Achieving a new standard in modern surgical wound care: the latest in hydrofiber/hydrocolloid technology

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From awareness to new technologies

- Awareness of acute wound problems
- Initial work at GJNH
- Implementation of EBM – DGRI study
- Physical properties
- New technologies
I: Awareness

Problems with acute wounds??
Preventing Wound Infection

- Theatre practice
- Surgical technique
- Ultra clean air theatres
- Prophylactic antibiotics
- Warming
- Oxygenation
Preventing Wound Infection

- Theatre practice
- Surgical technique
- Ultra clean air theatres
- Prophylactic antibiotics
- Warming
- Oxygenation
- Post-operative dressing?
Introduction

• >1300 primary elective total hip and total knee arthroplasties in 2005 at GJNH

• Recognition of wound problems
  – blistering
  – prolonged leakage
  – surgical site infection
Post-operative Blisters
Post-operative Blisters
Surgical Site Infection
Introduction

• Evidence of ‘modern’ dressings performing better than traditional dressings, e.g. Molndal
• Maintenance of ‘moist environment’ aids wound healing* (Winter, 1962)
Pilot Study

• GJNH 2005
• Hydrofiber/hydrocolloid (Jubilee method)
• 293 THR and TKR procedures
• Reduced blister rate
  – 19.5% Mepore group
  – 3.5% Jubilee group
RCT at GJNH

• To evaluate the costs and benefits using the Jubilee method compared to a standard competitor dressing
Clinical Trial Study Design

• Prospective RCT
• 428 patients:
  - 186 Standard
  - 242 Jubilee
• Liquid Film-Forming Acrylate (Cavilon)
Exclusion Criteria

• Age <50 years
• Trophic skin changes
• Inflammatory arthropathies
• Pre-existing chronic skin pathology (active)
• Systemic steroids
• Immunosuppressants
Randomisation

- Envelope method
- Envelope selected by theatre nursing staff at the end of case
Theatre Practice

Dressing was applied:

- **TKR:** 30° knee flexion
- **THR:** patient in lateral position
- **LFFA** applied topically to periwound area
- **Standard or Jubilee method dressing**
Standard Method
Jubilee Method
Jubilee Method
Jubilee method
Background-original HF/HC dressing

• Prospective RCT* at GJNH
• 428 patients
  – Low blister rate 1.6% v 18.3%
  – Longer wear time 3.7 v 2.3 days
  – Fewer dressing changes 1.5 v 3.2
  – Less delayed discharges 1.2% v 4.8%
  – Very low SSI rate 0.8% v 3.2%

*Dillon JM, Clarke JV et al. The Jubilee Method: A novel, effective wound dressing following total hip & knee arthroplasty. AAOS 2007
III: Implementation of EBM

- Evaluate dressing performance in a district general hospital
- Can we reproduce clinical outcomes achieved in NAU?
Methods

- Prospective evaluation 2008/2009
- Trauma and elective patients
- No exclusion criteria
- Traditional control dressing
Methods

Outcome measures
- Blistering
- Wear time
- Dressing changes
- Delayed patient discharge
- Surgical site infection rate
Methods

Raising awareness

• Departmental presentation
• Meetings with theatre, ward and clinic nurses
  – Application technique
  – Indications for dressing change
Methods
Methods

Questionnaire recording:
• Length of stay
• Wear time
• Number of dressing changes
• Wound leaking after 7 days?
• Antibiotics
• Presence of blisters
Methods

30 day SSI surveillance form:
• Monitoring in community for 30 days
• Monthly meeting with hospital/district nurses
• Problem wounds registered
Results

HF/HC case mix (n=65)

- Removal metalwork
- Arthroscopy
- Wound debridement/repair
- Upper limb elective
- NOF #
- Upper limb trauma
- Lower limb arthroplasty
- Lower limb #
Results

Traditional dressing case mix (n=24)

- Upper limb trauma
- Lower limb trauma
- Arthroscopy
- Upper limb elective
- Removal metalwork
- Lower limb arthroplasty
- NOF #
## Results

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Results

• Significant improvements in clinical outcomes using HF/HC dressing
  – Blistering $p<0.05^1$
  – Wear time $p<0.001^2$
  – Dressing changes $p<0.001^2$

$^1$Chi-squared test
$^2$Mann-Whitney U test
Summary

- HF/HC dressing introduced successfully into DGH
- Improved clinical outcomes at least as good as NAU in spite of diverse case mix
IV: Physical Properties

• ? Relationship between skin trauma/shearing forces and dressing
Aims

• Quantify skin movement of TKR wound with flexion

• Characterise material properties of dressings

• Compare dressing properties to requirements of wound
Knee Wound - Methods

- TKR wound measurements post-op at:
  - 0° knee flexion
  - 30° knee flexion
  - 60° knee flexion
  - 90° knee flexion

- % change in wound length
Knee wound - Results

- 85 patients
- 56 female : 39 male
- 45 right : 40 left
- Mean age 70 (SD 9.7) years
- Mean BMI 31.1 (SD 6.5)
## Knee Wound - Results

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Dressing Properties - Methods

- Hydrocolloid
- Adhesive
- Occlusive
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Dressing Properties - Results

Hydrocolloid

Load (N) vs. Strain (%)

- Peak loads
- Load after 1 min
Correlation

- TKR wounds strain 28% with 90° flexion

- Dressing load at 28%
  - Hydrocolloid = 8.7N
  - Occlusive 1 = 9.0N
  - Occlusive 2 = 7.2N
  - Traditional adhesive dressing >> 100N
Stress Recovery

- Occlusive film 1 - backing peeled off ‘2 in 1’ design; permanent deformation
- Occlusive film 2 - permanent deformation
- Traditional adhesive dressing – highly inflexible. No stress recovery evident
- Best results with hydrocolloid
Summary

- TKR wounds strain to 30% with normal knee flexion

- Dressing material properties
  - Hydrocolloid ✓
  - Occlusive 1 ?
  - Occlusive 2 ✓
  - Traditional adhesive dressing ❌

- Explain high blister rates
V: New Technologies

- HF/HC ‘2 in 1’
- 18 patients
- Elective and trauma patients
- Based at DGRI
- Aug – Sep 2010
- HF/HC combined dressing
HF/HC Combined Dressing

• Outer HC layer with envelope enclosing inner HF layer

• Inner HF layer ‘concertina’ effect to allow stretching with accompanying skin movement
Methods

• Similar clinical effectiveness outcomes
• Evaluation of costs
• Budget impact model
HF/HC Combined Dressing

- HF/HC combined dressing at day 5 post-op TKR showing 50% strikethrough
  - Note the exudate is well confined within the HF layer
Demographics

• 18 patients
• 11 female: 7 male
• Average age 72.9 years (18-88 years)
• 6 TKR, 3 THR, 9 trauma
• 9 trauma – all proximal femoral wounds
Feedback

• Ease of application
  – In theatre
  – On ward
  – Time saving

• Patients satisfied
  – Comfortable
  – Allows movement
  – Showerproof
  – Pain free on removal
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Budget Impact Model

- User friendly model to compare total inpatient costs using different dressings
- Compare combination HF/HC to Standard model (HF/gauze-based)
Costs

• Based upon 146,000 population D&G
• Rate TKR 0.15%, THR 0.14%
• c.420 patients per year
• 18 patients used for HF/HC combination
• 402 patients for HF/gauze-based (theoretical)
Individual Costs

• Dressings
• Labour – e.g. nursing time
• Delayed discharge
• Readmission
Summary

• New HF/HC combined dressing achieves similar results
• New HF/HC combined is cost effective
Problems

- Poorer performance with highly exudating wounds, e.g. PFN
- Unsuitable for using under plaster for > 1 week
  - e.g. after ankle ORIF
Recommendations

• Larger study needed
• Suitable for THR and TKR wounds
• Suitable for hip fracture wounds*
  – *slightly less effective with more highly exudating wounds, e.g. PFN
Thank you