WOUND CARE IN THE ELDERLY

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DISCLOSURES:
EMPLOYED WITH ELLIOT HEALTH SYSTEMS CENTER FOR WOUND CARE AND HYPERBARIC MEDICINE

WOUND CARE IN THE ELDERLY

- Anatomical and physiological changes in the geriatric population that affect wound healing.
- Socioeconomic factors specific to the geriatric population that affect wound healing.
- Wound care interventions and approaches best suited to the geriatric population for wound healing and prevention.

ANATOMICAL AND PHYSIOLOGICAL CHANGES:
SYSTEMIC AND LOCAL

- Age related typical changes
- Disease associated alterations
- Medication effects
- Lifestyle effects

SKIN: LARGEST AND MOST VISIBLE ORGAN

- 15% total body weight
- Functions:
  - Thermoregulation
  - Primary defense structure
  - Fluid balance
  - Communication

HEALTHY SKIN STRUCTURES
SKIN AGING

- Chronological & Photosaging
- SAS: Senescence and apoptosis
- Oxidative metabolism
  - DNA mutations
  - Mitochondrial dysfunction
  - Altered aging
  - Decreased transport
  - Protein oxidation
  - Decreased function

AGE RELATED TYPICAL SKIN STRUCTURAL CHANGES

ERDERMAL
- Thinning
- Flattening of rete ridges
- Decreased melanocytes
- Decreased Langerhan's cells
- Decreased Merkel cells
- Keratinocytes resist apoptosis

DERMAL & UNDERLYING
- Thinning
- Flattening of rete ridges
- Decreased blood vessels in rete ridges
- Increased # of MMPs, decreased # of inhibitors
- Elastin and collagen disorganization
- Same # of sebaceous glands, hypertrophic and decreased oil production
- Decreased # and function of sweat glands

SKIN ANATOMY

AGE SKIN

- Decreased flexibility, elasticity and strength
- Increased reaction to irritants
- Decreased antioxidant protection
- Impaired sensation, thermoregulation, vascular reserve

SYSTEMIC DISEASE

- Cardiovascular: decreased cardiac output, atherosclerosis, decreased peripheral flow, edema, vessel thin
- Diabetic: MD, decreased immune response, microangiopathy, renal impairment, neuropathy
- Cancer: chemotherapy decreases wound healing
- Immune: impaired or overactive response
- Endocrine: impaired metabolism, impaired communication
- Racially: aging skin and impaired wound healing
- Lymphedema

EFFECTS OF MEDICATIONS

Inhibits Wound Healing
- Antiangiogenic chemotherapy
- Pantoprazole
- Celebrex (Celecoxib) NSAIID
- Ibuprofen, Naproxen
- Metformin
- Singulair
- Valium
- Lovastatin, simvastatin
- Doxycycline, clarithromycin
- Furosemide (Lasix)
- Warfarin,
- Apixaban, Rivaroxaban
- Corticosteroids, methotrexate
- Nicotine

Promotes Wound Healing
- Pentoxifylline (Trental) for venous ulcers
- Chlostridial (Proprin) for arterial ulcers
- Currently being studied
- Topical insulin
- Topical oxygen
- Complementary approaches

(Lee, 2017)
LIFESTYLE EFFECTS

SMOKING, ETHOH, SWEET TOOTH, STRESS

SUN DAMAGE

SOCIOECONOMIC FACTORS SPECIFIC TO THE GERIATRIC POPULATION THAT AFFECT WOUND HEALING

FINANCIAL
- 2010 US Census Report:
  - 40.3 million >65 years
  - 13% of the population > 65 years
  - Health costs of 65+ age group
    - 3 x more than adult
    - 5 x more than child

EMOTIONAL

LIVING ENVIRONMENT

LIVING SITUATION

- SNF/LTC - 3.1%
- ALF - 10%
- Group Home Independent Living
- Single Home alone or with Spouse
- Single Home with Family Members

INSURANCE COVERAGE

- Medicare A
- Medicare B
- Medicare D - DMEs, pharmaceuticals
- Medicaid
- Private Insurance
- Private Pay
POVERTY LEVELS IN THE ELDERLY: 2013

- US:
  - 15% are in poverty
  - Greater in women than in men
  - 3x higher in Hispanic elders
  - 2.5x higher in Black elders
- NH: 14%

10% of elders in poor health, 1 in 5

HISTORY AND PHYSICAL THROUGH THE SOCIOECONOMIC LENS

- Sensory deficits: blindness, HOH, taste, smell, and neuropathy
- Mobility deficits: decreased ROM, balance and gait, bending/stepping
- Oral health/mental health: functional ability related to shopping/cooking/eating
- Functional ability related to bathing, hygiene, self-assessment
- Assistance: who is available to provide care
- Safety: alarm sensors, call for help options

INDIVIDUAL COST OF WOUNDS

- Painful
- Malodorous
- Prevents normal daily routine
- Time consuming
- Costly
- Isolating
- Depression
- Decline in overall QOL

WHO HAS MALNUTRITION!

- Emaciation
- Obesity

Nutrition
- Dietary restrictions medically prescribed
- Amino Acids: arginine, glutamine
- Vitamins, minerals
- Zinc, copper
- Anemia
- Malabsorption
- Enteral or ONS may be needed

Hydration
- Fluid restrictions medically prescribed
- No restrictions medically prescribed
- Swelling impairments
- Assess those contributing to fluid loss
- Monitor weight, skin turgor, urine, serum Na
- Medications: side effects
- Diuretics
- Anticholinergics

NUTRITIONAL STATUS

- "Screen and intervene"
- Affordability
- Eating alone or with others
- Oral health concerns
- Chronic or acute illness affecting appetite, absorption, intake

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http://www.thinkstockphotos.com/search/#/M||471559232

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http://www.mna-elderly.com/forms/mna_guide_english.pdf

http://thechroniclesofb.com/?tag=obesity
http://www.torontosun.com/2013/05/13/obesity-obsession-overlooks-underweight-kids

NUTRITION AND HYDRATION

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Academy of Nutrition and Dietetics and American Society for Parenteral and Enteral Nutrition (ASPEN) “do not recommend using inflammatory biomarkers such as serum protein levels for diagnosis of malnutrition.”

Recommends interprofessional care:

- Dx medical reasons for altered nutritional and hydration status
- Oral health screening
- SLP swallowing ability
- OT oral feed and feeding ability
- Dietitian and monitor nutritional status

Posthauer, 2015

Elder Abuse

- Last reported data from 2005, close to 1,500 cases
- Abuse
- Neglect
- Self neglect
- Not always malintended

http://www.nhcadsv.org/elder_abuse.cfm
https://www.dhhs.nh.gov/dcbcs/beas/aboutprotection.htm

Socioeconomic Effects on Wound Healing

- Increasing aging population: increasing aging skin
- Large percentage require care giving services
- Financial constraints restrict ability to afford care
- Nutritional deficits increase wound development and delay healing
- Fear and embarrassment: wounds under reported until serious illness
- Poor skin hygiene leads to increased risk of wound development

Wound Care Interventions and Approaches Best Suited to the Geriatric Population for Wound Healing and Prevention

Cleansing

- Mild surfactant
- High in phospholipids
- Soft cloth
- Decreased frequency
- Liquid or foam soap
- pH approx. 5.5
- Taped wound

Skin barriers:

- Dimethicone
- Petroleum
- Silicone

Restores skin:

- Urea
- Glycerin
- Hyaluronic acid
HEALING REQUIRES THE SAME PRINCIPALS FOR EVERY WOUND TYPE

- Ensure blood flow
- Manage edema and inflammation
- Assess for and treat infection
- Manage underlying diseases/conditions
- Provide nutritional supports and manage hyperglycemia
- Remove unhealthy tissue
- Provide moisture balance
- Off-load to avoid pressure and trauma
- Assist patient with financial and social needs

UNMET NEEDS

STAGES OF WOUND HEALING

**Stages**

- **Hemostasis**: platelet aggregation, clot formation, stop hemorrhage, lay a matrix for cell adhesion
- **Inflammatory**: complement cascade, neutrophil & macrophage response, acute inflammatory response
- **Proliferative**: 3 days to few weeks, proliferation of fibroblasts, protein synthesis, angiogenesis, granulation formation, epithelialization
- **Remodeling**: 7 days to one year or more, increases tensile strength, although never reaches 100%

WOUND TYPES

- Skin tears
- Diabetic foot ulcers
- Venous leg ulcers
- Arterial leg ulcers
- Pressure ulcers
- Surgical wounds
- Atypical wounds
- Edema related

SKIN TEARS: "WOUNDS CAUSED BY SHEAR, FRICTION, AND/OR BLUNT FORCE RESULTING IN SEPARATION OF SKIN LAYERS"

- Prevalence studies (over 10 yrs old):
  - LTC-up to 54%
  - Home setting-up to 19.5%
  - Acute setting-up to 22%

Contributing Factors

- Falls and Minor Trauma
- Neuropathy
- Cognitive Impairment
- Thining Skin and Xerosis
- Adhesive Removal
- Handling During Care
- Edema

Classifications

- Partial Thickness-deep
- Full Thickness-deep
- ISTAP International Skin Tear Advisory Panel
- 2013 Skin Tear Classification System
- Type 1: no skin flap loss
- Type 2: partial skin flap loss
- Type 3: complete skin flap loss
SKIN TEARS: "WOUNDS CAUSED BY SHEAR, FRICTION, AND/OR BLUNT FORCE RESULTING IN SEPARATION OF SKIN LAYERS"

### PREVENTION
- Avoid tape/adhesive use
- PT/OT referral
- Protective equipment
- Protective sleeves
- Moisturizing skin care
- Geropsych-cognitive health referral

### INTERVENTION
- Irrigate
- Approximate and secure
- No tape with dressing application
- Non-adherent dressing
- Protective sleeves

SKIN TEAR DRESSINGS: NON-ADHERENT

GERI-SLEEVES: PROTECTION

LOWER LIMB ULCERS
- Venous:
  - Accounts for 80% of leg ulcers
  - Due to venous valvular incompetence or occlusion
  - Managed with compression
- Arterial:
  - Accounts for up to 20% of leg ulcers, often comorbid venous
  - Due to impaired arterial circulation
  - Requires revascularization procedures
- Diabetic:
  - Located on feet most commonly on plantar surface
  - High risk for infection
  - Managed with strict off loading

VENOUS LEG ULCERS
- NCBI estimates annual cost of $14.9 billion
- Affects 3 million Americans, 1% of the population
- Incidence increases to 8% at age 80
- Co-morbid arterial disease in 20% of the cases

VENOUS STASIS DERMATITIS

http://www.skininfection.com/Resources/ImgLib/Dermatitis.html
http://hardinmd.lib.uiowa.edu/dermnet/dermatitisstasis6.html
VENOUS LEG ULCER INTERVENTION

Contraindications and Risks
- CHF
- Renal failure/ fluid overload
- PAD/ ischemia
- Infection
- Pain
- Pressure ulcer

MANAGE VENOUS HYPERTENSION AND STASIS

Incompetent valves
- Venous intervention
- Compression stockings
- Circaid garments

EDEMA RELATED

LYMPHEDEMA
- Different degrees of internal / external
  - Incompetent valves
  - Hypertension
  - Venous stasis
  - Infection

SYSTEMIC DISEASE
- Difficult to self apply
- Appears “medical”, not fashionable
- Costly
- Risks pain, pressure ulcer, infection
- Contraindicated in
  - Infection
  - Arterial flow compromise
  - CHF
  - HTN

BARRIERS TO CHRONIC COMPRESSION
- Difficult to self apply
- Appears “medical”, not fashionable
- Costly
- Risks pain, pressure ulcer, infection
- Contraindicated in
  - Infection
  - Arterial flow compromise
  - CHF
  - HTN

EDEMA EXERCISES

Treat Swollen Feet Just By Moving Your Toes
Exercises to prevent swelling

ARTERIAL ULCER: ISCHEMIA
- 20 % of leg ulcers
- Most commonly located on toes and lateral ankle/lower leg
- Requires procedure to re-establish flow
- Typically painful, either “punched out” appearance or black dry necrosis
- Often present with shiny, taut skin. Dark red or dusky with dependency, becomes pale with elevation. Pulse can be absent, difficult to locate, however are often present. Don’t be fooled by a pulse.
ARTERIAL WORK-UP AND INTERVENTION

- Palpation and Doppler of pulses
- Vascular studies with ABI and waveforms
- CTA with run-off, MRA, Angiography
- Angioplasty
- Interventional cardiology
- Surgical intervention
- Medication

![Image](http://www.cardiogallery.com/CVCTA/Aorta%20Iliofemoral%20Run%20Off%20CTA/Aorta%20Iliofemoral%20Run%20Off%20CTA.html)

ARTERIAL FLOW EXERCISES

Buerger-Allen exercises:
1. Elevate feet on padded chair or board for 1/2 to 3 minutes.
2. Sit in relaxed position while each foot is flexed and extended then pronated and supinated for 3 minutes. The feet should become entirely pink. If the feet are blue or painful, elevate them and relax as necessary.
3. Lie quietly for 5 minutes, keeping legs warm with a blanket.


![Image](http://medical-dictionary.thefreedictionary.com/Buerger-Allen+exercises)

LEG ULCERS

<table>
<thead>
<tr>
<th>VENOUS</th>
<th>ARTERIAL</th>
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<tbody>
<tr>
<td>Compression</td>
<td>No compression</td>
</tr>
<tr>
<td>Infection</td>
<td>Infection</td>
</tr>
<tr>
<td>Debridement</td>
<td>Avoid debridement</td>
</tr>
<tr>
<td>Avoid dependent position</td>
<td>Re-establish flow</td>
</tr>
<tr>
<td>Encourage ambulation</td>
<td>Buerger-Allen exercises</td>
</tr>
<tr>
<td>Venous surgical intervention</td>
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DIABETIC FOOT ULCERS

- US annual cost is > $15 billion
- 11 million Americans diagnosed with diabetes, 25% of these will develop foot ulcers
- 1 in 15 will undergo amputation in their lifetime
- 50% will survive >3 years

DIABETIC OR NEUROPATHIC ULCERS

- Diabetic caused by a combination of hyperglycemia, compromised circulation, decreased sensation, and pressure, neuropathic caused by decreased sensation and ongoing pressure.
- Ulcer typically present on plantar surface of foot, heel or toes. Wound often surrounded by thickened callous tissue.
- Infections are common.
- Treatment plan often includes and requires serial debridement, total contact casting, and topical wound therapy.
- Requires a collaborative approach, involving diabetes management, nursing care, wound care expertise, often fittings for orthotics, and in times vascular intervention.
DIABETIC FOOT ULCERS

Interventions

- Blood flow
- Infection
- Glycemic control
- Off load pressure
- Debridement

Risks

- Full risk
- Renal impairment
- Hypoglycemia
- Bleeding
- Pain
- Infection

INFORMED BY THE STATS: DM

- ADA estimates annual US cost of DM in 2012 as $245 billion
- Number of DM diagnoses is rising
  - 1985: 30 million
  - 2000: 177 million
  - 2010: 285 million
  - Projected in 2030 at 360 million

INFORMED BY THE STATS: DFU

- NIH reported in 2015: lifetime risk of DFU for DM is 15%
- Estimated that approx 20% of acute admissions in diabetic population are for the treatment of DFU
- Risks associated with DFU include infection, gangrene, amputation, death
- Approximated 50-70% of amputations performed are due to DFU
- Worldwide: One amputation is performed every 30 seconds for DFU

OFF-LOADING

- Temporary off loading shoe
- Diabetic shoe insert and shoe
- NWB

DFU CARE

The Facts:
- DM pathophysiology leads to high risk for DFU
- DFU rates of infection, amputation, mortality and recurrence are dangerously high
- Population of DM is increasing
- Aging population is increasing
- Prevention does decrease DFU rates

Comprehensive treatment plan to address:
- Infection: potent well absorbed antibiotics, consider ID referral, podiatry/surgical referral, HBOT.
- Elderly: high risk for Cdiff, nephrotoxicity.
- PAD: consider cardiology and/or vascular referral.
- Neuropathy/arthropathy: total contact casting initially, referral to orthotist.
- Elderly: high risk for falls and injury.
- Glycemic control: collaboration with PCP/endocrinology.
- Elderly: high risk of hypoglycemia.

PRESSURE ULCERS

- AHRQ estimates 2.5 million pressure ulcers yearly
- US cost: $9-11.6 billion annually
- Individual cost $32,790-151,700 per pressure ulcer
- CMS reports each ulcer added $43,180 during hospital stay
- More US lawsuits for pressure ulcers than falls or emotional distress, and second only to wrongful death suits
- 60,000 die annually in the US from pressure ulcers
PRESSURE ULCERS

RISK ASSESSMENT
- Braden Scale:
  - Immobility
  - Nutrition
  - Moisture
  - Activity
  - Sensory Deficit
  - Friction and Shear

INTERVENTION
- PT, frequent repositioning, off loading cushions and mattresses
- Feeding assist, Supplements, L-arginine, TPN
- Low air loss mattresses, frequent incontinence care, barrier creams
- PT, sensory training, assistance
- Proactive splinting, frequent repositioning, off loading
- PT for transfer and positioning, recommendations, 15 degrees, lower HOB less than 30 degrees if tolerated

PRESSURE ULCER STAGES

INTERVENTION
- Off-loading is crucial
- Debridement of necrotic tissue
- Pulse lavage, CPI
- PT/OT, mobilization, mobility, PSWD, US
- Management of underlying disease process
- Thoughtful selection of wound care products
- NPWT
- Nutritional support
- Surgical referral

UNSTAGEABLE HEEL WOUND

"TIME WOUNDS ALL HEELS."
JOHN LENNON
Pressure Wounds
- Caused by ischemia due to compression of tissue between a surface and bony prominence
- Located over bony prominence, or area of tissue against external source, i.e. tubing
- Stage I-IV, unstageable, or deep tissue injury
- Healed by combination of local wound care and pressure reduction
- May be partial or full thickness

MADS: Moisture Associated Skin Damage
- Caused by inflammation due to contact with moisture, especially when compounded by chemical irritant and/or altered pH
- Located where the skin is exposed to moisture: intertriginous folds, perineum, peri anal, peri ostomy and peri wound
- Typical moisture sources include urine, fecal matter, wound exudate, and/or perspiration
- Partial thickness: epidermal and dermal tissue loss

PREVENTION AND TREATMENT OF MADS/IAD
- Structured skin regimen
  - Gentle cleansing & moisturizing with a product pH that matches skin pH, use a moisturized disposable soft cloth versus hospital washcloth
  - Application of skin protectant or moisture barrier product, typically petroleum for urine and zinc for fecal
  - Increase frequency of incontinence brief changes
- Offload pressure: reduce risk of pressure ulcer
- Avoid friction and shearing
- Treat candidiasis, as needed, with antifungal
- Treat cutaneous infections promptly

SURGICAL WOUNDS
- Infection
- Edema management
- Glycemic control
- Mechanical forces and tension

ATYPICAL WOUNDS
- Biopsy unusual wounds or duration > 6 months without improvement
  - Malignancies
  - Bullous pemphigoid disorders
  - Pyoderma gangrenosum
  - Viral lesions
  - Vasculitis lesions
  - Necrobiotic xanthogranuloma
PEARLS IN ELDERLY WOUND CARE

- Malodor may be treated withFlagyl 500-500 mg topical or wound bed using straight limb or iodine-based wound cleanser
- Pseudomonas is not a common cause of systemic illness more commonly found in elders increase risk of and delay healing of wounds
- Regional ID update: systemic illness more commonly found in elders increase risk of and delay healing of wounds
- Medical device is common culprit in pressure injury, posthauer
- Medications and treatments of illnesses in elders increase risk of and delay healing of wounds
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- Tight glycemic control is high risk for hypoglycemic event, barefoot, and walking in the elderly
- Evidence supports arginine supplement for wound healing
- Zinc supplement with caution
- Systemic illness more commonly found in elders increase risk of and delay healing of wounds
- Socioeconomic factors of an increasing aging population who live longer with chronic illness have increasing rates of
- Developing plan of care for prevention and treatment of wounds in the elder population will prevent wound care

IN SUMMARY:

- Chronological and photosensitizing structural and functional skin changes increase risk of and delay healing of wounds
- Systemic illness more commonly found in elders increase risk of and delay healing of wounds
- Pseudomonas is not a common cause of systemic illness more commonly found in elders increase risk of and delay healing of wounds
- Socioeconomic factors of an increasing aging population who live longer with chronic illness have increasing rates of
- Fear of loss of independence is a barrier to seeking care
- Safety risks and treatment side effects unique to elders limit treatment options in wound healing
- Developing plan of care for prevention and treatment of wounds in the elder population will prevent wound care

REFERENCES