Revisions to the Syphilis Surveillance Case Definitions, 2018: Changes Related to Reporting Clinical Manifestations

Kimberly Workowski, MD, FACP, FIDSA
Professor of Medicine, Division of Infectious Diseases, Emory University

Sarah Kidd, MD, MPH
Centers for Disease Control and Prevention

Lynn Sosa, MD
Connecticut Department of Public Health

November 7, 2017
Outline for Today’s Webinar

- Brief overview of revisions to be implemented in 2018
- Neurologic, ocular, and otic manifestations of syphilis
- Surveillance for clinical manifestations, description of new variables
- Clinical case scenarios
- Question and answer period (by text window)
Overview of Revisions for 2018
Syphilis Surveillance Case Definition Revisions 2018

- Revisions related to reporting surveillance stages
  - Discussed on Sept. 28th webinar:
    [https://cste.webex.com/cste/lslr.php?RCID=a2c301a1f806ae978eb8b57e90d28413](https://cste.webex.com/cste/lslr.php?RCID=a2c301a1f806ae978eb8b57e90d28413)

- Revisions related to reporting clinical manifestations
  - New clinical manifestations variables
Current (2014–2017) Syphilis Case Reporting

- Must report a case as one of the following surveillance stages
  - Primary
  - Secondary
  - Early Latent
  - Late Latent
  - Late with Clinical Manifestations

- Additional variable for all cases: “Neurologic involvement?”
  - Refers to Neurosyphilis case definition
  - Answered as “Yes, confirmed,” “Yes, probable,” “No,” or “Unknown”
New Clinical Manifestation Variables in 2018

- Cases still reported according to surveillance stage
  - Primary
  - Secondary
  - Early, Non-Primary, Non-Secondary
  - Unknown Duration or Late

- Any case can be reported with one or more of the following
  - Neurologic Manifestations (Verified/Likely/Possible/No/Unknown)
  - Ocular Manifestations (Verified/Likely/Possible/No/Unknown)
  - Otic Manifestations (Verified/Likely/Possible/No/Unknown)
  - Late Clinical Manifestations (Verified/Likely/No/Unknown)
Neurologic, Ocular, and Otic Manifestations of Syphilis
Neurologic Involvement can occur at any stage of syphilis.
Neurosyphilis Clinical Syndromes

• Asymptomatic
  • Early, late

• Meningeal
  • Acute syphilitic meningitis, meningovascular, cerebral, spinal

• Parechymatous
  • General paresis, tabes dorsalis, taboparesis, optic atrophy

• Gummatous
  • Cerebral, spinal

Merritt, 1946
Neuroinvasion

• Invasion of CSF by T pallidum and CSF laboratory abnormalities common among adults with primary/secondary syphilis

• Demonstrating CNS invasion
  • Pre-penicillin -“fate of every patient was decided within the first few wks of infection” (Wile, 1914)
  • Moore and Hopkins distinguished between central nervous system "invasion“ and "involvement," considering invasion to occur universally, while involvement (pathology) was less common (Moore, 1930)
  • Isolation of Tp from 12/40 patients with primary/secondary syphilis redemonstrated early CNS invasion even in the absence of CSF abnormalities in the penicillin era (Lukehart, 1988)
Neuroinvasion

• After initial spirochetal invasion during early syphilis
  • Resolve spontaneously
  • Progress to symptomatic syphilitic meningitis
    • Meningovascular syphilis
    • Tabes or paresis
    • HIV infection may accelerate the progression
  • Progression represents a continuum of changes rather than a series of discrete steps
    • In antimicrobial era, shift of presentation to meningitis and meningovascular presentation rather than paresis or tabes dorsalis
Syphilitic meningitis

• Clinical manifestations within a year of early infection

• Principal manifestations
  • cranial nerve palsies (3, 6, 7, 8)
  • increased intracranial pressure
  • sensorineural hearing loss or deafness (tinnitus often precedes hearing loss). Often normal CSF and absence of other clinical findings

• Acute syphilitic hydrocephalus

• Syphilitic meningitis with cerebral changes
  • Symptoms (seizures, aphasia, hemiplegia)
  • Clinical findings of stiff neck, confusion or delirium, papilledem
Meningovascular Syphilis

• Meningitis + infarction due to endarteritis
• May involve any part of the nervous system
• Neurologic syndromes comparable clinically to those caused by arteriosclerotic thrombotic lesions, but with less extensive infarcts

• Clinical manifestations
  • Hemiparesis, hemiplegia, aphasia, seizures
  • Psychiatric changes (personality/behavior changes, slow mentation) prior to stroke syndrome
  • Onset can be abrupt or premonitory symptoms (weeks to months) due to diffuse involvement
Meningovascular syphilis of the spinal cord

• Almost always associated with cerebral involvement
• Clinical manifestations
  • Gradual onset of weakness or paresthesia of legs, progression to paraparesis or paraplegia (often asymmetric)
  • Urinary and fecal incontinence
  • Lower extremity pain and paresthesias
• Clinical examination reveals loss of position sense and vibration in the lower extremities, with a sensory level in some persons
• Classic manifestations involve flaccid paralysis of the lower extremities, sensory level, and urinary retention
General Paresis

• Chronic process that can evolve over years due to a meningoencephalitis associated with direct Tp invasion
• Combination of psychiatric manifestations and neurologic findings that can mimic numerous other disorders
• Early features are memory loss, personality changes that progress to emotional lability, disorientation, delusions, paranoia, seizures
• Clinical features- pupillary abnormalities (Argyll Robinson), tremors, speech, handwriting, gait abnormality, decreased reflexes in lower extremity and loss of position and vibratory senses
Tabes Dorsalis, Cerebral Gummas

• Uncommon presentation in the penicillin era

• Tabes
  • Onset of tabes in the fifth and sixth decades (long latency)
  • Clinical features- lightning pains lower extremities, ataxia, urinary incontinence, paresthesias, sluggish pupillary reactivity, visual loss, ataxia, loss of vibratory sense

• Intracerebral gummas
  • Intracranial or spinal cord mass lesion
  • Recent reports in HIV +
Neurologic Manifestations in HIV Infection

• Is symptomatic neurosyphilis more common in HIV+?
  • Retrospective review of 109 cases NS in 2001-2004 (ages 19-65)
  • Rate of neurosyphilis in early syphilis in HIV+ 2.1%; HIV 0.6%

• Early neurosyphilis in HIV+ MSM
  • Syndromes (cranial nerve, meningitis, meningovascular)
  • Previous treatment 24%

• Mechanism of risk
  • Review of neurosyphilis (42 HIV+)
    • Asymptomatic n=5; Symptomatic n=37
    • 16 previously treated with benzathine pcn
      • 31% developed neurosyphilis within 6 months of early syphilis treatment
      • Increased risk of neurorelapse after standard treatment for early syphilis

Neurologic Manifestations in HIV Infection

• Neurologic complaints in persons with HIV infection patients should prompt consideration of neurosyphilis

• Visual changes, hearing loss, facial weakness, stuttering stroke

• Early forms of neurosyphilis are most common
  ▪ Acute syphilitic meningitis (CN VI, VII, VIII)
  ▪ Meningovascular (stuttering stroke)

• Ocular syphilis
  • CSF inflammation may occur or parameters may be normal
Ocular Syphilis

Clinical Advisory: Ocular Syphilis in the United States

Updated March 24, 2016

Between December 2014 and March 2015, 12 cases of ocular syphilis were reported from two major cities, San Francisco and Seattle. Subsequent case finding indicated more than 200 cases reported over the past 2 years from 20 states. The majority of cases have been among HIV-infected MSM; a few cases have occurred among HIV-uninfected persons including heterosexual men and women. Several of the cases have resulted in significant sequelae including blindness.

Ocular syphilis can involve almost any eye structure, but posterior uveitis and panuveitis are the most common. Additional manifestations may include anterior uveitis, optic neuropathy, retinal vasculitis and interstitial keratitis. Ocular syphilis may lead to decreased visual acuity including permanent blindness. Ocular syphilis can be associated with neurosyphilis. Both ocular syphilis and neurosyphilis can occur at any stage of syphilis, including primary and secondary syphilis. While previous research supports evidence of neurotropic strains of syphilis, it remains unknown if some Treponema pallidum strains have a greater likelihood of causing ocular infections.

- Clinicians should be aware of ocular syphilis and screen for visual complaints in any patient at risk for syphilis (MSM, HIV-infected persons, others with risk factors and persons with multiple or anonymous partners).
- All patients with syphilis should receive an HIV test if status is unknown or previously HIV-negative.
- Patients with positive syphilis serology and early syphilis without ocular symptoms should receive a careful neurological exam including all cranial nerves.
- Patients with syphilis and ocular complaints should receive immediate ophthalmologic evaluation.
- A lumbar puncture with cerebrospinal fluid (CSF) examination should be performed in patients with syphilis and ocular complaints.
- Ocular syphilis should be managed according to treatment recommendations for neurosyphilis (Aqueous crystalline penicillin G IV or Procaine penicillin IM with Probenecid for 10-14 days).
- Cases of ocular syphilis should be reported to your state or local health department within 24 hours of diagnosis. Ocular syphilis cases diagnosed since December 1, 2014, should be reported to your local or state health department. The case definition for an ocular syphilis case is as follows: a person with clinical symptoms or signs consistent with ocular disease (i.e., uveitis, panuveitis, diminished visual acuity, blindness, optic neuropathy, interstitial keratitis, anterior uveitis, and retinal vasculitis) with syphilis of any stage.

### TABLE 3. Clinical characteristics, laboratory results and diagnoses for syphilis and suspected ocular syphilis—eight jurisdictions, United States, 2014–2015

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>388 (100.0)</td>
</tr>
<tr>
<td>Stage of syphilis</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>9 (2.1)</td>
</tr>
<tr>
<td>Secondary</td>
<td>101 (26.0)</td>
</tr>
<tr>
<td>Early latent</td>
<td>79 (20.4)</td>
</tr>
<tr>
<td>Late or latent of unknown duration</td>
<td>193 (49.7)</td>
</tr>
<tr>
<td>Unknown</td>
<td>7 (1.8)</td>
</tr>
<tr>
<td>Additional symptoms of neurosyphilis</td>
<td>87 (22.4)</td>
</tr>
<tr>
<td>Reported ocular symptoms (among 326 with symptoms)</td>
<td></td>
</tr>
<tr>
<td>Blurred vision</td>
<td>210 (64.4)</td>
</tr>
<tr>
<td>Vision loss</td>
<td>107 (32.6)</td>
</tr>
<tr>
<td>Eye pain or red eye</td>
<td>46 (14.1)</td>
</tr>
<tr>
<td>Eye exam</td>
<td>158 (40.7)</td>
</tr>
<tr>
<td>Diagnosis (among 158 with documented eye exam)*</td>
<td></td>
</tr>
<tr>
<td>Uveitis</td>
<td>72 (45.6)</td>
</tr>
<tr>
<td>Retinitis</td>
<td>20 (12.7)</td>
</tr>
<tr>
<td>Optic neuritis</td>
<td>18 (11.4)</td>
</tr>
<tr>
<td>Retinal detachment</td>
<td>6 (3.8)</td>
</tr>
<tr>
<td>CSF analysis performed</td>
<td>188 (48.5)</td>
</tr>
<tr>
<td>CSFVDRL (among 174 with a documented result)</td>
<td></td>
</tr>
<tr>
<td>Reactive</td>
<td>122 (70.1)</td>
</tr>
<tr>
<td>Nonreactive</td>
<td>52 (29.1)</td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
</tr>
<tr>
<td>Aqueous penicillin G IV</td>
<td>230 (59.3)</td>
</tr>
<tr>
<td>Other treatment</td>
<td>146 (37.6)</td>
</tr>
<tr>
<td>No/Unknown treatment</td>
<td>12 (3.1)</td>
</tr>
</tbody>
</table>

- Conjunctivitis, scleritis, and episcleritis
- **Uveitis**: anterior and/or posterior
- Elevated intraocular pressure
- Chorioretinitis, retinitis
- Vasculitis
- No clear evidence of oculotrophic strain (Oliver, 2016)

Initial Advisory April 2015

MMWR Nov
Otrosyphilis

• Late stage otosyphilis, whether acquired or congenital can present up to 50 years after exposure

• Clinical presentation
  • Sudden hearing loss, fluctuating hearing loss, persistent or fluctuating vestibular symptoms
  • Recent review of 85 cases- insidious hearing loss, tinnitus, vertigo (Yimtae 2007)
  • May be associated with osteitis of the temporal bone
  • Similar presentation as autoimmune inner ear disease

• Secondary syphilis can present with acute labyrinthitis or vesibular neuronitis
Evaluation of CNS Involvement

• All persons with syphilis should be evaluated for neurologic symptoms/signs

• CSF examination recommended:
  • Neurologic or ophthalmic symptoms/signs
    • Auditory disease, cranial nerve dysfunction, meningitis, stroke, altered mental status, loss of vibration sense, iritis, uveitis
  • Evidence of tertiary disease
    • aortitis, gumma
  • Serologic treatment failure

• CNS invasion in early syphilis is common
  • CSF abnormalities of unclear significance in the absence of signs/symptoms

• Neurosyphilis = CSF tests + reactive RPR + signs/symptoms
Surveillance for Clinical Manifestations of Syphilis: New Variables
New Clinical Manifestations Variables

- Variables
  - Neurologic Manifestations
    - Verified, Likely, Possible, No, Unknown
  - Ocular Manifestations
    - Verified, Likely, Possible, No, Unknown
  - Otic Manifestations
    - Verified, Likely, Possible, No, Unknown
  - Late Clinical Manifestations
    - Verified, Likely, No, Unknown

- Any case can report 1 or more of these manifestations
Clinical Manifestations Variables: General Principles

- Must have evidence of syphilitic infection
  - Reactive treponemal AND nontreponemal tests

- Must have signs/symptoms (or lesions) consistent with clinical description without other known causes for these abnormalities
  - Clinical judgement, somewhat subjective

- “Possible” classification only requires the above 2 criteria be met

- “Likely” and “Verified” classifications require additional evidence
NEUROLOGIC Manifestations: Clinical Description

- Infection of the central nervous system with *T. pallidum*, as evidenced by manifestations including syphilitic meningitis, meningovascular syphilis, general paresis, including dementia, and tabes dorsalis
Neurologic Manifestations – Verified

- Reactive nontreponemal and treponemal serologic tests
  - AND

- Clinical signs/symptoms consistent with neurosyphilis without other known causes for these clinical abnormalities
  - AND

- Reactive VDRL in CSF in the absence of grossly bloody contamination of the CSF
Neurologic Manifestations - Likely

- Reactive nontreponemal and treponemal serologic tests

  AND

- Clinical signs/symptoms consistent with neurosyphilis without other known causes for these clinical abnormalities

  AND

- Elevated CSF protein (>50 mg/dL$^2$) or CSF leukocyte count (>5 white blood cells/cubic mm) in the absence of other known causes for these abnormalities
Neurologic Manifestations – Possible

- Reactive nontreponemal and treponemal serologic tests
  
  AND

- Clinical signs/symptoms consistent with neurosyphilis without other known causes for these clinical abnormalities

- *No CSF criteria*
Neurologic Manifestations: Summary

- Serologic tests + signs/symptoms $\rightarrow$ POSSIBLE

- Serologic tests + signs/symptoms + elevated CSF protein or WBCs $\rightarrow$ LIKELY

- Serologic tests + signs/symptoms + positive CSF VDRL $\rightarrow$ VERIFIED
OCULAR Manifestations: Clinical Description

- Infection of any eye structure with *T. pallidum*, as evidenced by manifestations including posterior uveitis, panuveitis, anterior uveitis, optic neuropathy, and retinal vasculitis. Ocular syphilis may lead to decreased visual acuity including permanent blindness.
Ocular Manifestations – Verified

- Reactive nontreponemal and treponemal serologic tests
  
  AND
  
- Clinical signs/symptoms consistent with ocular syphilis without other known causes for these clinical abnormalities
  
  AND
  
- Demonstration of *T. pallidum* in aqueous or vitreous fluid by darkfield microscopy, or by PCR or equivalent direct molecular methods
Ocular Manifestations – Likely

- Reactive nontreponemal and treponemal serologic tests

  AND

- Clinical signs/symptoms consistent with ocular syphilis without other known causes for these clinical abnormalities

  AND

- Findings on exam by an ophthalmologist that are consistent with ocular syphilis in the absence of other known causes for these abnormalities
Ocular Manifestations – Possible

- Reactive nontreponemal and treponemal serologic tests

  AND

- Clinical signs/symptoms consistent with ocular syphilis without other known causes for these clinical abnormalities

- No additional criteria
Ocular Manifestations: Summary

- Serologic tests + signs/symptoms → POSSIBLE

- Serologic tests + signs/symptoms
  + diagnosis by ophthalmologist → LIKELY

- Serologic tests + signs/symptoms
  + ocular fluid positive by darkfield or PCR → VERIFIED
OTIC Manifestations: Clinical Description

- Infection of the cochleovestibular system with *T. pallidum*, as evidenced by manifestations including sensorineural hearing loss, tinnitus, and vertigo
Otic Manifestations – Verified

- Reactive nontreponemal and treponemal serologic tests

  AND

- Clinical signs/symptoms consistent with otosyphilis without other known causes for these clinical abnormalities

  AND

- Demonstration of *T. pallidum* in inner ear fluid by darkfield microscopy, or by PCR or equivalent direct molecular methods
Otic Manifestations – Likely

- Reactive nontreponemal and treponemal serologic tests

  AND

- Clinical signs/symptoms consistent with otosyphilis without other known causes for these clinical abnormalities

  AND

- Findings on exam by an otolaryngologist that are consistent with otosyphilis in the absence of other known causes for these abnormalities
Otic Manifestations – Possible

- Reactive nontreponemal and treponemal serologic tests

AND

- Clinical signs/symptoms consistent with otosyphilis without other known causes for these clinical abnormalities

- *No additional criteria*
Otic Manifestations: Summary

- Serologic tests + signs/symptoms → POSSIBLE

- Serologic tests + signs/symptoms
  + diagnosis by otolaryngologist → LIKELY

- Serologic tests + signs/symptoms
  + inner ear fluid positive by darkfield or PCR → VERIFIED
LATE Clinical Manifestations: Clinical Description

- Inflammatory lesions of
  - Cardiovascular system
  - Skin
  - Bone
  - Other tissue

- Certain neurologic manifestations
  - General paresis
  - Tabes dorsalis
Late Clinical Manifestations – Verified (Part 1 – For Late Non-Neurologic Manifestations)

- Reactive nontreponemal and treponemal serologic tests
  
  AND

- Characteristic abnormalities or lesions of the cardiovascular system, skin, bone, or other tissue in the absence of other known causes of these abnormalities
  
  AND

- Demonstration of *T. pallidum* in late lesions by special stains or equivalent methods, or by PCR or equivalent direct molecular methods or by demonstration of pathologic changes that are consistent with *T. pallidum* infection on histologic examination of late lesions
Late Clinical Manifestations – Verified (Part 2 – For Late Neurologic Manifestations)

- Reactive nontreponemal and treponemal serologic tests

AND

- Clinical signs and symptoms consistent with late neurologic manifestations of syphilis (e.g., general paresis, including dementia, or tabes dorsalis) in a case that meets the criteria for verified neurologic manifestations
Late Clinical Manifestations - Likely

- Reactive nontreponemal and treponemal serologic tests AND EITHER
- Characteristic abnormalities or lesions of the cardiovascular system, skin, bone, or other tissue in the absence of other known causes of these abnormalities OR
- Clinical signs and symptoms consistent with late neurologic manifestations of syphilis (e.g., general paresis, including dementia, or tabes dorsalis) in a case that meets the criteria for likely neurologic manifestations
Summary of Clinical Manifestations Variables

- Must have reactive serologic tests + signs/symptoms (or lesions)
Summary of Clinical Manifestations Variables

- Must have reactive serologic tests + signs/symptoms (or lesions)
- Things that might indicate “VERIFIED”
  - CSF: VDRL positive (Neuro)
  - Ocular fluid: detection of *T. pallidum* by darkfield or PCR (Ocular)
  - Inner ear fluid: detection of *T. pallidum* by darkfield or PCR (Otic)
  - Tissues/lesions: detection of *T. pallidum* by stains or PCR (Late)
Summary of Clinical Manifestations Variables

- Must have reactive serologic tests + signs/symptoms (or lesions)

- Things that might indicate “VERIFIED”
  - CSF: VDRL positive (Neuro)
  - Ocular fluid: detection of *T. pallidum* by darkfield or PCR (Ocular)
  - Inner ear fluid: detection of *T. pallidum* by darkfield or PCR (Otic)
  - Tissues/lesions: detection of *T. pallidum* by stains or PCR (Late)

- Things that might indicate “LIKELY”
  - CSF: elevated protein or WBC (Neuro)
  - Ophthalmologist diagnosis of Ocular Syphilis
  - Otolaryngologist diagnosis of Otosyphilis
  - Characteristic lesions of Late Syphilis
Clinical Case Scenarios
Case Study #1

- 33 yo male presents to his primary physician with a left sided facial droop; no other findings on physical exam
- He is diagnosed with Bell’s palsy and has a work-up
- RPR is 1:64, TPPA reactive; last RPR 6 months prior was non-reactive
- Patient was appropriately treated for neurosyphilis but no lumbar puncture was done
- Case is staged as early non primary, non secondary syphilis
How Would You Report these Clinical Manifestations?

- Neurologic Manifestations- Possible
- Neurologic Manifestations- Likely
- Ocular Manifestations- Likely
- Late Clinical Manifestations- Likely
- None of the Above
Neurologic Manifestations: Summary

- Serologic tests + signs/symptoms $\rightarrow$ POSSIBLE

- Serologic tests + signs/symptoms + elevated CSF protein or WBCs $\rightarrow$ LIKELY

- Serologic tests + signs/symptoms + positive CSF VDRL $\rightarrow$ VERIFIED
Case Study #2

- 28 yo male with HIV, undetectable viral load, CD4 count = 350
- Presents to ophthalmologist with two weeks of blurry vision, mainly in the left eye
- Dilated eye exam demonstrates findings consistent with posterior uveitis
- Work-up shows EIA positive, RPR = 1:128; last RPR 9 months ago was 1:4
- Patient refuses lumbar puncture
- Case is staged as early non primary, non secondary syphilis
How Would You Report these Clinical Manifestations?

- Ocular Manifestations- Possible
- Ocular Manifestations- Likely
- Ocular Manifestations- Verified
- No clinical manifestations
Ocular Manifestations: Summary

- Serologic tests + signs/symptoms $\rightarrow$ POSSIBLE

- Serologic tests + signs/symptoms
  + diagnosis by ophthalmologist $\rightarrow$ LIKELY

- Serologic tests + signs/symptoms
  + ocular fluid positive by darkfield or PCR $\rightarrow$ VERIFIED
Case Study #3

- 28 yo male with HIV, undetectable viral load, CD4 count = 350
- Presents to ophthalmologist with two weeks of blurry vision, mainly in the left eye
- Dilated eye exam demonstrates findings consistent with posterior uveitis
- Work-up shows EIA positive, RPR = 1:128; last RPR 9 months ago was 1:4
- Lumbar puncture shows a positive VDRL
- Case is staged as early non primary, non secondary syphilis
How Would You Report these Clinical Manifestations?

- Neurologic Manifestations- Possible; Ocular Manifestations- Possible
- Neurologic Manifestations- Likely; Ocular Manifestations- Likely
- Neurologic Manifestations- Verified; Ocular Manifestations- Likely
- Neurologic Manifestations- Verified; Ocular Manifestations- Verified
Ocular Manifestations: Summary

- Serologic tests + signs/symptoms $\rightarrow$ POSSIBLE

- Serologic tests + signs/symptoms
  $+$ diagnosis by ophthalmologist $\rightarrow$ LIKELY

- Serologic tests + signs/symptoms
  $+$ ocular fluid positive by darkfield or PCR $\rightarrow$ VERIFIED
Neurologic Manifestations: Summary

- Serologic tests + signs/symptoms → POSSIBLE

- Serologic tests + signs/symptoms + elevated CSF protein or WBCs → LIKELY

- Serologic tests + signs/symptoms + positive CSF VDRL → VERIFIED
Questions and Answers
Resources

- CSTE Position Statement

- First webinar on syphilis clinical manifestations
  - [https://cste.webex.com/cste/lsr.php?RCID=a2c301a1f806ae978eb8b57e90d28413](https://cste.webex.com/cste/lsr.php?RCID=a2c301a1f806ae978eb8b57e90d28413)

- Syphilis case definition and implementation breakout session
  - NCSD Meeting, Alexandria, VA
  - November 14-17, 2017
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.

Sarah Kidd
skidd@cdc.gov

Lynn Sosa
Lynn.sosa@ct.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)