Wound Healing Challenges for the Elderly

Focus on Pressure Ulceration

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Presenter Disclosure

- Dr. Brian Kunimoto
- Relationships with financial sponsors
  - No direct financial relationships with financial sponsors including honoraria
  - No membership on advisory boards or speakers' bureau(s)
  - No patents for drugs or devices
  - No other financial relationships or investments

Potential for conflict(s) of interest

- I have not received payment from an organization whose product(s) are being discussed in this lecture
- I will receive an honorarium from Fraser Health LTC Academic Planning Committee
- No supporting organization's product(s) will be discussed in this lecture

Mitigating potential bias

- No potential bias identified

After attending this lecture, the participant should be able to:

1. Identify the main systemic and local factors that affect wound healing especially in the elderly
2. Manage chronic wounds respecting the “Three Pillars of Wound Care”
3. Recognize the patient at risk for Pressure Ulceration
4. Review the healing challenges facing the elderly particularly with Pressure Ulceration

What are your wound healing challenges in Long-Term Care?

The Big Picture
Three Pillars of Wound Healing

1. Treat the WOUND
2. Treat the UNDERLYING DISEASE
3. Treat the WHOLE PATIENT

Wound Bed Preparation

- Moisture balance (dressings)
- Biofilm balance (debridement)

Moisture Balance - Dressings

- Plastic Films
- Absorbents
- Hydrocolloids
- Hydrogels
- Calcium Alginates
- Hydrofibres

Biofilm Balance

- Relentless debridement



Biofilm Balance – Topical Agents

- No evidence that Antiseptics and Antimicrobials have clinical efficacy against wound biofilms
- Silver – Two Cochrane reviews concluded there was no evidence of reduced infection rates or significant healing benefit
- Iodine – One Cochrane review concluded there was no good evidence of benefit but that there were no good studies!

Factors that can affect healing

- Systemic Factors
- Local Factors

Systemic Factors

A **Age**

B Building Blocks

Protein

Carbohydrates

Vitamins

Trace Metals

C Collagen Disease

D Drugs (Prednisone)

Local Factors

A Arterial Disease (reduced blood supply so include venous)

B **Bacterial Infection**

C Creams etc. often dumped into wounds

D Dessication

Age

- Prolonged inflammatory phase of healing
  - Reduced cellular proliferation
  - Cellular senescence (weaker response to external signals such as growth factors)
- Impaired microcirculation
- Despite all this, elderly patients heal – just slowly

Age - Comorbidities

- Malnutrition
- Type 2 Diabetes Mellitus
- UV Damage (especially on the head/neck)
- Vascular insufficiency (arterial and venous)

Building Blocks – Protein Malnutrition

- Increased incidence of pressure ulceration
- Impaired healing
  - Chronic leg ulcers
  - Surgical repair – wound dehiscence
- Increased risk of Sepsis

Building Blocks – Protein Malnutrition

- Involuntary weight loss in up to 85% of LTC residents (unintended weight loss)!
- Laboratory indices
  - Albumin not accurate
  - Prealbumin is better but not perfect
  - Total lymphocyte count
- Consider referral to Nutritionist

Building Blocks – Protein Catabolism

- Catabolic state is not conducive to healing wounds
- Mild/Moderate Catabolism
  - Malnutrition (unintended weight loss)
  - Chronic inflammatory disease
  - Obesity
  - Organ failure
- Severe Catabolism
  - Major injury (trauma/burns)
  - Serious infection/Sepsis

Building Blocks – Support for Anabolism

- Energy (Carbs)
- Protein

Energy

Situation	Energy Requirements
Support of healing	30-35kcal/kg/day
In presence of weight loss or underweight	35-40kcal/kg/day

Protein

Situation	Protein Requirements
Healthy adults	0.8g/kg/day
Older adults	1.0g/kg/day
Patients with wound(s)	1.5g/kg/day

Building Blocks – Disordered Carbohydrate Metabolism

- Poorly controlled Diabetes Mellitus
  - Advanced Glycation End Products (AGEs)
  - Diminished cellular migration and leukocyte function (Diabetic Immunopathy)
  - Neuropeptide degradation
- Big wound healing challenge in LTC patients

Other Building Blocks

- Lipid also needed as an energy source
- Vitamins A and C only needed in presence of deficiency
- Trace Metals (Cu and Zn) only needed in presence of deficiency

Bacterial Infection

- Biofilm in wounds is COLONIZATION not infection
- Pus, odour, and pain are poor indicators of infection (not specific)
- Diagnosis of wound infection is PURELY CLINICAL and involves NO TESTS







Heavy Biofilm Colonization









Local Ulcer Infection







Wounds with secondary Cellulitis

Bacterial Infection – Culture Swab Testing

- Misses many bacterial species (false negatives)
- Often samples surface organisms (false positives)
- Never quantitative (despite the reporting)
- Antibiotic MICs are for agar plates, not wounds!
- Positive swab result NEVER diagnoses infection

Biofilms





Bacterial Biofilm



Pressure Ulceration

- Pathophysiology
- Prevention
  - Recognition
  - Repositioning and Reduction of Pressure

Pressure Ulceration - Pathophysiology

- Pressure causes ischemic damage to tissues
  - Susceptibility: Muscle>Subcutaneous Fat>Skin (dermis/epidermis)
- Pressure x Time

Pressure Ulceration - Pathophysiology

- Deep soft tissues can develop necrosis with pressure in the range of 60-70mm Hg in 1-2 hours
- If there is tissue deformation (shear force), necrosis can develop in 15 minutes!

Pressure Ulceration – Sources of pressure

- Regular hospital mattress - 100 to 150mm Hg pressure
- Wooden chair – 300mm Hg pressure

Pressure Ulceration - Recognition

- Braden Risk Assessment Tool
- Just think!

Pressure Ulceration - Recognition

- Sensory perception
- Mobility
- Activity
- Nutrition
- Friction/Shear
- Microclimates
- Obesity

Pressure Ulceration – Sensory Perception

- Level of Consciousness
- Ability to sense pressure-related discomfort in order to avoid damage

Pressure Ulceration - Mobility

- Ability to move away from pressure on the susceptible part

Pressure Ulceration - Activity

- Bedfast
- Chairfast
- Occasional walking
- Frequently walking

Pressure Ulceration - Nutrition

- Unintentional weight loss
- Undernutrition
- Protein/Energy Malnutrition
- Dehydration

Pressure Ulceration - Nutrition

- Reduced cushion over the susceptible part
- Reduced mobility
- Frailty
- Malnutrition reduces the ability of the skin to resist pressure injury

Pressure Ulceration – Friction/Shear

- Friction itself does not cause pressure injury but does cause erosion/abrasion
- Friction combined with Shear causes tissue deformation which, markedly, increases one's risk for pressure ulceration

Pressure Ulceration - Microclimates

- Microclimate means the physical environment of the susceptible part
- Maintain hydration (use moisturizer)
- Minimize excessive moisture (use barrier creams)
  - Sweating
  - Water condensation
  - Incontinence

Pressure Ulceration - Obesity

- BMI > 40 is associated with a 3x increased odds of pressure ulceration vs that of a healthy-weight person
- Add malnutrition and the odds increase to 11x vs that of a person with a BMI > 40 who is not malnourished

Obesity – Independent risk factor

- Cardiovascular disease
- Increased weight over the susceptible part
- Reduced vascularity of adipose tissue
- Impaired mobility
- Tendency towards malnutrition

Sarcopenic Obesity

Sarcopenic Obesity

- This is the "perfect storm" that combines skeletal muscle loss and obesity
- Normal aging is associated with up to 2-3% skeletal muscle loss per year in older adults. When this muscle loss is associated with weakness on testing, we have Sarcopenia.
- When such Sarcopenia is coupled with Obesity, metabolic changes occur that make Sarcopenic Obesity worse than either condition

Sarcopenic Obesity

- Sarcopenic Obesity is associated with an even higher risk for Pressure Ulceration
- Please keep this relatively new entity in mind

What next?

- Optimize nutrition – Consult Dietician or Nutritionist
- Manage mobility – Physiatry or Physiotherapy
- Manage friction/shear – Bed head elevation less than 30^0
- Skin hydration – Use moisturizers
- Excessive moisture – Use barriers
- Manage comorbidities – Diabetes?
- Manage pressure

Manage Pressure

- Bed Supports
- Seating Supports
- Repositioning

Manage Pressure – Bed Supports

- Static Support
  - High-density Foam Overlays
- Dynamic Support
  - Alternating Air-Cell Mattress
  - Air Fluidized Mattress
  - Low Air-loss Mattress
- Consult Occupational Therapy for bed assessment

Manage Pressure – Seating Supports

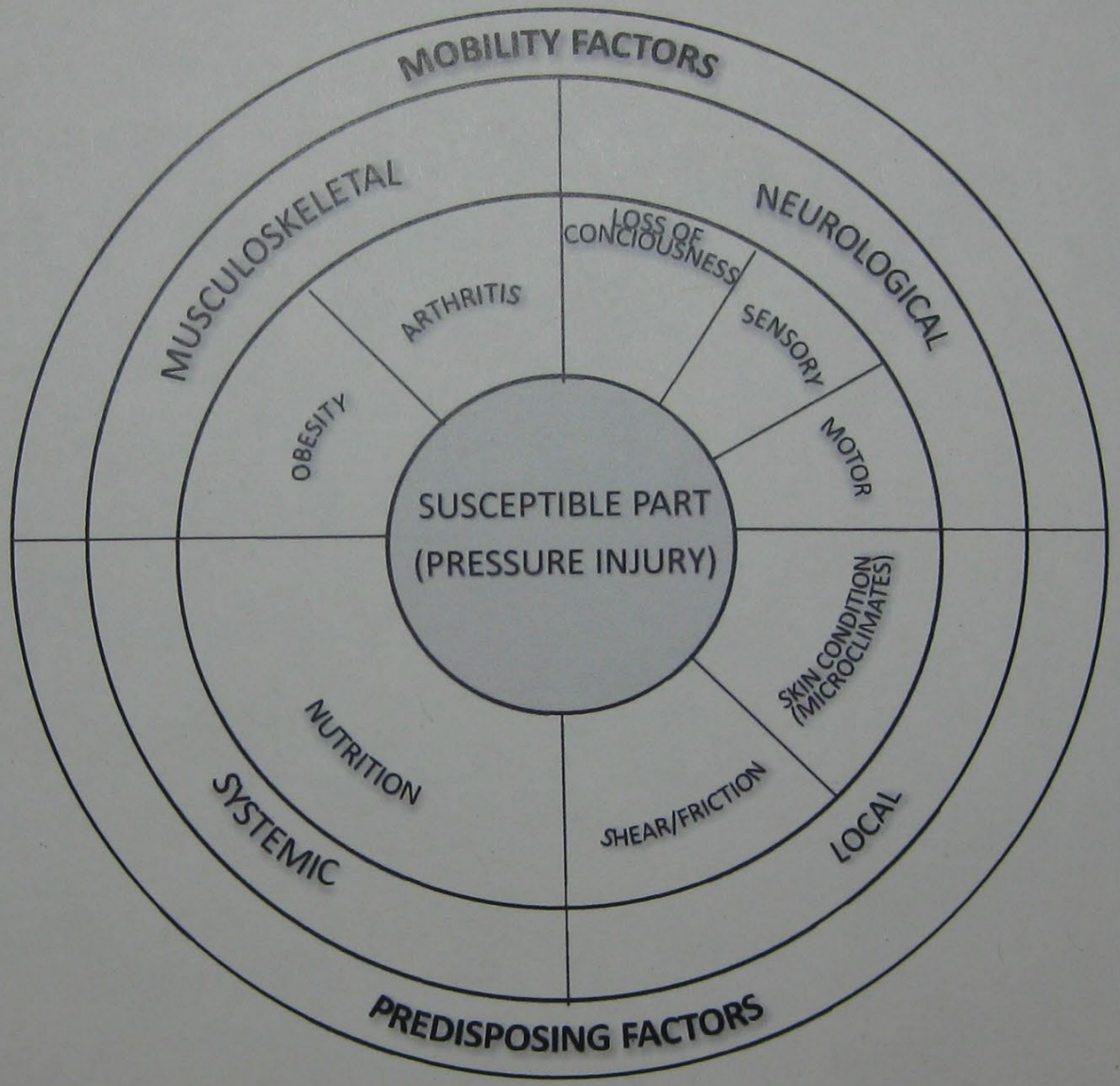
- Specialized air cell cushions
- Consult Occupational Therapy for seating assessment

Repositioning

- The “2-hour Rule” has no evidence to support it
- Repositioning is a judgement call and depends on:
  - The bed surface
  - The condition of the susceptible part(s)
  - The condition of the patient

In summary….

- Management of ALL chronic wounds involves:
  - Wound bed preparation
  - Treatment of the underlying disease
  - Management of the whole patient
- Wound healing challenges for the LTC patient:
  - Malnutrition
  - Obesity (and the new bad guy, Sarcopenic Obesity)
  - Diabetes Mellitus
- You can recognize the LTC resident at risk by just thinking


MOBILITY FACTORS
MUSCULOSKELETAL
NEUROLOGICAL
ARTHRITIS
LOSS OF CONCIOUSNESS
OBESITY
SENSORY
MOTOR
SUSCEPTIBLE PART
(PRESSURE INJURY)
SKIN CONDITION (MICROCLIMATES)
NUTRITION
SHEAR/FRICTION
SYSTEMIC
LOCAL
PREDISPOSING FACTORS