Pressure Ulcers by the Numbers: Does Staging Predict Progression?

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Faculty Disclosure

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Dr. Siddiqui has listed no financial interest/arrangement that would be considered a conflict of interest.
Purpose of Naming System

- Common language
- Accurately describe a clinical situation
- Reasonably predict the severity of a clinical finding.
- Inter-observer consistency
- Clear definitions for each category
- Precise documentation
Historical Perspective

L. Guttman 1955
“stages of the development of sores”
3 stages and closed ischial bursa

J. Shea 1975
4 grades and closed pressure ulcer

WOCN 1988
4 stages

NPUAP

- Present system codified in 1989 by NPUAP consensus conference
- NPUAP/EPUAP interval modifications
  - NPUAP 4 stages, unstageable and sDTI
  - EPUAP 4 categories
Numbering and Severity

- Stage: distinct period in the course of a disease
- Grade: severity of a condition
- EPUAP changed to category from grade specifically to remove the connotation of a progression

Are They Mistaken

Pressure Ulcer Audit

- Biweekly surveillance
- Incidence report
- NPAUP staging I-IV, unstageable
- 3 WOCN certified
- 2010-2012
- 900 bed hospital (162 ICU beds)

Prevalence Audit

- 823 HAPU
  (625 POA)
- Rate of PU
  3.8 per 1000
  patient days

II 28%
III 16%
U 25%
IV 31%
Natural History

- What happens to these patients
- HAPU follow up range 1 month to 6 month
- 6% died during hospital stay
- 15% died within 6 months
- 18% lost to follow up prior to evidence of improvement

Stage I Ulcers -62

- 93% resolved
  - 32% advanced to Stage II prior to healing
- 2% advanced to stage III
  - 1.8% healed at 6 months
- 5% advanced to stage IV
  - 2% healed at 6 months
Stage II - 230

- 91% resolved
  - 10% advanced to stage III prior to healing
  - 3% required debridement
- 8% stage III
  - 2% healed
- 1% stage IV
  - 0.1% healed

Stage III - 132

- Mortality 8%
- 54% healed at 6 months
- 34% Stage III
- 12% Stage IV
Stage IV - 255

- Mortality 37%
- 42% healed at 6 months
  - 72% re-admitted at least once
  - 6% flap reconstruction
    - 3% successful
- 58% unhealed group
  - 88% readmitted
  - 57% some substantial improvement
    - 41% decreased area
    - 17% depth < 0.5 cm

Unstageable - 206

- 26% Healed at 6 months
- 8% mortality
- 11% stage 2
- 45% stage 3
- 18% stage 4
Skin Ulcers Are Different Than Deep Ulcers

- Stage II: 91% increase
- Stage III: 54% increase
- Stage IV: 42% increase

Progression Of Pressure Ulcer After Diagnosis

Some ulcers continue to increase in size even as intervention is initiated.

Stage II Ulcers:
- 63% increased in area more than 10% after diagnosis
Subdermal Plexus

Angiosomes

Replantation – Ischemia tolerance

Finger – 12 hours

Forearm 4 hours

> 6 hours
Suspected Deep Tissue Injury

Pressure, shear, tissue deformation, ischemia reperfusion
Intact skin is a barrier to fluid loss, infection, tissue distortion

Risk Factors for Pressure Ulcers

Superfical    Deep
Superficial Damage

- Moisture
- Friction,
- Support surface irregularity
- Microclimate
- Circulatory compromise.

Pressure Ulcers: Skin Deep or Muscle Bound

- …tissue geometry and composition are complex and surface pressures result in highly inhomogeneous internal mechanical conditions…

Bouten et al., Arch Phys Med Rehabil, 2003
Are all pressure ulcers the result of deep tissue injury? A review of the literature

• deep tissue is more susceptible than superficial tissue to injury caused by externally applied pressure.

• superficial injuries appear to be caused by factors other than pressure...

Berlowitz and Brienza, OWM, 2007
Skin Response to Mechanical Stress: Adaptation Rather than Breakdown

- Skin adaptation occurs differently for different directions and durations of applied mechanical loads.
- Skin structure and bioprocesses are modified according to the mechanical demands placed on the skin.

Sanders et al, J of Rehab Res Devel., 1995

Future Direction

- Documentation
- Multidisciplinary
- Transparency
- Resource management
Risk factors for nonhealing Stage I and II

- Incontinence
- Braden < 14
- BMI > 35
- ICU > 7 days

Risk factors for nonhealing Stage III and IV

- > 7 ICU days
- Braden < 11
- ED > 6 hours
- OR > 4 hours