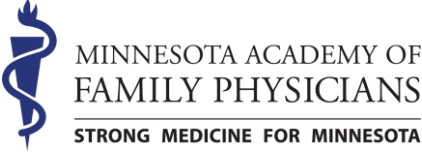


# Opioid Use Disorder Education and Treatment ECHO Series

## Session 9 – Infectious Complications

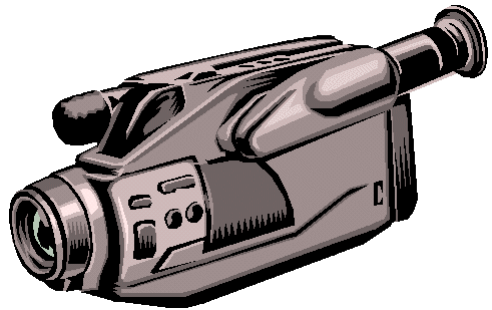
March 15, 2022

Kurt DeVine, MD, and Heather Bell, MD  
Family Medicine and Addiction Physicians



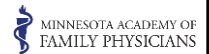
# Announcements





## SESSIONS ARE RECORDED

2



2

## YES, THERE'S *FREE* CME

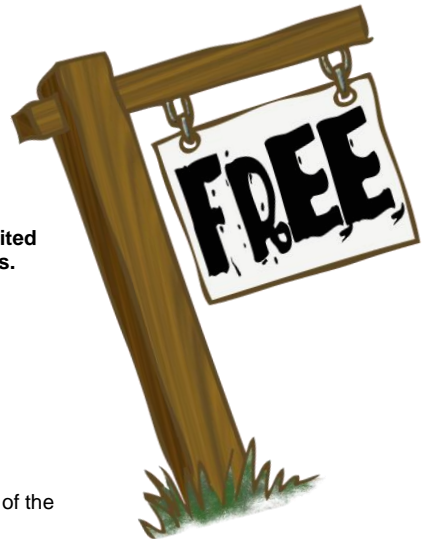
This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Minnesota Medical Association (MMA) through the joint providership of Stratis Health and the Minnesota Academy of Family Physicians. **Stratis Health is accredited by the MMA to provide continuing medical education for physicians.**

Stratis Health designates this educational activity for a maximum of **1 AMA PRA Category 1 Credits™**.

Physicians should claim credit commensurate with the extent of their participation in the activity.

### **Continuing Education Credits and Contact Hours for Other Health Professionals**

The OUD Education and Treatment ECHO Series may meet continuing education requirements for your focus. It is the responsibility of the individual to determine if this activity fulfills that requirement.



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## Attendance

- Please chat us the names of people on ECHO if there are multiple people in your room!
- “Re-name” your self so we know who’s here!
- Please turn your video on!
  - Human connection!
  - And we do NOT care if you are eating!



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## Case Presentations!

The ECHO model is based on case-based learning! The case presentation form is on the MAFP website and also on the announcements email!

\*\*\*BUT feel free to present in any de-identified format!\*\*\*

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## Upcoming Tuesday ECHO Sessions

- **Tuesday, April 5, 2022:** The Emergency Department's Role
- **Tuesday, April 19, 2022:** OUD and Benzodiazepines
- **Tuesday, May 3, 2022:** OUD and EtOH
- **Tuesday, May 17, 2022:** OUD and Stimulants
- **Tuesday, June 7, 2022:** OUD and Pregnancy

## Upcoming Wednesday ECHO Sessions

- **Wednesday, March 16, 2022:** Contingency Management  
Dr Sarah Spencer- Alaska
- **Wednesday, March 23, 2022:** Promising Treatments for SUD  
Dr. Ivan Montoya- NIDA
- **Wednesday, March 30, 2022:** CBT for Chronic Pain  
Murray McAllister- Courage Kenny
- **Wednesday, April 6, 2022:** Fentanyl Part 3  
Dr. Charlie Reznikoff- Hennepin Healthcare

# “The Addiction Connection Podcast”

Weekly addiction topics- Tuesday release day!

[www.buzzsprout.com/954034](http://www.buzzsprout.com/954034)

(Or anywhere you get your podcasts!)

Email us questions:

theaddictionconnectionpodcast@gmail.com



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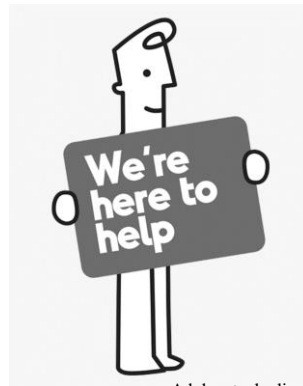
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## TECHNICAL ASSISTANCE

- **We are ALWAYS here for you!!!**
  - Program implementation
  - Inductions
  - Difficult cases
  - Trouble-shooting
  - Anything!
- **Call us anytime:**
  - Heather Bell: 320-630-5607
  - Kurt DeVine: 320-630-2507



Adobe stock clipart

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## Objectives

- Identify multiple ways that patients who inject drugs increase their risk of many infections.
- Understand the significant burden of Hepatitis C in patients who inject drugs.
- List the different types of superficial infections related to injecting drugs and which are most common.
- Analyze the harm reduction techniques that can be used to mitigate risks of bacterial and viral infections

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## Background

- ~5% of the global population (200 million people) use illicit drugs
  - 8.2% of US population (~19.5 million) 12 and older use illicit drugs in the previous 12 months
- 13 million IVDU worldwide

\*Data based on World Health Data 2005



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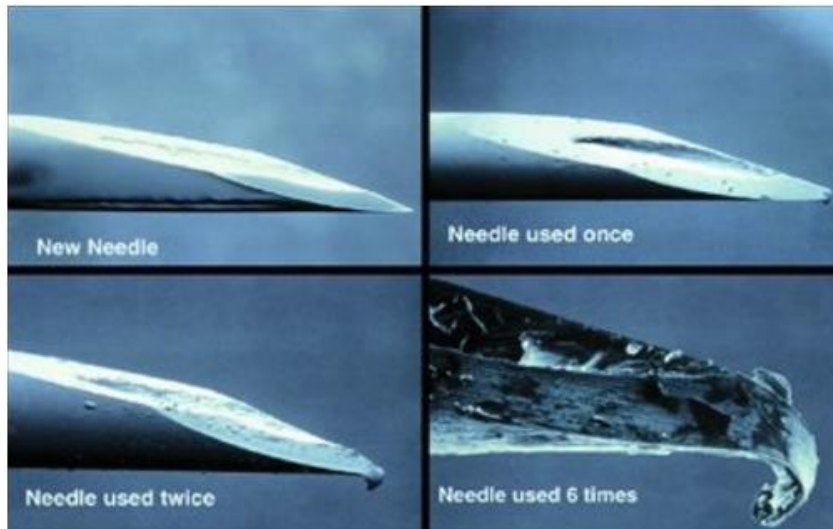
# The Patient's Perspective

## The Injection Process

- Lack of any of the following can lead to infections:
  - Clean surface
  - Wash hands
  - Mix drug (“cooking”)
  - Draw through filter (also called a rinse)
    - Don't share rinses
    - Discuss risk of re-using
  - Find site, clean skin
  - Tourniquet
  - Inject (don't lick needle!)
  - Band-aid



## Re-Using Syringes = Infections



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## What Infections are People Who Inject Drugs At Risk For?

- Viruses
  - Hepatitis C
  - Hepatitis A
  - Hepatitis B
  - HIV
- Bacteria (skin, oral flora)
  - Cellulitis (Skin/Soft Tissue)
  - Abscess
  - Osteomyelitis
  - Endocarditis
  - Pulmonary
  - Rare

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# Viruses

## What Infections are People Who Inject Drugs At Risk For?

- Viruses
  - **Hepatitis C**
  - Hepatitis A
  - Hepatitis B
  - HIV
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  - Abscess
  - Osteomyelitis
  - Endocarditis
  - Pulmonary
  - Rare

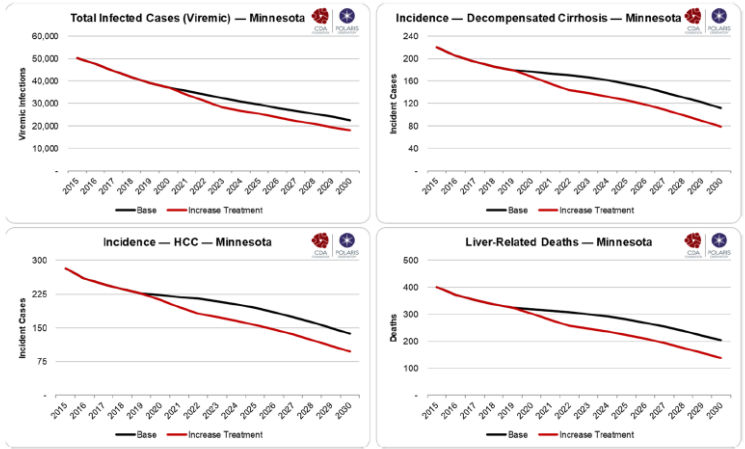
## Hep C

- CDC: 81% of HCV burden in US is attributable to IDU (IV Drug Use)
- As of Dec. 31, 2018:  $\geq 33,856$  persons reported to MDH with chronic hepatitis C virus (HCV) infection
- In MN, as of 1/1/2020, access to curative medications (direct acting antivirals) has increased

## Hep C cont.

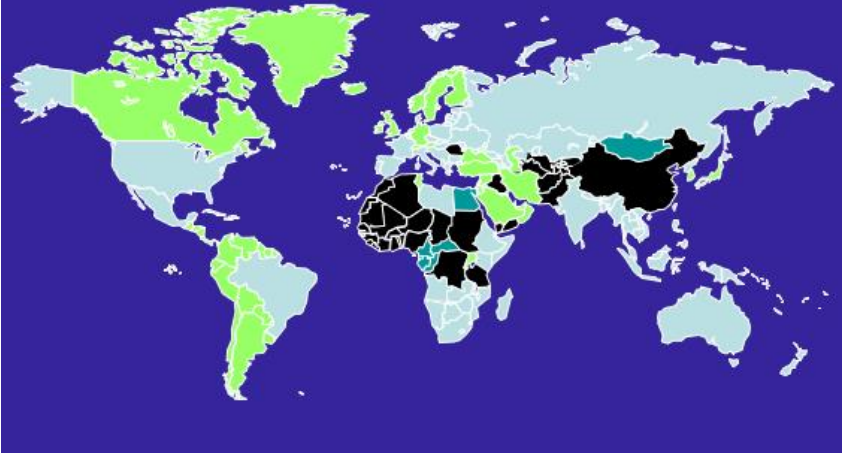
- A microscopic droplet of blood on a spoon can carry Hep C for 3 weeks
- For every one person with Hepatitis C who injects drugs, data suggests it is spread to 2 new people per year (~ 243 new infections in 5 years).

This scenario would reduce total viremic infections, as well as incident DC, HCC and LRDs by 65% by 2030



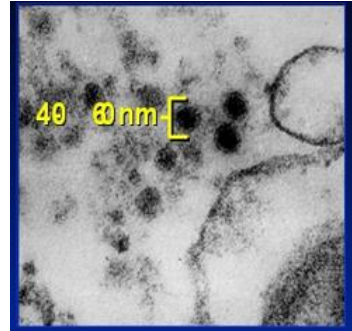
This scenario would achieve the WHO mortality target and avert 300 cases of DC, 370 cases of HCC and 590 liver related deaths

## Estimated 70 Million Persons With HCV Infection Worldwide



## Hepatitis C Virus

- Nucleic Acid: 9.6 kb ssRNA
- Classification: Flaviviridae, Hepacivirus
- **Genotype: 1 to 6**
- Enveloped

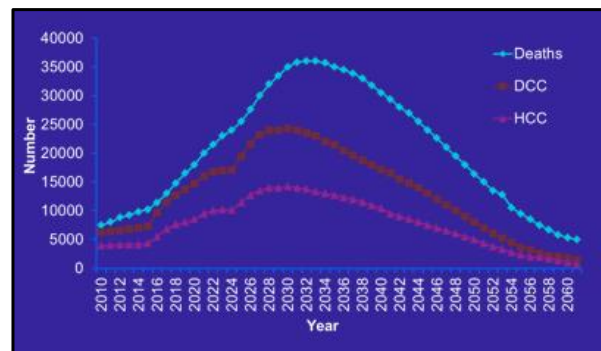


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## Future Burden of Hepatitis C Related Morbidity and Mortality in the US

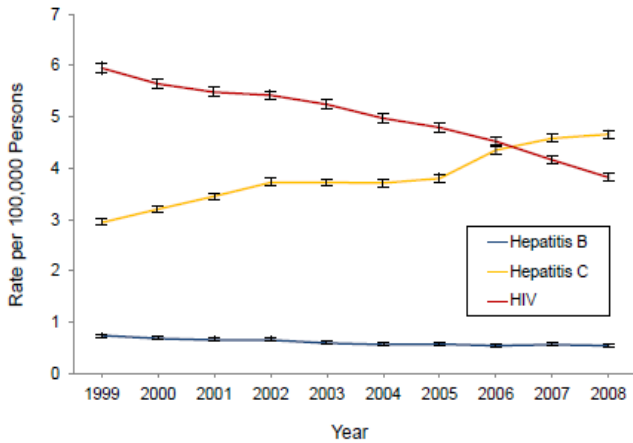
- Markov model of health outcomes
  - Of 2.7 M HCV infected persons in primary care
    - 1.47 M will develop cirrhosis
    - 350,000 will develop liver cancer
    - 897,000 will die from HCV-related complications



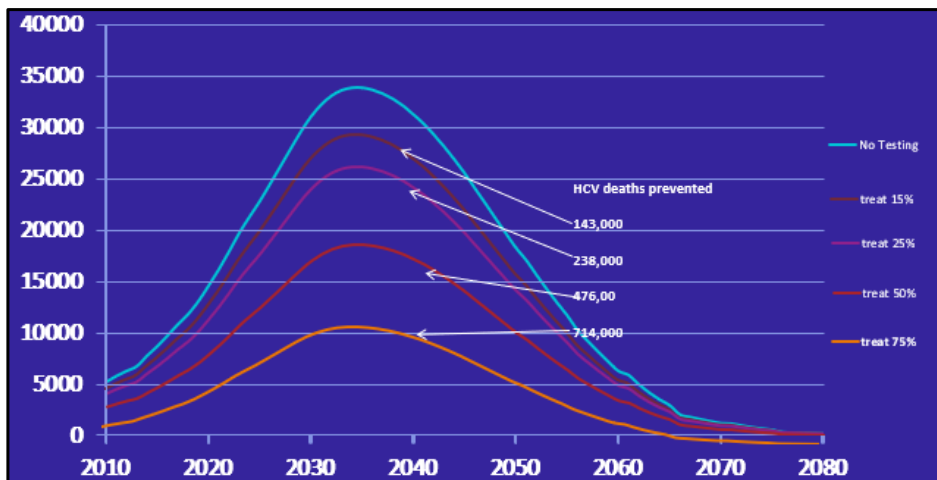
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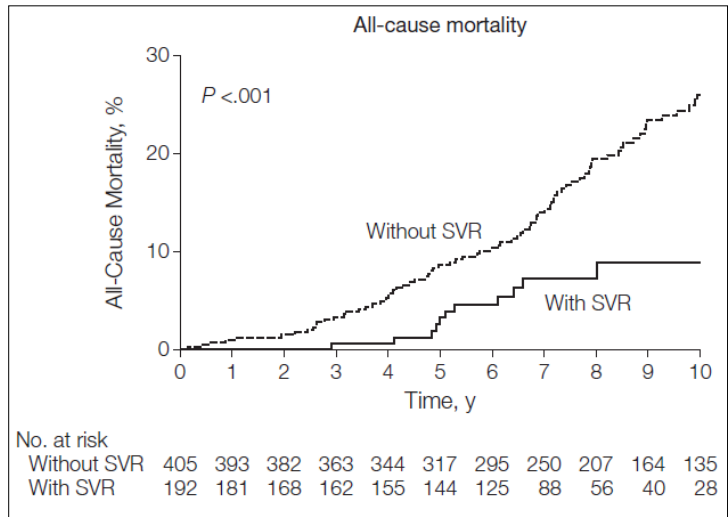
## Mortality Associated with Hepatitis B, Hepatitis C, and HIV- United States, 1999 – 2008



## Potential Impact on Future Burden of Hepatitis C Related Mortality in the US



## Treatment Reduces **All-Cause Mortality** in Patients With Advanced Fibrosis



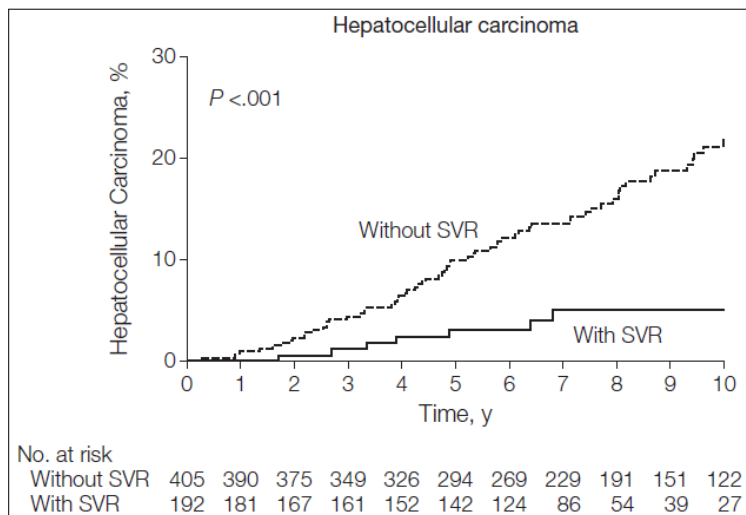
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## Impact of Treatment on **HCC**



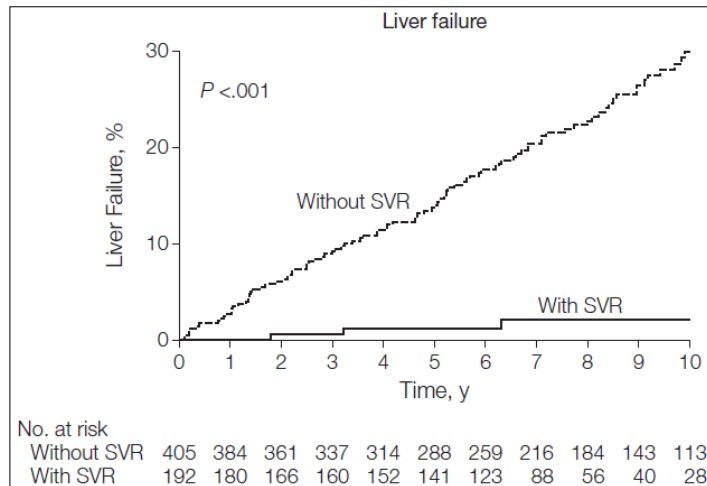
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## Impact of Treatment on *Liver Failure*



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## Approach to the Patient with Newly Diagnosed HCV

- Patients need to be educated on
  - The natural history of disease
  - Modes of transmission of
  - How to avoid transmission to family members
  - The availability of effective treatment
  - The promise of new highly effective and safe interferon free treatments in the near future

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## Additional Measures for Newly Diagnosed Patients with HCV

- Vaccinate for hepatitis A and hepatitis B
- Counsel for weight loss if appropriate. Obesity increases likelihood of liver fibrosis
- Recommend avoiding doses of acetaminophen exceeding 1-2 grams per day
- Determine presence or absence of cirrhosis
- NSAIDs should be avoided in patients with advanced fibrosis or cirrhosis

## Diagnosis of Cirrhosis Changes Approach to Patients with HCV

- Screen for HCC every 6 months
- Evaluate for esophageal varices with endoscopy
- Avoid all hepatotoxic drugs
- Avoid use of aminoglycosides for treatment of infections
- Screen for depression



## Measures to Avoid Transmission of Hepatitis C

- Avoid sharing razors or toothbrushes
- Cover bleeding wounds
- Stop injection drug use
- Advise not to share needles and paraphernalia
- Advise not to donate blood, organs, tissue or semen

## Sexual Transmission of HCV

- Risk of sexual transmission is low in monogamous heterosexual relationships
- Many experts do not recommend barrier protection for couples that are in a monogamous long-term relationship
- Patients with multiple sexual partners, and patients with HIV should use barrier protection

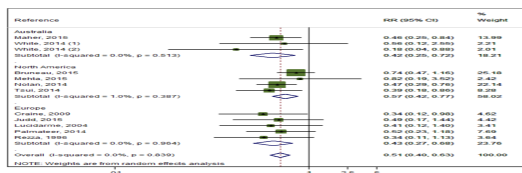
# Hepatitis C and Alcohol

- Hepatitis C Infection Rates in Alcoholics are Significantly Higher Than Controls
- Alcohol Use in Patients with HCV Infection Increases Fibrosis Progression Rate, Risk for Liver Cancer and Overall Mortality
- Abstinence from Alcohol is Recommended
- Educate on Synergistic Damage to liver by Alcohol and HCV
- Refer to Alcohol Rehab Programs if appropriate

Coelho-Little ME: Alcohol Clin Exp Res. 1995;19(5):1173  
 Chen CM: Alcohol Clin Exp Res. 2007;31(2):285  
 Delarocque-Astagneau E: Ann Epidemiol. 2005;15(8):551  
 Hassan MM: Hepatology. 2002;36(5):1206



## Impact of Needle Syringe Programs and Opioid Substitution Therapy on HCV Transmission

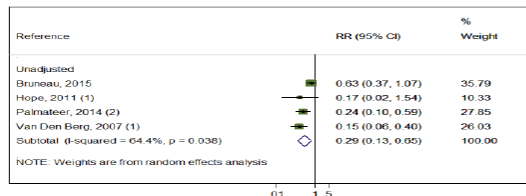


### Current OST

12 studies:  
 6361 participants  
 1030 HCV cases

50% reduction in HCV

Little heterogeneity



### High NSP with OST

4 studies  
 3356 participants  
 518 HCV cases

71% reduction in HCV

moderate heterogeneity

## What Infections are People Who Inject Drugs At Risk For?

- Viruses
  - Hepatitis C
  - **Hepatitis A**
  - Hepatitis B
  - HIV
- Bacteria (skin, oral flora)
  - Cellulitis (Skin/Soft Tissue)
  - Abscess
  - Osteomyelitis
  - Endocarditis
  - Pulmonary
  - Rare

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## Hepatitis A

- Vaccine preventable
- Currently nation-wide epidemic
- Indirectly related to IVDU:
  - Spread by poor hygiene
  - Housing insecure communities the main population impacted
- One vaccine is >90% effective
- Give vaccine!

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## What Infections are People Who Inject Drugs At Risk For?

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  - Hepatitis C
  - Hepatitis A
  - **Hepatitis B**
  - HIV
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  - Cellulitis (Skin/Soft Tissue)
  - Abscess
  - Osteomyelitis
  - Endocarditis
  - Pulmonary
  - Rare

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## Hepatitis B

~20%

- Vaccine preventable
- Data:
  - In 2017: 3,409 cases of acute hepatitis B were reported to CDC
  - As of Dec. 31, 2018, 25,335 people in MN with chronic hep B
  - In 2000: US: highest incidence of new hepatitis B infection among people who inject drugs aged 15 to 29.
- Treatment is NOT curative

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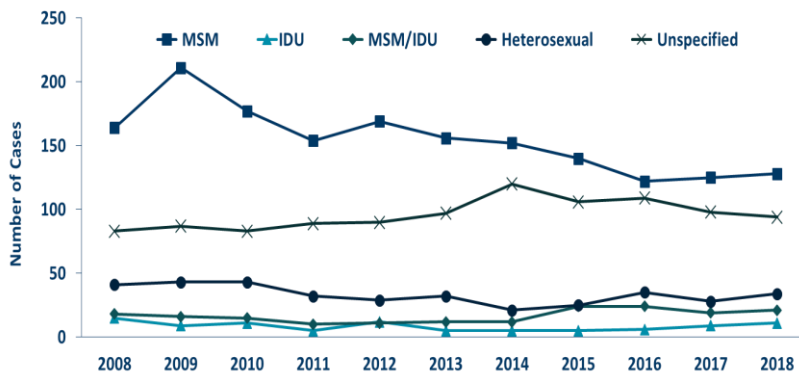
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# What Infections are People Who Inject Drugs At Risk For?

- Viruses
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  - Hepatitis A
  - Hepatitis B
  - **HIV**
- Bacteria (skin, oral flora)
  - Cellulitis (Skin/Soft Tissue)
  - Abscess
  - Osteomyelitis
  - Endocarditis
  - Pulmonary
  - Rare

# HIV Diagnoses\* by Mode of Exposure and Year, 2008-2018



\*HIV or AIDS at first diagnosis  
 MSM = Men who have sex with men  
 No mode of exposure ascertained

IDU = Injecting drug use    Heterosexual = Heterosexual contact    Unspecified =

## HIV- Number of Cases (per 100,000 persons) of HIV Diagnosis by Race/Ethnicity & Mode of Exposure Minnesota 2018

Total		
Mode of Exposure		
MSM	128	45%
IDU	11	4%
MSM/IDU	21	7%
Heterosexual	34	12%
Perinatal	1	0%
Other	0	0%
Unspecified	91	32%
<b>Total</b>	<b>286</b>	<b>100%</b>

PrEP for ANYONE AT RISK!  
**TRUVADA**  
 (emtricitabine/tenofovir disoproxil fumarate)

# Bacteria

**Synthetic Opioid Crisis:  
Fentanyl leads to more  
withdrawal frequency.**

**Hence, more injection use =  
Higher Bacterial Burden**

## What Infections are People Who Inject Drugs At Risk For?

- Viruses
  - Hepatitis C
  - Hepatitis A
  - Hepatitis B
  - HIV
- **Bacteria (skin, oral flora)**
  - Cellulitis (Skin/Soft Tissue)
  - Abscess
  - Osteomyelitis
  - Endocarditis
  - Pulmonary
  - Rare

# Bacterial Infections

- Technique
  - Licking needles
  - Improper skin cleaning
  - Re-using syringes
  - Sharing needles
  - Re-using rinses
  - The more injections, the increased risk

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# Background - Bacterial

- 21-32% of active IVDUs (in several studies) have current skin infection
- ~70% have a lifetime history of past infection
- Most common: abscess, cellulitis, or both
- Amsterdam study: 1 abscess per 3 years of injection-drug use



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## What Infections are People Who Inject Drugs At Risk For?

- Viruses
  - Hepatitis C
  - Hepatitis A
  - Hepatitis B
  - HIV
- Bacteria (skin, oral flora)
  - **Cellulitis (Skin/Soft Tissue)**
  - Abscess
  - Osteomyelitis
  - Endocarditis
  - Pulmonary
  - Rare

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## Skin and Soft Tissue Bacterial Infections

- Many infections are self-treated
- Many caused by own skin flora
  - Staphylococcus aureus
    - E.g.: MRSA
  - Group A Streptococcus
    - Invasive:
      - Necrotizing fasciitis
      - Strep toxic shock syndrome
    - Non-invasive:
      - “Strep” throat, tonsillitis, otitis media, sinusitis, impetigo, cellulitis, scarlet fever



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## Skin and Soft Tissue Bacterial Infections cont.

- Outbreaks with unusual organisms:
  - Clostridia species
  - Pseudomonas aeruginosa
- Worrisome for particular behaviors
  - Needle sharing
  - Skin popping
  - Etc.



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## Skin and Soft Tissue Bacterial Infections Am J Drug Alcohol Abuse Study (2010)

- Phillips KT, Stein MD
- Objective: Rates of bacterial infections among IDUs in Denver, CO
- **51** active heroin, cocaine and methamphetamine IDUs (over 18 years)
  - 60 min interview, \$20 reimbursement
  - Averaged 39.2 years (SD 9.7)
  - 17 (33%) female
  - 57% homeless or in transient housing in last 3 months
  - 62.7% only heroin/49% only cocaine/33.3% speedball/37.3% only meth
  - 75% black tar heroin
  - 49% antecubital fossa (hand>upper arm>forearm>leg>groin>shoulder>neck)

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## Skin and Soft Tissue Bacterial Infections Am J Drug Alcohol Abuse Study cont.

- Results:
  - **55% lifetime history** of at least 1 skin infection
  - **29% infection in last year**
  - If infection in last year, significantly more likely to inject IM (OR = 1.57) and greater heroin injection frequency
  - **Heroin and speedball injectors: higher number past abscess** compared to meth and cocaine
  - **57% HCV +, 2% HIV +**
  - Other infections: endocarditis (11.8%), sepsis (9.8%), Necrotizing fasciitis (3.9%), wound botulism (3.9%) (other: septic arthritis, tetanus, osteomyelitis)



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## Skin and Soft Tissue Bacterial Infections Am J Drug Alcohol Abuse Study cont.

- Take Home:
  - Increased access to risk(harm) reduction services to decrease rates
    - I.e., Needle exchange
  - HIV/HCV treatment access



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## Predisposition For Infection

- Inexperience with injection
- Experienced but without visible veins
  - “Skin popping” (subcutaneous or IM injection)
  - Higher risk of injection with skin popping
- Speedballs
- Increased injection frequency
- HIV +



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## Predisposition For Infection cont.

- Shared or re-used needles
- Failure to clean skin
- “Booting”: repeatedly flushing and pulling back during injection
- Sharing drug paraphernalia
- Drug adulterants (Spores and more when “cut”)
- Drug preparation: saliva, solubilizing



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## Increase in Invasive Infections

- Individuals with increased risk:
  - Prisoners
  - Military recruits
  - Men who have sex with men
  - Crystal meth



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## Most Common Types of [Superficial] Infections

- Cellulitis
- Abscesses
- Boils (hair follicles)
- Carbuncles (large abscess, several “heads”)
- Impetigo
- Styes



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  - Hepatitis C
  - Hepatitis A
  - Hepatitis B
  - HIV
- Bacteria (skin, oral flora)
  - Cellulitis (Skin/Soft Tissue)
  - **Abscess**
  - Osteomyelitis
  - Endocarditis
  - Pulmonary
  - Rare

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## Abscess

- Inflamed tissue
- Bacteria introduced beneath skin
- Often accompanied by cellulitis
- Needs drainage
- Often also antibiotics



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## MRSA

- Typically appear similar to other abscesses
- Often confused with spider bites
- More common in:
  - History of MRSA
  - High-risk living situations
  - Not responding to common antibiotics



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## Group A Strep

- Typically throat and skin
- 15% population carriers
- Mild to severe infections
- Severe/invasive
  - Reportable
  - Necrotizing fasciitis, toxic shock, sepsis, pneumonia



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## Necrotizing Fasciitis

- “Flesh-eating disease”
- Rare infection of fatty tissue surrounding muscle
- Intense pain, swelling, fever
- Fast onset
- Skin color change to dark purple
- May blister
- Urgent medical attention
- Death can occur in 12-24 hours



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## Strep Toxic Shock Syndrome

- Life threatening
- Injury to major organs with quick shut down
- Vague symptoms: flu-like, muscle aches, diarrhea, vomiting, confusion, coma
- Fever, low BP, possible rash



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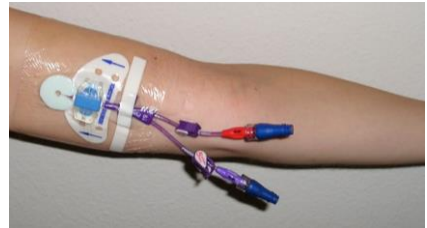
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# Skin and Soft-Tissue Infections - Treatment

- Uncomplicated:
  - Antibiotic therapy to cover *S. aureus* and streptococci
  - MRSA if history or colonization
- Complicated:
  - IV antibiotics
  - Necrotizing fasciitis, abscess or pyomyositis:
    - Also cover gram-negative and anaerobic
    - Urgent surgical consult
- 10 days- 6 weeks
- If bacteremia with *S. aureus*- >2 weeks of IV therapy and receive an ECHO



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# What Infections are People Who Inject Drugs At Risk For?

- Viruses
  - Hepatitis C
  - Hepatitis A
  - Hepatitis B
  - HIV
- Bacteria (skin, oral flora)
  - Cellulitis (Skin/Soft Tissue)
  - Abscess
  - **Osteomyelitis**
  - Endocarditis
  - Pulmonary
  - Rare

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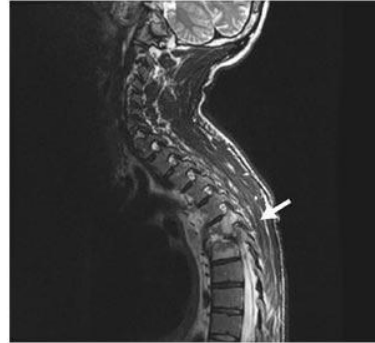
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# Musculoskeletal Infections

- Includes:
  - Septic arthritis
  - Osteomyelitis
- “Common” locations:
  - Strenoclavicular joint
  - Sacroiliac joints
  - Vertebral spine
  - Knee



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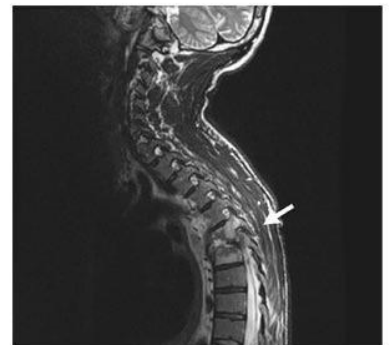
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# Musculoskeletal Infections cont.

- Results from:
  - Hematogenous seeding (most common)
  - Local extension of skin or soft-tissue infection
- Only presenting symptom may be pain without fever



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# Musculoskeletal Infections

- “High-risk” injection sites
  - Jugular vein (“pocket shot”)
  - Femoral vein (“groin hit”)
- Agent:
  - Polymicrobial
  - Anaerobic
  - \* Especially if contaminated with saliva



**Table 2. Initial Management of Bacterial Infectious Syndromes among Suspected Drug Users.<sup>a</sup>**

Clinical Scenario	Selected Diagnostic Tests	Empirical Treatment Options <sup>†</sup>	
		Oral	Parenteral
Skin or soft-tissue infection in which <i>S. aureus</i> is a likely pathogen	Send drainage for Gram's staining, culture, and susceptibility testing.	Incision and drainage plus wound care may suffice for uncomplicated abscesses	For methicillin-susceptible <i>S. aureus</i> : dicloxacillin or cephalexin; 500 mg every 6 hr
		For methicillin-susceptible <i>S. aureus</i> : nafcillin or oxacillin, 1–2 g every 4–6 hr; cefazolin; 1–2 g every 8 hr	
Infections in which oral contamination is suspected, including skin or soft-tissue and skeletal infections (septic arthritis and bursitis, tenosynovitis, and osteomyelitis)	Send specimens for Gram's staining, culture, and susceptibility testing. Consider imaging to diagnose or define deep-seated infections. A bone biopsy is important when osteomyelitis is suspected regardless of whether blood-culture results are positive. Specimens for anaerobic culture require special handling.	If MRSA suspected: TMP-SMX; 6–10 mg/kg of body weight/day (TMP) in divided doses given every 8–12 hr; clindamycin; 300 mg every 6 hr or 450 mg every 8 hr; doxycycline or minocycline, 100 mg every 12 hr; linezolid, 600 mg every 12 hr	If MRSA suspected: vancomycin; 15 mg/kg every 12 hr; teicoplanin; 6 mg/kg every 12 hr for 3 doses, then 6 mg/kg every 24 hr; linezolid, 600 mg every 12 hr; daptomycin; 4 mg/kg every 24 hr
		Incision and drainage when appropriate; wound care Amoxicillin–clavulanate; 875 mg every 12 hr; For serious penicillin allergy: clindamycin and quinolone (dose and route based on type and severity of infection)	Ampicillin–sulbactam; 1.5–3.0 g every 6 hr, plus gentamicin; 1.5–2.0 mg/kg every 8 hr for serious or complicated infections; piperacillin–tazobactam; 3.375 g every 4–6 hr or 4.5 g every 6–8 hr; ticarcillin–clavulanate; 3.1 g every 4–6 hr; cefepime; 1–2 g every 12 hr; For osteomyelitis, serious infections, and possible MRSA infection, add vancomycin <sup>‡</sup> or teicoplanin <sup>§</sup>

<sup>a</sup> MRSA denotes methicillin-resistant *S. aureus*; TMP-SMX, trimethoprim–sulfamethoxazole; AFB, acid-fast bacilli; RPR, rapid plasma reagin; VDRL, Venereal Disease Research Laboratory; FDA-MS, fluorescent tropoanemal antibody absorption; IV, intravenously; and CDC, Centers for Disease Control and Prevention.  
<sup>†</sup> Therapy should be adjusted on the basis of the culture results and antibiotic susceptibilities.  
<sup>‡</sup> The dose must be adjusted in patients with reduced creatinine clearance.  
<sup>§</sup> Clindamycin should not be used if the isolate is resistant to erythromycin.  
<sup>¶</sup> This drug is not available in the United States.  
<sup>||</sup> Therapy is generally continued for four to six weeks. Baildour et al.<sup>16</sup> provide specific recommendations.  
<sup>\*\*</sup> Respiratory quinolones include gatifloxacin, levofloxacin, and moxifloxacin.  
<sup>††</sup> Hyperbaric oxygen has also been used.

## What Infections are People Who Inject Drugs At Risk For?

- Viruses
  - Hepatitis C
  - Hepatitis A
  - Hepatitis B
  - HIV
- Bacteria (skin, oral flora)
  - Cellulitis (Skin/Soft Tissue)
  - Abscess
  - Osteomyelitis
  - **Endocarditis**
  - Pulmonary
  - Rare

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## Infective Endocarditis

- Incidence 1.5 to 3.3 cases per 1000 injection drug users per year
- Increased risk:
  - Infection at other sites
  - Colonization with *S. aureus*
  - History of infective endocarditis
- Risk higher with:
  - Injected cocaine
  - HIV infection (Baltimore study)
    - 3.3 cases per 1000 person-years in HIV–
    - 13.8 cases per 1000 person-years in HIV+

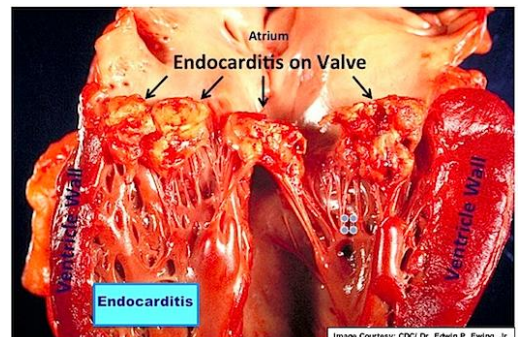


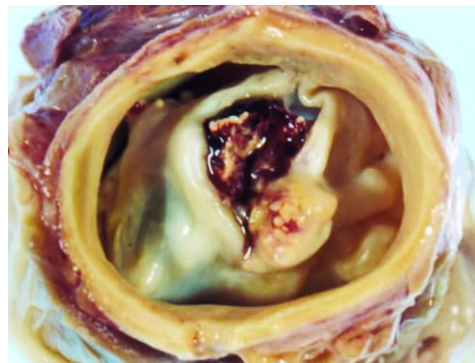
Image Courtesy: CDC/ Dr. Edwin P. Ewing, Jr.

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## Endovascular Infections

- Includes:
  - Infective endocarditis
  - Septic thrombophlebitis
  - Mycotic aneurysms
  - Sepsis
- Investigate in ALL IVDU with bacteremia
- L sided infective endocarditis similar to rates in non-drug users
- Tricuspid valve (R sided) 70% of cases and most common agent in *S. aureus*



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## Endovascular Infections cont.

- Symptoms:
  - Fever
  - Dyspnea
  - Pleuritis chest pain
  - Cough
  - +/- Murmur
- Mortality rate <5%
- If L sided- complications: brain and splenic abscess from septic embolization

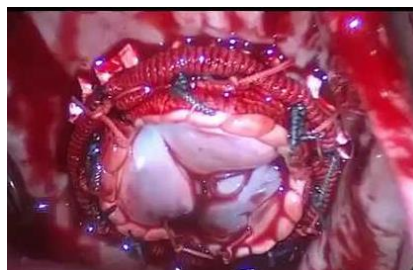


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## Endovascular Infections -Treatment

- Prolonged length of IV antibiotics similar to non-IVDU (6 weeks)
  - Considerations:
    - Outpatient parenteral
      - PICC line IV access
      - Unstable housing
      - Follow up concerns
    - Long-term inpatient stay

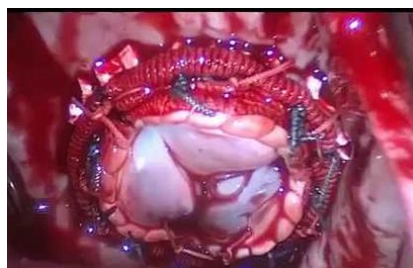


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## Endovascular Infections-Treatment cont.

- Short-course
  - 2-4 weeks IV in combination with oral
  - R sided due to MSSA
- Acute surgery
  - Generally not advisable due to prosthetic valve infection
  - 41% survival at 10 years



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## What Infections are People Who Inject Drugs At Risk For?

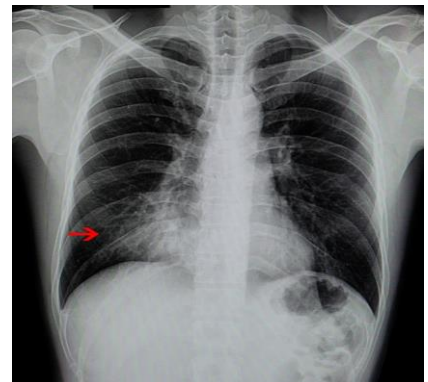
- Viruses
  - Hepatitis C
  - Hepatitis A
  - Hepatitis B
  - HIV
- Bacteria (skin, oral flora)
  - Cellulitis (Skin/Soft Tissue)
  - Abscess
  - Osteomyelitis
  - Endocarditis
  - **Pulmonary**
  - Rare

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## Pulmonary

- Most frequent sequelae of drug use
- Present [often] with **atypical clinical** and radiographic findings
- **10-fold increased risk of community-acquired pneumonia**
  - Often smokers: impaired respiratory-clearance mechanisms
  - Increased risk of aspiration
  - Immunocompromise: nutrition or HIV infection
- Hospitalization:
  - Aspiration pneumonia
  - *S. pneumoniae*, *H influenzae*, *S. aureus*, *K. pneumoniae*



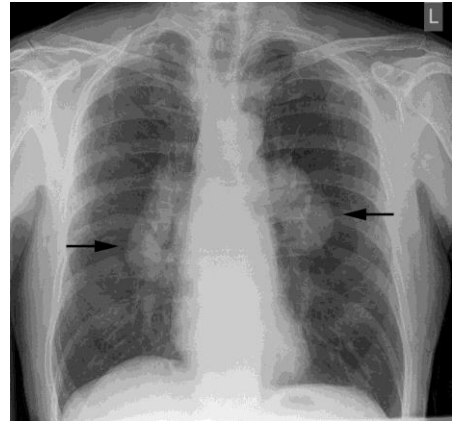
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## Pulmonary cont.

- Ask about history of: TB, HIV, risk for aspiration
  - Atypical presentation of TB with HIV:
  - Without cavitory lesion
  - Negative test (purified-protein-derivative)
  - Hilar or mediastinal lymphadenopathy may be only finding
- Pneumocystis pneumonia: can uncover HIV
- Septic pulmonary emboli from endovascular infections



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## Pulmonary cont.

- Pulmonary tuberculosis
  - Crowded living conditions
    - Homeless shelters
    - “Crack” houses
    - “Shooting galleries”
  - Delayed diagnosis
  - Poor treatment adherence
  - HIV/AIDS co-infection
  - “Shotgunning”- smoking and inhaling drug then expelling smoke into another person’s mouth (crack cocaine)



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# Pulmonary-Treatment

- Broad spectrum and hospitalization if any suspicion for IVDU and “ill-appearing”
- Isolation of organism from blood or sputum
- May need prolonged course ~4 weeks
- Empirical treatment for lung abscess to cover *S. aureus*, Gram-negative bacteria, and anaerobes



Acute right-sided infective endocarditis	Diagnosis is based on the modified Duke criteria. <sup>71</sup> Culture of multiple blood specimens before the initiation of antibiotic therapy is the optimal approach.	Vancomycin, <sup>‡</sup> 15 mg/kg IV every 12 hr (or teicoplanin, <sup>§¶</sup> 12 mg/kg every 12 hr for 3 doses, then 12 mg/kg every 24 hr), plus gentamicin, <sup>‡</sup> 1 mg/kg every 8 hr or consider nafcillin or oxacillin, 2 g IV every 4 hr, plus gentamicin, <sup>‡</sup> 1 mg/kg every 8 hr, if MRSA not present in the community; consider broadening coverage (pseudomonal, gram-negative, or fungal antibiotics) on the basis of patient risk factors. <sup>  </sup>
Pulmonary infection (community-acquired pneumonia and aspiration pneumonia, pulmonary tuberculosis, and other opportunistic pathogens) in drug users, including those with HIV or AIDS or risk factors for HIV infection	Radiographic imaging: Gram's and AFB staining of sputum and cultures of sputum and blood. Bronchoscopy may be needed to diagnose pneumocystis pneumonia. In certain cases, performing a PPD test or checking for <i>Streptococcus pneumoniae</i> and legionella urinary antigens may be useful.	Hospitalized with community-acquired pneumonia: ceftriaxone, 1–2 g IV every 24 hr, and azithromycin, 500 mg IV every 24 hr or respiratory fluoroquinolone <sup>**</sup> Aspiration pneumonia likely: clindamycin, 600–900 mg IV every 8 hr Pneumocystis pneumonia suspected: TMP-SMX, <sup>‡</sup> 15–20 mg/kg/day (TMP dose), given in divided doses every 6–8 hr (with or without corticosteroids) For tuberculosis, see treatment guidelines at <a href="http://www.thoracic.org">www.thoracic.org</a> or <a href="http://www.who.int/tb/en/index.html">www.who.int/tb/en/index.html</a>
Presentation involving septic or neurologic findings of unknown cause with or without skin or soft-tissue infection	Gram's staining, culture, and susceptibility testing should be done if applicable.	For botulism: trivalent antitoxin (type A, B, or E), 1 vial, available from the appropriate public health authority; and penicillin G, <sup>‡</sup> 3 million U IV every 6 hr For tetanus-prone wounds or tetanus: human tetanus immune globulin and tetanus toxoid; metronidazole, 500 mg orally or IV every 8 hr For other clostridia species (may be polymicrobial): débridement of skin or soft-tissue infections; ampicillin-sulbactam, <sup>‡</sup> 3 g IV every 6 hr plus vancomycin, <sup>‡</sup> 15 mg/kg IV every 12 hr (or teicoplanin, <sup>§¶</sup> †††
Sexually transmitted infections	Examination and workup are conducted according to local health department guidelines. RPR and VDRL tests may be false positive; confirm results with FTA-ABS test.	Follow CDC treatment guidelines or those of public health authorities (available at <a href="http://www.who.int/topics/sexually_transmitted_infections/en/">www.who.int/topics/sexually_transmitted_infections/en/</a> )

<sup>‡</sup> MRSA denotes methicillin-resistant *S. aureus*. TMP-SMX is trimethoprim-sulfamethoxazole, AFB acid-fast bacilli, RPR rapid plasma reagin, VDRL Venereal Disease Research Laboratory, FTA-ABS fluorescent treponemal antibody absorption, IV intravenously, and CDC Centers for Disease Control and Prevention.  
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  - Cellulitis (Skin/Soft Tissue)
  - Abscess
  - Osteomyelitis
  - Endocarditis
  - Pulmonary
  - **Rare**

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## Rare(r) Infections

- Tetanus
  - IVDU accounted for 19 of 130 cases (1998-2000)- 15%
  - Contamination of drugs with *Clostridium tetani*
  - Often in clusters
- Necrotizing fasciitis
  - With toxic shock syndrome
  - In 2000: 88 users in England, Scotland and Ireland hospitalized and more than 30 died
  - *C sordellii*, *C novyi*, *C perfringens*



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## Rare(r) Infections cont.

- Clostridial
  - Black-tar heroin (Mexico)
  - Often with skin popping
  - Epidemic wound botulism in California in 1990s
  - Typical presentation of tetanus (*C. botulinum*)
    - Descending symmetrical flaccid paralysis, cranial nerve palsies, dysphagia, dysarthria
  - Unusual presentation similar to toxic shock syndrome (*C. sordellii*)
  - May masquerade as intoxication (slurred speech)
  - Treatment with antitoxin, wound debridement, antibiotics, supportive



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## Rare(r) Infections cont.

- Anthrax
  - Spores- IV
    - Cutaneous disease in 5-7 days: bruised papule -> blisters and ulcerates -> painless necrotic ulcer with black eschar
    - Edema, lymphadenopathy, lymphangitis
  - Mortality <1% with antibiotics (ciprofloxacin or doxycycline) 20% without
  - 2009-2010 52 confirmed cases
    - IV heroin in Scotland
    - 17 died
    - “Bad batch”



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## Rare(r) Infections cont.

- Anthrax

- Inhalation

- Hemorrhagic mediastinitis
    - Prodrome: fever, cough, dyspnea
    - Rapidly fulminant bacteraemic phase
    - Respiratory failure, shock and death within 5 days
    - Antibiotics during prodromal phase
    - Fulminant almost always fatal
    - CXR: widening of mediastinum, +/- pleural effusions, hilar abnormalities, pulmonary infiltrates and consolidations



## Prevention

## Prevention

- Hand hygiene
- Safer injection
  - Hand washing before
  - Cleanse injection site
  - Inject IV only
  - Pre-mixing
  - Avoid infected areas



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## Prevention cont.

- Avoid
  - Sharing any equipment
  - Licking the needle
  - Re-using a filter
  - Sipping water from the spoon
  - Touching the needle with fingers



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## Injection Sites

- Arms:
  - Safest place for injecting
  - Sites need to be rotated to preserve tissue around veins
- Hands, feet, legs
  - Small and fragile and bruise easily
  - More disabling if infection occurs
  - Slower circulation
  - Consider sweat/socks etc.



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## Injection Sites cont.

- AVOID:
  - Femoral- femoral artery and femoral nerve too close
  - Neck- carotid too close, abscess complications
  - Breast- veins small and fragile, milk ducts
  - Penis - dangerous complications. infections, priapism



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# Harm Reduction

## Harm Reduction

- Needle exchanges
- Supervised injection facilities
- Injection practices:
  - Boiling the drug
  - Cleaning skin with alcohol
  - Bleaching paraphernalia
  - Avoid sharing
- Co-occurring high risk behaviors:
  - Unprotected sex, multiple partners etc.
  - Vaccinate where able





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Podcast:  
The Addiction  
Connection

Funded fully or in part through the State Opioid Response (SOR) grant from the Substance Abuse and Mental Health Services Administration (SAMHSA) and the Minnesota Department of Human Services (MN DHS). Nothing in this material constitutes a direct or indirect endorsement by SAMHSA or the MN DHS of content, services, or policies.



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