Turtlepocalypse 2012

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Division of Foodborne, Waterborne, and Environmental Diseases

8th Annual OutbreakNet Meeting
August 30, 2012
Brief *Salmonella* and Turtle History

**BACKGROUND**
**Salmonella**

- Most common bacterial cause of foodborne disease in the U.S
  - Meat, poultry, and produce

- Animal Contact
  - Reptiles, amphibians, live poultry

- >2,500 serotypes

- 1 laboratory-confirmed *Salmonella* infection, >16 others
Human *Salmonella* Infections

- Incubation period 12 to 72 hours
- Illness duration 4 to 7 days
- Acute gastroenteritis: fever, diarrhea, abdominal cramps, vomiting
- Serious illness: meningitis, bloodstream infections, joint infections
- Most do not require treatment other than oral fluids
  - May require rehydration with intravenous fluids
  - Antibiotics not usually needed for treatment
Populations at High-Risk

- Children aged <5 years
- Persons >65 years
- Immunocompromised persons
Animals can be a source of *Salmonella* and other zoonoses

- Direct contact with infected animals
  - May appear healthy and clean
- Indirect contact with infected animals
  - Animal environments, contaminated pet food
Pet Ownership Statistics
2011-2012*

- 72.9 million U.S. households include ≥1 pets

<table>
<thead>
<tr>
<th>Pet</th>
<th>Households Own Pet</th>
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<tbody>
<tr>
<td>Dog</td>
<td>46.3</td>
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<tr>
<td>Cat</td>
<td>38.9</td>
</tr>
<tr>
<td>Small Animal</td>
<td>5.0</td>
</tr>
<tr>
<td>Reptile</td>
<td>4.6</td>
</tr>
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*2011-2012 American Pet Products Manufacturer’s Association
Turtle-associated *Salmonella*

- **Turtles have long been recognized as a source of human infections**
  - *Salmonella* are found in the normal gut flora
  - Turtles high-risk for young children
    - More likely than other reptiles to be given to young children
    - Frequently in daycares and schools
    - Commonly given as prizes at carnivals

- **1960s**
  - Turtles were popular household pets
  - ~15 million turtles per year produced on farms
Turtle-associated *Salmonella*

- Turtles have long been recognized as a source of human infections
  - *Salmonella* are found in the normal gut flora
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    - More likely than other reptiles to be given to young children
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- 1960s
  - Turtles were popular household pets
  - ~15 million turtles per year produced on farms
Turtle-associated *Salmonella*

- **1970s**
  - 4% of households reported having at least one turtle
  - ~280,000 cases of *Salmonella* each year in the U.S.
  - 14% of *Salmonella* infections in humans

- **Several states passed laws blocking turtle imports**
  - Not an effective prevention measure

- **In 1975, FDA enacted a ban to protect children from turtle-associated infections**
Code of Federal Regulations Title 21

FDA: TURTLE BAN
CFR Code of Federal Regulations Title 21

Prohibit the sale of turtles with a carapace <4 inches

(b) Sales; general prohibition. Except as otherwise provided in this section, viable turtle eggs and live turtles with a carapace length of less than 4 inches shall not be sold, held for sale, or offered for any other type of commercial or public distribution.

Purchase is acceptable for “...bona fide, scientific, educational, or exhibitional purposes...”

(d) Exceptions. The provisions of this section are not applicable to:
(1) The sale, holding for sale, and distribution of live turtles and viable turtle eggs for bona fide scientific, educational, or exhibitional purposes, other than use as pets.
Results of the Ban

- **1980s**
  - ~100,000 reptile-associated *Salmonella* infections in children annually were prevented in the U.S among children ages 1-9 years.
  - Production declined to ~2 million turtles each year from ~15 million in the 1960s.

- Small turtles remain available in pet shops, souvenir shops, flea markets, street vendors, and online sales.

- Since 2006, 11 multistate outbreaks reported to CDC.
Challenges of Enforcing the Ban

- **Loopholes to ban**
  - Small signs with small print quoting ban
  - Internet sales with hidden disclaimer
  - Buy tank, get turtle free
  - Prize at carnival
  - Flea markets and street vendors

- **Limited resources at the local, state, and federal levels**
EPIDEMIOLOGIC INVESTIGATION
PulseNet USA

- National molecular subtyping network for foodborne disease surveillance
- Network of >85 public health & regulatory laboratories
- Pulsed-field gel electrophoresis (PFGE)
- Electronically creates and shares “DNA fingerprints”
- “DNA fingerprints” stored in dynamic database at CDC

Cluster of indistinguishable patterns as “outbreak strain”
Outbreak Detection

- In January 2012, PulseNet detected a national increase in *Salmonella* Sandiego pattern JLXX01.0053
- PulseNet notified CDC epidemiologists of cluster
- State and local health departments contacted and performed case interviews
- Turtles emerged as hypothesis
Outbreak Detection Timeline: 6 Multistate Turtle-Associated Outbreaks

Turtle questionnaire distributed

Outbreak 1

Outbreak 2

Outbreak 3

Outbreak 4

Outbreak 5

Outbreak 6
Outbreak 1
*Salmonella* Sandiego, Strain A
*Salmonella* Newport, Strain A

Outbreak 2
*Salmonella* Pomona, Strain A

Outbreak 3
*Salmonella* Poona, Strain A

Outbreak 4
*Salmonella* Sandiego, Strain B

Outbreak 5
*Salmonella* Pomona, Strain B

Outbreak 6
*Salmonella* Poona, Strain B

6 Outbreaks
# Case Definitions for 6 Multistate Turtle Associated Outbreaks in 2012

<table>
<thead>
<tr>
<th>Outbreak #</th>
<th>Serotype</th>
<th>Strain (XbaI Pattern)</th>
<th>Illness Onset</th>
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<tbody>
<tr>
<td>1*</td>
<td><em>Salmonella</em></td>
<td><strong>Strain A (JLXX01.0053)</strong></td>
<td>August 1, 2011 to present</td>
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<tr>
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<td><em>Sandiego</em></td>
<td><strong>Strain A (JJPX01.1253)</strong></td>
<td>August 1, 2011 to present</td>
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<td><em>Salmonella</em></td>
<td><strong>Strain A (POMX01.0004)</strong></td>
<td>December 1, 2011 to present</td>
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<td><em>Poona</em></td>
<td><strong>Strain A (JL6X01.0104)</strong></td>
<td>October 15, 2011 to present</td>
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<td>4</td>
<td><em>Salmonella</em></td>
<td><strong>Strain B (JLXX01.0051)</strong></td>
<td>February 15, 2011 to present</td>
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<tr>
<td>5</td>
<td><em>Pomona</em></td>
<td><strong>Strain B (POMX01.0002)</strong></td>
<td>June 20, 2011 to present</td>
</tr>
<tr>
<td>6</td>
<td><em>Poona</em></td>
<td><strong>Strain B (JL6X01.0055)</strong></td>
<td>April 1, 2012 to present</td>
</tr>
</tbody>
</table>
Outbreak 1
*Salmonella Sandiego, Strain A*
*Salmonella Newport, Strain A*
70 ill persons in 15 states

Outbreak 2
*Salmonella Pomona, Strain A*
15 ill persons in 10 states

Outbreak 3
*Salmonella Poona, Strain A*
21 ill persons in 11 states

Outbreak 4
*Salmonella Sandiego, Strain B*
6 ill persons in 3 states

Outbreak 5
*Salmonella Pomona, Strain B*
50 ill persons in 20 states

Outbreak 6
*Salmonella Poona, Strain B*
6 ill persons in 3 states

6 Outbreaks
168 ill persons in 30 states
Cases from Turtle-associated Outbreaks of *Salmonella* Sandiego, Pomona, and Poona, United States,* by State**

*OB #1* Sandiego 1201PAJLX-1 n=70,
*OB #2* Pomona 1202MLPOM-1 n=15,
*OB #3* Poona 1203MLJL6-1 n=21,
*OB #4* Sandiego 1204COJL6-1 n=6,
*OB #5* Pomona 1205MLPOM-1 n=50,
*OB #6* Poona 1206PAJL6-1 n=6

**n=168 for whom information was reported as of August 2, 2012**
Persons infected with the outbreak strains of *Salmonella* Sandiego, *Salmonella* Pomona, and *Salmonella* Poona, by date of reported illness onset*

Number of Persons

Date of Illness Onset

* n=168 for whom illness onset date was reported as of August 2, 2012. Some illness onset dates have been estimated from other reported information.
Combined Demographics: 6 Outbreaks of Human *Salmonella* Infections Linked to Small Turtles

(as of August 2, 2012)

- **Median age:** 8 years (1-86 years)
  - 64% are age 10 or younger
  - 27% are age 1 or younger
- **57% female**
- **34 ill persons hospitalized**
- **No deaths**
Epidemiologic Findings

- **High % of Hispanic ethnicity reported**
  - 56% of all ill persons included in all 6 outbreak investigations are of Hispanic ethnicity
Epidemiologic Findings

- **Turtle Exposure (n= 127)**
  - 72% of ill persons reported turtle exposure prior to illness
  - 94% of ill persons reported exposure to turtle <4 inches
    - 84% reported owning or contact with red eared sliders

- **Purchase (n= 63)**
  - 39% report purchase from street vendors
  - 15% reported purchase from pet stores
ENVIRONMENTAL AND TRACEBACK INVESTIGATIONS
Environmental and Traceback Investigations

- States with outbreak-associated cases
  - Environmental sampling of turtles and turtle tank water from case-patient homes
  - Detailed purchase information obtained from patients for traceback investigations
  - Collected and tested turtles and tank water from retail stores
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168 ill persons in 30 states
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70 ill persons in 15 states

Sampling from home of *Salmonella* Sandiego, Strain A yielded two strains:
Outbreak 1, *Salmonella* Sandiego, Strain A
Outbreak 2, *Salmonella* Pomona, Strain A

Outbreak 2
*Salmonella* Pomona, Strain A
15 ill persons in 10 states

Outbreak 3
*Salmonella* Poona, Strain A
21 ill persons in 11 states

Outbreak 4
*Salmonella* Sandiego, Strain B
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*Salmonella* Poona, Strain B
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6 Outbreaks
168 ill persons in 30 states
Outbreak 1
*Salmonella* Sandiego, Strain A
*Salmonella* Newport, Strain A
70 ill persons in 15 states

Sampling from home of *Salmonella* Sandiego, Strain A case yielded:
Outbreak 1, *Salmonella* Newport, Strain A
Outbreak 5, *Salmonella* Pomona, Strain B

Outbreak 2
*Salmonella* Pomona, Strain A
15 ill persons in 10 states

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21 ill persons in 11 states

Outbreak 4
*Salmonella Sandiego, Strain B*
6 ill persons in 3 states

Outbreak 5
*Salmonella Pomona, Strain B*
50 ill persons in 20 states

Sampling from pet store where *Salmonella Pomona, Strain B* purchased turtle yielded:
Outbreak 6, *Salmonella Poona, Strain B*

Outbreak 6
*Salmonella Poona, Strain B*
6 ill persons in 3 states

6 Outbreaks
168 ill persons in 30 states

Epi Link
Outbreak 1
Salmonella Sandiego, Strain A
Salmonella Newport, Strain A
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Epi Link
Traceback Investigations

- Numerous state and local health departments performed traceback investigations
  - Challenging, inadequate records
  - Street vendors or flea markets
  - 20% received as gifts

- Goal: to identify stores with purchase records and turtle farms associated with outbreaks
Documentation to Support Investigations

- Bills of Landings
- Receipts that show sale of turtles <4 inches from source suppliers to customers
- Proof of turtle size
  - Photographs
  - Use small object to verify actual turtle size
- Sworn statement (e.g. affidavit)
- States should collect all information when states visit turtle vendors
Education and Recommendations

PREVENTION
Education and Recommendations

- Collaboration needed at all levels - community, local, state, and federal
- Goal: to educate everyone about the risk of *Salmonella* infection from handling turtles
  - General Public
  - Pet Stores and Employees
  - Pet Industry
  - School and Daycares
  - Health Professionals and Veterinarians
  - Shelter staff
  - Education Centers
Health Professionals

CDC MMWR

Multistate Outbreak of Human Salmonella Typhimurium Infections Associated with Pet Turtle Exposure — United States, 2008

Notes from the Field: Outbreak of Salmonellosis Associated with Pet Turtle Exposures — United States, 2011

Medscape Today

From CDC Expert Commentary

Pots Can Make People Sick

Janell Routh, MD

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Small Turtles Can Make People Sick

Small turtles have been making people sick for decades. Clinicians need to take specific steps to help protect patients and their families. In the United States, selling turtles with a shell less than 4 inches in length has been banned by the US Food and Drug Administration (FDA) since 1975.[1] Despite the FDA’s ban, small turtles continue to be sold in a variety of venues, including stores, flea markets, and fairs, and from roadside or street vendors.

The Centers for Disease Control and Prevention (CDC) recently published a report[2] describing an outbreak involving 132 people who became ill with salmonellosis from August 2010 to September 2011 that was linked to contact with small turtles and their habitats. During this outbreak, interviews were conducted with 56 patients, and 36 (64%) of them reported exposure to a turtle in the week preceding their illness. For 15 patients who could recall the type of turtle they touched, 14 identified small turtles with a shell length of less than 4 inches. These turtles were subject to the FDA ban and should not have been for sale to the public.
Consumers/ General Public

Search by Animal

Some animals carry germs that can be passed to humans. Learn what germs your pets and other animals can carry.

- Birds
- Cats
- Dogs
- Farm Animals
- Fish
- Horses
- Reptiles
- Wildlife
- Pocket Pets

Podcasts

Listen to/view CDC podcasts on your computer or download them for reliable health and safety information when and where you want it. New to podcasting? See Podcast Help and RSS Help.

Don't Kiss a Frog! and I Love Petting Zoos!

This CDC KidBlasts podcast discusses the danger of reptiles and amphibians carrying and spreading Salmonella and how to prevent infection. Created: 8/4/2009 by National Center for Zoonotic, Vector-Borne, and Enteric Diseases (NCZVED). Date Released: 8/4/2009. Series Name: CDC KidBlasts.

More info on this topic »

Press Play to listen to this CDC Podcast
Running time = 5:30

To save the Podcast, right-click the "Save this file" link below and select the "Save Target As..." option.

Save This File [3MB] (right click)
French:

Lavez vos mains après avoir touché des amphibiens ou des reptiles, pour ne pas tomber malade!

English:

Ouch amphibians or reptiles, hands so you don’t get sick!

Spanish:

Si toca anfibios o reptiles, ¡lavese las manos para no enfermarse!

Photo: J. Mitchell, 2012
General Recommendations

- Basic ways to reduce risk for transmission of *Salmonella* from reptiles to humans
  - Thoroughly wash hands with soap and water
  - Households with children <5 years should not have reptiles
  - Do not buy small turtles from street vendors, websites, pet stores, or other sources
  - Keep reptiles away from food preparation areas
  - Schools and child care facilities should not have reptiles
To be safe, we recommend that you wash your hands with soap after your farm visit.

Hand Wash Station

Thank you.
Unwanted Turtles

- **Petco Turtle Relinquishment Program**
  - Petco accepts unwanted turtles at any Petco location
  - Includes turtles <4 inches
  - Sent to a turtle farm
  - >70 unwanted turtles collected since May 2012
  - [www.petcoscoop.com](http://www.petcoscoop.com)

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Due to recent Salmonella outbreaks, the U.S. Centers for Disease Control (CDC) is encouraging anyone who has an aquatic turtle smaller than the legally mandated 4-inch carapace length to relinquish them in an effort to prevent further spread of the disease.

"The sale and distribution of turtles with carapace lengths less than four inches has been prohibited in the United States since 1975," said Dr. Thomas Edling, VP of Veterinary Medicine, "yet they are still available for illegal purchase through street vendors, flea markets and fairs. Most of these turtles come from substandard breeding farms that do not utilize the latest egg disinfecting, hatching and grow out technologies to reduce the chance of Salmonella in their turtles. We want to do our part at Petco to help ensure the public has a chance to purchase healthy legal turtles as well as reduce the population of illegal turtles in people's homes."

Turtle owners wishing to relinquish turtles with carapace lengths of less than four inches can bring them to any Petco. The turtles will be sent to Concordia Turtle Farms where they will live and be cared for in Concordia ponds. Concordia, who is partnering with Petco on this initiative, is a family owned and operated producer of farm-raised turtles, which has been their specialty since 1966. Find your local Petco [here](http://www.petcoscoop.com).
Final thoughts

- Despite state laws and federal regulations, small turtles continue to be available to the public for sale
- Turtles continue to be identified as a source of human *Salmonella* infections, and are a public health problem
- Children are at high risk for turtle-associated *Salmonella* infections
- Education is critical for prevention of infections
- Collaborative investigations to identify
  - Small turtle-associated outbreaks
  - Suppliers, distributors, or turtle farms
# Acknowledgements

<table>
<thead>
<tr>
<th>State and Local Health Departments &amp; Public Health Laboratories</th>
<th>Centers for Disease Control and Prevention</th>
<th>U.S. Food and Drug Administration, Center for Veterinary Medicine</th>
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<tbody>
<tr>
<td>Alabama, Mississippi</td>
<td>PulseNet Database Team</td>
<td>U.S. Food and Drug Administration</td>
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<tr>
<td>Alaska, Missouri</td>
<td>Outbreak Assessment Unit</td>
<td>Susan Lance</td>
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<tr>
<td>Arizona, Nevada</td>
<td>Maroya Walters</td>
<td>FDA District Offices</td>
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<td>California, New Jersey</td>
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<td>Tracey Forfa</td>
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For more information on “Turtlepocalypse 2012”, please email isf3@cdc.gov

Thank you!

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA  30333
Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov    Web: http://www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.