Chagas Disease-Awareness Program for CHWs

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Session 1: What is Chagas Disease?
History of Chagas Disease

Distribution:
• Endemic in the Americas
• Cases outside of the Americas are from migration/relocation
• CDC estimates 300,000 infected individuals living in U.S. and 8-11 million infected individuals living in Latin America
• **28,000 new cases** yearly in 21 countries of the Americas
  • **8,000** of those cases are newborns

Overview:
• Named after Brazilian physician Carlos Chagas in 1909

Causative Agent:
*Trypanosoma cruzi*, a hemoflagellate protozoan parasite
Chagas Disease in Texas

Statistics:
• 156 diagnosed cases in Texas from 2013-2018
  • 26 cases locally acquired
  • 92 cases imported
  • 38 cases unknown etiology
• Most imported cases found in Harris County
• Most locally acquired cases found in Bexar County

https://www.dshs.texas.gov/IDCU/disease/chagas/Chagas-Disease-Data.aspx
Modes of Transmission

• Most common mode of infection:
  Kissing bug bites and defecates near the bite site allowing T. Cruzi contained in the feces to enter the host’s blood stream

• Other possible modes of infection
  • Congenital
  • Blood products
  • Solid organ transplantation
  • Laboratory accident
  • Contaminated food or drink
Chagas is a vector-borne disease with many animal reservoirs.
T. Cruzi trypomastigotes in Blood Stream

The parasite undergoes changes in the host.

- First entering as a **metacyclic trypomastigote** at the bite site
- Next invading cells in the body and changing to **amastigotes**, which begin to multiply within the cells
- **Amastigotes** multiply and break out and reenter the blood stream as **trypomastigotes** that invade other cells in different tissues of the body.
Human Transmission Cycle

Triatomine Bug Stages
1. Triatomine bug takes a blood meal (passes metacyclic trypomastigotes in feces, trypomastigotes enter bite wound or mucosal membranes, such as the conjunctiva)
2. Metacyclic trypomastigotes penetrate various cells at bite wound site. Inside cells they transform into amastigotes.
3. Amastigotes multiply by binary fission in cells of infected tissues.
4. Intracellular amastigotes transform into trypomastigotes, then burst out of the cell and enter the bloodstream.
5. Triatomine bug takes a blood meal (trypomastigotes ingested)
6. Epimastigotes in midgut
7. Multiply in midgut
8. Metacyclic trypomastigotes in hindgut

Human Stages
1. Metacyclic trypomastigotes penetrate various cells at bite wound site. Inside cells they transform into amastigotes.
2. Amastigotes multiply by binary fission in cells of infected tissues.
3. Intracellular amastigotes transform into trypomastigotes, then burst out of the cell and enter the bloodstream.
4. Trypomastigotes can infect other cells and transform into intracellular amastigotes in new infection sites. Clinical manifestations can result from this infective cycle.

CDC
Safer • Healthier • People™
Three species of Kissing bugs vectors commonly found in Texas.

3 most common species found in Texas

Nymphs (juveniles)

Kissing bugs develop through five stages of nymphs before becoming adults. Nymphs do not have wings, so they can walk, but they cannot fly. Only adult kissing bugs can fly.

Photos courtesy of Dr. Gabriel Hamer and Dr. Rachel Curtis-Robles, Texas A&M
Key features of non-Kissing bugs.

Wheel Bug

Leaf-footed Bug

Squash Bug

Kissing Bug-thin, straight mouth parts

Non-Kissing Bug, thick, curved mouthparts
Testing bugs

Research shows approximately 65% or more of triatomines in Texas have tested positive for the T. cruzi parasite that causes Chagas.

TX DSHS will test kissing bugs found inside of homes or associated with a human exposure.

Texas A&M will test bugs found outside the home and NOT associated with human bites.

Bugs submitted for testing will be tested for
1) the parasite and if found positive
2) a human blood meal

If positive for both parasite and human blood, the exposed person should have their blood tested for Chagas

Triatomine Testing

The Department of State Health Services, in conjunction with the U.S. Centers for Disease Control and Prevention (CDC), provides testing of Triatomine bugs for the parasite Trypanosoma cruzi. T. cruzi is the causative agent of Chagas disease in humans and potentially fatal infections in dogs and other animals. Due to laboratory workload and budget constraints at CDC, only bugs implicated in a human exposure will be accepted for testing. This free service is provided to Texas residents only.

1. Fill out the “Submitter,” “Specimen,” and “Comments” portions of the “Texas Triatomine Bug Submission Form” which can be downloaded here. If you are submitting more than one bug, you should complete a separate form for each.

2. Place the bug, dead or alive, into a pill vial or other suitable container. Do not use alcohol or other preservatives. If you are submitting more than one bug, you should place each bug into a separate container and label each container and its accompanying submission form such that we will know which container goes with which form.

3. Place the container(s), sufficiently padded if breakable, and accompanying “Texas Triatomine Bug Submission Form(s)” into a mailing tube or padded envelope and mail to:

Department of State Health Services
Attn: Zoonosis Control Branch – MC1956
P.O. Box 149347
Austin, TX 78714-9347

If you have questions please contact:
Whitney Qualls at whitney.qualls@dshs.texas.gov (512-776-2790) or
Bonny Mayes at bonny.mayes@dshs.texas.gov (512-776-2888)

Regional DSHS Zoonosis Control personnel will communicate test results to the original submitter, usually within 2 – 5 weeks of receiving the specimen (laboratory workload at CDC dictates turnaround time).

Links to Resources

CDC Website:  www.cdc.gov/parasites/chagas

Provides access to national databases with emphasis on trends, treatments, and resources/publications.
Links to resources

Provides state specific data and resources to use for education.

DSHS Website: www.dshs.state.tx.us/idcu/disease/chagas
Links to Resources

Helps provide illustrations of triatomine bugs for easier identification and elimination of similar looking insects. Also accepts bugs for testing

TAMU website: https://kissingbug.tamu.edu
Case Study Session 1

- Mother finds kissing bug in child’s bed
- "What usually happens" vs "Correct next steps"
Chagas disease is caused by a parasite called *T. cruzi* that lives in the gut of a triatomine bug (also called a “kissing bug” or “chinche beuscona”).

Chagas disease is primarily spread through contact with the contaminated feces of the Kissing Bug.

- Congenital transmission (mother-to-child) is also of concern.

Chagas is endemic in Latin America and the vector is also found in the Southern U.S.

Humans and animals can both be infected with the parasite.
Summary

- A single bite from a Kissing Bug does not mean the person is infected
  - The kissing bug must be positive for *T. cruzi* and the feces must enter the wound
- Local transmission (in the U.S.) is a possibility, but not common
- TxDSHS can test kissing bugs for *T.cruzi* if associated with a human exposure
  - If the kissing bug is positive for *T.cruzi*, a blood meal analysis will be completed to test for human blood
- Testing the exposed person for Chagas may be recommended, but waiting to be tested may be necessary

**NEXT SESSION: Chagas disease and its symptoms/treatment**

Photo from: [https://web.diarioelunodetehuacan.com/nacional/la-enfermedad-de-chagas/](https://web.diarioelunodetehuacan.com/nacional/la-enfermedad-de-chagas/)
Thank you!

**Next sessions –**

• Session 2: Chagas disease and its symptoms/treatment
  • October 30\textsuperscript{th} 11am

• Session 3: Chagas disease health threat to pregnant and reproductive age women
  • November 6\textsuperscript{th} 11am

• Session 4: Talking about Chagas disease and prevention
  • November 13\textsuperscript{th} 11am