were also ill with diarrhoea but recovered quickly and were not tested for salmonellosis.

Case 1b

Over a year later, in June 2006, Case 1 attended his GP with diarrhoea, abdominal pain and headache. A stool sample tested positive for *S. enterica* subsp. *enterica* serovar Monschaui. Apart from the ongoing contact with his animals, possible ingestion of river water during sporting activities sometime before he became ill was also a risk factor.

Case 2

In March 2006, a 15-year-old female was admitted overnight to hospital on two occasions with diarrhoea, but stool samples were not taken at this time. She continued to suffer from intermittent diarrhoea. In April 2006, the girl spent three days in hospital with diarrhoea, abdominal pain and fever. A stool sample taken during this time tested positive for *S. enterica* subsp. *enterica* serovar Enteritidis PT 21. She had direct contact with a number of pets; four fish, a dog and a terrapin which was bought on 1 March, 2006. There were no other risk factors for salmonellosis.

Case 3

A six-month-old boy was notified in March 2006 with salmonellosis. The boy had been ill with diarrhoea and respiratory symptoms. Laboratory testing confirmed *S. enterica* subsp. *diarizonae*. Because the illness had been ongoing, it was not possible to obtain an accurate food history. The child had indirect contact with the family pets; two snakes and a tarantula. One of the snakes had died of unknown causes three weeks before notification of the case. There were no other risk factors.

Case 4

During March 2007, a four-month-old boy became ill with bloody diarrhoea and vomiting. He attended the local out-of-hours GP service and hospital accident and emergency department. A stool sample taken at this time tested positive for *S. enterica* subsp. *enterica* serovar Pomona. The boy had indirect contact with two terrapins which were kept in a tank at home. The boy was fed exclusively on a commonly available infant formulation which was prepared using cooled boiled water.

Case 5

A three-week-old boy was admitted to hospital for two days with diarrhoea in September 2007. Laboratory testing confirmed *S. enterica* subsp. *arizonae* with antigenic structure O41:z4,z23. The child was fed on a commonly available infant formulation in powdered form prepared using cooled boiled water and also as a ready made preparation. *Salmonella* was not isolated from two household contacts tested. Case 5 had indirect contact with a snake and had also visited a reptile farm recently. A faeces sample from the snake and a sample of the snake's bedding grew *S. enterica* subsp. *diarizonae* with antigenic structures O48:i,z and O65:z10 respectively. Swabs taken from the snake container grew *Salmonella enterica* serogroup O57.

Discussion

All six episodes of salmonellosis occurred in children, with three occurring in infants less than one year of age, probably as a result of indirect reptile-contact. Four episodes resulted in illness severe enough to require hospitalisation. In case 5, the same serovar was not identified in the child and in the snake. This is not a cause for reassurance as the snake was tested after the child was diagnosed (and two different serovars were identified). In addition, reptiles can shed *Salmonella* intermittently and so a negative test for *Salmonella* does not mean they are disease free.

While there are no data on reptile ownership in Ireland, information from veterinary professionals and pet shop owners is that keeping reptiles as pets is becoming more popular. These recent salmonellosis cases emphasise the need for public education aimed at preventing reptile-acquired salmonellosis. Potential reptile owners, young reptile owners and carers who own reptiles should be particularly targeted.

The CDC has published recommendations which include washing hands with soap and water after handling reptiles or their cages and keeping reptiles out of food preparation areas. Recently, pellet food for terrapins and lizards has been identified as a vehicle for transmission of *Salmonella* [personal communication] and it would be prudent to advocate hand washing after handling animal feed and keep small children away from it. Reptiles in zoos and exhibits should be kept from direct or indirect contact with the public except in designated areas equipped with hand washing facilities. The public should not eat and drink in areas where they are also handling reptiles.

The CDC also advises that pregnant women and young children should not have reptiles as pets. [10] It appears similar guidelines and public advice at the point of sale are needed in Ireland.

TABLE

Summary of salmonellosis cases with reptile contact, Ireland 2005–2007

Case	Age	Gender	Organism isolated	Reptile Contact
1	11 years	M	*Salmonella* Minnesota (2005) *Salmonella* Monschaui (2006)	Pet iguana
2	15 years	F	*Salmonella* Enteritidis PT21	Pet terrapin
3	6 months	M	*Salmonella enterica* subsp. *diarizonae*	Parents have pet snakes
4	4 months	M	*Salmonella* Pomona	Parents have pet terrapins
5	3 weeks	M	*Salmonella enterica* subsp *arizonae*	Parent has pet snake. Child visited reptile farm with parent.

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