Wound Care & Xylazine

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Great Lakes Addiction
Technology Transfer Center

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The use of affirming language inspires hope and advances recovery.

LANGUAGE MATTERS.

Words have power.

PEOPLE FIRST.

The ATTC Network uses affirming language to promote the promises of recovery by advancing evidence-based and culturally informed practices.

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Thank you for joining us!

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- **Questions for the speaker**: Please put any questions for the speaker in the **Q&A section of your Zoom toolbar**. The speaker will respond to questions as time allows.

- The recording and PowerPoint will be made available on our website within the week.

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A few more housekeeping items:

- If **captions or the live transcript** would be helpful, please use your Zoom toolbar to enable by going into the More section > select captions > show captions

- You will be directed to a link to a short survey at the end of todays presentation– we would really appreciate it if you could fill it out. It takes about 3 minutes.

- Certificates of attendance will be sent out via email to all who attended all sessions in full.

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Funded by Substance Abuse and Mental Health Services Administration

Presenters

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Wound Care for People Who Inject Drugs

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Foreword

- PWID are at increased risk for skin and soft tissue infections (SSTI's) as well as acute and chronic wounds
- Prevalence of chronic wounds in PWID can be as high as 20%
- Wounds are not SSTI's and do not benefit from treatment with systemic or topical antibiotics unless an infection is present
- Most wounds are chronically colonized with bacteria and benefit from debridement, careful dressing selection, and mitigation of causative factors

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Foreword

- Hospitals, outpatient clinics, and residential treatment programs are capable of caring for most wounds within this population
- PWID/PWUD with wounds are often capable of self-care and require supplies and support
- Non-admittance due to chronic wounds excludes a large proportion of persons experiencing addiction and worsens treatment prognosis
- Addiction treatment, specifically MOUD, addresses the main risk factor for wound development which is the injection of drugs

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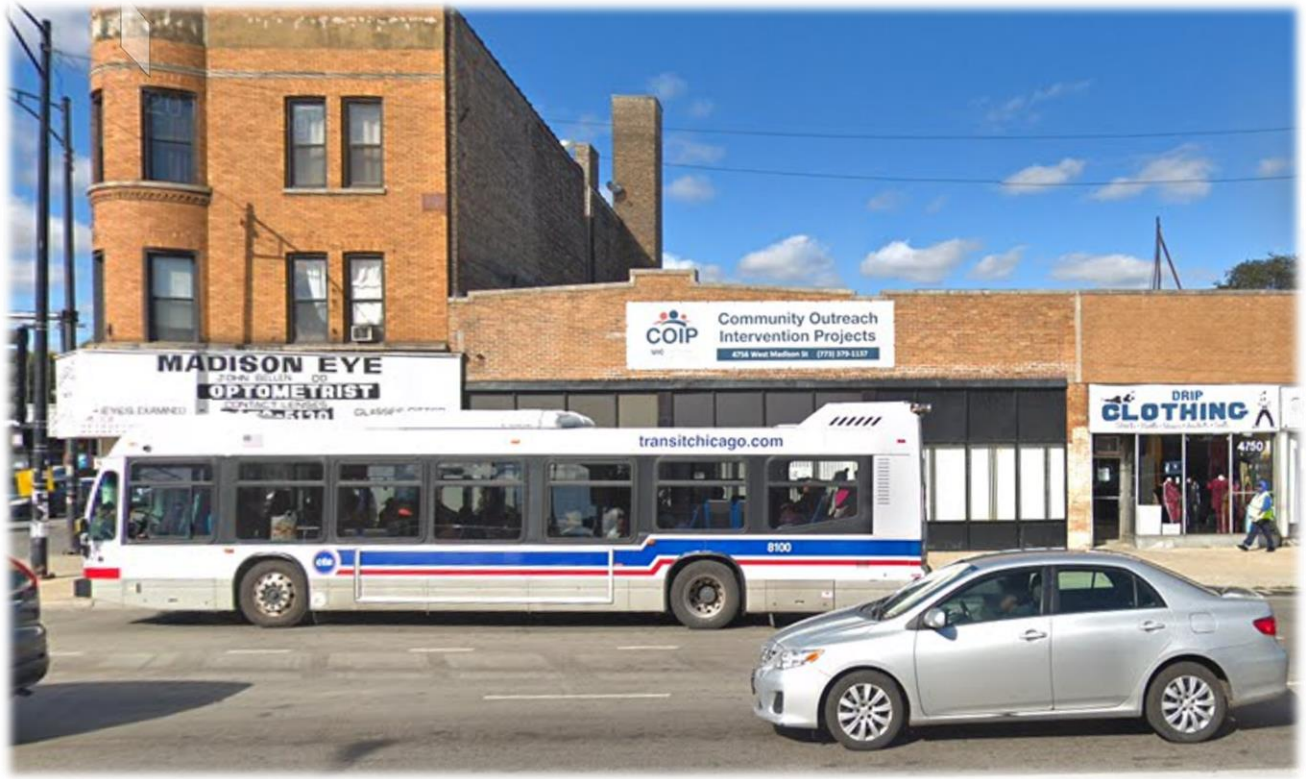
Content Development

- Training developed in partnership with the Community Outreach Intervention Projects (COIP)
- Providing healthcare, rehabilitative, and harm reduction services for people who use drugs (PWUD)



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Topics to Cover

- Causes of Chronic Wounds and SSTI's in PWID
- Prevalence and Cost
- Complications
- Treatment Options

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History

- Dr. Alexander Wood of Scotland credited with inventing the first medical hypodermic needle in 1851.
- Morphine isolated in early 1800s (Germany). Widespread use during US civil war.
- Reported cases of syringe sharing in the US early as 1914.[22]

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Substances Used for Injection

- **Heroin**
- **Pharmaceuticals:** Oxycodone, hydrocodone, hydromorphone, dextroamphetamine, xylazine, fentanyl
- **Cocaine:** Base (powder) and Hydrochloride salt (rock)
- **Methamphetamine**
- Combinations of **opiates** and **stimulants** (speedball/snowball)

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Where People Inject

- Anywhere there is venous access
  - Upper/ lower extremities
  - Hands, feet, digits
  - Neck/ external jugular
  - Groin/ femoral vein

Image courtesy of CATIE.CA harm reduction education service

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Intro to Injection Related Wounds

“ It cooked up different. Usually, it is pale yellow but this time it looked like Coca-Cola. It felt like shooting battery acid. The next day all the skin started dying off.” – **Wound Client**

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Stages of Wound Healing

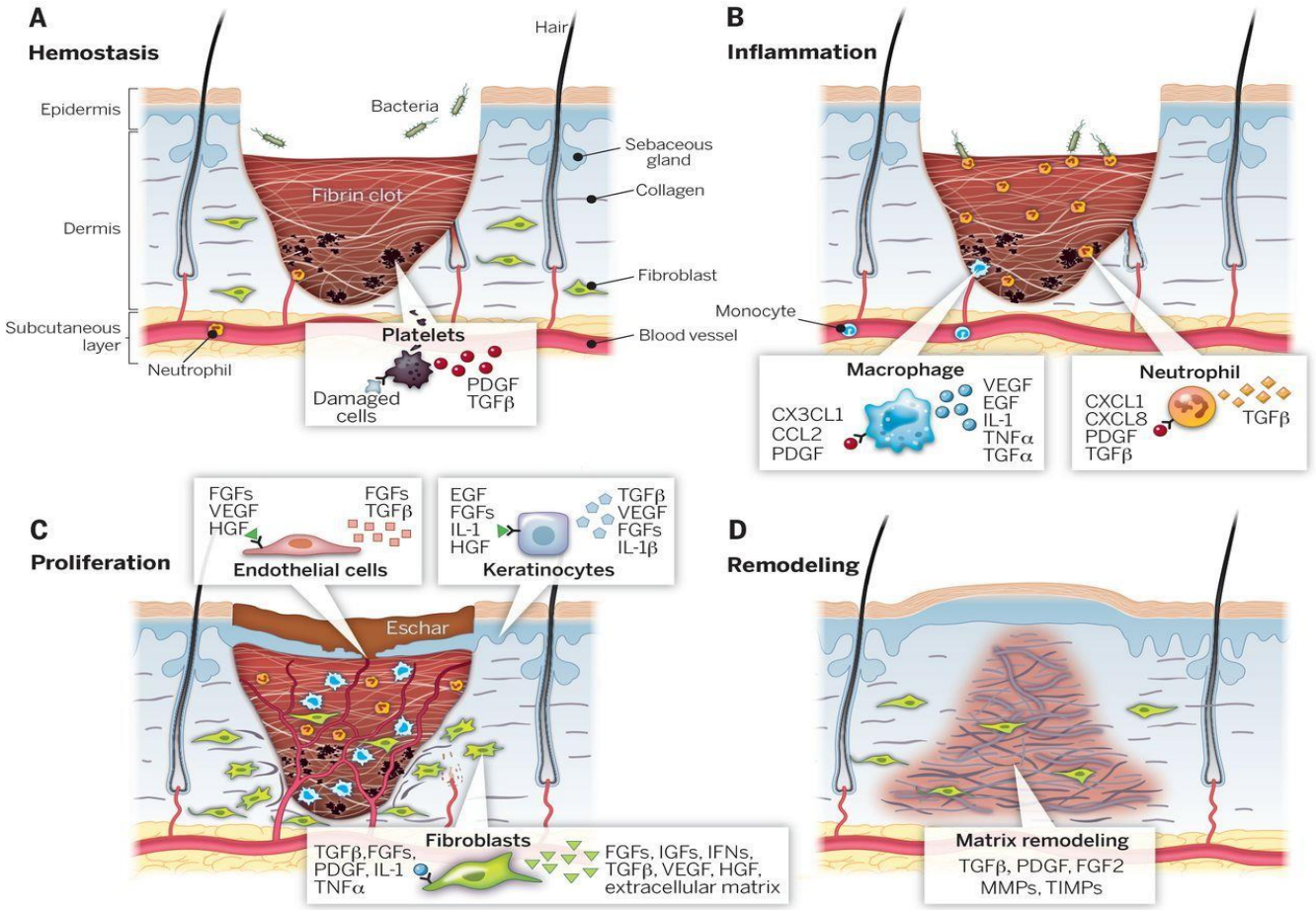
- 4 stages of wound healing
- Many injection related wounds become arrested in the inflammatory phase
- Contributing factors to nonhealing wounds:

-Necrotic tissue,

-Manipulation of wound

-Bacterial colonization/biofilm

-Poor nutrition



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Etiology of Injection Related SSTI

- Introduction of infectious agents subcutaneously and intravenously
- Poor hygiene practices leading to inoculation with skin flora
- Contaminants within illicit substance
- Cytotoxic effects of substance injected
- Sharing of injection equipment/reusing paraphernalia [2]

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Etiology of Injection Related Wounds

- An abscess which was self treated and drained gives rise to a chronic wound
- Missed injection of heroin/fentanyl is extravasated into the subcutaneous tissues
- Acidic/cytotoxic substances destroy surrounding tissues when not diluted through intravenous injection
- Vasoconstrictive substances such as cocaine and methamphetamine are extravasated and cause local tissue hypoxia
- Many wounds have mixed etiology

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Risk Factors

- Subcutaneous injection (skin popping) and Intramuscular injection (muscling) highly associated with development of abscess and infection[14, 15]

- Females more likely than males to have SSTI or cutaneous injection related injury (CIRI) [14,15]
- Length of time injecting increases risk of SSTI [15]

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Risk Factors

- Whether injection site was cleaned prior to use
- As the number of daily injections increases so does the incidence of SSTI and wounds
- Using multiple sites for injection
- Lower extremity injection associated with greater risk of SSTI/wounds [9]

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Prevalence and Cost

- Baltimore syringe exchange (SEP) survey (N=159)

  17.8% with an active abscess

  19.7% with current chronic wound[15]

- DC area SEP survey, 81.2% reported having ever had a wound (N=101)[23]

- California syringe survey exchange (N=864)

  37% of clients endorsed an abscess in the last 30 days [7]

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Prevalence and Cost

- Between 1993-2010, US hospital admissions for heroin related SSTI's increased from 4 to 9 per 100,000 persons [3]

- Cost of $11.4 million to Miami-Dade County in Florida from July 2013 - June 2014
- $4,449 per admission [19]

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COIP Wound Clients (Chicago, Illinois)

TABLE 2 —Patient Encounter Data October 2018–August 2019

Total Clinic Patients Seen (N=85) (Wound Client N=16 (18.8%)

Encounter Type	
Wound Visits	48 (24%)
Visit Other	152 (76%)
Total Visits	**200**

Visit other: Includes visits for medical problems other than wound care.

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Wounds Vs SSTI's

- Not all wounds are infected
- Most wounds are chronically colonized with bacteria
- Chronic wounds that are not infected do not benefit from treatment with antibiotics
- The Infectious Disease Society of America (IDSA) recommends against using topical antibiotics on wounds
- Chronic non-infected wounds benefit from debridement, exudate management and thoughtful dressing selection

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Wounds Encountered in PWID

- Injection related ulcerations
  -Related to cytotoxic effects of injected substance
  - Can be secondary to infectious process such as an abscess

- Wound injection related ulceration (wound maintained for purpose of injecting heroin into the wound bed)

- Venous Ulcers

- Arterial wounds

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Injection Related Ulcer

- Can arise from a previously infectious process such as an abscess that was self-treated or never treated
- Heroin induces a cytotoxic inflammatory response which causes tissue necrosis
- Cytotoxic effects of drug adulterants (xylazine/quinine/ citric acid to dissolve black tar heroin)
- Cocaine is a potent vasoconstrictor and can induce tissue hypoxia and necrosis if injected [20]

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Injection Related Ulcer: Xylazine

- Xylazine (Tranq) is a central a2-adrenergic agonist
- Used as a veterinary tranquilizer/sedative since 1962 (Bayer)
- Reduces release of norepinephrine and dopamine in the central nervous system
- Results in sedation, muscle relaxation, respiratory depression, hypotension
- First reported used as an adulterant in heroin supply within Puerto Rico early 2000's [17]

"anestesia de caballo"

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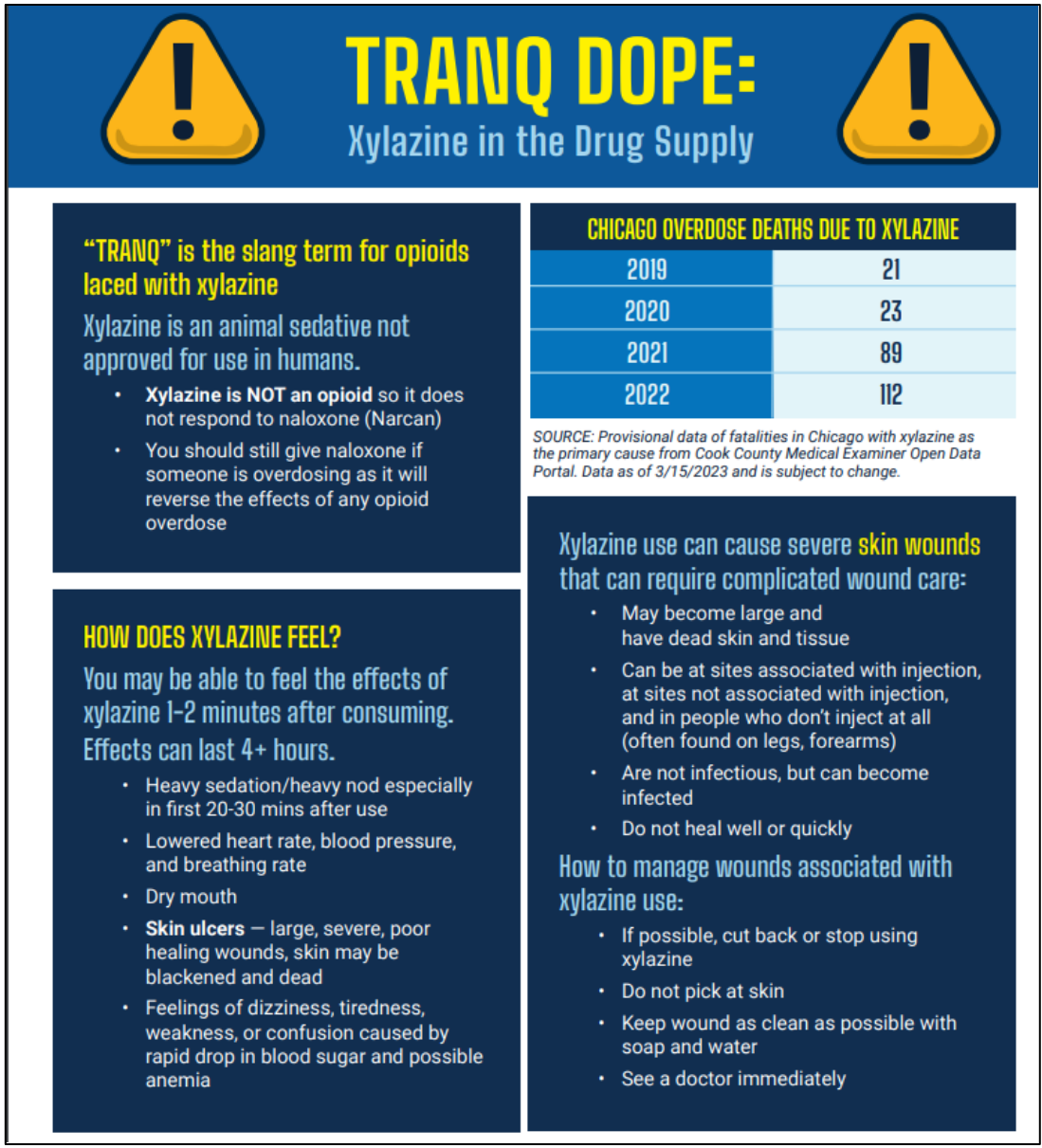
Injection Related Ulcer: Xylazine

- Xylazine prevalence in US Heroin supply identified around 2010 in Philadelphia
- Associated with increased risk of fatal overdoses and acute wounds [10]



Reproduced from: Chicago Department of Public Health 2023; *Tranq Dope*.

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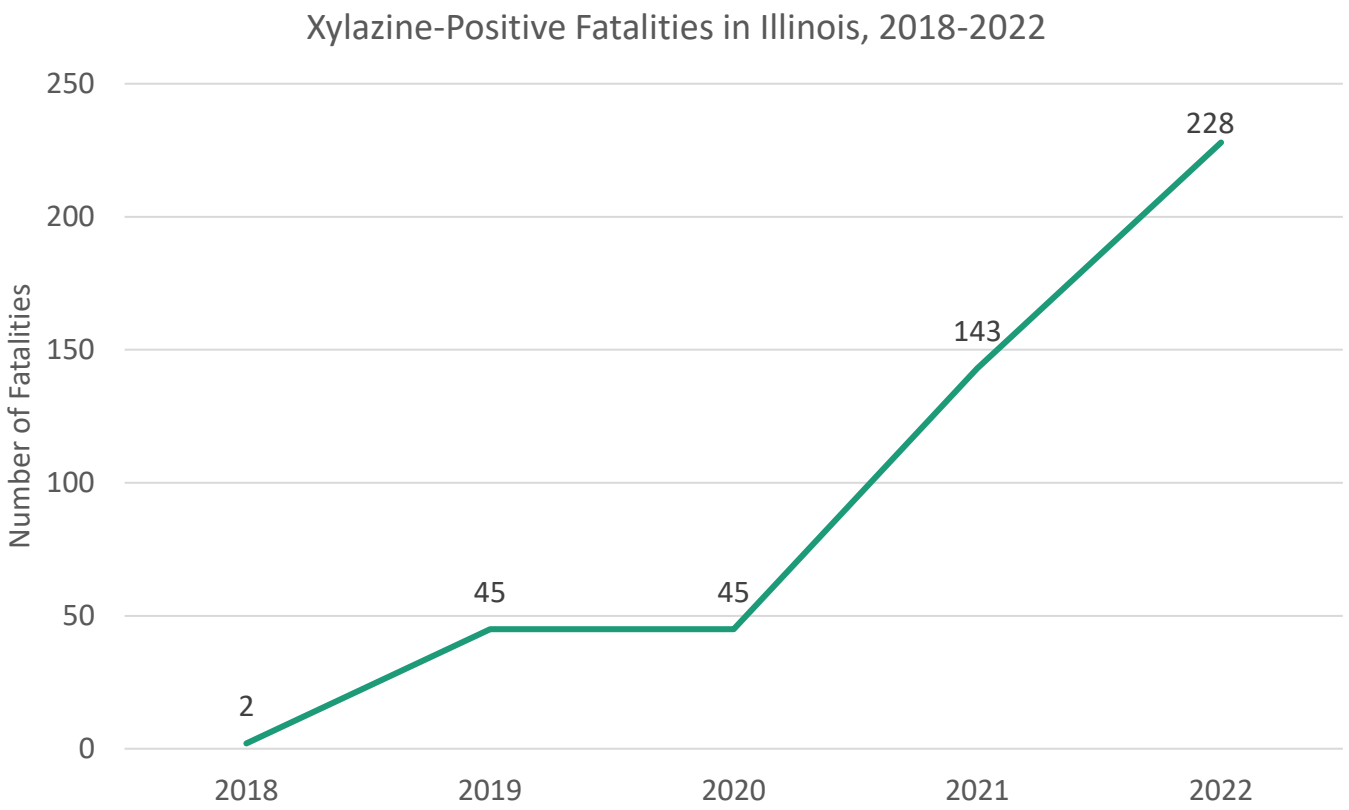
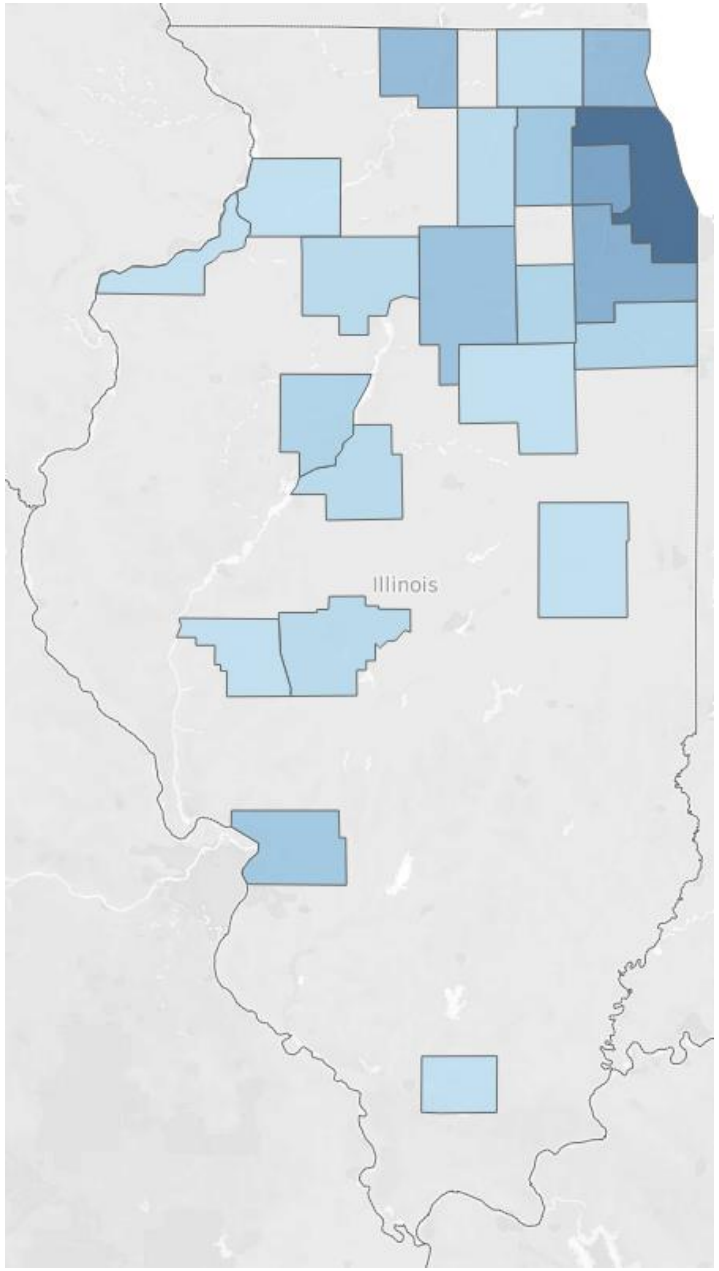
Xylazine-Positive Overdose Fatalities



Xylazine-Positive overdose fatalities in 2022 increased:

- 59% from 2021
- 407% from 2020



In 2022, counties of residence for overdose fatalities:

- 66% Urban
- 15% Suburban
- 11% Small Urban
- 7% Rural

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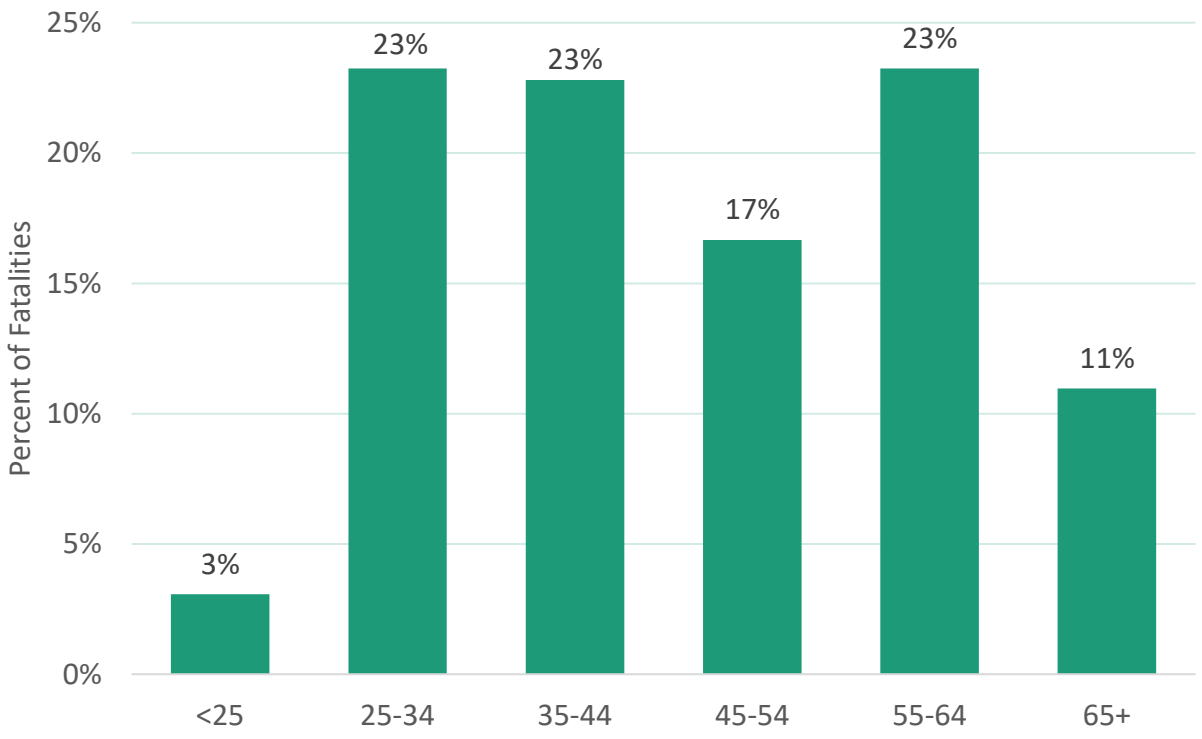
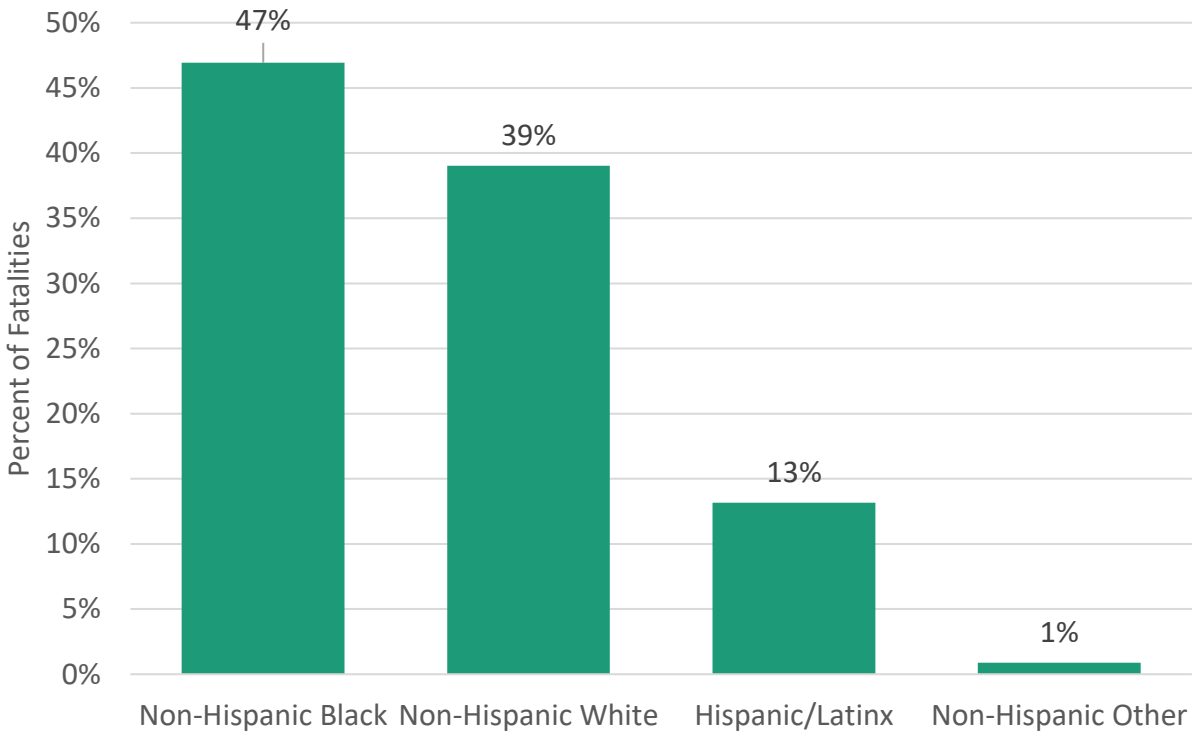
Xylazine-Positive Overdose Fatalities - 2022

Xylazine-Positive Overdose Fatalities by Age Group
Illinois 2022



Xylazine-Positive Overdose Fatalities by Race/Ethnicity
Illinois 2022



Highest percentage of fatalities occurred in 25-34, 35-44, and 55-64-year age groups

Highest percentage of fatalities occurred in Non-Hispanic Black individuals

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Xylazine-Positive Overdose Fatalities - 2022

Other Substances Involved in Xylazine-Positive Overdose Fatalities

Substance(s) Involved	Count	Percent
Opioid	228	100%
Cocaine	90	39%
Alcohol	51	22%
Benzodiazepine	38	16%
Psychostimulant	19	8%

- 9.2% of fentanyl-involved deaths in Cook County and 7.6% of fentanyl-involved deaths statewide are xylazine-positive
- Xylazine is most commonly found in overdose deaths involving an opioid
- Polysubstance use is common and other substances are also detected in xylazine-positive overdose deaths

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Injection Related Ulcer: Xylazine

- a2-adrenergic receptors also found in peripheral tissues but a1 are more prevalent
- a1 agonism results in vasoconstriction
- Postulated that xylazine causes injection site tissue hypoxia and skin necrosis through local a1 agonism
- Wounds can occur independent of injection site and have been reported in those insufflating heroin

Photo from 2022 Malayala et al.

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Injection Related Ulcer: Xylazine

“ I have the most meticulous injection technique you have ever seen. I always have clean rigs, and never share or reuse.

I find a vein, get a register, draw back fresh blood, and make sure the whole hit goes into the vein.

But when I remove the needle, even that little bit of residue left is enough to form a small ulcer and that’s why I have all these wounds. “

- Wound Client

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Injecting Into Wounds

“ Yeah, I have been injecting into the wound and messing with it for awhile. I know, what kind of person would do something like that ? But I have no veins, I am desperate, and it is almost as good as mainlining.” – Wound Client

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Wound Injection Ulceration

- When venous access becomes too difficult to obtain, PWID may resort to subcutaneous and intramuscular injecting
- PWID may also use a chronic wound for injection/drug delivery
- Healing wound beds have a robust blood supply=quick drug absorption
- Important to assess as wound injection can be a risk factor in up to half of PWID with chronic wounds

Houck & Ganti, 2019

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Venous /Lower Extremity Ulcers

- Venous stasis ulcers are highly prevalent within PWID, especially in those with a history of lower extremity injection
- A Detroit area study found that 39% of PWID frequenting a syringe exchange had medically verifiable evidence of venous disease [15]
- Decreased venous blood flow, damage to venous valves, and deep vein thrombosis (DVT) contribute to venous hypertension, eventual venous insufficiency, and ulceration

John Hopkins Medicine, 2023

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Arterial Wounds

- Arterial thromboembolism
- Femoral artery necrosis
- Tissue hypoxia and necrosis from venous or arterial injection
- Organic process (PAD)

Kobilica & Flis , 2021

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Infections (may accompany wounds)

- Chronic or acute wounds in PWID can have an infectious etiology. Injection related hygiene is highly correlated with the development of SSTI and those with higher uptake of hygiene and harm reduction services have overall less reported SSTI [16]

Abscess - Carbuncle - Furuncle

- Abscesses, carbuncles, and furuncles are characterized as purulent infections which manifest as a collection of pus forming a “head” within the subcutaneous layer
- The Infectious Disease Society of America 2014 guidelines specify a range of treatment options such as incision and drainage, oral, and intravenous antibiotics depending on infection severity
- These infections are commonly caused by resident streptococcus and staphylococcus species but may include resistant strains such as MRSA [4]

Goldberg , 2023

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Cellulitis

- Classified as a non-purulent SSTI and manifests as expanding erythema affecting all dermal layers originating from a site of infection. Often accompanied by a “burning sensation,” increase in skin temperature, and possible systemic symptoms such as fever [4]

- Cellulitis may accompany many different wounds and SSTI as they represent an inoculation site for pathogens

Tintinalli’s Emergency Medicine, 2011

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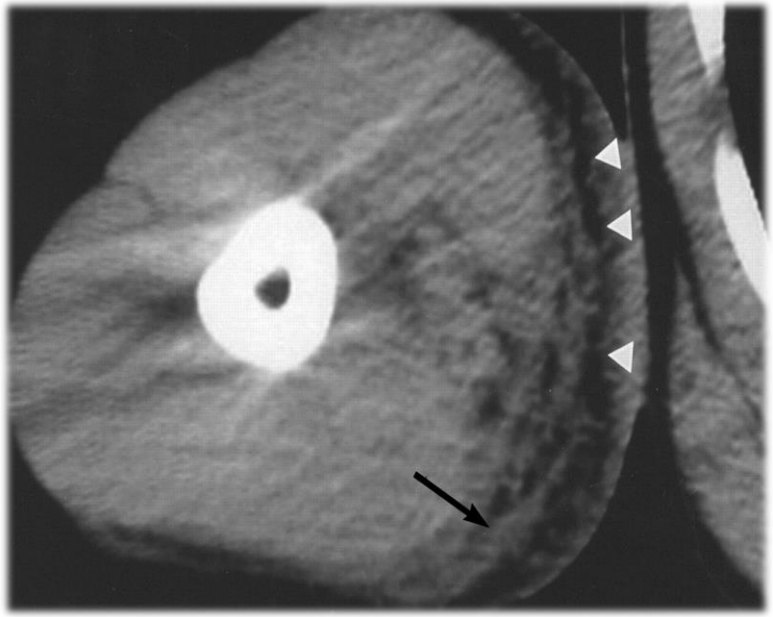
Pyomyositis

- Purulent infection of the deep muscle which can occur from intramuscular injection
- Beware of painful and erythematous musculature at injection sites
- Pockets of distributed pus/gas throughout musculature



Johnston & Keogan, 2004
CT scan obtained with soft-tissue setting shows high-attenuation areas of cellulitis (arrow) and low-attenuation areas of subcutaneous gas (arrowheads).

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Cutaneous Anthrax

- Anthrax is a zoonotic disease caused by gram positive bacillus anthracis [12]
- Isolated cases of cutaneous anthrax have occurred in European clients with a few outbreaks since 2000
- Heroin contaminated during transport via livestock in mountainous Afghanistan is thought to be the source
- There are no known anthrax infections in Chicago PWID

Meghji, Judd, & Carr, 2013

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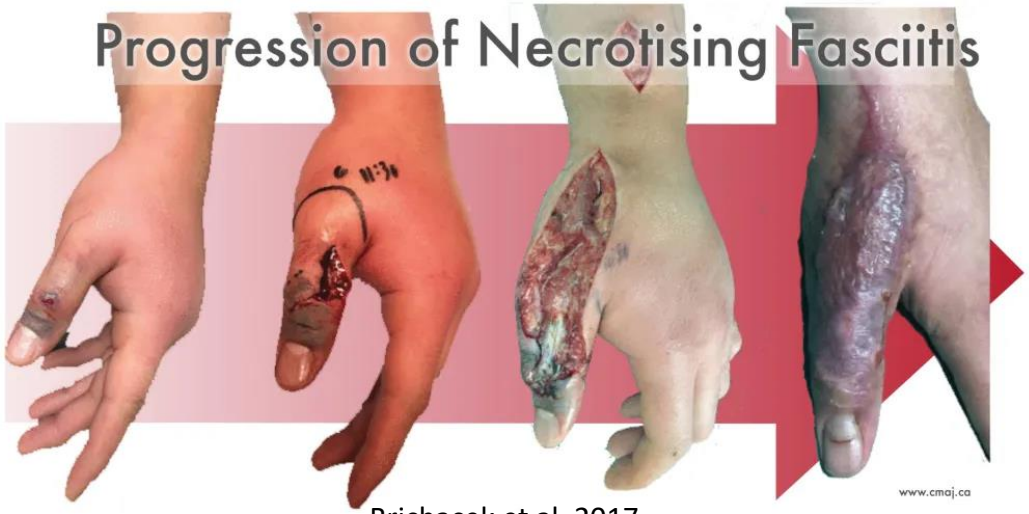
Necrotizing Infections

- Rapidly expanding infection of the subcutaneous tissue and fascia caused by streptococcal pyogenes, staphylococcus aureus and most commonly a clostridial species [5]

- Necrotizing infections related to black tar heroin injection (Washington, Oregon, and California)

- Rapidly expanding infection, edema, and erythema -increases in size by the hour



Brichacek et al. 2017

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Wound Botulism

- Contamination with the anaerobic gram-positive bacterium clostridium botulinum which is commonly found in soil

- Cases have been mostly isolated to California and the west coast and associated with the injection of black tar heroin

- C. botulinum is a potent neurotoxin that causes descending paralysis and respiratory arrest [1]

Sam & Beynon, 2010

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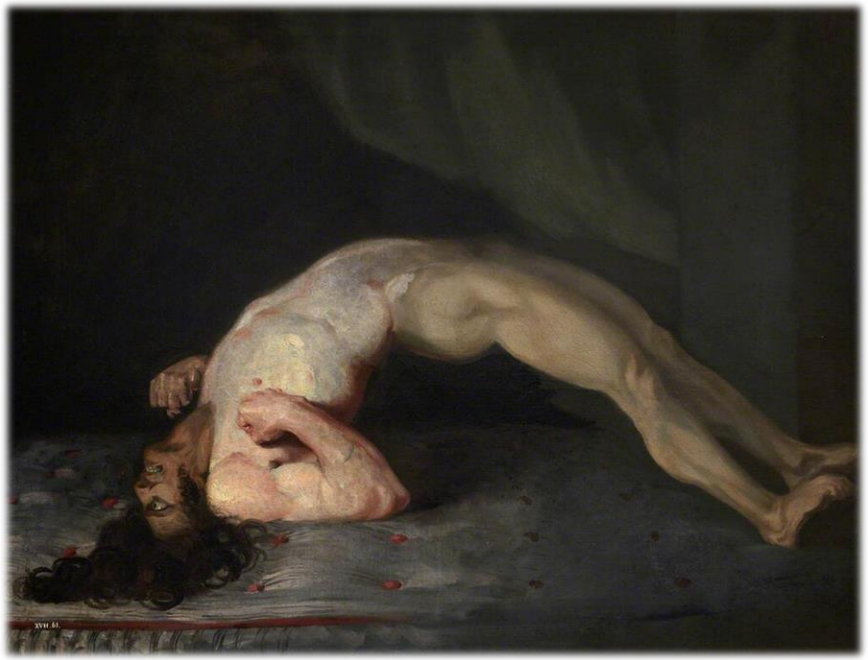
Wound Tetanus

- Clostridium tetani is found in soil and causative agent in injection related wound botulism [8]
- Tetanus cases in the US are mostly isolated to the west coast and related to black tar heroin injection
- C. tetani produces the exotoxin tetanospasmin which inhibits GABA and leads to uninhibited neuronal firing [8]



Sir Charles Bell, 1809

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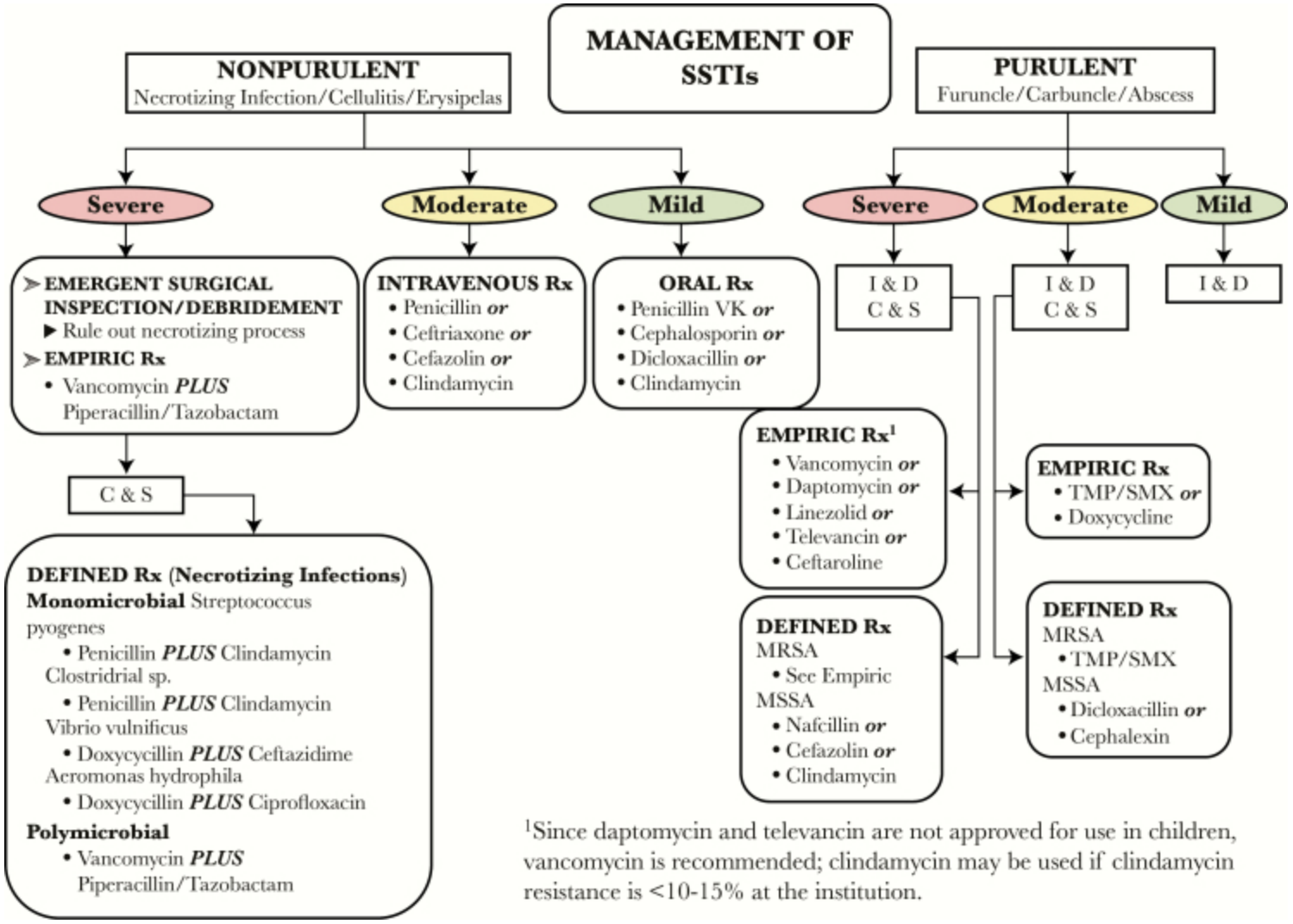

[19] Executive summary: practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the infectious diseases society of america

Considering the Differentials

- Cutaneous malignancy such as Squamous cell carcinoma
- Basal cell carcinoma Melanoma
- Kaposi sarcoma
- Medical conditions -Scleroderma, Rheumatoid arthritis, pyoderma gangrenosum [11]
- PWID are people and have medical conditions aside from addiction

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Wound Assessment

- The first step to caring for wounds is to learning to assess them
- Charting a wound assessment is integral to the wound encounter and eventually receiving reimbursement for wound related services
- Standardize the process of measuring and assessing a wound
- Photographs are helpful for assessing progress, referrals, and continuity of care

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Wound Assessment

- Size/Location: Length X Width X Depth
- Necrotic Tissue: Type and amount

  -Slough, Eschar,

  -Loosely or firmly adhered, thick or mucinous?

  -50% of wound covered? Can you visualize the wound base?
- Granulation Tissue: Type and Amount

  - Beefy red, granulation, dull white to pink, friable, dusky?

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Wound Assessment

- **Edges**

  -Attached vs unattached. Deep wound cavity, undermining, tunneling?

- **Peri wound Skin**

  - Intact, excoriated, dry, xerosis, macerated, erythematous, hemosiderin staining, lichinification, lipodermatosclerosis?

- **Drainage**

  - Scant, moderate, heavy, serous, purulent, odor?

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Treatment Options

- If there is a wound bed you cannot see…
- Then debridement is required of thee…
- Unless it’s gangrene, arterial, or concern for reduced circulation

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Debridement

- Larval/Enzymatic

  -Collagenase is the only enzymatic agent available in the USA (200USD per 30gm tube).

  - Medicaid coverage-possible with prior auth

- Surgical : Requires specialist referral/OR time

- Conservative sharp debridement can be performed with training but may be painful and not suitable for office visits

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Debridement

- Autolytic debridement using semi-occlusive dressings.

  -Very slow process but painless and effective

  -Most prevalent and comfortable option

- Mechanical: May only work with loosely adhered necrotic tissues

- Wet to dry dressings-painful removal of necrotic tissue

- Can remove loosely adhered necrotic tissue with blunted edge of a dermal curette or sweep with gauze during irrigation to remove loose tissue

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Dressing Selection

- There is little evidence to suggest one dressing over another
- Specialty dressings such as Enluxtra, Mepilex, Hydrofera can be cost prohibitive
- Dressings should manage exudate, maintain a moist wound environment, and not adhere to a granulating wound bed
- Products priced for clients with limited financial resources are necessary
- The aim is to encourage follow up and promote wound healing

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Dressing Selection: *Calcium Alginate*

- Made from seaweed
- Highly absorptive
- Forms non-adhering gel when saturated
- Great for packing wounds
- 1.00-8.00 per unit
- One of the more expensive products

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Dressing Selection: *Hydrogel*

- Many brands e.g. Medline, Dynarex
- Donates moisture to dry and desiccated wounds/loosens DRY necrotic tissue
- Assists with autolytic debridement
- Medical grade honey an option ($$$)
- 2.00 per 1.5 oz tube

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Dressing Selection: *Collagenase*

- Enzymatic debrider. Very effective and relatively painless to use
- Breaks down collagen in necrotic tissue
- $200USD for 30gm tube
- $50manufacture coupon- not for Medicaid patients

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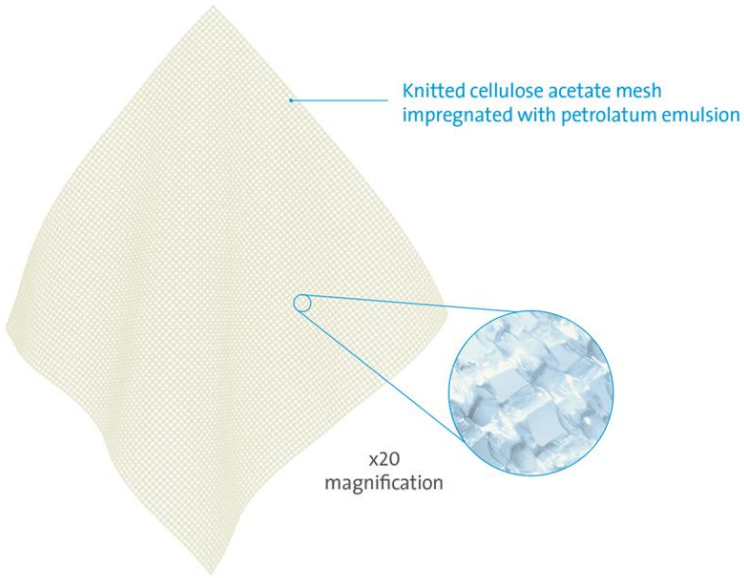
Dressing Selection: *Wound contact dressing*

- Acetate mesh impregnated with petrolatum (Screens)
- Forms non-adherent layer over wound bed
- Drainage can pass through onto a secondary dressing
- Minimizes trauma to wound bed
- Many brands and sizes



- 3 X 3 inch $0.35
- 3 X 8 inch $0.50

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Dressing Selection: *Multi Layer Compression Dressings*

- Either 3-layer (lite) or 4-layer compression therapy system
- The standard therapy for venous insufficiency ulcerations
- Must obtain ABI's before use and cannot be used if signs of arterial insufficiency
- $12.00 to 15.00 per box
- 1-3 dressing changes per week depending on exudate level
- Podiatry-subject matter expert

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Dressing Selection: *Wound Irrigation*

- Wounds can be cleansed with sterile saline
- Treated/boiled tap water is an option for those without access
- Unscented castile soap if wound has debris/dirt
- Can clean with Povidone iodine 10% during irrigation to neutralize biofilm
  (contraindicated if hx of thyroid condition)
- Hydrogen peroxide, Dakins (sodium hypochlorite) can be cytotoxic to healing tissues [27]

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Dressing Selection: *Barrier Cream*

- Petroleum Jelly, diaper cream, zinc oxide-based ointment, petrolatum can all be used to protect the skin around a wound

- Moisture associated maceration is a contributing factor to the expansion of wound margins

- Wound effluent also contains collagenases and other cellular byproducts than can break down surrounding tissues

- Manage drainage and protect peri-wound skin!

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Dressing Selection: *Absorbent Dressing*

- Abdominal Absorbent pads are an inexpensive absorbent secondary dressing
- .10-.20 cents per item
- Do not place directly over wound bed-use a wound contact layer first!

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Golden Rules

- Assess and chart your wound care effectively
- If there is necrotic tissue, **debride it**
- If there is biofilm, **control it**
- If the wound is dry, **hydrate it**
- If there is copious exudate, **absorb it**
- Protect peri-wound skin
- Never put something on a wound that will adhere to the tissue
- Mitigate causative factors

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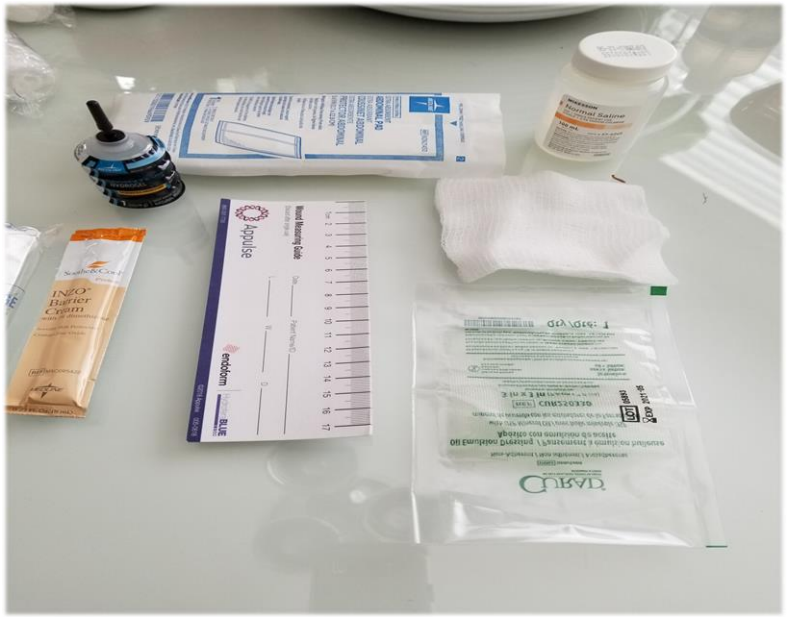
Simple Dressing Technique

- Gather your supplies and your wound



- Prevalent dry necrotic tissue/eschar in wound
- Wound bed is very dry

- What would you do?

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Simple Dressing Technique

- Irrigate and clean wound with saline
- For a dry and low exuding wound (and wounds with necrotic tissue), hydrogel applied to the wound will assist with debridement and providing a moist healing environment
- Alternatively medical honey, or collagenase can be applied to necrotic tissue after irrigation

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Simple Dressing Technique

- Apply a thick layer of barrier cream to the skin surrounding the wound

- A nonadherent contact layer can then be applied to the wound bed

- Contact layers will prevent damage to healthy tissues during dressing changes and prevent the adherence of dressing materials to the wound bed

- Vaseline gauze/xeroform should be avoided as they are occlusive dressings

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Simple Dressing Technique

- An absorbent dressing can then be applied to the wound bed to capture drainage- secure with stretch gauze
- Secure entire dressing with elastic bandage
- Avoid tape around wound edges-use stretch gauze or elastic bandages to secure dressing
- Aim to change dressing daily or when saturated

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Simple Dressing Technique

- **Disclaimer:**
- Cavity wounds that are deep/form pockets/tunnels must be packed to occupy dead space and allow the wound close uniformly
- Alginate is effective for packing as is moist gauze for cost effectiveness

Alberta Health Services, 2023

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Example Formulary

Gauze	Sterile cotton (any brand): Cleaning and irrigating wounds as well as packing (wet to moist). (4x4) Conforming stretch gauze: Secure secondary dressings. Less friable than kerlix and holds better to contours. (4-inch X 5-yard)
Absorbent dressings	Abdominal pad (any brand): Used as a secondary dressing to absorb moderate to heavy wound exudate. (5x9)
Calcium Alginate	Made from seaweed, highly absorptive, forms non-adhering gel when saturated. Great for packing wounds
Non-adherent pad (Telfa)	Can be used to cover superficial wounds. Non-stick backing won't traumatize the wound bed. (4X4)
Oil emulsion non-adhering dressing (Adaptic)	Non-adherent wound contact layers. Petrolatum impregnated acetate mesh. To be placed in contact with wound bed. Allows exudate to flow through onto secondary dressing. Prevents dressing from adhering to wound. (3X8)
Zinc oxide barrier cream	Protect peri-wound skin from exudate and moisture associated maceration.
Petroleum Jelly	Barrier agent and used to cover superficial wounds.
Medical Honey (MediHoney or Manuka type)	Assists with autolytic debridement of wounds. Osmotically pulls fluid into wound bed. Can be used on dry necrotic wounds.
Hydrogel	Donates moisture to dry and desiccated wounds. Assists with autolytic debridement. Used to hydrate dry necrotic tissue.
Sterile saline 120ml	Wound irrigation and cleansing.
Povidone Iodine 10% Solution	Broad spectrum antiseptic. Dilute 1:10 and irrigate heavily colonized/odorous wounds.
Elastic bandage	Securing dressings on upper/lower extremities. Can be washed and reused by client. (4-6 inch X 5 yards)
Surgical Tape (Medipore/ Micropore)	Do not secure dressing directly to skin. Tape will damage wound margins when removed.
Castile soap packets	Provide to clients for wound irrigation/cleansing. Can be placed in bottle of saline or water, shake/use to clean wound. Great for clients without housing.
Absorbent under pads (chucks)	Catch effluent and wound debris during dressing changes.
Mask (Ear loop face mask/dental mask)	Protect face and mucous membranes from infectious material.

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Building Bridges

- “ I stayed away from the ER and hospitals as much as possible. I know I need help for this but they just treat you poorly. Like, I know I am an addict and when people treat you bad, you really begin to believe that’s what you are. It reinforces those negative things you think about yourself for being in this situation. You guys have been really good to me and given me hope that I can heal this and get better. It’s a much different experience with the team here.”

-Wound Client

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Thank You!

Go forth and heal those wounds!

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