# Update on Advanced Pediatric Wound Care

## *Wound Care in the NICU*

Pediatric Wound Care & Laser Specialists

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# Objectives

- Review various wounds which arise in the NICU patient.
- Discuss the unique skin characteristics that increase the risk for trauma and wound development in the neonate.
- Discuss the basic principles of wound care and how they apply to the NICU patient.
- Review advanced wound care dressings and techniques
- Case studies illustrating advanced wound care interventions in the neonatal patient.
- Quiz

# So What is Wound Care?

Wound Care - defined as the clinical science dedicated utilizing advanced wound dressings and techniques to promote wound healing and prevent wounds from arising.

# Pediatric Wounds??

# Common Pediatric/Neonatal Wounds

Contact Irritation

Surgical Wounds

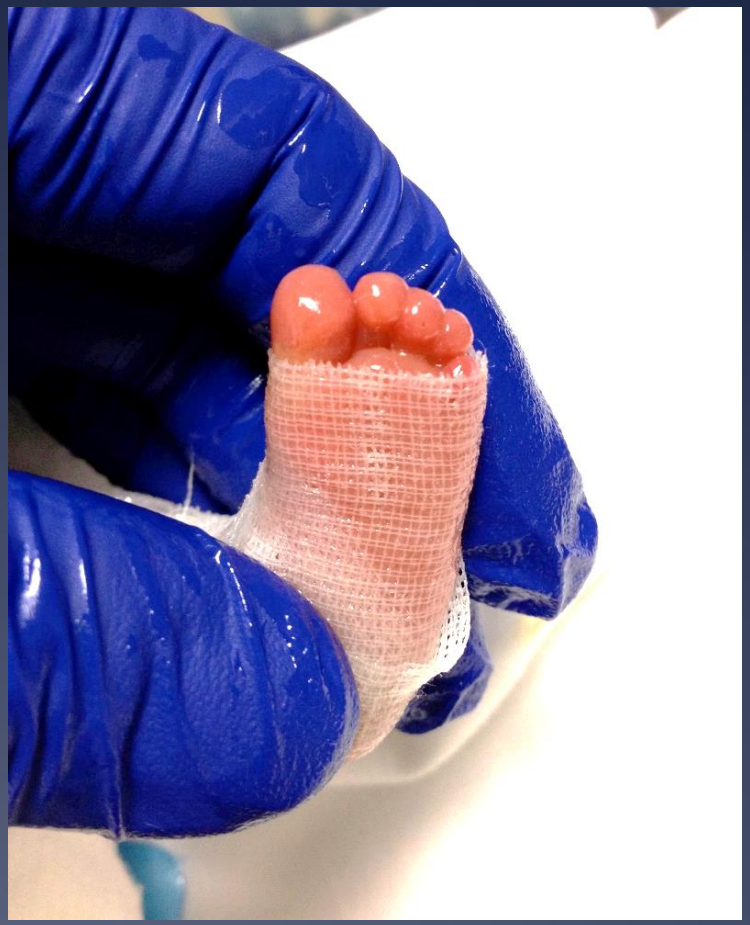
Pressure Ulcers

IV Infiltrates

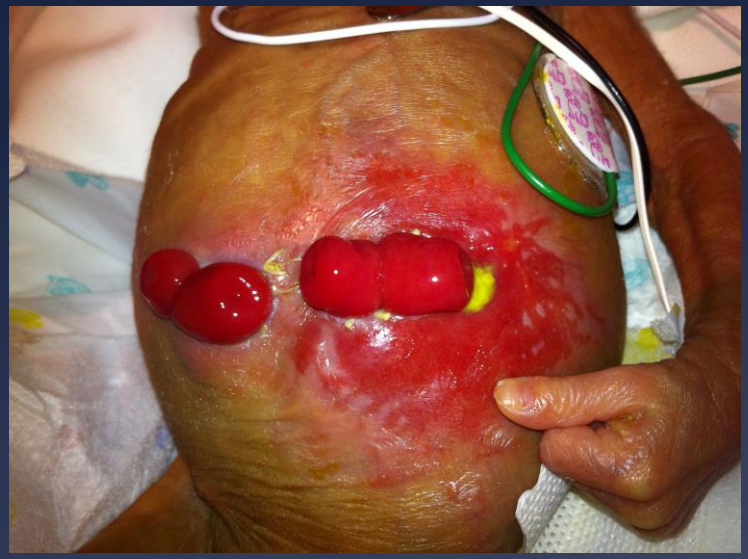
Trauma/Shear Injuries/Misc

Infections

Burns



# Contact Irritation



# Surgical Wounds


# Complex Ostomy Care


# Pressure Ulcers



# Infections

# IV Infiltrates




# Trauma/Shear Injuries/Misc

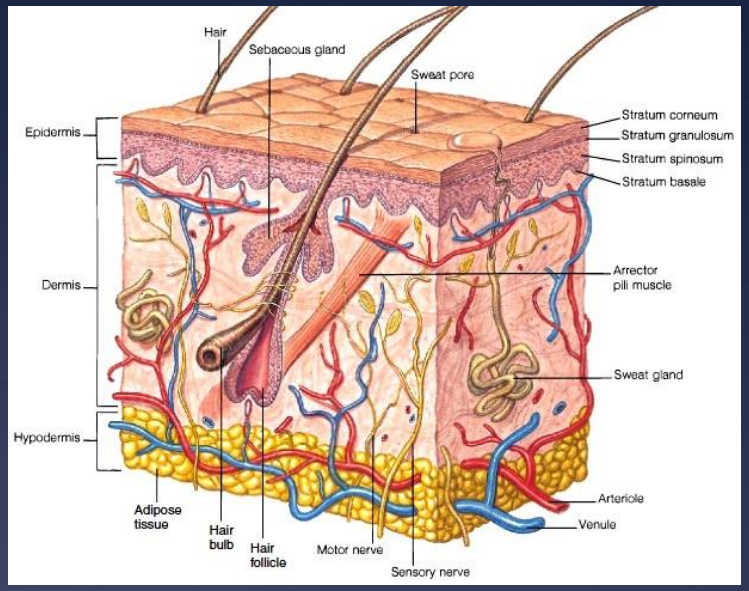

# Wound Healing Principles in Neonates:

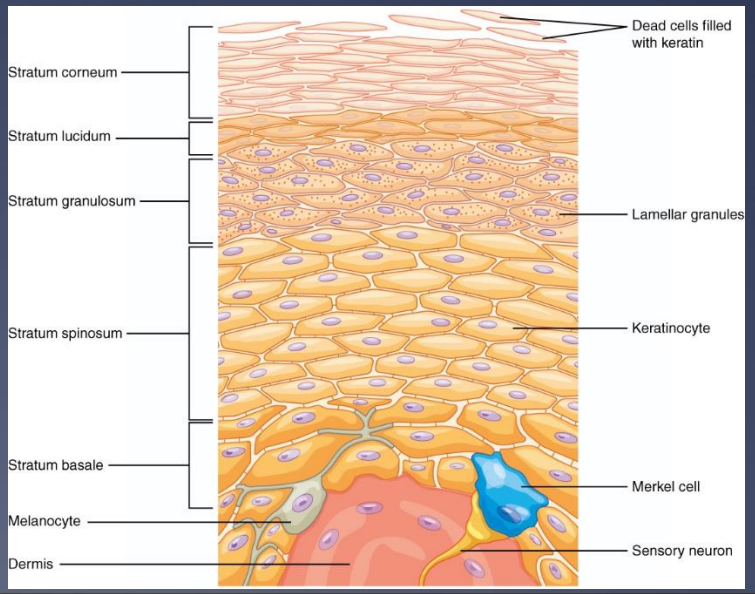
Recognizing differences in skin anatomy when approaching neonatal skin

# All Skin Is Not Alike

# Unique features of Neonatal Skin

- Skin does not mature until 34 weeks gestation.
- Skin integrity of premature infants is weak and far from complete.
- Stratum corneum is the outermost section of the epidermis. Composed of nonviable skin cells packed on top of each other to create a protective barrier.
- Key function of Stratum corneum is to control transepidermal water loss (TEWL) and to prevent absorption of toxic substances.



# Stratum Corneum

* In full term infants and adults the stratum corneum is 10-20 layers thick

* Premature neonates <30 weeks have less than 2-3 layers

* 23-24 week premies have virtually no corneum

# Unique features of Neonatal Skin - Dermis

* The dermis of premature infants has less collagen and fewer elastin fibers.
* This increases the risk for edema .
* Edema can in turn raise the risk for pressure ulcers and other ischemic injury due to reduced blood flow.

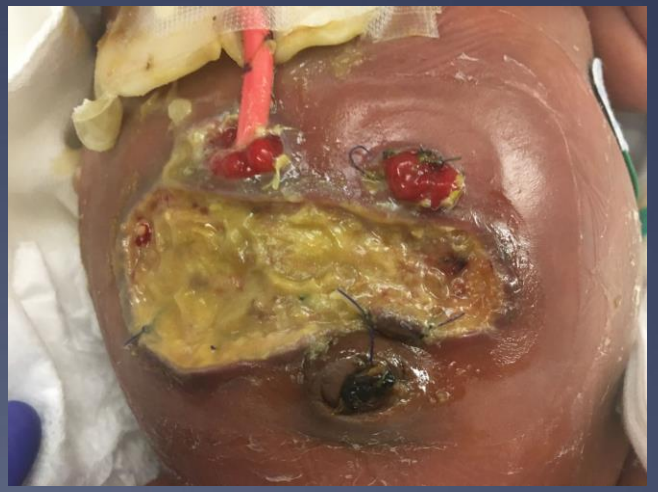
# Wound Healing Principles in Neonates:

Adequate Debridement

# Debridement

Tissue Debridement

- Good wound healing requires a viable wound bed
- Presence of necrotic tissue prolongs inflammation and impedes growth of new healthy tissue.
- Wounds require routine debridement of necrotic tissue: *Autolytic, Mechanical, sharp, enzymatic, low frequency ultrasound, biologic.*

# Honey Based Dressings for Debridement

- *Leptospermum* honey is derived from the pollen and nectar of a specific species of bush in New Zealand. AKA "Manuka honey"
- Unique among all types of honey – maintains its effectiveness even in the presence of a necrotic wound.
- Aids in the removal of necrotic tissue and has multiple wound healing properties.
- Also shown to have antimicrobial effects

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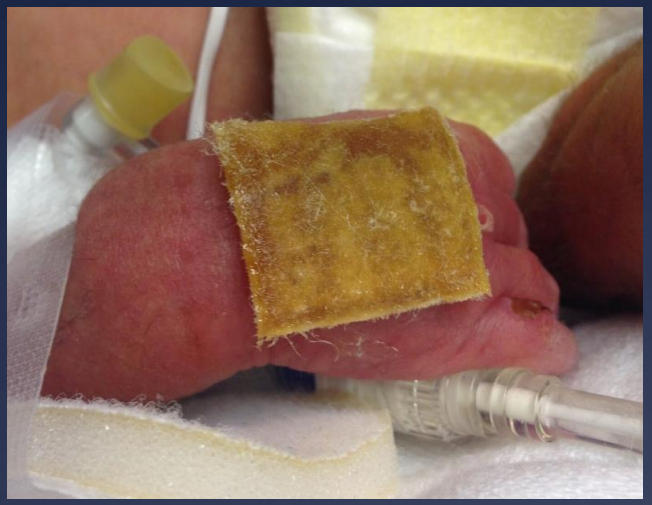
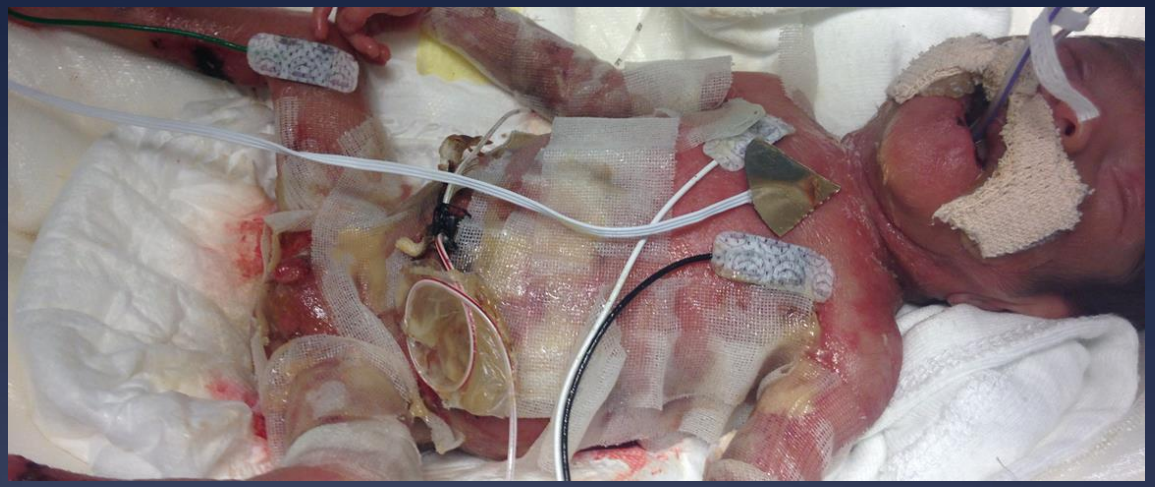
# Honey Based Dressings in NICU




# Honey Based Debridement – Caution in Extreme Prematurity

- Application of medical grade honey will perform exactly as requested – debridement of all necrotic and nonviable tissue.
- However, debridement is nonselective in this age patient. Will likely result in larger, deeper wound than expected.



# Debridement in Extreme Premature Infants

# Efficacy of Polymeric Membrane Dressings


* Whereas the utility and efficacy of medical grade honey and surfactant gels have been proven in the neonatal population, the risk for complications arises in extreme premature infants who require debridement.
* Polymetric Membrane Dressings have shown to be safe and effective in this unique fragile population.
* Applied directly onto the wound as a primary dressing, it has proven to be an effective and gentle debridement intervention with no complications encountered.

# Wound Healing Principles in Neonates:

- NICU: Safety, safety, safety
- *Recognizing differences in skin anatomy when approaching neonatal skin*
- Adequate Debridement
- Appropriate choice of dressing to promote moisture balance

# Dressings in the NICU Patient

- Promote autolytic debridement
- Maintain moisture balance
- Thermal protection
- Minimize pain
- Friction and shear protection


# To Cover or Uncover??

Myth #1 – Let wounds "breath and uncover"

# Wound Healing Principles

- Myth #1 – Let wounds "breath and uncover"
- The first basic principle of wound care is that wounds must be kept *moist and covered.*
- Goal: Not too wet, not to dry
- Add, retain or absorb moisture

# Moist Wound Dressings

- Without moist dressing:
  - Cells and other nutrient desiccate and die – can't migrate and close wound
  - Dry wounds allow dressings to stick to granulation tissue resulting in pain upon removal
  - Wounds cool off which impedes cell growth and wound closure.
- **With a moist wound dressing: Everything heals better**

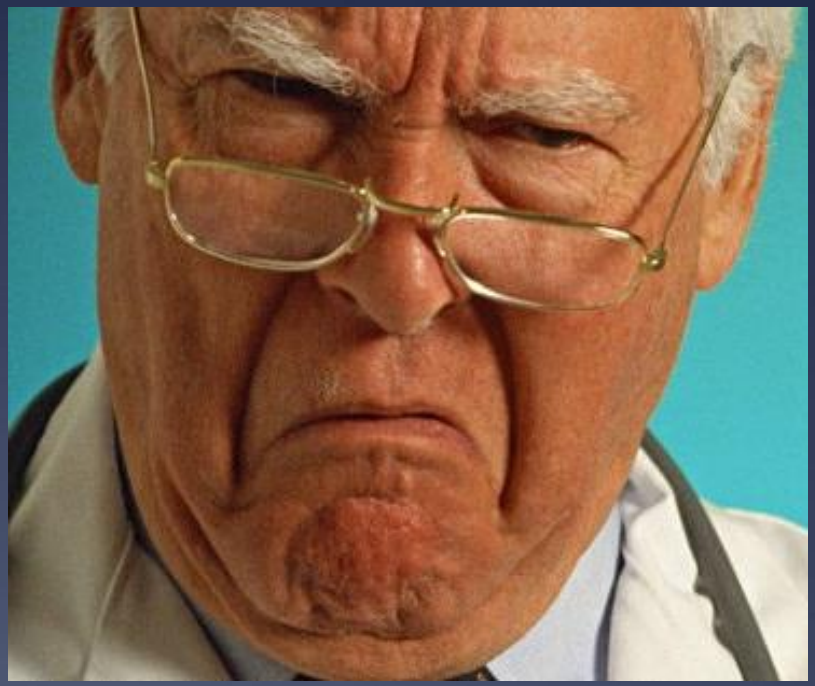
# Moisture Balance

# Why not Wet-to-Dry Dressings?

- No longer standard of care
- Compared to other advanced wound dressings there is nothing within gauze stimulates healing or promotes protection.
- Increased risk for infection
  - Not a barrier to environmental bacteria
  - Bacteria shown to penetrate multiple layers of gauze rapidly.
- Saline applied to gauze promotes desiccation/drying.
- WtD debridement is painful and damages healing granulation tissue

# Why not Wet-to-Dry Dressings?

- No longer standard of care
- Compared to other advanced wound dressings there is nothing within gauze stimulates healing or promotes protection.
- Cotton gauze is poorly absorbent
- Increased risk for infection
  - Not a barrier to environmental bacteria
  - Bacteria shown to penetrate multiple layers of gauze rapidly.
- Saline applied to gauze promotes desiccation/drying.
- WtD debridement is painful and damages healing granulation tissue



"I understand you ordered Wet-To-Dry dressing changes. We have many new great dressings available, would if be okay if we try one of these instead? They're supposed to work great"

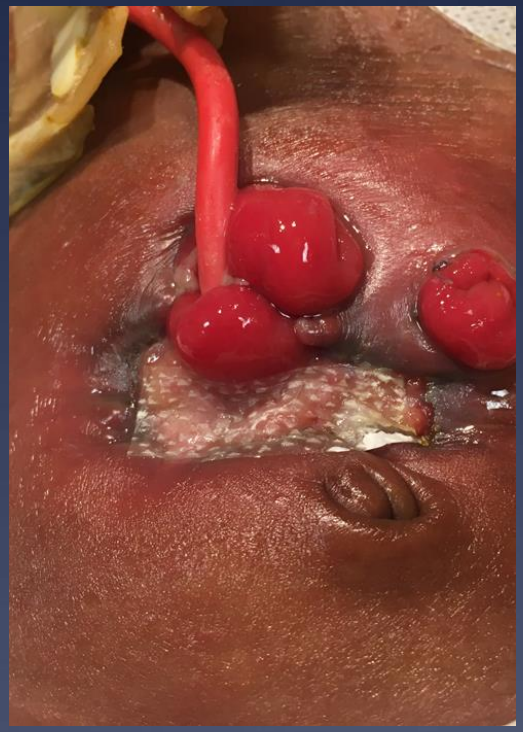
# Foam Dressings

- Nonadherent to avoid additional skin trauma
- High absorbent capacity for wounds with moderate-high drainage
- Provide cushioning/protection
- Cut to fit a variety of shapes
- Silicone bordered foam less apt to cause skin trauma.
- Caution with extreme preemies <23 weeks.

# Collagen Dressings

- Stimulate macrophages, angioblasts, keritinocytes and other growth factors.
- Provide a scaffolding for host cell proliferation and migration.
- Promote healthier balance between inflammatory mediators in the wound
- Can be changed anywhere from daily to weekly.
- Require secondary dressing to cover and secure.
- Best for smaller wounds.
- Slow healing for larger wounds.

# Collagen Dressings



# Cyanoacrylate Skin Protectant

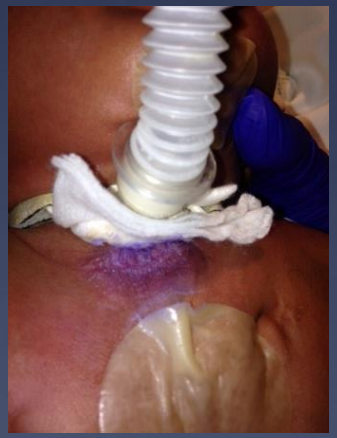
* Non-cytotoxic liquid barrier that quickly dries and forms a bond with skin surface when applied.
* Single application typically lasts 2-3 days.
* Protects skin from prolonged exposure to urine, stool and other bodily fluids.
* Protects from friction and maceration
* Remains in place until the epidermal cells naturally slough away.
* Nonirritating and safe in preemies and infants.

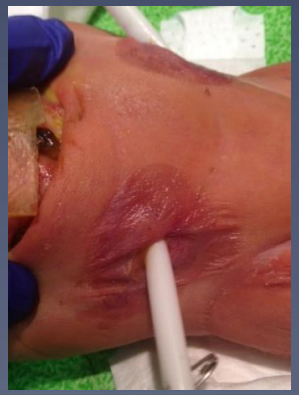
# Cyanoacrylate Skin Protectant

Indications:

- Skin protection for fragile or compromised skin:
  - Perianal area
  - Periwound
  - Skin tears
  - Surgical sites
- Skin protection under medical devices:

  G tubes, tracheostomy tubes, ostomy sites, oxygen tubing, negative pressure devices





# Negative Pressure Wound Therapy

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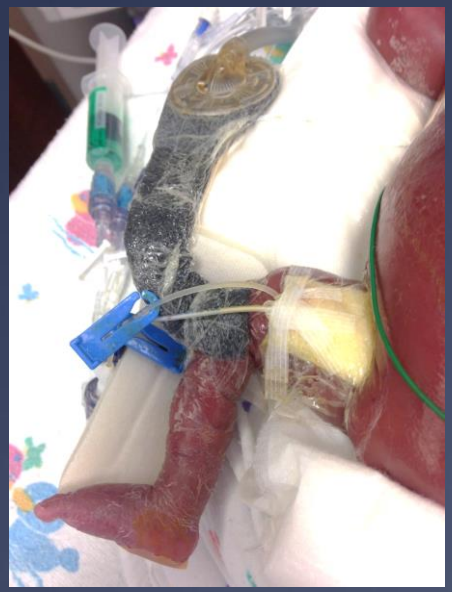
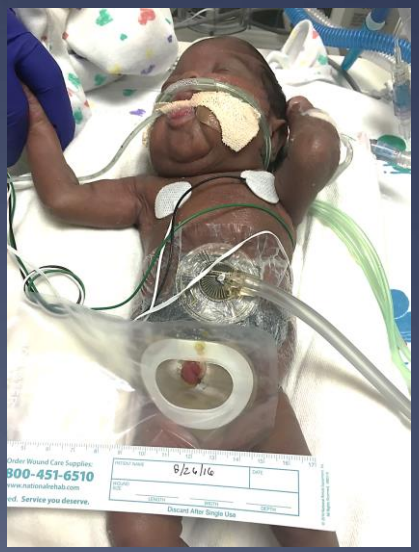


# Cases and Outcomes

# 23 week preemie with invasive fungal dermatitis

Skin cleansing resulted in active bleeding and severe pain

# Abdominal Surgical Wound

15 d/o 36 week preemie with NEC and multiple surgeries for complex bowel resection



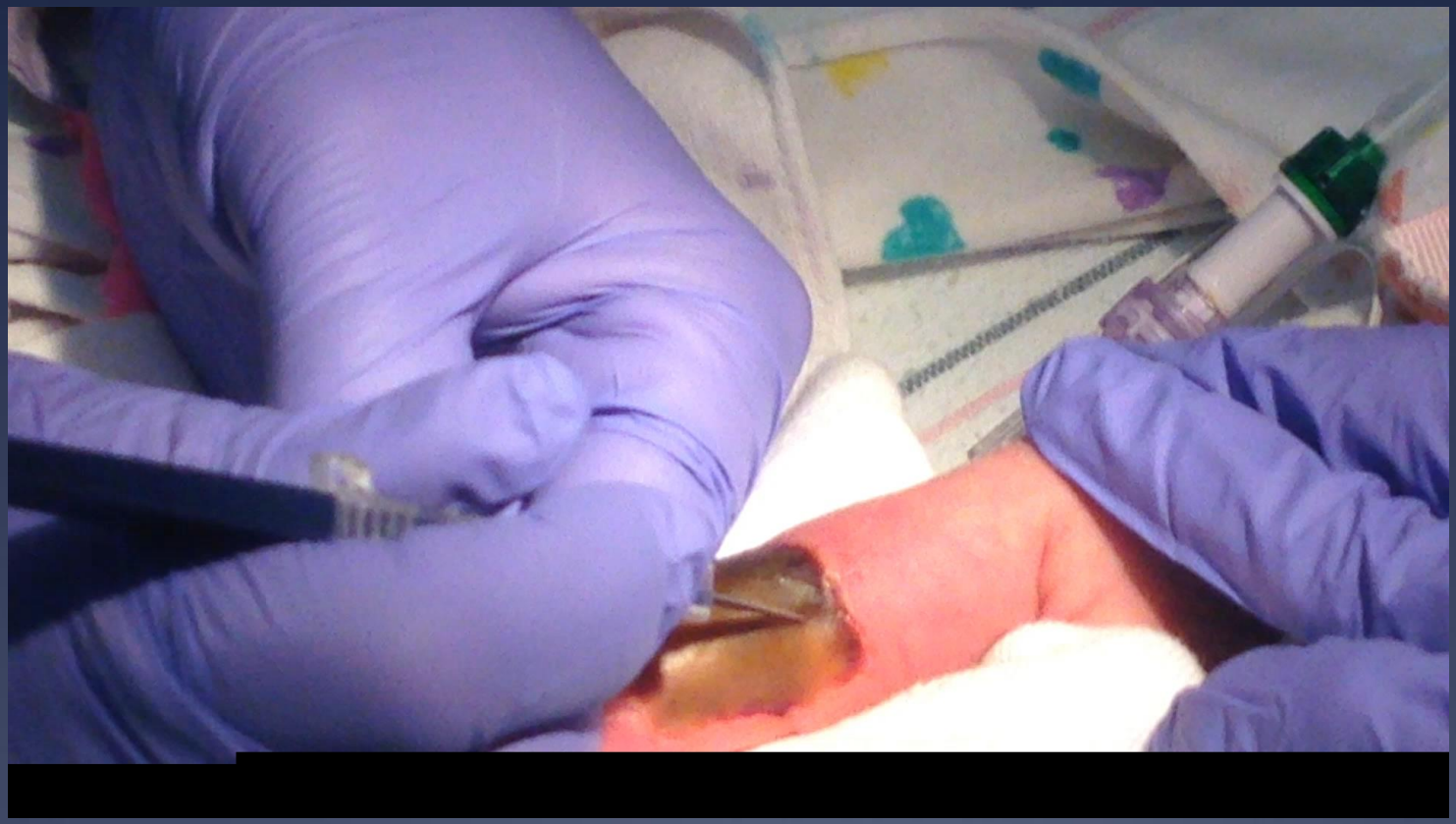

PATIENT NAME
4/29/17
DATE

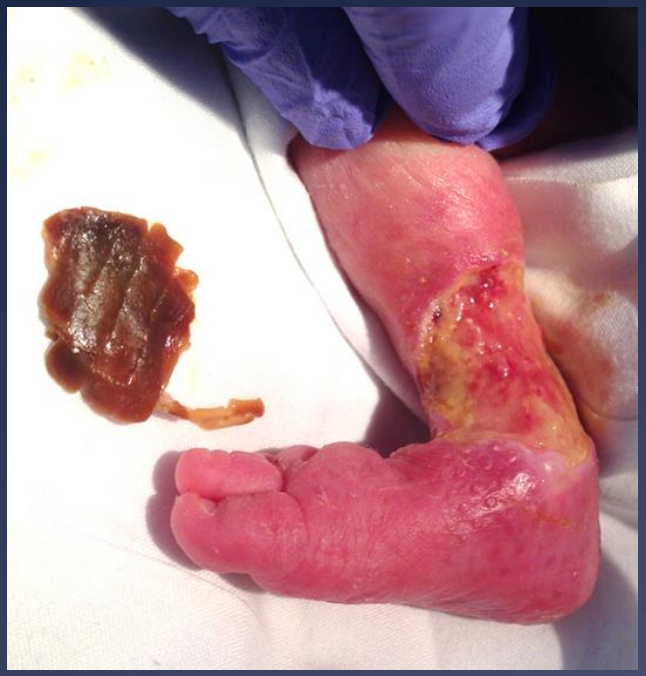
# Successful closure

# IV Infiltrate

26 week premature infant female with severe IV infiltrate secondary to Vancomycin

Eschar crosshatched using scalpel at bedside to facilitate penetration of Leptospermum honey into wound bed






9
10
11
12
13
14
PATIENT NAME
WOUND SIZE
LENGTH
WIDTH
DEPTH
Discard After Single Use


WOUND SIZE
1.3 x 1.7 x 0.1
LENGTH
WIDTH
Discard After Single Use

## Success! = Happy Mom & Dad (and Hospital Attorney)

# Quiz

During your assessment you identify this previously unrecognized skin injury.

You would classify this as

A. Unstageable Pressure Injury
B. Stage 1 Pressure Injury
C. Normal newborn hair loss
D. Tinea Capitis Fungal infection

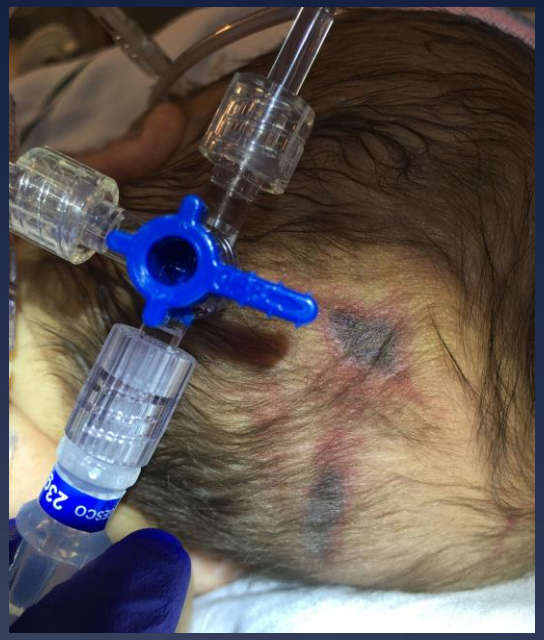
# Which IV Infiltrate should raise the greatest concerns?


# Which wound would not benefit from Medihoney?


Your patient has developed an acute pressure injury after you realize he's been laying atop an IV catheter.

You would classify this wound as a

A. Stage 2 Pressure Injury
B. Stage 3 Pressure Injury
C. Stage 4 Pressure Injury
D. Unstageable Pressure Injury




# Closure of this wound is best accomplished using which dressing?

A. Collagen Dressing

B. Placental Graft

C. Cadaveric Skin Graft

D. Calcium alginate

# Summary

- The size of the patient, developmental maturity of the skin and multiple comorbidities often result in a diffuse range of injuries and wounds.
- Early and effective debridement of wounds is critical for closure and healing.
- Wet to Dry dressing changes should never be used in neonates and are the least effective mechanism for debridement.

# Summary

- Choosing an appropriate dressing in a neonate should focus not only on recognized wound healing principles but also on safety, avoiding additional harm and reducing pain.
- Familiarize yourself with 2-3 dressing options and use them effectively.