The Power of One: Impacting Patient Outcomes By Returning to the Basics

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It is Time to Change!!

- 44,000 to 98,000 preventable death in hospitals related to medical errors annually (IOM report, 1999)
- 92,888 deaths directly attributable to safety indicators between 2005-2007 (HealthGrades 2009)
  - Failure to rescue, pressure ulcers and post-op infections
- HAIs the 5th leading cause of death
- Lack of reimbursement for preventable injury
- 2013-lowest percent improvement/ 1% total Medicare cut
- $50 billion in total costs for preventable injury
Advocacy Starts with Us

Patient Advocacy/Safety Related to Clinical Practice

- Nurses knowledge of the Evidence based care
- Ability to deliver the care to the right patient at the right time, every time it is needed
- The ability to communicate patient concerns in a concise, data driven manner and take appropriate action
- Understanding the chain of command when faced with resistance
Protect The Patient From Bad Things Happening on Your Watch

Implement Interventional Patient Hygiene

Interventional Patient Hygiene

- Hygiene…the science and practice of the establishment and maintenance of health
- Interventional Patient Hygiene….nursing action plan directly focused on fortifying the patients host defense through proactive use of evidence based hygiene care strategies
  
  Incontinence Associated Dermatitis Prevention Program

Hand Hygiene
Comprehensive Oral Care Plan

Catheter Care
Bathing & Assessment
Pressure Ulcer Prevention
INTERVENTIONAL PATIENT HYGIENE (IPH)

- Oral Care/Mobility
- VAP/HAP
- HAND
- Skin Care/Bathing/Mobility
- Catheter Care
- CA-UTI
- CA-BSI
- SSI
- HASI

Factors Impacting the ability to Achieve Quality Nursing Outcomes at the Point of Care

- Skills & Knowledge
- Resources & System
- Value
- Attitude & Accountability

Vollman KM. Australian Crit Care, 2009;22(4): 152-154
Patient Advocacy/Safety Related to Clinical Practice

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Care Practice to Promote Health Intact Skin
Florence Nightingale on:

SKIN INTEGRITY

• “It may be worth while to remark, that where there is any danger of bed-sores a blanket should never be placed under the patient. It retains damp and acts like a poultice.”

• “If a patient is feverish, if a patient is faint, if he is sick after taking food, if he has a bed-sore, it is generally the fault NOT OF THE DISEASE, BUT OF THE NURSING.”

• “Poisoning by the skin is no less certain than poisoning by the mouth—only it is slower in its operation.”

Notes on Nursing (1860/1969)

Pressure Ulcer Facts

• 4th leading preventable medical error in the United States
• 2.5 million patients are treated annually in Acute Care
• NDNQI data base: critical care 5-14% ~ ~ 22%
• Incidence in acute care 7%
• 60,000 persons die from pressure ulcer complications each yr
• ↑LOS ~ 3x longer
• PU related hospitalizations ↑80% from 1993 to 2006
• Cost to treat PU $43,000 as a secondary dx
• National health care cost $10.5-17.8 billion dollars for 2010

Moisture Injury: Incontinence Associated Dermatitis

- Inflammatory response to the injury of the water-protein-lipid matrix of the skin
  - Caused from prolonged exposure to urinary and fecal incontinence
- Top-down injury
- Physical signs on the perineum & buttocks
  - Erythema, swelling, oozing, vesiculation, crusting and scaling

Brown DS & Sears M, OWM 1993;39:2-26

Assessment, definitions, grading & evidence based interventions

Joan Junkin
IADIT@mediopub.com
Impact of Moisture

• Urinary and fecal incontinence are common in the acute care setting, occurring in more than one-third of hospitalized adults.
• Humidity/Moisture:
  • Strain at which the skin breaks is 4x greater with excess moisture than dry skin
  • Moisture increases the risk of shear & friction damage


Pressure Ulcers – Risk Factors

“Patients with fecal incontinence were 22 times more likely to have pressure ulcers than patients without fecal incontinence.”

When impaired mobility is combined with fecal incontinence those odds rise to 37.5 times more likely.

Identify Patients at High Risk

Risk Assessment on Admission, Daily, Change in Patient Condition

- Use standard EBP risk assessment tool
- Research has shown Risk Assessment Tools more accurate than RN assessment alone
- Braden Scale for Predicting Pressure Sore Risk
  - 6 subscales
  - Rated 1-4
  - Pressure on tissues
  - Mobility, sensory perception, activity
  - Tissue tolerance for pressure
  - Nutrition, moisture, shear/friction
  - Score 6-23

www.ihi.org; Macklebust, JA (2009) The Braden Scale reliable assessment to effective interventions
Its About the Sub-Scale’s

- Retrospective cohort analysis of 12,566 adults patients in progressive & ICU settings for yr. 2007
- Identifying patients with HAPU Stage 2-4
- Data extracted: Demographic, Braden score, Braden subscales on admission, LOS, ICU LOS, presence of Acute respiratory and renal failure
- Calculated time to event, # of HAPU’s
- Results:
  - 3.3% developed a HAPU
  - Total Braden score predictive (C=.71)
  - Subscales predictive (C=.83)


Braden Score

Braden Sub-Scales

Multivariate model included 5 Braden subscales, surgery and acute respiratory failure C=0.91 (Mobility, Activity and sensory perception more predictive when combined with moisture or shear and friction)
The Bath: The First Line Of Defense

Who Does The Bath?
What Happens During a Bath in Addition to Cleaning?

Assessments:
• Complete assessment of the skin
• Muscle tone & strength
• Range of motion
• Participation in ADL’s…physical & mental
• Pain assessment with activity
• Opportunity to communicate
• Opportunity to identify coping, feelings of powerlessness, depression, family support etc.
• Fatigue factor

The Role of IPH in Improving Clinical and Economic Outcomes

• 21-bed SICU
• Prospective study:
  • Staff education to improve knowledge base of the non-licensed staff
  • Patient intervention component to improve communication of pressure ulcer risk to the registered nurses
• A pre and post intervention knowledge survey was conducted.
• Implemented Basinless Bath with Skin Check and Barrier cloths with Peri Check
• Educated around the Skin Check label and proper usage. Non-licensed staff received instruction in observational skills and the facilities bathing and incontinence management protocol were changed.

Carr D, Benoit R. Advances in Skin and Wound Care. 2009;22(2)
The Role of IPH in Improving Clinical and Economic Outcomes

Outcomes

- Pressure ulcers decreased from 7.14% to 0%
- 100% of the staff were able to demonstrate adequate knowledge of hospital protocol and procedure after the intervention
- Department manager confirmed by random sampling of the audit tools that reported alterations in skin integrity was followed up by the responsible RN.

Carr D, Benoit R. Advances in Skin and Wound Care. 2009;22(2)

The Bath: The First Line Of Defense

Nurse!!!

Early Detection of Skin Injury

Reducing Microorganism spread

Efficiency & Effectiveness
Optimal Hygiene

- ph balanced (4-6.8)
  - Stable pH discourages colonization of bacteria & ↓ risk of infection
  - Bar soaps may harbor pathogenic bacteria
  - Skin pH requires 45 minutes to return to normal following a ordinary washing
- Non-drying, lotion applied
- Multiple steps can lead to large process variation
- Excessive washing/use of soap compromises the water holding capacity of the skin

Voegel D. J WOCN, 2008;35(1):84-90

Impact of Wash Cloth/Soap Cleansing and Towel Drying on Skin

- Methodology
  - 15 healthy volunteers, 6 different W/D techniques
  - 3 W/D techniques on each arm repeated twice with a 2hr rest period
  - Measured: Transepidermal water loss (TEWL), skin hydration, skin pH and erythema
- Results:
  - TEWL increased with each type of W/D episode, further loss with repeated procedures
  - Increase skin pH with all W/D, esp with soap

Washing with soap & water and towel drying significantly disruptive effective on skin barrier function

Voegel D. J WOCN, 2008;35(1):84-90
Comparison of Basinless Bath to a Basin Bath

Methodology:
- 60 patients in a progressive & surgical unit in an acute care institution compared basin bath vs. comfort bath
- Served as their own control with the right side of the body bathed with basinless bath/ left side with a basin bath
- Required a partial or complete bath conducted over 3 consecutive days
- Measured: skin condition using SCDF, nurse satisfaction & patient satisfaction

<table>
<thead>
<tr>
<th>Questions</th>
<th>Basinless Bath</th>
<th>Basin Bath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall preference</td>
<td>97%</td>
<td>3%</td>
</tr>
<tr>
<td>Nurse satisfaction</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Time</td>
<td>10 minutes</td>
<td>21 minutes</td>
</tr>
<tr>
<td>SCDF (skin condition)</td>
<td>Significantly improved</td>
<td>Improved</td>
</tr>
</tbody>
</table>

Kron-Chalupa J et al. Iowa City Veterans Medical Center
Traditional vs. Disposable Bath in Critically Ill Patients

Methodology:
• 40 patients in Surgical, Medical and CT ICU received both baths on different days
• Compare basin bath vs. disposable
• Measure: time, quality of bath, microbial counts on skin (periumbilicus & groin, nurse satisfaction & costs

Results:
• No difference in quality or microbial scores between the two bathing procedures
• Fewer products used*, lower costs, less time and higher nurse satisfaction with disposable bath*

Larson E. et al. AJCC, 2004; 13(3):235-41

Traditional Bathing

Why are there so many bugs in here?

Spreading Microorganism
Environmental Contamination as a Source of Health Care Acquired Pathogens

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Survival</th>
<th>Data</th>
<th>Transmission Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>C. difficile</em></td>
<td>Months</td>
<td>3+</td>
<td>Healthcare facilities</td>
</tr>
<tr>
<td>MRSA</td>
<td>d-weeks</td>
<td>3+</td>
<td>Burn units</td>
</tr>
<tr>
<td>VRE</td>
<td>d-weeks</td>
<td>3+</td>
<td>Healthcare facilities</td>
</tr>
<tr>
<td>Acinetobacter</td>
<td>33 d</td>
<td>2/3+</td>
<td>ICUs</td>
</tr>
<tr>
<td><em>P. aeruginosa</em></td>
<td>7 h</td>
<td>1+</td>
<td>Wet environments</td>
</tr>
</tbody>
</table>

Hands equally become contaminated from commonly examined skin sites & environmental surfaces


Bath Water: A Source of Health Care Acquired Microbiological Contamination

- Compared normal bath water with chlorhexidine bath water on 3 wards
- Without Chlorhexidine: All samples + for bacterial growth (14/23 > 10⁵ cfu/ml)
- With Chlorhexidine: 5/32 grew bacteria with growth 240 to 1900 cfu/ml
- Gloved hands/bathing: objects touch grew significant numbers of bacteria

Bath Basins: Potential Source of Infection

- Multicenter sampling study (3 ICU’s) of 92 bath basins
- Identify & quantify bacteria in patients basins
- Sampling done on basins used > 2x in patients hospitalized > 48 hours & preformed 2 hours post bath
- Cultures sent to outside laboratory
- Qualitative vs. quantitative measures used to exclude growth that may have occurred in transport
- Bathing practices not controlled & no antiseptic soaps used to bathe


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Bath Basins: Potential Source of Infection

- Results
  - 98% of all cultures grew some form of bacteria after plating or enrichment

- Enrichment Results
  - 54% enterococci, 32% for gram -, 23% for *S aureus* and 13% VRE (statistically significant)
  - <10% growth rates for: MRSA 8%, *P aeruginosa* 5%, *C albicans* 3% & *E coli* 2%

Large Multi-Center Basin Evaluation For Presence of MDRO’s

Methodology
• 88 hospitals from US & Canada
• From July 2007 to February 2011
• Randomly selected basins for damp swab culture
• External lab tested for MRSA & VRE & gram – bacilli
• All basins were clean & were not visibly soiled

Results:
• 1103 basins: 63.2% contaminated
• 385 basins (34.9%) from 80 hospitals were colonized with VRE
• 495 basins (44.9% ) from 86 hospitals had gram-negative bacilli
• 36 basins (3.3%) from 28 hospitals had MRSA


Waterborne Infection Study

• Hospital tap water is the most overlooked source for Health-care associated pathogens
• 29 evidenced-based studies present solid evidence of waterborne Health-care associated infections
• Transmission occurs via drinking, bathing, items rinsed with tap water and contaminated environmental surfaces
• Results:
  • Significant morbidity and mortality associated with waterborne pathogens
  • Immunocompromised patients are at greater risk
  • Recommendation: minimize pt exposure to tape water, bottle water and prepackage disposable bathing

Bacteria Biofilm

- Organized communities of viable & non-viable microorganisms protected within a matrix of extracellular polysaccharides, nutrients & entrained particles
- Adhere to inert material (plumbing)
- Bacteria contain within Biofilm may be transmitted to at risk patients by direct contact with water used for ingestion, ice, washing


ICU & Hospital Water Samples

- Systematic review published studies 1998-2005
  - 9.7%-68.1% of random ICU water samples + for Pseudomonas aeruginosa
  - 14.2%-50% of patient infections were due to genotypes found in ICU water
- 9 hospital in New York city
  - Bacteria recovered in every hospital
  - 4-14 species identified
  - 1/3 organism known to be responsible for HAI’s

Reducing UTIs Through Basinless Bathing

CA-UTI 7.5 per 1000 catheter days to 4.42 per 1000 catheter days, then to .46 per 1000 catheter days

89% Reduction


Impact on UTI with Basin Bathing

UTI Rate- Removal of Prepackaged Bath Product QTR 3 FY05

The Effect of Bathing with Basin and Water and UTI Rate, LOS and Costs

<table>
<thead>
<tr>
<th>Phases</th>
<th>Product Cost/No. of UTI</th>
<th>Median(^4) LOS 17 Days</th>
<th>Median(^4) Cost (4857.00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I- Pre-Packaged Bathing Washcloths (9 months)</td>
<td>$10,530(^1) ($3.00)</td>
<td>25</td>
<td>$117,175</td>
</tr>
<tr>
<td>II- Basin/Water (9 months)</td>
<td>$3,510(^2) ($1.00)</td>
<td>48</td>
<td>$224,916</td>
</tr>
<tr>
<td>III- Additional Product Cost, UTI, LOS, COSTS</td>
<td>$7,020</td>
<td>23(^3)</td>
<td>$107,741</td>
</tr>
</tbody>
</table>

1 Based on 3 packages of 8 towels each 2 Based on product cost of towels, soap, and basin 3 Difference between phase I pre-package/phase II basin water 4 Pre-Op Prep

- Antisepsis must demonstrate a 3.0 log\(^{10}\) from baseline in groin, 2.0 log\(^{10}\) log reduction on the abdomen and maintain effectiveness for minimum of 6 hrs.
- CHG shower/bathing versus soap & water or placebo showed no difference in SSI (Cochrane EBR: 2010:CD004985)
- 2% prep cloth more effective in reducing bacterial load than 4% CHG solution that must be rinsed off/Inguinal sites sustained action at 10min, 30 min, 6 hrs > than 4% (Edmiston CE. Et al AJIC, 2007;35:89-96)
- CDC recommends must bathe or shower night before
  - Compliance issues, consistency in application, unable to bathe self
Bathing with CHG Basinless Cloths

- Prospective sequential group single arm clinical trial
- 1787 patients bathed
  - Period 1: soap & water
  - Period 2: CHG cloth cleansing
  - Period 3: non-medicated basinless cloth bath

Veron MO et al. Archives Internal Med 2006;166:306-312

26 colonization's with VRE per 1000 patients days vs. 9 colonization's per 1000 patient days with CHG bath

Veron MO et al. Archives Internal Med 2006;166:306-312
2% CHG Cloth vs. Soap & Water Bathing for Reduction of HAI’s in Med-Surg

- Quasi-experimental study of 14,701 patients in 4 med-surg units (94 beds) in a 719 bed academic center
- Pre-post design: 7102 (control group soap & water) 7699 (experimental group 2% CHG cloth)
- Monitor hand hygiene and isolation compliance
- MRSA screening performed in both groups

Results
- 64% reduced risk of developing HAI’s from MRSA & VRE (hazard ratio, .36 [95% CI, 0.2-0.8]; P=.01)
- More + MRSA colonization in CHG group so isolate & hand hygiene

CHG Bathing Reduces CLA-BSI’s

- 52 week, 2 arm, cross-over design clinical trial
- 22 bed MICU with 11 beds in 2 geographically separate areas
- 836 MICU patients
  - 1st 28 weeks: 1 hospital randomize to bathe with (Sage 2%) CHG cloths & the other unit bathe with soap & water
  - 2 week wash out period
  - 2nd 24 weeks: methods were crossed over
- Measured: Primary outcomes: incidence of CA-BSI’s & clinical sepsis. Secondary: other infections


Results:

- CHG arm were significantly less likely to acquire a CA-BSI 4.1 vs. 10.4 infections per 1000 patient days
- Benefit against primary CA-BSI’s by CHG cleansing after 5 days in MICU
- No difference in clinical sepsis or other infections

Daily CHG Bathing with 2% Cloths to Reduce CLA-BSI: Meta-Analysis

- Statistical significance in reducing CLA-BSI's
- Limitations
  - Non-randomized
  - Before/after designs
  - Other data potentially impacting findings was not reported


VRE & MRSA: Colonization Reduction with 2% CHG cloth

VRE


MRSA
CHG Daily Bath Reduces MRSA Bacteremia
Wynckoll D et al. Presented at SCCM 2009

- Guidelines & care of Central lines (2002)
- 2% CHG cloths (2007)

Effect of CHG Cloth Bath of HAI’s in Trauma Patients

- Retrospective analysis 6 months before and after institution of CHG bathing
- 12 bed level 1 trauma center
  - 286 severely injured patients bathes 2% CHG cloth
  - 253 severely injured patients bathed without CHG cloth
- Results: CHG bathed patients less likely to acquire a CLA BSI (2.1-vs. 8.4), MRSA VAP 1.6 vs. 5.7 & rate of colonization was significantly lowers; 23.2 vs.69.4 per 1000 patient days

Simple Cost Effective Strategies to Reduce HAIs

- Implementation:
  - Utilize daily 2% CHG cloths for cleansing at night in any patient with a central line or foley catheter
  - Focused on areas most prone to bacterial colonization from the neck down

Was moved from the ICU to house-wide post initial project with similar results in Med-Surg

Strategies for Bathing to Reduce Source Control & Improve Skin Defense

**Basin Bath**

- ↑ transmission of organisms
- ↑ time & effort
- ↑ # of supplies
- Harmful soaps
- Rough washcloths
- Cold/tepid water
- Scrubbing technique
EBP Recommendations to Achieve Offloading & Reduce Pressure

- Turn & reposition every 2 hours (avoid positioning patients on a pressure ulcer)
  - Repositioning should be undertaken to reduce the duration & magnitude of pressure over vulnerable areas
  - Cushioning devices to maintain alignment /30 ° side-lying & prevent pressure on boney prominences
  - Use lifting device or other aids to reposition & make it easy to achieve the turn
  - Assess whether actual offloading has occurred


The Routine

- Barriers:
  - Time to turn: 3.5-5min up to 17minutes
  - People resources
  - Current equipment not user friendly

- Staff perceived barriers
  - 41/49 in-bed activities
    - Unstable VS (59%) & low respiratory and energy reserves (46%) most common reasons for restricting activity
    - 34% stated safety issues/falling or tube/catheter integrity
    - 27% reported sedation

Draw Sheet/Pillows/People

Bates-Jensen et al 2003
Xakellis, et al 1995
Gefen et al 2008
Winkelman C, 2010;
Do We Even Achieve the Minimum Mobility Standard… “Q2 Hours in ICU’s”? 

Body Position: Clinical Practice vs. Standard

- Methodology
  - 74 patients/566 total hours of observation
  - 3 tertiary hospitals
  - Change in body position recorded every 15 minutes
  - Average observation time 7.7 hours
  - Online MD survey

- Results
  - 49.3% of observed time no body position change
  - 2.7% had a q 2 hour body position change
  - 80-90% believed q 2 hour position change should occur but only 57% believed it happened in their ICU

Krishnagopalan S. Crit Care Med 2002;30:2588-2592
Positioning Prevalence: UK ICU’s

- **Methodology**
  - Prospectively recorded, 2 days, 40 ICU’s in the UK
  - Analysis on 393 sets of observations
  - Turn defined as supine position to a right or left side lying

- **Results:**
  - 5 patients prone at any time, 3.8% (day 1) & 5% (day 2) rotating beds
  - Patients on back 46% of observation
  - Left 28.4%
  - Right 25%
  - Head up 97.4%
  - Average time between turns 4.85 hrs (3.3 SD)
  - No significant association between time and age, wt, ht, resp dx, intubation, sedation score, day of wk, nurse/patient ratio, hospital

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Hemodynamic Instability

Is it a Barrier to Positioning?
Hemodynamic Status

- No differences noted in hemodynamic variables between supine & positions
- Lateral turn results in a 3-9% decrease in SVO2 which takes 5-10 minutes to return to baseline
- Appears the act of turning has the greatest impact on any instability seen
- Minimize factors which contribute to imbalances in oxygen supply & demand

Patients at Risk for Intolerance to Positioning

- Elderly
- Diabetes with neuropathy
- Prolonged bedrest
- Low Hb and cardiovascular reserve
- Prolonged gravitational equilibrium


Recommendation 1 for Addressing Hemodynamic Instability

- Critically ill patients who are older, with comorbid conditions such as diabetes and preexisting cardiac disease and/or the presence of vasoactive agents, will be at greater risk for not tolerating in-bed mobilization.
- It is critical that the nurse assess the risk factors and plan when activity will occur to allow sufficient physiological rest to meet the oxygen demand that positioning will place on the body.
- A clinician may also choose to pre-oxygenate before position change.
- The right lateral position should be used initially to prevent the hemodynamic challenges reported with use of the left lateral position.
- Reducing the speed of the turn to minimize the influence of inner ear changes on cardiovascular response.

Recommendation for Address Hemodynamic Instability

2. Prevent prolonged gravitational equilibrium by initiating a turning schedule within hours of admission to the ICU. Prolonged periods in a stationary position result in greater hemodynamic instability when the patient is turned.

3. Tolerance of a position change should not be assessed for 5 to 10 minutes after a position change. All the evidence indicates that critically ill patients require this amount of time to equilibrate to the new position.


Recommendation for Address Hemodynamic Instability

- If the patient does not tolerate manual turning using the just-stated recommendations, as evidenced by a sustained decrease in blood pressure and oxygen saturation and/or an increase in heart rate, the patient should be returned to the supine position and the nurse should consider the use of continuous lateral rotational therapy in an effort to train the patient’s body to tolerate side-to-side movement.
  - Continuous lateral rotation therapy should be managed by a protocol

EBP Recommendations to Achieve Offloading & Reduce Pressure

- Turn & reposition every 2 hours (avoid positioning patients on a pressure ulcer)
  - Use active support surfaces for patients at higher risk of development where frequent manual turning may be difficult
  - Heal-protection devices should elevate the heel completely (off-load) in such a way as to distribute weight along the calf
    - Uses pillows to offload if expected immobility < 8hrs
    - Uses device is expected to be immobile > 8hrs
  - Progressive mobility program
  - 2 clinical trials currently underway to examine turning regimes on pressure ulcers & other outcomes in acute & ICU patients (2011)


EBP Recommendations to Reduce Injury From Incontinence & Other Forms of Moisture

- Clean the skin as soon as it becomes soiled.
- Use a protective cream or ointment on the skin to protect it from wetness.
  - Disposable barrier cloth prevents unprotected episodes (www.ihi.org 5 Million Lives Campaign)
- Use an incontinence pad and/or briefs to absorb/wick away wetness from the skin.
- Consideration of pouching device or a bowel management system
- Ensure an appropriate microclimate & breathability
- < 4 layers of linen

www.ihi.org
Current Practice: Moisture Management

EBP Recommendations to Reduce Injury From Incontinence & Other Forms of Moisture

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www.ihi.org
32 State Survey on Perineal Skin Care Protocols

Methodology:
- 76 protocols form Acute and LTC facilities
- Analyzed to determine correlation with evidence-based practices per the literature
- HPIS (Healthcare Products Information Services) data used to evaluated amount sold to each facility
- HPIS data compared to urinary & fecal incontinence prevalence data

Results:
- All 76 protocols lack 1 or more interventions considered important in perineal care
- 75% included use of skin protectants
- Analysis against HPIS data and incontinence data suggests under utilization of skin protectants (< 10 cents per day vs. $1.35)


Evaluating the Efficacy of a Uniquely Delivered Skin Protectant and Its Effect on the Formation of Sacral/Buttock Pressure Ulcers

Methodology:
- Retrospective/prospective quasi-experimental study
- 57 bed LTC
- Data collected 3 months before use & 3 months following conversion
- Demographics comparable between groups
  - Age, LOS, mobility in bed, transfer between surfaces, incontinence of bowel/bladder, BMI, albumin and concurrent disease scale
- Pre-data revealed 12 residents with incontinence developed 15 sacral stage 1 & 2 ulcers.
- Monthly incidence rates over 9 months 4.7%

Clever K. OWM. 2002;48(12): 60-67
Clever et al. “Pressure Ulcer” Study

Evaluating the Efficacy of a Uniquely Delivered Skin Protectant and Its Effect on the Formation of Sacral/Buttock Pressure Ulcers

Average Monthly Incidence of Sacral/Buttock Pressure Ulcers

<table>
<thead>
<tr>
<th>Old Standard of Care</th>
<th>New Standard of Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2000 to March 2001</td>
<td>May to July 2001 Feb to April 2002</td>
</tr>
</tbody>
</table>

*No significant differences in impact variables between groups

4.7% 0.5% 89% Reduction in Incidence

Average Monthly Incidence of Sacral/Buttock Pressure Ulcers compared to use of Comfort Shield® as preventative*

89% Reduction in Incidence

Old Standard of Care

New Standard of Care

Clever K. OWM. 2002;48(12): 60-67

What Lies Beneath the Patient

- Linen
  - Linen increases entrapment of moisture
  - Creates wrinkles
  - May increase risk of skin compromise
  - Limit linens on all beds
    - Especially on pressure redistribution beds and low air loss beds
  - Newer ICU beds are pressure redistribution surfaces
  - www.npuap.org/npuap_s31_td_position_statement_on_bed_surface_termnology


Ventilator Associated Pneumonia

The Vent Bundle…To the VAP Bundle

- Applying evidence-based practice
- 5 activities that when done 100% of the time has shown a reduction in
  - VAP
  - LOS
  - Time on Vent
  - Cost
- HOB 30°, Peptic Ulcer Disease (PUD) prophylaxis, DVT prophylaxis, Sedation vacation, Daily assessment for SBT and Oral care with an antiseptic
- Additions: Mobility, EVAC tube, OG vs. NGT
European VAP Bundle

- No ventilator circuit change unless specifically indicated
- Alcohol based hand hygiene
- Appropriately educated and trained staff
- Incorporation of sedation and weaning protocols
- Oral care with CHG


Hospital Acquired Pneumonia (HAP) and Ventilator-Associated Pneumonia (VAP)

- VAP crude mortality approximately 10-40%.
- HAP crude mortality 15-18%
- Pooled mean ranges 0.7 (Ped CVICU) to 7.4 (Burn ICU) per 1000 ventilator days
- HAP rates 5-15 per 1000 patient days
- Est cost $30,000-$40,000 per VAP
- Calculated loss for VAP against matched controls=$12,780
- Increase LOS up to 4-14 days
- Annual cost $2 billion dollars.


Rello J. Chest. 2002;121:2115-2121
ATS Guidelines for HealthCare Acquired Pneumonia 2006
# Health Care Acquired Infection Data

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<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CLA-BSI/per 1000 cath days</td>
<td>INICC Rates 2 to 3x higher than those reported in North America, Western Europe and Australian ICUs</td>
<td>2.0</td>
</tr>
<tr>
<td>VAP/per 1000 vent days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CA-UTI/per 1000 cath days</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Staph aureus Resistance/VRE</td>
<td>84.4%/lower VRE</td>
<td>56.8%/33%</td>
</tr>
</tbody>
</table>


---

# Healthcare Acquired Pneumonia

- **Risk Factor Categories**
  - Factors that increase bacterial burden or colonization
  - Factors that increase risk of aspiration
Mechanical Ventilation/Intubation

- 6-21 times the risk for developing a pneumonia
- Removes normal filter mechanisms
- Facilitates entry of bacteria
- Decreases clearance of bacteria
- Colonization of the endotracheal tube
- Use of non-invasive positive pressure ventilation when indicated (COPD/CHF)
- Early (6-8 days) vs. late tracheotomy (13-15 days) did not reduce the risk of VAP or 28 day mortality in adults with ARF. Early trach > VFD & ↓ stay in the ICU

Tablan OC, et. al. CDC 1994
Xue Y. Joanna Briggs Institute, 2010.
Terragni PP, et al. JAMA, 2010;303:1483-9

An automatic weaning protocol should be in place and mechanically ventilated patients should undergo assessment of readiness to wean & spontaneous breathing trial when they satisfy the 2-step process:

- **Readiness to Wean**: Arousable, Low ventilatory and end expiratory pressure requirements, No new potentially serious conditions, Hemodynamically stable without vasopressors, Requiring levels of FiO2 that could be delivered with a face mask or nasal cannula
- **Perform a Spontaneous Breathing Trial**: 30 to 120 minutes with assessment of vent pattern, gas exchange, hemodynamics & comfort

MacIntyre N. Semin Resp Crit Care Med, 2006;27:396-403
Esteban A. Am J Respir Crit Care 1999;159:512-18
Esteban A. Am J Respir Crit Care 1997;156:459465
Appropriate Sedation: Impacting Ventilator Outcomes

- Around the clock sedation administered via a protocol based on evaluation of sedative levels with a reliable and valid tool shorten time on vent, ICU & hospital length of stay, need for a trach*
- Daily interruption of sedative drug infusions decreases the duration of mechanical ventilation and LOS in the ICU. In the group that had daily interruption, the duration of mechanical ventilation was reduced by 33% (2.4 days) and ICU LOS was reduced by 35% (3.5 days) and lower impact on PTSD.
- Wake up and breathe protocol resulted in ↓ time on ventilator, ↓ ICU & hospital stay and reduced 1 year mortality (NNT=7)
- When dexmedetomine was compared to midazolam in long term sedation, it showed ↓ time to extubation, ↓ ICU stay, ↓ delirium prevalence and ↑ delirium free days, problems with Bradycardia

Riker RR, et al. JAMA, 2009;301:489-499

Sneak Peek at New Guidelines

- PAD Guidelines Coming (Evidence Based)
  - Pain (Non-pharm & Pharmacological-Remifentanil or Fentanyl)
    - BPS (Behavioral Pain Scale)
    - CPOT (The Critical Care Pain Observation Tool)
  - Agitation (non-benzodiazepine, Dexmedetomidine or Propofol) light sedation & interruption
    - RASS
    - SAS
  - Delirium (use atypical antipsychotics- Olanzapine/Quetiapine
    - ICU-CAM
    - ICU Delirium Screening Checklist
- PAD Bundle

Riker RR, et al. JAMA, 2009;301:489-499
Presented at SCCM 2012 February
Endotracheal / Nasogastric Tube/ Sinusitis

- Carriage of oropharyngeal bacteria during intubation
- If cuff pressure < 20 cm 4x ↑ risk VAP
- Cuff pressure range btwn 25-40cm (JBI-Level A) with maintenance at 25cm-30cm of H2O pressure.
  - Continuous monitoring resulted in a lower portion of out of range cuff pressure (11% vs. 51.7% p< 0.001)
- NGT increases risk of sinusitis/gastric reflux & increases oropharyngeal colonization
- Use oral ET versus nasal (CDC-Cat IB)
- Sinusitis increases the risk of nosocomial pneumonia by 3 fold

Carstens J. Joanna Briggs Institute, 2010
Oral Cavity & VAP

- 89 critically ill patients
- Examined microbial colonization of the oropharynx throughout ICU stay
- Used pulse field gel electrophoresis to compare chromosomal DNA

Results:
- Diagnosed 31 VAPs
- 28 of 31 VAP’s the causative organism was identical via DNA analysis

El-Solh AA. Chest. 2004;126:1575-1582

Role of Salivary Flow

- Provides mechanical removal of plaque and microorganisms
- Innate & specific immune components (IgA, cortisol, lactoferrin)
- Patients receiving mechanical ventilation have dry mouth which in turn contributes to accumulation of plaque & reduced distribution of salivary immune factors

Munro CL & Grap MJ. AJCC. 2004;13:25-34
What Does the Evidence Tell Us?

Brush  
CHX rinse alone  
CHX rinse in Combination  
Swab/Clean/Moisturize  
Suction  
All of the above

BRUSH & SWAB

- 77% more clean approximal sites with brushing
- 44% more clean crevice sites with brushing
- Benefit of brushing is directly correlated with technique
- Foam swabs could not remove plaque from sheltered areas on or between teeth

Toothbrush; grade D, Swabs; unresolved, Use of flexible suction catheter post oral cleansing; Grade D (Berry AM et al. AJCC, 2007;16:552-563)
Oral Care Reduces Pneumonia In Nursing Homes

Methodology

- 11 nursing homes in Japan over 2 year period
- 417 enrolled / 366 residents analyzed (death from other causes)
- 184 received oral care program/182 did not
- Tooth brushing after each meal (teeth or dentures) & 1x weekly review by dentist/or hygienist

<table>
<thead>
<tr>
<th></th>
<th>No Oral</th>
<th>Oral Care</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Febrile</td>
<td>29%</td>
<td>15%</td>
<td>p&lt;.01</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>19%</td>
<td>11%</td>
<td>p&lt;.05</td>
</tr>
<tr>
<td>Death</td>
<td>16%</td>
<td>7%</td>
<td>p&lt;.01</td>
</tr>
<tr>
<td>MMSE</td>
<td>Increase</td>
<td>p&lt;.05</td>
<td></td>
</tr>
</tbody>
</table>

Yoneyama et al. JAGS. 2002;50:430-433

H₂O₂, Cetylpyridium Chloride (CPC) & Biotene

H₂O₂

- >3% may cause harm, <1% no benefit in plaque removal.
- Must be diluted properly, not with normal saline.
- 3x a day mouth rinse with 1.5% H₂ O₂ revealed no mucosal damage, improved plaque scores and overall gingival health.

CPC

- Cetylpyridium chloride had significant antigingivitis effects in several individual studies
- Used in some over the counter plaque reduction rinses (Crest rinse)

Biotene

- Contains salivary enzymes
- Moisturize, Some oral care kits

Recent Trials Reduction in VAP or Colonization with CHG or Povidone-iodine

- 2004: Grap (CHG via swab)
- 2005: Fourier (CHG) (negative trial)
- 2006: Koeman (CHG or CHG/colistin)
- 2006: Munro (CHG via swab & toothbrushing)
- 2006: Sequin (povidone-iodine)
- 2006: Mori (povidone-iodine)
- 2008: Tantipong (CHG)
- 2009, Sona (CHG)
- 2009, Panchabhai (CHG)—no decrease

Prevention of VAP with Oral Antisepsis: A Systematic Review & Meta-analysis

- 14 studies evaluated from 1996 to 2011
- 2481 patients
- All randomized trials
- 9/14 blinded
- 12 trials assessed the effectiveness of CHG (2341 patients, 941 were CABG)
- 2 trials evaluated Povidone-iodine (140pts)
- Variation of additional interventions:
  - toothbrushing,
  - oropharyngeal aspiration
  - mechanical cleaning of the mouth
  - Frequency of antiseptic

Comprehensive Oral Care Program/Bundle element

- Soft suction tooth brush x2 daily
- CHG rinse .12% 2x daily,
- Suction Oral Swab, use of a 1.5% \( \text{H}_2\text{O}_2 \) peroxide mouth rinse or CPC for in between cleaning,
- Deep oral suctioning catheter used 4x daily
- Covered yankauer for non-traumatic oral suctioning
- Dedicated oral suction line for infection control and ease of use.

Murray TM et al. AACN Advanced Critical Care. 2007;18(2):190-199

Frequency of Oral Care and Suctioning

- Process of giving oral care rather than specific agent has a greater influence on the general condition of the mouth.
- 2 to 4 hour interval tends to show a greater improvement in oral health.
- If oral care is omitted for a period of 4 to 6 hours the previous benefits are lost.

DeWalt EM. Nurs Research 1975; 24(2):104-108
Drimmelen and Rollins. Nurs Research 1969: 18; 327-332
Comprehensive Oral Care Protocol: The Good Shepherd Study

Methodology:
- Retrospective study 10 bed Med-Surg
- Protocol included: Covered Yankauer for non-traumatic oral suctioning, soft-suction toothbrush, Suction Oral Swab, use of a 1.5% H₂O₂ peroxide mouth rinse for cleansing, subglottic suction catheter used 4x daily, dedicated oral suction line for infection control and ease of use.
- Education provided and presence of clinical champion.


Literature Review: Oral Care Impact of VAP

Comprehensive Oral Care:
- Reduction in VAP from 5.6 to 2.2 (Schleder B. et al. J Advocate Health 2002;4(1):27-30)
- Reduction in VAP from 4.10 (2005) to (2.15) in 2006 with addition of CPC & comprehensive oral care. Vent bundle & rotational therapy already being performed
- Reduction in VAP from 12.0 to 8.0 (p=.060) with 80% compliance, vent bundle already being preformed, 1538 patients randomized to control or study group, Additional outcomes; ↓ vent days (p=.05), ↓ ICU LOS (p=.05) ↓ time to VAP (p= <.001) & reduction in mortality (p=.05) (Garcia R et al AJCC, 2009;18:523-534)
Oral Care Impact of VAP

Comprehensive Oral Care & CHG:

- Reduction in VAP to zero for 2 years, vent bundle, mobility, oral care & CHG with comprehensive education preformed (Murray TM et al. AACN Advanced Critical Care. 2007;18(2):190-199)

Dickinson S et al. SCCM Critical Connections, 02/2008

Literature Review: Oral Care Impact of VAP

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- Dickinson S et al. SCCM Critical Connections, Feb 2008
Oral Care Impact of VAP

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- Reduction in VAP to zero for 2 years, vent bundle, mobility, oral care & CHG with comprehensive education preformed (Murray TM et al. AACN Advanced Critical Care. 2007;18(2):190-199)

Dickinson S et al. SCCM Critical Connections, 02/2008

Does Compliance Make A Difference?

Oral care compliance & use of the ventilator bundle resulted in a 89.7% reduction in VAP

Subglottic Secretion Drainage

5 level 2 trials conclude that subglottic secretion drainage is associated with a reduction in VAP


How high is 30 degrees?
Body Position: Supine versus Semi-recumbent (30-45 degrees)

Methodology

* 19 mechanically ventilated patients
* 2 period crossover trial
* Study supine and semirecumbent positions over 2 days
* Labeled gastric contents (Tc 99m sulphur colloid)
* Measured q 30 min content of gastric secretions in endobronchial tree in each position
* Sampled ET secretions, gastric juice & pharyngeal contents for bacteria


Results

➢ Radioactive contents higher in endobronchial secretions in supine patients
➢ Time dependant:
  - Supine: 298cpm/30min vs. 2592cpm/300min
  - HOB: 103cpm/30min vs. 216cpm/300min
➢ Same microbes cultured in all 3 areas 32% with HOB vs. 68% supine

Micro Aspiration During Sleep in Healthy Subjects

- Prospective duplicate full-night studies
- 10 normal male’s 22-55 yrs of age
- Methods:
  - Radioactive $^{99m}$Tc tracer inserted into the nasopharynx
  - Lung scans conducted immediately following final awakening
  - No difference in sleep efficacy btwn 2 study nights
- Results:
  - 50% of subjects had tracer in the pulmonary parenchyma upon final awakening
  - No difference in age, time spent in bed, efficacy of sleep, apnea-hyponea index, arousal plus awakening index or % sleep in the supine position between subjects that aspirated and those that did not.


HOB Research

Methodology:
- 86 patients
- Randomly assigned to supine position or HOB 45 degrees (39 semi recumbent, 47 supine)
- Monitored clinical suspected & microbiologically confirmed nosocomial pneumonias

Results:
- Microbiologically confirmed nosocomial pneumonia lower in the semi recumbent group 2/39 (5%) vs. 11/47 (23%)
- Supine position & enteral nutrition were independent risk factors for VAP & had the greatest number of VAP’s 14/28 (50%)

Drakulovic MB. et. al. Lancet. 1999;354:1851-1858
HOB Research

• Methodology
  • Prospective multicenter trial randomly assigned to targeted 45° vs. 10° HOB
  • 112 to targeted 45° vs. 109 patients to 10°
  • Continuous measurement of backrest elevation first wk of MV
  • Dx of VAP by bronchoscopic techniques

• Results
  • Baseline characteristics similar
  • Average elevations
    • 10° group day 1 & 7: 9.8 & 16.1
    • 45° group day 1 & 7: 28.1 & 22.6*
  • Target 45° not achieved 85% of the time
  • VAP: 10° = 6.5% vs. 45° = 10.7%

*p < .001


Continuous Lateral Rotation Therapy
Cushion Based Rotation Bed

![Image of a patient on a hospital bed with a rotation mechanism]

### Table: Proportion of patients with pneumonia

<table>
<thead>
<tr>
<th>Study or subcategory</th>
<th>Proportion of patients with pneumonia</th>
<th>Odds ratio (fixed)</th>
<th>Weight %</th>
<th>Odds ratio (fixed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia and prophylaxis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimare et al⁹⁶</td>
<td>1/16</td>
<td>4/14</td>
<td>3.45</td>
<td>0.17 (0.02, 1.72)</td>
</tr>
<tr>
<td>Fink et al⁹⁹</td>
<td>7/51</td>
<td>19/48</td>
<td>14.55</td>
<td>0.24 (0.09, 0.65)</td>
</tr>
<tr>
<td>Gentilello et al⁹⁶</td>
<td>5/27</td>
<td>13/38</td>
<td>7.58</td>
<td>0.44 (0.13, 1.42)</td>
</tr>
<tr>
<td>Kelley et al⁹⁶</td>
<td>5/18</td>
<td>13/25</td>
<td>6.77</td>
<td>0.36 (0.10, 1.30)</td>
</tr>
<tr>
<td>Kirschenbaum et al⁹⁶</td>
<td>3/17</td>
<td>10/20</td>
<td>6.52</td>
<td>0.21 (0.05, 0.88)</td>
</tr>
<tr>
<td>Summer et al⁹⁶</td>
<td>4/41</td>
<td>7/42</td>
<td>5.38</td>
<td>0.54 (0.15, 2.01)</td>
</tr>
<tr>
<td>Traver et al⁹⁶</td>
<td>8/44</td>
<td>17/59</td>
<td>10.24</td>
<td>0.55 (0.21, 1.42)</td>
</tr>
<tr>
<td>Whiteman et al⁹⁶</td>
<td>10/33</td>
<td>14/36</td>
<td>8.04</td>
<td>0.68 (0.25, 1.86)</td>
</tr>
<tr>
<td>deBoissblanc et al⁹⁶</td>
<td>6/69</td>
<td>11/51</td>
<td>9.05</td>
<td>0.35 (0.12, 1.01)</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>49/316</td>
<td>106/333</td>
<td>72.49</td>
<td>0.40 (0.27, 0.58)</td>
</tr>
</tbody>
</table>

Test for heterogeneity: $\chi^2 = 4.03, (df = 8, P = .85), \phi = 0%$

Test for overall effect: $Z = 4.66 (P < .001)$

### Pneumonia treatment:

<table>
<thead>
<tr>
<th>Study or subcategory</th>
<th>Proportion of patients with pneumonia</th>
<th>Odds ratio (fixed)</th>
<th>Weight %</th>
<th>Odds ratio (fixed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abners et al⁹⁶</td>
<td>14/48</td>
<td>45/137</td>
<td>27.51</td>
<td>0.34 (0.18, 0.67)</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>14/48</td>
<td>45/137</td>
<td>27.51</td>
<td>0.34 (0.18, 0.67)</td>
</tr>
</tbody>
</table>

Test for heterogeneity: $\chi^2 = 0.22, (df = 1, P = .64), \phi = 0%$

Test for overall effect: $Z = 4.66 (P < .001)$

Total (95% CI):

<table>
<thead>
<tr>
<th>Proportion of patients with pneumonia</th>
<th>Odds ratio (fixed)</th>
<th>Weight %</th>
<th>Odds ratio (fixed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>63/413</td>
<td>153/470</td>
<td>100.00</td>
<td>0.38 (0.27, 0.53)</td>
</tr>
</tbody>
</table>

Test for heterogeneity: $\chi^2 = 4.16, (df = 9, P = .30), \phi = 0%$

Test for overall effect: $Z = 5.63 (P < .001)$

**Figure 4:** Meta-analysis of pneumonia (with subgroups of prophylaxis and treatment for respiratory dysfunction): rotation versus control.

Goldhill DR et al. Amer J Crit Care, 2007;16:50-62
CLRT to Prevent VAP

Methodology

• Prospective randomized controlled trial, 3 medical ICUs at a single center
• Eligible if ventilated < 48 hours & free from pneumonia, ALI or in ARDS
• 150 patients with 75 in each group
• 35 CLRT patients allocated to undergo percussion before suctioning
• Measures to prevent VAP were standardized for both groups including HOB

Results: CLRT vs. Control

• VAP: 11% vs. 23% p = .048
• Ventilation duration: 8 ± 5 days vs. 14 ± 23 days, p = .02
• LOS: 25 ± 22 vs. 39 ± 45 days, p = .01
• Mortality: no difference


CLRT Practical Challenges

• CLRT is an advance therapeutic technique
• The therapy is driven by a protocol and changes in settings are nursing orders
• Yearly competency based education to ensure proper use of the therapy
• Monitor initial turn cycle to ensure one lung is above the other
• Automation of turning requires insertion of usual assessment practices
• Minimum of 18 hours per day & six cycles per hour
CAN WE MOBILIZE CRITICALLY ILL PATIENTS SAFELY AND IS THERE A BENEFIT?

Impact of Immobility
The Effects of Immobility/Supine Position on Respiratory Function

- Decreased Respiratory Motion
  - Abdomen influence on diaphragm motion
  - Atelectasis
- Increased Dependent Edema
  - Fluid accumulation in the dependent regions
  - Compression atelectasis
- Decreased Movement of Secretions
  - Impaired ability to clear tracheobronchial secretions
  - Normal mechanism dysfunctional in supine position


The Effects of Immobility on Cardiovascular Function

- Fluid Shift
  - Fluid shift from upright to sitting…500cc shift
  - ↓ of plasma volume of 8-10% that occurs in the first 3 days of bedrest
  - Stabilizes at 15-20% volume loss by the 4th week of bedrest
- Cardiac Effects
  - ↑ workload (fluid shift)
  - ↑ resting heart rate & ↓ cardiac output
- Cardiac Deconditioning & Decreased Maximum Oxygen Uptake
  - Falls 23% after 3 weeks of strict bedrest

The Effects of Immobility on Cardiovascular Function

- Orthostatic Intolerance
  - Deteriorates rapidly with bed rest
  - Occurs within 1-2 days with maximum effect at 3 weeks
  - Results from decreased autonomic tone & fluid shifts

Melada, G.A., et. al. Space and Environmental Medicine, August 1976
Pressure Ulcers – Risk Factors

1. Immobility 87.0%
2. Fecal Incontinence 56.7%
3. Malnutrition 54.4%
4. Decreased Mental Status 50.7%
5. Peripheral Vascular Disease 28.1%
6. Urinary Incontinence 27.0%
7. Diabetes 23.7%


Skeletal Muscle Deconditioning

- Skeletal muscle strength reduces 4-5% every week of bed rest (1-1.5% per day)
- Without activity the muscle loses protein
- Healthy individuals on 5 days of strict bed rest develop insulin resistance and microvascular dysfunction
- 2 types of muscle atrophy
  - Primary: bed rest, space flight, limb casting
  - Secondary: pathology

Candow DG, Chilibick PD J Gerontol. 2005;60A:148-155
Homburg NM., Arterioscler Thrombo Vasc Biol, 2007;27(12):2650-2656
Skeletal Muscle Deconditioning

- Muscle groups that lose strength most quickly related to immobilization are those that maintain posture, transferring positions & ambulation.
- > 1/3 of patients with ICU stays greater than two weeks had at least two functionally significant joint contractures.
- Muscle atrophy in mechanically ventilated patients contribute to fatigue of the diaphragm and challenges with weaning.
- Degradation within 6-8 days; continues as long as bedrest occurs
- One day of bed rest requires two weeks of reconditioning to restore baseline muscle strength

Candow DG, Chilibick PD J Gerontol, 2005:60A:148-155
Hamburg NM,. Arterioscler Thrombo Vasc Biol, 2007;27(12):2650-2656
JGerontoMedSci: 63

Impact of Quality of Life
Functional Disability 5 Years after ARDS

- 109 survivors of ARDS at 3, 6, 12 months, 2, 3, 4 & 5 yrs
- Interviewed, pulmonary function tests, 6 minute walk test, resting & exercise oximetry, chest imaging, quality of life & reported use of health services
- Results:
  - Median 6 minute walk distance 436m (76% of predicted)
  - Physical component score of medical outcomes was 41 (mean norm score matched for age & sex, 50)
  - Pulmonary function normal or near normal
  - Constellation of other physical & psychological problems develop or persisted in pts & family caregivers for up to 5 yrs


Definition

- Progression:
  - Moving forward or onward
  - A continuous & connected series
- Mobility:
  - Capable of moving or being moved
- Early Progressive Mobility:
  - Planned movement in a sequential manner beginning at a patients current mobility status and returning them to baseline

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Progressive Mobility Includes:

- Head elevation
- Manual turning
- Passive & Active ROM
- Continuous Lateral Rotation Therapy/Prone Positioning
- Movement against gravity
- Physiologic adaptation to an upright/leg down position (Tilt table, Bed Egress)
- Chair position
- Dangling
- Ambulation

Outcomes of A Progressive Mobility Program

- ↓ incidence of skin injury
- ↓ time on the ventilator
- ↓ incidence of VAP
- ↓ days of sedation
- ↓ delirium
- ↑ ambulatory distance
- Improved function

Thomsen GE, et al. CCM 2008;36;1119-1124
Winkelman C et al, CCN,2010;30:36-60
Progressive Mobility Continuum

Include complex, intubated, hemodynamically unstable and stable intubated patients; may include non-intubated.

LEVEL I
- Includes intubated, non-intubated hemodynamically stable/stabilizing, no contraindications.
- RASS -3 & up
- Tolerates Level I Activities
- Ambulate progressively longer distances with less assistance x2 or x3/day with RN/PT/RT/UAP

LEVEL II
- Includes complex, intubated, hemodynamically unstable and stable intubated patients; may include non-intubated.
- RASS -5 to -3
- Tolerates Level II Activities
- Perform Initial mobility screen w/in 8 hours of ICU admission & daily
- PaO2/FiO2 > 250
- Peep <10
- O2 Sat > 90%
- RR 10-30
- No new onset cardiac arrhythmias or ischemia
- HR >60 <120
- MAP >55 <140
- SBP >90 <180
- No new or increasing vasopressor infusion
- RASS > -3

LEVEL III
- Goal upright sitting, increased strength and moves arm against gravity
- Tolerates Level III Activities
- Perform Initial mobility screen w/in 8 hours of ICU admission & daily
- PaO2/FiO2 > 250
- Peep <10
- O2 Sat > 90%
- RR 10-30
- No new onset cardiac arrhythmias or ischemia
- HR >60 <120
- MAP >55 <140
- SBP >90 <180
- No new or increasing vasopressor infusion
- RASS > -1 & up

LEVEL IV
- Goal: increased trunk strength, moves leg against gravity and readiness to weight bear
- Tolerates Level IV Activities
- Perform Initial mobility screen w/in 8 hours of ICU admission & daily
- PaO2/FiO2 > 250
- Peep <10
- O2 Sat > 90%
- RR 10-30
- No new onset cardiac arrhythmias or ischemia
- HR >60 <120
- MAP >55 <140
- SBP >90 <180
- No new or increasing vasopressor infusion
- RASS = 0 & up

LEVEL V
- Goal: increase distance in ambulation & ability to perform some ADLs
- Tolerates Level V Activities
- Perform Initial mobility screen w/in 8 hours of ICU admission & daily
- PaO2/FiO2 > 250
- Peep <10
- O2 Sat > 90%
- RR 10-30
- No new onset cardiac arrhythmias or ischemia
- HR >60 <120
- MAP >55 <140
- SBP >90 <180
- No new or increasing vasopressor infusion
- RASS 0 & up

For each position/activity change allow 5-10 minutes for equilibration before determining the patient is intolerant.

*Mobility is the responsibility of the RN, with the assistance from the RT’s Unlicensed Assistive Personnel and PT/OT. PT and OT may assist the team with placement to the appropriate mobility level of activity, always prioritizing patient and provider safety. Placement is based on clinical judgment.*
WITHOUT EFFECTIVE SEDATION & DELIRIUM MANAGEMENT MOBILITY PROGRAMS WILL LIKELY FAIL

Wake up & breathe, lower sedation use, demonstrates 14% absolute survival advantage, 4 day reduction in LOS & no difference in incidence of PTSD, depression or cognitive decline & less likely to report functional decline 1 yr post follow up.

Jackson JC. et al. Am J Respir Crit Care Med; 2010;182:183-191

AWAKE
BREATHE
CHOICE OF SEDATION
DELIRIUM
EARLY MOBILITY
FEEDING?
2012 – Early Progressive Patient Mobility

• **Old way**
  - Admission, bed, immobilized, supine, complications

• **New way**
  - HOB elevation
  - Lateral rotation/Prone
  - Full-chair position
  - Bed egress/weight bearing
  - Bedside chair
  - Ambulation
  - Enhanced recovery

Progressive Mobility Programs

Journey to tolerating upright position, tilt, sitting, standing and walking can occur quicker through the use of technology.
How Do We Make It Happen?

4 E’s: Implementation Framework


<table>
<thead>
<tr>
<th></th>
<th>Frontline Staff</th>
<th>Team Leaders</th>
<th>Senior Executives</th>
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<tr>
<td>Engage</td>
<td>Ask, how does this make the world a better place?</td>
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<td></td>
<td>– Help staff understand the preventable harm</td>
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<td>– Share stories about patients affected</td>
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<td></td>
<td>– Estimate number of patients harmed</td>
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<td>– Develop a business case</td>
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<td>Educate</td>
<td>What do I need to do?</td>
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<td></td>
<td>– Convert evidence into behaviors;</td>
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<td></td>
<td>– evaluate awareness and agreement</td>
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<td>Execute</td>
<td>How can I do it?</td>
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<td></td>
<td>– Listen to resisters</td>
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<td>– Standardize, create independent checks</td>
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<td></td>
<td>– Make it easy to do the right thing</td>
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<td>– Learn from mistakes</td>
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<td>Evaluate</td>
<td>How do I know we made a difference?</td>
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<td></td>
<td>– Define measures</td>
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<td>– Regularly assess measures</td>
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Potential Barriers

- Perception of lack of time or the importance
- Lack of evidence based education...just do it!!!!
- Absence of a define protocol/procedure
- Staff turnover/Replacement staff
- Inaccessibility of needed supplies
- No real clinical lead on the unit
- Lack of feedback on progress
- Lack of accountability/responsibility

Interventions To Ensure Patients Receive Evidence

- Evidence based education
- Recognition of value and reinforcement
- Products/Processes that make it easy for the frontline caregiver to provide the care (make it part of the bundle)
  - Bathing kits
  - Placement on the med record
  - Automated charting with flag reminders
- Frequent rounding/reinforcement of standard
- Multidisciplinary rounds/Checklists

Westwall S. Nursing in Critical Care, 2008;13(4):203-207
Abbott CA, et al. Worldviews on Evidence Based Practice, 2006:139-152

Interventions To Ensure Patients Receive Evidence

- Setting targets/Celebrating successes
- Placement of new practice/education in orientation
- Attractive signs to outline protocol in the patient rooms near the products
- Compliance program with feedback to all caregivers
- Outcome measurement/Feedback*

Westwall S. Nursing in Critical Care, 2008;13(4):203-207
Abbott CA, et al. Worldviews on Evidence Based Practice, 2006:139-152
Notes on Hospitals: 1859

“It may seem a strange principle to enunciate as the very first requirement in a Hospital that it should do the sick no harm.”

Florence Nightingale

Advocacy = Safety
For Our Patients & Ourselves

Advocacy Starts with Us
Be Courageous

We all are responsible for the safety of our patients & ourselves…Own the Issues

• “If not this, then what??”
• “If not now, then when?”
• “If not me, then who??”