STD Cases

Elda Kong, PHN, MPH, AGPC-NP
Clinical Assistant Professor
San Francisco VA Medical Center
University of California, San Francisco
**Learning Objectives**

Upon completion of this presentation, learners should be better able to:

- Identify, test, and treat common sexually transmitted infections:
  - Chlamydia
  - Gonorrhea
  - Syphilis.
- Improve retesting for chlamydia and gonorrhea.

---

**Faculty and Planning Committee Disclosures**

Please consult your program book or Conference App.

- I have no financial relationships to disclose.

**Off-Label Disclosure**

The following off-label/investigational uses will be discussed in this presentation:

- I will discuss off label use of NAATs.

---

**CDC 2015 STD Tx Guidelines**
https://www.cdc.gov/std/treatment/
Why are we talking about STDS?

Dramatic recent increases in bacterial STI incidence in era of effective HIV treatment & prevention

- Gonorrhea: continued antimicrobial resistance
- Syphilis: incidence above pre-AIDS era in MSM, spread into heterosexual networks
- Reappearance of classics: LGV proctitis

http://www.cdc.gov/std; Pathela Sex Transm Dis 2019; WHO; Oliver Clin Infect Dis 2018; Braun DL Clin Infect Dis 2018
Syphilis in California: A focus on women

The number of infants born with congenital syphilis increased for the 5th year in a row.

70 of those infants were stillbirths, with 30 stillbirths in 2017 alone.

Slide adapted from Dr. Oliver Bacon, SFDPH
Case 1: Mr. R

- 32 year old male presenting for PREP f/u. He had 2 female partners and 1 male partner in the last month. He has a documented history of anaphylaxis to cephalosporins. Otherwise feels well and denies urogenital complaints.
- Routine STD screen: Rectal GC and CT positive
- How would you treat him?
Treatment

A. Ceftriaxone 250 mg IM once + Azithromycin 1 gram once
B. Doxycycline 100 mg BID x 7 days
C. Gentamicin 240 mg IM (or 5mg/kg IM) + Azithromycin 2 grams once
D. Doxycycline 100 mg BID x 7 days + Azithromycin 2 grams once
Gonorrhea Treatment and Test of Cure

• Doxycycline no longer recommended (leaves only Ceftriaxone + Azithromycin as recommended tx)
• For cephalosporin allergic, 2 options:
  – Gentamicin 240 mg IM (or 5mg/kg IM) w/azithromycin 2g orally OR
  – Gemifloxacin 320 mg orally with azithromycin 2g orally

• Who needs test of cure?
  – Pregnant patients
  – Patients with pharyngeal GC treated with non-ceftriaxone regimen
  – Cases of suspected treatment failure (culture and simultaneous NAAT)
  – Consider if using non-recommended or monotherapy
• In addition, all patients should have a repeat test 3 months after treatment

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/

What if he wasn’t allergic to cephalosporins?

Current Recommended Gonorrhea Treatment
Any Anatomic Site

Ceftriaxone 250mg IM x 1 + Azithromycin 1g PO x 1

This is Dual treatment for GC – add the Azithromycin or Doxycycline regardless of CT result

Example: If patient is treated empirically with azithromycin and the NAAT is GC + >= 5 days later, must repeat azithromycin in combination with ceftriaxone to meet treatment recommendations.

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/
3 month PREP f/u:

- Rectal CT NAAT is again positive and he reports that he has not had any receptive anal sex since his last visit.
- How would you treat him?

Treatment?

A. Azithromycin 1 gram
B. Doxycycline 100 mg BID x 7 days
C. Ceftriaxone 250 mg IM + Azithromycin 1 gram
D. Doxycycline 100 mg BID x 21 days
Chlamydia Treatment: Adolescents and Adults

**Recommended regimens (non-pregnant):**
- Azithromycin 1 g orally in a single dose
- Doxycycline 100 mg orally twice daily for 7 days

**Recommended regimens (pregnant*):**
- Azithromycin 1 g orally in a single dose

*Test of cure at 3-4 weeks only in pregnancy

**New Alternative Regimen (non-pregnant):**
- Doxycycline (delayed release) 200 mg QD for 7 days
  - Equally efficacious to doxycycline BID
  - Decrease GI side effects
  - More $$$

**Moved to Alternative Regimen (pregnant*):**
- Amoxicillin 500 mg po TID x 7 days
  - CT persistence documented in vitro after treatment prompted removal from recommended to alternate

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/
Azithromycin versus Doxycycline for Urogenital Chlamydia

- RCT comparing azithromycin with doxycycline
- Directly observed treatment of urogenital chlamydia among adolescents in youth correctional facilities
- Primary end point was treatment failure at 28 days after treatment imitation
  - Treatment failure determined on basis of NAAT, sexual history, and genotyping of CT strains
- Efficacy:
  - Azithromycin 97% effective
  - Doxycycline 100% effective

*Geisler et al. NEJM 2015;373:2512-21*

Is Azithro Adequate Treatment for Rectal Chlamydia Infection?

<table>
<thead>
<tr>
<th>Population MSM in Seattle</th>
<th>Treatment</th>
<th>Repeat positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N=407)</td>
<td>Azithro 1 g</td>
<td>22%</td>
</tr>
<tr>
<td>(N=95)</td>
<td>Doxy 100 mg BID x 7 days</td>
<td>8%</td>
</tr>
</tbody>
</table>

- Meta-analysis pooled efficacy 82.9% for azithromycin 1g PO x 1, 99% for doxycycline 100 mg PO BID x 7days but all observational
- Not randomized
- Varying times to test of cure
- Low rates of follow-up
- Australian, European guidelines have moved to doxycycline
- US CDC treatment guidelines remain azithromycin 1g PO x 1
- RCT in progress!

Is Azithro Adequate Treatment for Rectal Chlamydia Infection?

<table>
<thead>
<tr>
<th>Population MSM in Seattle</th>
<th>Treatment</th>
<th>Repeat positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N=407)</td>
<td>Azithro 1 g</td>
<td>22%</td>
</tr>
<tr>
<td>(N=95)</td>
<td>Doxy 100 mg BID x 7 days</td>
<td>8%</td>
</tr>
</tbody>
</table>

Use doxy for recurrent rectal CT!


Gonorrhea Treatment is one of CDC’s key strategies to reducing risk of resistant *Neisseria gonorrhoeae*

Antibiotic Resistance Threats in the United States, CDC 2013
Routine gonorrhea surveillance: Seven isolates from Honolulu with high level azithromycin resistance.

Monotherapy with macrolides or fluoroquinolones not recommended.

Very Concerning: Five of seven also with reduced susceptibility to ceftriaxone (first cases documented in US).

No treatment failures yet in U.S. with CDC recommended dual treatment.
Recommend PrEP for people diagnosed with an STD

- Rectal GC or CT: 1 in 15 MSM were diagnosed with HIV within 1 year.*
- Primary or Secondary Syphilis: 1 in 18 MSM were diagnosed with HIV within 1 year.**
- No rectal STD or syphilis infection: 1 in 53 MSM were diagnosed with HIV within 1 year.*

Case 2: Mr. P

- 47 y/o male w/HIV (CD4 600/VL UD) and hypertension present in urgent care:
  - CC: “I think I pulled my groin muscle.”
  - Believes around 3 days ago he developed worsening pain at his right groin.
  - The pain is so severe that he is unable to sleep at night.
  - Aggravated with bending and lifting. Not reducible
  - Subjective fevers and also BRBPR, which he attributes to his hemorrhoids.
  - Sex with men and women.
  - Occasionally smokes methamphetamines
  - Works in construction and exercises daily.
Physical Exam:

- VSS

Radiology:
Which of the following is most likely to be the cause of this patient’s illness?

A. Chlamydia trachomatis
B. Treponema pallidum
C. Hemophilus ducreyi
D. Herpes simplex virus

Source: https://api.cvent.com/polling/v1/api/polls/sp-
Lymphogranuloma Venereum (LGV)

<table>
<thead>
<tr>
<th>Incubation Period</th>
<th>Clinical Signs and Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>3 to 12 days</td>
</tr>
<tr>
<td></td>
<td>Genital ulcer that heals on its own; no accompanying symptoms</td>
</tr>
<tr>
<td>Secondary</td>
<td>2 to 6 weeks</td>
</tr>
<tr>
<td></td>
<td>“Groove” sign that may form buboes, which are unilateral painful inguinal lymph nodes that can rupture. Accompanying proctitis symptoms.</td>
</tr>
<tr>
<td>Late</td>
<td>&gt;6 weeks</td>
</tr>
<tr>
<td></td>
<td>Elephantiasis, Frozen pelvis, Strictures, Infertility</td>
</tr>
</tbody>
</table>

**C. Trachomatis serovars L1, L2, or L3**

Zenilman, JM. Lymphogranuloma venereum. In: UpToDate, Post, TW (Ed), UpToDate, Waltham, MA, 2019

What diagnostics do you order next?

A. Serology  
B. Nucleic Acid Amplification Testing  
C. Skin Testing  
D. Culture
Trick question...there is no validated test!

- Diagnosis is based on clinical suspicion and exclusion of other etiologies of proctocolitis, inguinal lymphadenopathy, or genital or rectal ulcers.
- Genital lesions, rectal specimens, and lymph node specimens (i.e. lesion swab or bubo aspirate) can be tested for C. trachomatis by culture, direct immunofluorescence, or nucleic acid detection.
- NAATs for C. trachomatis (but not FDA approved)
- PCR based genotyping (LGV vs non-LGV)
- Chlamydia serology (complement fixation titers or microimmunofluorescence titers)

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/
How should we treat?

A. Ceftriaxone 250mg IM once + Azithromycin 1 gram once
B. Azithromycin 1 gram once
C. Doxycycline 100 mg bid x 7 days
D. Doxycycline 100 mg bid x 21 days
Treatment

<table>
<thead>
<tr>
<th>Recommended Regimen</th>
<th>Doxycycline 100 mg BID x 21 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative Regimen</td>
<td>Erythromycin 500 mg QID x 21 days</td>
</tr>
</tbody>
</table>

***azithromycin 1 g orally once weekly for 3 weeks is likely effective (JL Blanco et al, CROI 2019, Oral Abstract 845)

***Pregnant and lactating women should be treated with erythromycin. Doxycycline should be avoided in the second and third trimester of pregnancy because of risk for discoloration of teeth and bones, but is compatible with breastfeeding

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/

When do you treat for presumptive LGV?

- Bloody rectal discharge, perianal ulcers, or mucosal ulcers among MSM with acute proctitis and either a positive rectal chlamydia NAAT or HIV infection*
- Typically deep ulcers when directly visualized
- Genital lesions may be associated with LAN (“groove sign”), bubo formation

*5-30% symptomatic rectal CT (i.e. CT proctitis is LGV)

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/
Follow up and Counseling

- Repeat testing (by rectal NAATS) in 3 months due to high rates of reinfection
- Return for evaluation if symptoms persist or recur after treatment
- Refer sex partners from the past 60 days for evaluation
- Avoid sex for at least 7 days and until partners are evaluated and treated

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/

Case 3

- Mr. S is a 40 year old male w/substance use disorder (methamphetamine), h/o homelessness, PMH presenting to eye clinic:
  - CC: “Harder for me to see the past 3 month.”
    - For the past 3 months both of his eye has have been red and irritated w/his vision “going in and out.”
    - In the past 2 weeks lost vision in his right eye.
    - Sexually active w/men. Last sexual active x 4 months ago.
    - Last used methamphetamines x 1 day ago.
    - Last negative HIV test was 2 years ago.
Ophthalmology Exam

Hicks, C.B. & Clement, M. Syphilis: Epidemiology, pathophysiology, and clinical manifestations in HIV uninfected patients. In: UpToDate, Post, TW (Ed), UpToDate, Waltham, MA, 2019.

Ocular Syphilis

Clinical Manifestations:
- Conjunctivitis, scleritis, episcleritis
- Uveitis: anterior and posterior or “panuveitis”
- Elevated IOP
- Chorioretinitis, retinitis
- Optic neuritis
- Vasculitis

Symptoms:
- Eye Pain
- Red eye
- Floaters
- Flashes of light
- Visual loss
Labs Results:

- HLA-B27: pending
- ACE level: pending
- Quantiferon: pending
- Chest x-ray: pending
- Syphilis CIA: reactive
- RPR: Reactive, titer >1: 512
- TP-PA: Reactive
- HIV: presumptive positive

Ophthalmology pages ID….what do you do next?

Syphilis Serologic Screening Algorithms

**Traditional**

1. Quantitative RPR
   - RPR+
   - RPR-
   - TP-PA or other trep test
     - TP-PA+ Syphilis (past or present)
     - TP-PA- Syphilis unlikely

**Reverse Sequence**

1. EIA or CIA
   - EIA/CIA+
   - EIA/CIA-
   - Quantitative RPR
     - RPR+
     - RPR-
     - TP-PA or other trep test
       - TP-PA+ Syphilis (past or present)
       - TP-PA- Syphilis unlikely

What do you do next?

A. Perform lumbar puncture
B. Start empiric therapy for neurosyphilis
C. Treat for neurosyphilis independent of LP results
D. All of the above

Source: https://api.cvent.com/polling/v1/api/polls/sp-
Ocular Syphilis Management

- Patients with suspected ocular syphilis should receive a lumbar puncture and be treated for neurosyphilis
  - CSF may be normal, but obtain to help guide follow up
  - Note: a negative LP does not rule out ocular syphilis
  - Treatment for ocular syphilis is IV PCN (neurosyphilis regimen) even if the CSF lab tests are negative

  Work closely with the ophthalmologist!

When to perform an LP?

- Clinical signs of neurosyphilis
  - Aseptic meningitis, stroke, acute or chronic altered mental status, auditory, or ophthalmic abnormalities (Ocular and Oto-syphilis ARE neurosyphilis)
  - Auditory and visual symptoms concerning as hearing and visual loss may be irreversible if diagnosis is delayed
- Evidence of active tertiary syphilis (aortitis and gumma)
- Confirmed serologic treatment failure

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/
Lumbar Puncture:

<table>
<thead>
<tr>
<th>RESULT</th>
<th>UNITS</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>COLORLESS</td>
<td>REF: COLORLESS</td>
</tr>
<tr>
<td>WBC</td>
<td>32 #/CMM</td>
<td>0-5</td>
</tr>
<tr>
<td>RBC</td>
<td>0 #/CMM</td>
<td>REF:0</td>
</tr>
<tr>
<td>NEUTROPHILS, SEG %</td>
<td>3 %</td>
<td>0-6</td>
</tr>
<tr>
<td>LYMPHOCYTES, %</td>
<td>94 %</td>
<td>40-80</td>
</tr>
<tr>
<td>MONOS/MACR/HISTIO, %</td>
<td>3 %</td>
<td></td>
</tr>
<tr>
<td>APPEARANCE</td>
<td>CLEAR</td>
<td></td>
</tr>
<tr>
<td>GLUCOSE</td>
<td>41 MG/DL</td>
<td></td>
</tr>
<tr>
<td>PROTEIN</td>
<td>91 MG/DL</td>
<td>12-60</td>
</tr>
<tr>
<td>VDRL</td>
<td>pending</td>
<td>Non reactive</td>
</tr>
</tbody>
</table>

Neurosyphilis Diagnostic Criteria

• Identification of T. palladium in CSF of CNS tissue by PCR, animal inoculation, DFA, or history (non routinely done in clinical practice)

• Clinical suspicion of neurosyphilis and
  – Positive CSF VDRL (this is considered “confirmed”) OR
  – Abnormal CSF WBC >5 cells/ul* or CSF protein >40 mg/dl (this is considered probable)

* Note: There may be a mild elevation of CSF WBC due to HIV itself, so a more appropriate diagnostic criterion for neurosyphilis in patients with HIV is >10 - 20 WBC/u in patients.

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/
Neurosyphilis Treatment

- Aqueous penicillin G 3-4 million units IV q4h for 10-14 days
- If there is a high suspicion for neurosyphilis and the patient is being referred elsewhere for lumbar puncture, recommend giving benzathine penicillin G 2.4 million units IM once before the patient leaves clinic, in case she/he is lost to follow up. This treats concomitant early syphilis and renders the patient noninfectious.

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/

Don’t Forget!

- Jarisch-Herxheimer Reaction
  - Acute febrile reaction often times accompanied by headache, myalgia, fever, and other symptoms that can occur within the first 24 hours after the initiation of any therapy
  - Most common in secondary syphilis

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/
Which stage of syphilis does ocular syphilis occur?

A. Primary  
B. Secondary  
C. Tertiary  
D. Latent  
E. All of the above

Insert Web Page

This app allows you to insert secure web pages starting with https:// into the slide deck. Non-secure web pages are not supported for security reasons.

Please enter the URL below.

https://api.cvent.com/polling/v1/api/polls/sp39wt6e

Note: Many popular websites allow secure access. Please click on the preview button to ensure the web page is accessible.
Syphilis

Easy to diagnose and treat - if you think of it. The consequences of a missed diagnosis are horrible.

"When it comes to syphilis, suspect your grandmother." — Dr. Oliver Bacon

Primary
- It doesn't hurt, so that makes it just a zipper cut!
- Don't miss syphilis!
- hard
- painless
- sharp borders

Even people who should know better are likely to overlook the primary chancre.

Secondary
- Uh, I never had a sore...
- Don't miss syphilis!
- General paresis simulates chronic depressive illness.
- Syphilis can do lots more.

Tertiary
- Uh, I never had VD...

Timeline and infectivity: early through late disease

<table>
<thead>
<tr>
<th>STAGE</th>
<th>STARTS</th>
<th>LASTS (untreated)</th>
<th>Other see</th>
<th>Infectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>10-14d after inoculation (median time 2-3)</td>
<td>1-6 weeks</td>
<td>* Papular Chancre</td>
<td>* Infectious by direct contact or blood</td>
</tr>
<tr>
<td>Secondary</td>
<td>2-6 weeks after chancre heals or 4-8 weeks after onset of chancre can overlap with early</td>
<td>~Several weeks</td>
<td>* Erythematous, bilateral rash</td>
<td>* Infectious by direct contact (when mucosal lesions present) or blood</td>
</tr>
<tr>
<td>Early Latent</td>
<td>After resolution of chancre symptoms</td>
<td>Until 1 year after inoculation</td>
<td>* Neurologic meningitis, ocular, otitis</td>
<td>* Infectious by direct contact (when mucosal lesions present) or blood</td>
</tr>
<tr>
<td>Late Latent</td>
<td>1 year after inoculation</td>
<td>Until treatment or development of late symptomatic disease</td>
<td>* General paresis (CNS parenchyma)</td>
<td>* Infectious by blood</td>
</tr>
<tr>
<td>Late Symptomatic</td>
<td>15-25 years after inoculation</td>
<td>Until treatment</td>
<td>* Tabes dorsalis (posterior columns: sensory/proximal)</td>
<td>* Cardiac (aortitis, infection)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Latent benign (gummatous)</td>
<td></td>
</tr>
</tbody>
</table>

Slide adapted from Dr. Oliver Bacon
5 days later...

- VDRL (CSF) Reactive 1:256
- CD4: 362/22%
- HIV Viral Load: 36644 copies/ml
- HIV antibody confirmatory positive
- Cryptococcus antigen: negative
- CMV DNA negative

......Started on ART and discharged home!

6 months later...

- Mr. S underwent two retinal detachment repairs and both failed.
- Lost to follow up.
- He returns to clinic today and reports he started his ART 1 month ago.
- A third retinal detachment repair is planned and the ophthalmologist calls you and asks if he his syphilis is adequately treated.
- How do you know?
Do you repeat a lumbar puncture?

- If CSF pleocytosis was present initially, a CSF examination should be repeated every 6 months until the cell count is normal.
- Follow up CSF examinations can be used to evaluate changes in the CSF-VDRL or CSF protein after therapy, however changes in these two parameters occur more slowly than cell counts and persistent abnormalities are less important.
- Leukocyte count is a sensitive measure of the effectiveness of therapy.
- If the cell count does not decrease after 6 months, or if the CSF cell count or protein is not normal after 2 years, retreatment is indicated.

Labs

- Serum RPR 1:256
- HIV VL: UD
- CD4: 644/34%
### Labs

<table>
<thead>
<tr>
<th>Result</th>
<th>Units</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>COLORLESS</td>
<td>REF: COLORLESS</td>
</tr>
<tr>
<td>WBC</td>
<td>5 #/CMM</td>
<td>0-5</td>
</tr>
<tr>
<td>RBC</td>
<td>2 #/CMM</td>
<td>REF:0</td>
</tr>
<tr>
<td>NEUTROPHILS, SEG %</td>
<td>3 %</td>
<td>0-6</td>
</tr>
<tr>
<td>LYMPHOCYTES, %</td>
<td>92 %</td>
<td>40-80</td>
</tr>
<tr>
<td>MONOS/MACR/HISTIO, %</td>
<td>3 %</td>
<td></td>
</tr>
<tr>
<td>APPEARANCE</td>
<td>CLEAR</td>
<td></td>
</tr>
<tr>
<td>GLUCOSE</td>
<td>54 MG/DL</td>
<td></td>
</tr>
<tr>
<td>PROTEIN</td>
<td>51 MG/DL</td>
<td>12-60</td>
</tr>
<tr>
<td>VDRL</td>
<td>1:8</td>
<td>Non reactive</td>
</tr>
</tbody>
</table>

### Persons with HIV infection

**Diagnostic Considerations:**
- Post treatment serologic titers higher than expected
- False negative serologic titers and/or delayed appearance of seroreactivity
- Serologic titers may decline slower in HIV infected patients if NOT on ART or low CD4

**Treatment Considerations**
- Increased risk for neurologic complications and higher rates of serologic treatment failure
- ART improves clinical outcomes!

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/
Does he need to be retreated for neurosyphilis?

A. Yes
B. No
C. Maybe
**Follow up/ Determining response to treatment:**

- Repeat nontreponemal titer at 3, 6, 9, 12, 24 months
- Serologic Rx failure: confirmed failure to achieve 4 fold decline in 12 months; sustained 4-fold rise in titer in absence of repeat infection
- The NON-treponemal titer of many, but not all, patients treated for early syphilis will revert to zero
- Some patients will achieve a 4-fold drop in titer, but remain NTT-reactive (serofast)
- It has been observed that serofast titers can be higher in some HIV (+) vs HIV (-) patients.

**Slow response or non-response:**

- 15-27% of patients with early syphilis fail to achieve a four fold decline in titers after 12 months, irrespective of HIV infection status
- Declines are slower for late vs early syphilis; and in patients with a prior history of syphilis
- If inadequate response if confirmed: CSF to look for neurosyphilis
  - If (+): treat
  - If (-): 3 weekly dose of 2.4 MU benzathine PCN, and stop

CDC 2015 STD Tx Guidelines https://www.cdc.gov/std/treatment/
What is our plan for Mr. S?

- Do not plan to retreat for neurosyphilis for now
- Repeat serum RPR in 3 months
- 3rd retinal repair surgery is scheduled!

Fantastic STD Clinical and CME Resource:

University of Washington, National Network of STD Clinical Prevention Training Centers http://www.std.uw.edu/
THE guide for STD treatment

http://www.cdc.gov/std/tg2015/

CDC Treatment Guidelines App for iOS and Android
Available now, FREE!
(accept no competitors)

ACTHIV 2019: A State-of-the-Science Conference for Frontline Health Professionals

Thank you!

- Dr. Harry Lampiris
- Dr. Stephanie Cohen
- Dr. Julie Stoltey
- Dr. Oliver Bacon
- San Francisco Department of Public Health
- San Francisco Department of Veterans Affairs Infectious Disease Clinic Staff and Patients
Activity Code FM975

ACTHIV 2019: A State-of-the-Science Conference for Frontline Health Professionals