Topical Pain Medications: Another Approach to Pain, Wound and Scar Management

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Ladd Family Pharmacy
August 24, 2013
This Talk Will Cover…

- Brief overview of the categories of pain
- Review opioid pharmacology
- Review the available treatment modalities and alternative options for pain management
- Discuss alternative options for wound treatment
- Discuss alternative options for scaring
Pharmacy Compounding

- Art and science of preparing customized medications
- Today an estimated 10% of all prescriptions and medication orders are compounded
- NECC fallout and impact
  - Proposed legislation
Ask questions like these listed below.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is your staff properly trained and evaluated in non-aseptic manipulation skills, gowning technique and compounding room use?</td>
<td></td>
</tr>
<tr>
<td>Do you have systems in place for handling complaints and investigating adverse events?</td>
<td></td>
</tr>
<tr>
<td>Do you purchase pharmaceutical-grade chemicals (USP, NF equivalent) from FDA-registered suppliers?</td>
<td></td>
</tr>
<tr>
<td>Do you obtain Certificate of Analyses for all formula ingredients?</td>
<td></td>
</tr>
<tr>
<td>Do you maintain both master formulas and lot-specific worksheets for all compounds?</td>
<td></td>
</tr>
<tr>
<td>Can you immediately trace a prescription back to the original formula log sheet and the source of ingredients?</td>
<td></td>
</tr>
<tr>
<td>Is every step of the compounding process from prescribing to compounding and labeling through dispensing reviewed and verified by a licensed pharmacist?</td>
<td></td>
</tr>
<tr>
<td>Do you verify the potency of finished compounds via weight, volume and yield checks and can share the results within 48 hours?</td>
<td></td>
</tr>
<tr>
<td>Are your pharmacists, technical and customer care staff dedicated to compounding?</td>
<td></td>
</tr>
</tbody>
</table>
PAIN
Pain Introduction

- Pain is an unpleasant sensory and emotional experience
- Every individual is unique and the pain experience can be equally diverse
- 1.5 billion people worldwide suffer from chronic pain
- 3-4.5% of the global population suffers from neuropathic pain, incidence rate increases with age\(^1\)
- Back pain is the leading cause of disability in Americans under 45 years old\(^2\)
- More than 26 million Americans between the ages of 20-64 experience frequent back pain\(^2\)

## Incidence of Pain –
American Academy of Pain Medicine

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of Sufferers</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Pain</td>
<td>100 million Americans</td>
<td>Institute of Medicine of The National Academies³</td>
</tr>
<tr>
<td>Diabetes</td>
<td>25.8 million Americans (diagnosed and estimated undiagnosed)</td>
<td>American Diabetes Association⁴</td>
</tr>
<tr>
<td>CHD (heart attack and chest pain)</td>
<td>16.3 million Americans</td>
<td>American Heart Association⁵</td>
</tr>
<tr>
<td>Stroke</td>
<td>7.0 million Americans</td>
<td></td>
</tr>
<tr>
<td>Cancer</td>
<td>11.9 million Americans</td>
<td>American Cancer Society⁶</td>
</tr>
</tbody>
</table>

6) American Cancer Society, Prevalence of Cancer: [http://www.cancer.org/docroot/CRI/content/CRI_2_6x_Cancer_Prevalence_How_Many_People_Have_Cancer.asp](http://www.cancer.org/docroot/CRI/content/CRI_2_6x_Cancer_Prevalence_How_Many_People_Have_Cancer.asp)
5 Major Categories of Pain

- **Inflammatory** – response to tissue damage that potentiates pain
  - Proinflammatory mediators → peripheral sensitization
  - Phenotypic switch (chemical and physical change in character and function of nerves – neuroplastic change)
  - Central sensitization
- **Soft tissue** – pressure ulcers, burns
- **Intracranial pressure** – brain tumor edema and hemorrhage
5 Major Categories of Pain

- **Nociceptive** – CNS and peripheral afferent pathways modulated via spinal cord
  - Somatic – aching, constant, localized (musculoskeletal)
  - Visceral – sharp, crescendo/decrescendo (cholecystitis, renal stones, intestinal obstruction, MI)

- **Neuropathic** – ischemia, destruction or encroachment of nerve by disease or tumor
  - Paroxysmal shooting or shock-like pain on a background of burning, aching sensation
Opioid Pharmacology

- **Opioid**: Narcotic or opiate-like drugs, include natural, synthetic, and endogenous ligands/substances

- **Receptor site**: that portion of a nerve cell to which a drug can bind. There are several opioid receptor sites, e.g., mu (beta-endorphins), kappa (dynorphins) and delta (met- & leu-enkephalins)
Opioid Pharmacology

- **Agonist**: in large enough doses, this type of drug binds to a specific site and initiates activity at that receptor site.

- **Types of agonist**:
  - **Pure agonist** – binds tightly with the receptor site and produces the near maximal activity possible at that receptor site.
  - **Partial agonist** – binds with the receptor site less tightly than a pure agonist.
Opioid Pharmacology

- **Antagonist**: in large enough doses, this type of drug binds to a specific site, or it displaces the agonist at the receptor site, thereby stopping the receptor’s activity.

- **Types of antagonist**:
  - **Pure antagonist** – binds tightly with the receptor site and stops or blocks activity at that receptor site.
  - **Partial antagonist** – binds with the receptor site less tightly than a pure antagonist, stopping or blocking less of the activity at that receptor site.
# Opioid Pharmacology

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Effect</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mu</strong></td>
<td>Analgesia (robust) Respiration depression Inhibits GI motility Euphoria</td>
<td>Mid-Brain/Spinal Cord Medulla Intestines Limbic system Peripheral sensory neurons</td>
</tr>
<tr>
<td><strong>Kappa</strong></td>
<td>Analgesia (mild) Inhibits GI motility Diuresis</td>
<td>Spinal cord Intestines Pituitary Gland Peripheral sensory neurons</td>
</tr>
<tr>
<td><strong>Delta</strong></td>
<td>Analgesia (minor) Tolerance Seizures</td>
<td>Spinal Cord Striatum/Cortex Peripheral sensory neurons</td>
</tr>
</tbody>
</table>
### Receptor Affinity of Opioid Analgesics

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Mu</th>
<th>Kappa</th>
<th>Delta</th>
<th>NMDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>A</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>A</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>A</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>A</td>
<td>A (?)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Methadone</td>
<td>A</td>
<td>-</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Pentazocine</td>
<td>-</td>
<td>A</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stadol</td>
<td>-</td>
<td>A</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ketamine</td>
<td>A (?)</td>
<td>-</td>
<td>A (?)</td>
<td>B</td>
</tr>
<tr>
<td>Dextromethorphan</td>
<td>A (?)</td>
<td>-</td>
<td>A (?)</td>
<td>B</td>
</tr>
</tbody>
</table>

- **A** = strong agonist  
- **B** = strong antagonist  
- **?** = questionable  
- **-** = negligible  

Modified by A. Peralta from Twycross R et al. Palliative Care Formulary. 1998
N-Methyl D-Aspartate Antagonist/Inhibitors

- **NMDA Antagonists** –
  - Blocks the amino acid **glutamate** from binding to **NMDA receptors**
  - reducing the depolarization of spinal cord neurons
  - continued firing of these neurons causes hyperalgesia
  - This increased response or hypersensitivity to a painful stimulus causes a “**windup” phenomenon**, a progressive increase in depolarization spikes that cause a single summation spike and the spontaneous firing of neurons that can persist for minutes
Transdermal Treatment

- Transdermal delivery allows drugs to solubilize in order to penetrate the tissue layers.
- Gels form liposomes that carry the drug down between the cells of the dermis and epidermis.
- Minimizes SE’s by delivering drug to the site of injury.
- Research confirms peripheral site of action for many of these drugs.
Liposomes
<table>
<thead>
<tr>
<th>Common Topical Pain Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amantadine (5-20%)</td>
</tr>
<tr>
<td>Amitriptyline (2-10%)</td>
</tr>
<tr>
<td>Baclofen 2%</td>
</tr>
<tr>
<td>Bupivicaine (2-5%)</td>
</tr>
<tr>
<td>Carbamazepine 5%</td>
</tr>
<tr>
<td>Clonidine (0.1-0.3%)</td>
</tr>
<tr>
<td>Cyclobenzaprine (1-3%)</td>
</tr>
<tr>
<td>Dextromethorphan (5-10%)</td>
</tr>
<tr>
<td>Diclofenac (1-10%)</td>
</tr>
<tr>
<td>Gabapentin (5-10%)</td>
</tr>
<tr>
<td>Guaifenesin (10-40%)</td>
</tr>
<tr>
<td>Haloperidol (0.5-2%)</td>
</tr>
<tr>
<td>Ibuprofen (10-40%)</td>
</tr>
<tr>
<td>Indomethocin (10-40%)</td>
</tr>
<tr>
<td>Ketamine (5-10%)</td>
</tr>
<tr>
<td>Ketoprofen (10-50%)</td>
</tr>
<tr>
<td>Lidocaine (2-10%)</td>
</tr>
<tr>
<td>Loperamide 1%</td>
</tr>
<tr>
<td>Nifedipine (2-16%)</td>
</tr>
<tr>
<td>Orphenadrine (5-10%)</td>
</tr>
<tr>
<td>Phenytoin (2-10%)</td>
</tr>
<tr>
<td>Piroxicam (0.5-2%)</td>
</tr>
<tr>
<td>Tetracaine (0.5-10%)</td>
</tr>
<tr>
<td>Topiramate 1%</td>
</tr>
</tbody>
</table>
# Mode of Action

<table>
<thead>
<tr>
<th>Drug</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amantadine</td>
<td>NMDA receptor antagonist, advantageous because it is not a controlled substance.</td>
</tr>
<tr>
<td>Amitriptyline</td>
<td>Has been shown to reduce nerve pain when used topically but mechanism of action is unknown.</td>
</tr>
<tr>
<td>Baclofen</td>
<td>Very effective muscle relaxant and anti-spastic agent. Thought to work by decreasing excitatory neurotransmitter release.</td>
</tr>
<tr>
<td>Bupivicaine</td>
<td>Local anesthetic with double the duration of action of Lidocaine. Sodium channel blocker that works to prevent ectopic neuropathic impulses.</td>
</tr>
</tbody>
</table>
## Mode of Action

<table>
<thead>
<tr>
<th>Drug</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clonidine</td>
<td>An alpha receptor agonist useful in reducing neuropathic pain, especially syndromes with a sympathetic component.</td>
</tr>
<tr>
<td>Cyclobenzaprine</td>
<td>Muscle relaxant and anti-spastic agent that affects muscle function. Possesses anti-neuropathic properties as it is structurally related to the trycyclic antidepressants by inhibiting sodium channels.</td>
</tr>
<tr>
<td>2-Deoxy-D-Glucose</td>
<td>A natural anti-viral from Alaskan Red Algae.</td>
</tr>
<tr>
<td>Diclofenac</td>
<td>A potent NSAID with augmented absorption and depot effect.</td>
</tr>
</tbody>
</table>
## Mode of Action

<table>
<thead>
<tr>
<th>Drug</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gabapentin</td>
<td>Anticonvulsant which works by 3 mechanisms for neuropathic pain. Best combined with ketamine for maximum synergistic effect.</td>
</tr>
<tr>
<td>Guaifenesin</td>
<td>Has been shown in studies to be an effective muscle relaxant but mechanism of action is unclear.</td>
</tr>
<tr>
<td>Ketoprofen</td>
<td>Inhibiting cyclooxygenase and preventing formation of inflammatory mediators, such as prostacyclin, prostaglandin, and thromboxane, NSAID. Best for pain involving torn muscles and similar injuries.</td>
</tr>
<tr>
<td>Loperamide</td>
<td>An opioid agonist that produces an antihyperalgesic effect through peripheral opioid receptors in inflamed tissue.</td>
</tr>
</tbody>
</table>
## Mode of Action

<table>
<thead>
<tr>
<th>Drug</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium</td>
<td>A mineral known for its ability to provide muscle relaxation.</td>
</tr>
<tr>
<td>Nifedipine</td>
<td>Calcium channel blocker that works at the gated NMDA receptor but also greatly improves tissue perfusion, improving healing time and nerve conduction velocity.</td>
</tr>
<tr>
<td>Orphenadrine</td>
<td>Strong muscle relaxant and pain relieving agent that provides both NMDA receptor and sodium channel blocking properties. Provides addition benefits when combined with neuropathic and muscle relaxing agents.</td>
</tr>
<tr>
<td>Pentoxifylline</td>
<td>A xanthine derivative that improves blood flow in peripheral extremities.</td>
</tr>
</tbody>
</table>
# Mode of Action

<table>
<thead>
<tr>
<th>Drug</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenytoin</td>
<td>An anti-convulsant used in combo with other analgesics for chronic pain.</td>
</tr>
<tr>
<td>Piroxicam</td>
<td>Member of the oxicam family, inhibits edema, erythema, tissue proliferation, fever and pain.</td>
</tr>
<tr>
<td>Topiramate</td>
<td>An anticonvulsant with numerous properties contributing to pain relief.</td>
</tr>
<tr>
<td>Camphor</td>
<td>Used topically as an analgesic and an antipruritic that replaces the perception of musculoskeletal pain with a cooling sensation.</td>
</tr>
<tr>
<td>Menthol</td>
<td>Acts as a local anesthetic or counterirritant by replacing the perception of localized pain with a cooling sensation.</td>
</tr>
<tr>
<td>DMSO</td>
<td>Dimethyl sulfoxide, used to increase skin penetration.</td>
</tr>
</tbody>
</table>
# Essential Oils for Pain

<table>
<thead>
<tr>
<th>Agent</th>
<th>Mode of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamomile</td>
<td>Helps to control muscle spasms and has analgesic and anti-inflammatory properties</td>
</tr>
<tr>
<td>Lavender</td>
<td>Helps with preventing muscle spasms, relieving pain and inflammation, and helping to relieve stress and tension</td>
</tr>
<tr>
<td>Rosemary</td>
<td>Has analgesic and antispasmodic properties. Also helps to improve blood circulation</td>
</tr>
<tr>
<td>Peppermint</td>
<td>Good for muscle soreness</td>
</tr>
</tbody>
</table>
Clinical Trials

- **BAK**-Baclofen 1.67%, Amitriptyline 3.33%, Ketamine 1.67% (5ml twice daily)
  - Chemotherapy-induced peripheral neuropathy
  - Locally we see BAK 2/2/2%, max 5/5/5%
  - **Sig:** Apply 1-2 ml topically up to tid prn

- **AK**-Amitriptyline 4%/ Ketamine 2%
  - **Sig:** 4ml topically bid
  - amitriptyline 40mg/ml, ketamine 20mg/ml

- **NCI**
  - Clinicaltrials.gov identifier: nct00516503
Neuropathic Pain

- **ABKK Gel**
  - Baclofen 5%
  - Amitriptyline 2%,
  - Ketamine 5%,
  - Ketoprofen 10%

  Sig: apply 1-2 grams up to tid prn

- **Feedback:** Type of nerve damage can give a good indication on which medication to use

- **Pearls for use:** Better if applied to well hydrated skin and rubbed in well.


Neuropathic Pain- Locally

- **Neurogel Forte**
  - Amitriptyline 2%
  - Baclofen 2%
  - Lidocaine 5%
  - Gabapentin 5%
  - Ketamine 5%
  - Ketoprofen 20%

  **Sig:** Apply 1-2 grams topically up to qid prn

- **NP-S**
  - Ketoprofen 7%
  - Piroxicam 1%
  - Bupivicaine 5%
  - Ketamine 10%
  - Gabapentin 6%
  - Carbamazepine 5%
  - Clonidine 0.2%
  - Amitriptyline 2%
  - Baclofen 2%
  - Loperamide 1%
Muscular Pain - Locally

- **Muscular Pain Gel**
  - Ketoprofen 20%
  - Lidocaine 5%
  - Clonidine 0.3%
  - Guaifenesin 20%

  Sig: apply 1-2 grams up to tid prn

- **BCGKLMN**
  - Baclofen 2%
  - Cyclobenzaprine 2%
  - Gabapentin 6%
  - Ketamine 10%
  - Lidocaine 2%
  - Magnesium 5%
  - Nifedipine 2%
Inflammation - Locally

- **Ketoprofen 10% Gel**
- **KETO-CAM**
  - Ketoprofen 10%
  - Piroxicam 1%
- **Diclofenac 8% in DMSO**
  - Use as roll-on

**Pearls:** no GI upset as avoiding first pass

**Sig:** apply 1-2 grams up to tid prn
Inflammation and pain - Locally

- **Keto-Cam/Lido**
  - Ketoprofen 10%
  - Piroxicam 1%
  - Lidocaine 5%

- **Inflamagel**
  - Ketoprofen 40%
  - Bupivacaine 5%

- **BCDL**
  - Baclofen 2%
  - Cyclobenzaprine 2%
  - Diclofenac 3%
  - Lidocaine 2%

Sig: Apply 1-2 grams topically up to tid prn
The Vulvodynia Guideline Journal of Lower Genital Tract Diseases Volume 9 Number 1, 1005, 40-51 With Dr. Hope Haefner at U of M

- This is the List of topical analgesics that their office uses.

<table>
<thead>
<tr>
<th>Medication</th>
<th>Strength</th>
<th>Directions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amitriptyline/Baclofen Transdermal</td>
<td>2%, 2%</td>
<td>Apply once to three times daily</td>
</tr>
<tr>
<td>Gabapentin Transdermal</td>
<td>6-10%</td>
<td>Apply once to four times daily</td>
</tr>
<tr>
<td>Ketamine Transdermal</td>
<td>10-20%</td>
<td>Apply once to four times daily</td>
</tr>
<tr>
<td>Baclofen/Guaiifenasin/Ketoprofen</td>
<td>2%, 10%, 20%</td>
<td>Apply once to twice daily</td>
</tr>
<tr>
<td>Doxepin Transdermal</td>
<td>5%</td>
<td>Apply once to four times daily</td>
</tr>
<tr>
<td>Lidocaine base/Prilocaine base</td>
<td>2.5%, 2.5%</td>
<td>Apply once to four times daily</td>
</tr>
<tr>
<td>Lidocaine ointment</td>
<td>5%</td>
<td>Apply twice daily as needed</td>
</tr>
</tbody>
</table>
Introduction: Wounds

- Rapid progress in the understanding of the body’s complex healing processes
  - Injection Site Infections
  - Pressure Sores
  - Diabetic and Neuropathic Sores
  - Venous Leg Ulcers
  - Nonhealing Surgical Wounds
Management of Wounds

- **Topical Wound Treatments**
- Skin Substitutes
- Biatain Foam
- Debridement
- Advanced Dressings
- Growth Factor Therapy
- Vacuum – Assisted Closure
- Electromyography
- Nerve Studies
- Compression Stockings
- Vascular Studies

- Total Contact Casting
- Hyperbaric Oxygen Treatment
- Low Level Laser Therapy
- UV Therapy
- Negative Pressure Wound Therapy
- Wound Closure
- Sutures, Stitches, Staples
- Nerve Conduction Study
- Antibiotics (oral, IV)
- Ultrasound Therapies

http://www.woundcarecenters.org/wound-therapies
## Wound Care

<table>
<thead>
<tr>
<th>Wound Type</th>
<th>Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Odor / No Pain</td>
<td>Misoprostol 0.0024% Phenytoin 5%</td>
</tr>
<tr>
<td></td>
<td>Metronidazole 2%</td>
</tr>
<tr>
<td>Odor / No Pain</td>
<td>Misoprostol 0.0024% Phenytoin 5%</td>
</tr>
<tr>
<td></td>
<td>Metronidazole 2%</td>
</tr>
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<td>Lidocaine 4%</td>
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<td>Odor / Pain</td>
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</tr>
<tr>
<td></td>
<td>Metronidazole 2%</td>
</tr>
</tbody>
</table>

### Base Choices

**Emollient Cream:** Good for most decubitus wounds, very hydrating

**Protective Barrier Ointment:** Good for areas with potential for soiling

**Gel:** Good for tunneling areas or dry wounds

**Polyox Bandage:** Good for high draining wounds

**Spira-wash:** Best choice

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**Notes:**
- If local circulation is poor, nifedipine 2% or pentoxifylline may be added to preparation. Nifedipine works well for potential gangrenous areas.
- Medication is best used 3 times daily.
## Mode of Action

<table>
<thead>
<tr>
<th>Agent</th>
<th>Strength</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misoprostol</td>
<td>0.0024%</td>
<td>Synthetic analogue of prostaglandin E1, attenuate the inflammatory process and promote collagen formation by inhibiting IL-1 and TNF. Modulate inflammation and decrease wound healing time.</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>5%</td>
<td>Stimulates collagen deposition, fibroblast proliferation, glucocorticoid antagonism, and has antibacterial activity.</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>4%</td>
<td>Topical anesthetic</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>2%</td>
<td>Deodorizing effect of metronidazole correlate with eradication of anaerobic infection.</td>
</tr>
<tr>
<td>Nifedipine</td>
<td>2%</td>
<td>Ca2+ channel blocker that greatly improves tissue perfusion and improving healing time</td>
</tr>
<tr>
<td>Pentoxifylline</td>
<td></td>
<td>Reduces blood viscosity, thus improving circulation to wounds</td>
</tr>
</tbody>
</table>
Vani-Scar Gel

- Promote a moist wound environment to promote the healing process
- Polyethylene Glycol (PEG) ointment base containing organic Meadowsweet Extract
- Great for wounds, ulcers, burns, sores, cuts
  - Phenolic glycosides (spiraein) and flavonoids in the Meadowsweet Extract
- Water-washable base for easy cleansing/debridement
- Is adherent, and provides occlusion
Treatment of Oozing Wounds Without Infection

- Phenytoin 2%
- Misoprostol 0.0024%
- Lidocaine 2%
- Bupivacaine HCl 0.2%
- Diphenhydramine HCl 1%
- Aloe Vera 0.2%
  - Poly ox bandage

Note: Increasing blood flow (with Aloe Vera) can lead to better healing times
The accordion puffer for mucosal and wound bandage

Accordion Puffer

- Mucosal Bandage
- Anesthetics
- Antifungals
- Antibiotics
- Steroids
Treatment of Decubitis Ulcers

Ketoprofen 2%
Lidocaine 2%,
Misoprostol 0.0024%,
Phenytoin 2%,
Aloe Vera 1.2% in an emollient cream base

- **Note:** Increasing blood flow (with Aloe Vera) can lead to better healing times
- **Pearls for use:** No serum phenytoin levels detected, no ADR

Treatment of Infected Wounds

Misoprostol 0.0024%
Phenytoin 5%
Metronidazole 2% or Gentamicin 0.2%

If pain:
+ Lidocaine 2% or
+ Morphine 0.1%

If inflammation:
+ Ketoprofen 2%
Scars
Scarring

- Scarring is the process by which wounds repair
- Damage to the dermis is needed to produce a scar
- The quality and appearance depends on the nature of the trauma that produced the damage
  - Location, conditions of wound healing and genetics
- Keloids are thicker, itchy, enlarging scars
Silicone

- Silicone sheeting has been widely used in treatment since the early 1980s
- Several clinical studies and reviews have confirmed its efficacy
- Recent studies have confirmed the efficacy of silicone gel
- Silicone sheeting is OTC item. Silicone gel is a prescription covered item.

Mechanism of Action of Silicone

- Increases hydration of stratum corneum
- Facilitates regulation of fibroblast production
- Reduction in collagen production
- Allows the skin to “breathe”
- Results in a softer and flatter scar

- Protects the scarred tissue from bacterial invasion
- Prevents bacteria-induced excessive collagen production in the scar tissue
- Modulates the expression of several different growth factors that stimulate fibroblasts to synthesize collagen and fibronectin.
- Thus, restoring the balance of fibrogenesis and fibrolysis
Vani-Scar

- Elegant topical anhydrous silicone base
- Useful on all types of scar tissue
  - New scars, old scars, surgical scars, keloids, stretch marks, or any skin conditions that would benefit from barrier protection
- Infused with unique ingredients increase healing, emolliency and mild penetration
Vani-Scar

- May be used after surgery or an injury, to reduce inflammation and the buildup of scar tissue
- May be used on stretch marks from sudden weight gain or loss, growth spurts during puberty, or with pregnancy
- Drugs can be added to help with different types of pain/injury caused by scar tissue that has formed over time
Agents used in Scar Prevention/Treatment

- **Pentoxifylline (0.1 – 0.5)%**
  - Decreases collagen production
  - Increases activity of collagenase in dermis
  - Inhibits fibroblast hyperactivity

- **Betamethasone (0.1%)**
  - Steroid and anti-inflammatory

- **Dimethyl Sulfone 2%**
  - Anti-inflammatory

- **EGCg (0.1 – 0.5%)**
  - Antioxidant

- **Caffeine (0.1 – 1%)**
  - Induces differentiation and proliferation in epidermal keratinocytes

- **Collagenase (350 u/Gm)**
  - Reduces collagen production

- **Hyaluronidase (250 u/Gm)**
  - Breaks down collagen

- **Tranilast (1 – 10%)**
Tranilast, a Multitasking Agent

- One of the most versatile substances available to practitioners
  - Allergic rhinitis and allergic conjunctivitis
  - Atopic dermatitis and eczema
  - Keloids and hypertrophic scars
  - Oligozoospermia
  - Otitis media
- Mast cell stabilizer, inhibiting the release of chemical mediators such as histamine
- Inhibits collagen synthesis through interference with Tissue Growth Factor beta activity, a mediator that stimulates collagen synthesis
Treatment of Keloids and Hypertrophic Scars

- **Formula #10234**
  - Tamoxifen Citrate 0.1%, Tranilast 1%, Caffeine Citrated 0.1%, Lipoic Acid 0.5% Topical Vani-Scar Gel

- **Formula #10233**
  - Betamethasone Valerate 0.1%, Tranilast 1% Topical Vani-Scar Gel

- **Formula #10317**
  - Pentoxifylline 0.3%, Caffeine 1%, EGCg 1% Topical Vani-Scar Gel

All formulas are to be applied topically BID

If pain:
  + Lidocaine 2%

If inflammation:
  + Ketoprofen 2%
Scar Prevention

- **Formula #10235**
  - EGCg 1%, DMSO 2%, Tranilast 1%, Ascorbic Acid 2% Topical Vani-Scar Gel

- **Formula #10236**
  - EGCg 1%, DMSO5%, Ascorbic Acid 2%, Caffeine 1% Topical Vani-Scar Gel

All formulas are to be applied topically BID
Stretch Marks/Acne Scars

- **Formula #10419**
  - Tretinoin 0.1%
  - Topical Vani-Scar Gel

**Note:** may use the Vani-Scar Gel by itself or can be mixed with 5-20% grapeseed oil
Big Picture Take Home Points

- Every individual is unique and the pain experience can be equally diverse.
- Topical treatment options take on a customizable approach.
- There are treatment options for NEW and OLD scars with a silicone gel.
- Scaring can be prevented.
Questions?