# Reducing Harm: Focus on the Fundamentals





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# Disclosures

- Consultant-Michigan Hospital Association Keystone Center
- ▲ Subject matter expert on CAUTI, CLABSI, HAPI, Sepsis, Safety culture for HRET/AHA
- ▲ Consultant and speaker bureau
  - $\triangle$  Stryker's Sage business
  - △ LaJolla Pharmaceutical
  - $\triangle$  Potrero Medical
- ▲ Baxter Advisory Board

# **Objectives**

- eting the
- Describe the impact of patient harm and nurse's role in resuscitating the nursing care fundamentals to create a safer patient environment
- Identify and detail the evidence-based practices for bathing hospitalized patients
- Discuss nursing care practices in infection control to reduce CAUTI & CLABSI's
- ▲ Determine strategies for reducing pneumonia in the hospitalized patient
- Outline various evidence-based strategies to reduce pressure, shear, moisture and device related injuries
- ▲ Identify ways you can help prevent delirium in your patients
- A Discuss the evidence based intervention of mobility and how to implement in your culture.



# Capturing the Essence of Nursing

"Nurses primarily assists the individual (sick or well) in the performance of those activities contributing to health, or its recovery (or a peaceful death) that he would perform unaided if he had the strength, will or knowledge. It is likewise the unique contribution of nursing to help the individual to be independent of such assistance as soon as possible.

Henderson 1969



- 1 out of 10 patients are harmed in hospitals in high income countries
- 134 million adverse events occur each year in hospitals in LMICs, contributing to
  2.6 million deaths annually due to unsafe care
- Medication errors cost an estimated 42 billion USD annually



# We Need to Keep the Journey Going!!

- As many as 440,000 people die every year from hospital errors, injuries, accidents, and infections
- Every year, 1 out of every 23 patients develops an infection while in the hospital—an infection that didn't have to happen.
- A Medicare patient has a 1 in 4 chance of experiencing injury, harm or death when admitted to a hospital
- A Today alone, more than 1000 people will die because of a preventable hospital error



# **Missed Nursing Care**

- Any aspect of required patient care that is omitted (either in part or whole) or significantly delayed.
- A predictor of patient outcomes
- Measures the process of nursing care







# Hospital Variation in Missed Nursing Care



Figure 2. Elements of care most and least frequently missed. The solid bars represent the means across all 10 hospitals, and the range lines indicate the standard deviations.

# **Reasons for Missed Nursing Care**



#### ▲ Qualitative Review

- △ Interruptions/multitasking/task switching
- △ Fatigue & physical exhaustion
- △ Cognitive biases
- △ Lack of patient & family engagement
- △ Lack of physician resources
- △ Leadership issues
- △ Moral distress & compassion fatigue
- △ Documentation load
- △ Large proportion of new nurses on unit
- $\triangle$  Complacency

#### **Challenging Practice environment correlates to missed nursing care**

# **Rationing Care-How we Prioritize**

- Highest priority activities for nurses
  - A Those which are likely to have an immediate negative impact
    - Administering meds
    - Medical directed treatments
    - Procedures-wound dressings, labs
- Lower priority activities for nurses
  - $\bigtriangleup$  Those which show no immediate negative harm
    - Ambulation
    - Oral hygiene
    - Emotional support
    - Teaching



Rationing contributes to functional and cognitive decline



 Nurses prioritise: medication administration; treatment and procedures; vital signs monitoring; handwashing

 Nurses ration: skin/mouth care; toileting/bathing; mobilisation; pain management; teaching; communication; comforting; documenting

Limited facilitation of patient rehabilitation/maintenance of self care



IMPLICIT CARE

RATIONING



Bail K, et al. International Journal of Nursing Studies. 2016;63:146-161

# Outcomes of Missed Nursing Care: A Systematic Review

- 14 studies connecting missed nursing care with at least 1 patient outcome
  - $\land$  Patient Satisfaction  $\checkmark$
  - $\bigtriangleup$  Lower quality of care reported by nurses with greater missed care
  - △ Clinical Outcomes
    - Medication errors
    - CLA-BSI's
    - Pneumonia
    - UTI's
    - Pressure Injuries
    - Falls
    - Failure to rescue

5 nurse sensitive adverse events in 22 med-surg units added 1300 additional hospital days for 166 patients & \$ 600,000 in excess costs

Recio-Saucedo A, et al. J of Clin Nurs. 2018;27:2248-2259

# Fundamentals of Care Framework



- Fundamental care involves actions on the part of the nurse that respect and focus on a persons essential needs to ensure their physical & psychosocial wellbeing
- A These needs are met by developing a positive & trusting relationship with the person being care for as well as their families/carers

Feo R, et al. J of Clin Nurs. 2018;27:2285-2299

# **Reconnect With Our Professional Purpose**



"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** 





# Protect The Patient From Bad Things Happening on Your Watch





Implement Interventional Patient Hygiene





#### INTERVENTIONAL PATIENT HYGIENE

- A 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

Pressure Prevention



Bathing & Assessment

#### **INTERVENTIONAL PATIENT HYGIENE(IPH)**



Vollman KM. Intensive Crit Care Nurs, 2013;22(4): 152-154

# Achieving the Use of the Evidence

Value

GKIIIS thomedore e cystern **Factors Impacting the Ability to Achieve Quality Nursing Outcomes at the Point of Care** 

Pesources

Attitude & Accountability



# Teamwork and Fundamental Nursing Interventions











Do we really see missed nursing care as patient harm?





# Strategies to Link Harm with Nurse Patient **Advocacy Role**

- 🛕 Do No Harm Rounding
- Immediate learn from a deficit
- Incorporate action plans and data into daily huddle



# **Outcomes We Own as Professional Nurses**

#### Infection reduction:

- $\triangle$  VAP
- $\triangle$  NV-HAP
- Skin Injury (pressure, medical device, moisture)
- Functional & Cognitive Decline/Falls
- Safe Medication delivery

Critical Interventions to Prevent Harm & the Why

#### **INTERVENTIONAL PATIENT HYGIENE(IPH)**



Vollman KM. Intensive Crit Care Nurs, 2013;22(4): 152-154

Infection Prevention: Critical Nursing Interventions to Prevent Harm



#### Excess Mortality Estimates for HAC's

	Ν	Range (RR)	Estimates of RR (95% CI)	Underlying Mortality	Estimates of Excess Mortality (95% CI)		
Adverse Drug Events (ADE)	6	0.68–3.09	1.61 (1.14–2.27)	0.020	0.012 (0.003–0.025)		
Cathether-Associated Urinary Tract Infections (CAUTI)	4	1.28–1.97	1.50 (1.06–2.11)	0.071	0.036 (0.004–0.079)		
Central Line- Associated Bloodstream Infections (CLABSI)	5	1.86–4.88	2.72 (1.81–4.10)	0.086	0.150 (0.070–0.270)		
Falls For Every 1000 in-hospital CAUTI cases, there are 36 excess deaths (0.035-0.070)							
Obstetric Adverse Events (OBAE)	-	-	-	-	0.005 (0.003–0.013)		
Pressure Ulcers	3	2.42-5.06	3.26 (1.71–6.17)	0.018	0.041 (0.013–0.093)		
Surgical Site Infections (SSI) Infections (CAUTI)			\$13,793 (\$5,019–: 	\$22,568)	009–0.059)		
Ventilator-Associated Pneumonia (VAP)	10	0.52–4.90	1.48 (0.64–3.42)	0.300	0.140 (-0.110–0.730)		
Venous Thromboembolism (VTE)	9	1.01–13.63	3.15 (2.02–4.91)	0.020	0.043 (0.040–0.078)		
<i>C. difficile</i> Infections (CDI)	13	1.17–9.60	1.60 (1.38–1.87)	0.073	0.044 (0.028–0.064)		

# Additional Inpatient Costs & Mortality for HAC's: Building the Business Case

	Studies (n)	Range of Estimates	Estimate (95% CI)	
Adverse Drug Events (ADE)	2	\$1,277-\$9,062	\$5,746 (-\$3,950–\$15,441)	
Catheter-Associated Urinary Tract Infections (CAUTI)	6	\$4,694–\$29,743	\$13,793 (\$5,019–\$22,568)	
Central Line-Associated Bloodstream Infections (CLABSI)	7	\$17,896-\$94,879	\$48,108 (\$27,232–\$68,983)	
Falls	3	\$2,680-\$15,491	\$6,694 (-\$1,277–\$14,665)	
Obstetric Adverse Events (OBAE)	2	\$13-\$1,190	\$602 (-\$578–\$1,782)	
Pressure Ulcers	4	\$8,573-\$21,075	\$14,506 (-\$14,506–\$41,326)	
Surgical Site Infections (SSI)	5	\$11,778–\$42,177	\$28,219 (\$18,237–\$38,202)	
Ventilator-Associated Pneumonia (VAP)	5	\$19,325–\$80,013	\$47,238 (\$21,890–\$72,587)	
Venous Thromboembolism (VTE)	4	\$11,011-\$31,687	\$17,367 (\$11,837–\$22,898)	
C. difficile Infections (CDI)	9	\$4,157-\$32,394	\$17,260 (\$9,341–\$25,180)	

#### Impact of COVID on Healthcare-Associated Infections (HAIs) in 2020 Compared to 2019: Data from NHSN

	2020 Q1	2020 Q2	2020 Q3	2020 Q4
CLABSI	-11.8%	1 27.9%	16.4%	47.0%
CAUTI	-21.3%	No Change <sup>1</sup>	12.7%	18.8%
VAE	11.3%	1 33.7%	<b>1</b> 29.0%	44.8%
SSI: Colon surgery	-9.1%	No Change <sup>1</sup>	-6.9%	-8.3%
SSI: Abdominal hysterectomy	-16.0%	No Change <sup>1</sup>	No Change <sup>1</sup>	-13.1%
Laboratory-identified MRSA bacteremia	-7.2%	12.2%	1 22.5%	133.8%
Laboratory-identified CDI	-17.5%	-10.3%	-8.8%	-5.5%

Weiner-Lastinger LM, Pattabiraman V, Konnor RY, et al. The impact of coronavirus disease 2019 (COVID-19) on healthcare-associated infections in 2020: A summary of data reported to the National Healthcare Safety Network. *Infection Control & Hospital Epidemiology*. 2021:1-14. doi:10.1017/ice.2021.362

# **Common Routes of Transmission**





HAI in the ICU was the patients' endogenous flora (40%-60%); cross-infection via the hands of health care personnel (HCP; 20%-40%); antibiotic-driven changes in flora (20%-25%); and other(including contamination of the environment; 20%). Weinstein RA.. Am J Med 1991;91(Suppl):179S-184S.



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"I use so much alcohol-based hand sanitizer, my hands had to join a 12-step program!"



# Question



What is the average number of times a clinician should be cleaning their hands in a shift?

A. 35

- B. 50
- C. 75

D. 100

Hand Hygiene is the Single Most Important Factor in Preventing the Spread of Infection

Healthcare providers clean their hands less than half of the times they should!!



Most Efficient Measure in Reducing MDRO-GNB in ICU

# Guidelines for Hand Hygiene in Health Care Settings

- Alcohol-based hand rub frontline method for decontaminating hands (20-30 seconds)
- Visibly soiled or exposure to potential spore forming organisms, wash with a non-antimicrobial or antimicrobial soap & water (40-60 seconds)
- △ Do not use Triclosan containing soaps
- ▲ Decontaminate hands after removing gloves
- A Provide HCW with hand lotions & creams to minimize occurrence of irritant contact dermatitis
- △ Use multidimensional strategies to improve hand hygiene practice
- △ Do not wear artificial fingernails or extenders

CDC. Hand Hygiene Guidelines: MMWR 2002; 51(No. RR-16):[1-45] WHO Hand Hygiene Guidelines 2009 Ellingson K, et al. Infect control & Hosp Epidemiology, 2014;35(2): S155-S178 https://www.cdc.gov/handhygiene/science/index.html



hand in left palm and vice versa

Handwashing Technique with Soap and Water



dry thoroughly with a single use towel use towel to turn off faucet/tap

...and your hands are safe.

# MDRO on Hands of HCW

- Determine prevalence of MDRO on HCP hand in adult acute care
- ▲ 59 article-6840 hand cultures
- 47.5% of samples taken during direct pt care
- A North America higher rates of MRSA
- ▲ ICU's slightly higher
  Pseudomonas and trend for 个
  Acinetobacter





Pittet D. Infect Control Hosp Epidemiol, 2009;30(7):611-622 WHO Hand Hygiene Guidelines 2009 Ellingson K, et al. Infect control & Hosp Epidemiology, 2014;35(2): S155-S178

# Hand Hygiene Measurement Methods

- Direct Observation
- A Product Usage/Volume
- Automation monitoring can improve compliance
  - Electronic versus direct observation more accurate in measuring compliance

Morgan DJ, et al. AJIC, 2012;40:955-959

Unit B Soap + San combined (Beds: 101-300, Category: NON-ICU



Intervention period (Baseline = period 0)

Increase use of alcohol hand rub (measure by volume use) correlated significantly (p=0.014) with improvement in MRSA rates Sroka S, et al. J of Hosp Infect, 2010;74:704-211

> Haas and Larson Journal of Hospital Infection 2007;66:6-14 Polgreen PM, et al. Infect Control & Hosp Epidemiol, 2010;31:1294-1297 Ellingson K, et al. Infect Control & Hosp Epidemiol, 2014;35(S2):S155-178


#### **Reasons for Bathing**





Coyer FM, et al. Aust Crit Care. 2011;24(3):198-209.

#### Timing of the Bath



#### **40%** baths occur 2400 – 0600

- ▲ Timing for bathing varies globally
- Consider patient need for sleep and energy reserves Avoid:
  - △ Nurse preference
  - △ Organizational factors
  - $\triangle$  Unit norms

### **Activities That Increase VO<sub>2</sub>**

Dressing change	10%
\Lambda Agitation	18%
\Lambda Bath	23%
\Lambda Suctioning	27%
Increased work of breathing	40%
\Lambda Weigh on sling scale	36%
A Position change	31%
\Lambda Linen change – occupied bed	22%
\Lambda Chest physiotherapy	35%



White KM, et al. Heart & Lung 1990; 19(5):548-551

## Patients At Risk

#### ▲ Multi-Drug Resistant Organisms

- △ Immunodeficiencies
- $\triangle$  Breaks in skin integrity related to invasive devices
- $\triangle$  Open wounds
- $\triangle$  Co-morbidities
- $\triangle$  Hand transmission
- $\triangle$  Equipment contamination/ Hospital environment
- ▲ Damaging the Natural Barriers to Infection...the Skin
  - △ Bathing techniques
  - △ Soaps
  - $\triangle$  Wash cloths

Bonten MJM. Am J Respir Crit Care Med. 2011;184:991-993 Weber DS, et al. Am J of Infect control, 2010;38:S25-33. Perkins KM, et al. Infect Control & Hosp Epidemiology 2019;40:621-626



## **Optimal Hygiene**

- ▲ pH balanced (4-6.8)
  - ightarrow Stable pH discourages colonization of bacteria &  $\psi$  risk of infection
  - △ Bar soaps may harbor pathogenic bacteria
- Excessive washing/use of soap compromises the water holding capacity of the skin
- A Non-drying, lotion applied
- Multiple steps can lead to large process variation

Voegel D. J WOCN, 2008;35(1):84-90 Byers P, et al. WOCN. 1995; 22:187-192. Hill M. Skin Disorders. St Louis: Mosby; 1994. Fiers SA. Ostomy Wound Managment.1996; 42:32-40. Kabara JJ. et. al. J Environ Pathol Toxicol Oncol. 1984;5:1-14



## **Traditional Bathing**

Why are there so many bugs in here?



Soap and water basin bath was an independent predictor for the development of a CLABSI

Bleasdale SC, e tal. Arch Intern Med. 2007;167(19):2073-2079

#### Bath Basins: Potential Source of Infection

Large multi-center study evaluates presence of multi-drug resistant organisms

Total hospitals:88Total basins:1,103





## **Mechanisms of Contamination**

- \Lambda Skin flora
- ▲ Multiple-use basins
  - $\triangle$  Incontinence cleansing
  - $\triangle$  Emesis
  - $\triangle$  Product storage
- A Bacterial biofilm from tap water



## **Biofilms are Ubiquitous**



Pathogens 2015, 4, 373-386; doi:10.3390/pathogens4020373

OPEN ACCESS



Review

**Opportunistic Premise Plumbing Pathogens: Increasingly Important Pathogens in Drinking Water** 

Joseph O. Falkinham, III 1,\*, Amy Pruden 2 and Marc Edwards 2



INVITED ARTICLE

HEALTHCARE EPIDEMIOLOGY: Robert A. Weinstein, Section Editor

Healthcare Outbreaks Associated With a Water Reservoir and Infection Prevention Strategies

Hajime Kanamori,<sup>1,2</sup> David J. Weber,<sup>1,2</sup> and William A. Rutala<sup>1,2</sup>

<sup>1</sup>Division of Infectious Diseases, University of North Carolina School of Medicine, and <sup>2</sup>Hospital Epidemiology, University of North Carolina Health Care, Chapel Hill

nearth | Local News | Northwest | Fuger Jounu

#### **Operating-room machines test positive for Legionella at UW Medicine**

Originally published September 19, 2016 at 2:19 pm | Updated September 19, 2016 at 7:31 pm

## **Understanding Water**

- All water with the exception of sterile water and filtered water is contaminated with microbes (eg, potable water, tap water, showers, and ice).
- △ In healthy persons, contact or ingestion of such water rarely leads to infection.
- A However, contact or ingestion of such water may cause infection in immunocompromised persons or when applied to non-intact skin
- A Transmission of these pathogens from a water reservoir may occur by direct and indirect contact, ingestion and aspiration of contaminated water, or inhalation of aerosols\*
- ▲ Compared sink & water based care activities to non sink and non water based care activities on GNB colonization in ICU. Found rate dropped from 26.1 to 21.6 colonization pre 1000 ICU days. ↑ reduction with longer ICU LOS's

## Waterborne Infection

#### **Hospital Tap Water**

- A Bacterial biofilm
- Most overlooked source for pathogens
- **29** studies demonstrate an association with HAIs and outbreaks
- ▲ Transmission:

 $\triangle$  Drinking

 $\triangle$  Sinks

 $\triangle$  Bathing

 $\triangle$  Rinsing items

- $\bigtriangleup$  Contaminated environmental surfaces
- $\bigtriangleup$  Contaminated ice machines
- Immunocompromised patients at greatest risk





Anaissie EJ, et al. Arch Intern Med. 2002;162(13):1483-1492. Cervia JS, et al. Arch Intern Med, 2007;167:92-93 Trautmann M, et al. Am J of Infect Control, 2005;33(5):S41-S49, <u>https://www.pinterest.com/pin/332914597437828576/?l=t</u> Kanwar A, et al. Am J Infect Control. 2017;45(11):1273-1275.

#### Reducing UTI's Through Basinless Bathing

FIGURE 2. Hospital-Acquired CAUTI on 2 Medical/Surgical Units 6.0 **Pre-Study Period** Washout Study Period 5.0 4.77 89% Reduction 4.0 2.62 3.0 2.16 2.0 1.0 0.0 Jan 091 Feb.09 Mar 39 Apr 09 May 09 Sec. (B) OH OF: Nov 55 Dec 08. lun 199 Get 891 May OB Dec 18 Jac. 10. Feb 101 Mar 10 Apr 10. Robe 1000 Falley days 4 ST 4.02 3.22 Ø. 4.77 3.86 3.03 2.18 01 10 0 0. Rate/1000 Foley days -Linear | Rate/1000 Foley days)

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



## Impact on UTI with Basin Bathing

UTI Rate- Removal of Prepackaged Bath Product QTR 3 FY05





McGuckin M, et al. AJIC, 2008;36:59-62

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

Unit Census: 14								
Phases	Product Cost	No. of UTI	Median <sup>4</sup> LOS 17 Days	Median <sup>4</sup> Cost (4857.00)				
I- Pre-Packaged Bathing Washcloths (9 months)	\$10,530 <sup>1</sup> (\$3.00)	25	175	\$117,175				
II- Basin/Water (9 months)	\$3,510 <sup>2</sup> (\$1.00)	48	336	\$224,916				
III- Additional Product Cost, UTI, LOS, COSTS	\$7,020	23 <sup>3</sup>	151	\$107,741				

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

Review of Literature: Bathing & CAUTI's

- Bacterial contamination of bath basins is common leading to the recommendation that bathing wipes replace bath basins to reduce HAI's & CAUTI's
- A Non medicated basinless bathing lowered the incidence of CAUTI's, decreased bathing time and resulted in a cost savings
- ▲ No data to support benefit of CHG wipes in reducing CAUTI's
  - $\triangle$  Studies on going

## Comparison of Wash Basin Baths & Disposable Baths

- ▲ RCT comparing basin bath to disposable bath
- 58 patient served as own control
- A Baths were observed
- A Nurse bathed same patient using both methods
- 🛆 Measured
  - △ Duration & quality of bath
  - $\triangle$  Patient satisfaction
  - $\triangle$  Nurse satisfaction
  - $\triangle$  Cost-
    - Basin bath: towels, soap, moisturizer, hot water, basins
    - Disposable package bath and towels

#### Table 1 Duration

	Disposable baths	Wash basins	Wikoxon
	(n = 58) Minutes	(n = 58) Minutes	signed-rank
	(interval)	(interval)	test (p-value)
Preparation	4 (2-5)	5 (3–10)	<0.001
The bath	21 (8-35)	26 (13–42)	<0.001
Cleaning up	4 (1-6)	5 (2–8)	<0.001
Total	29 (14-44)	36 (22–54)	<0.001

Less time was used with the disposable bath in all three categories. This was significant (p < 0.001)

Table 2 Patients' bath type preferences					
Patient Interview	Prefer disposable bath	Prefer wash basins	Equal		
n = 51*	24 (47%)	11 (22%)	16 (31%)		

#### Table 3 Nurses' bath type preferences

Nurse ID	Prefer disposable baths (n)	Prefer wash basins (n)	Equal (n)	
Nhi -1	5	0	0	
Llb -2	5	1	0	
Nbj -3	12	1	0	
Hm -4	11	2	0	
JI -5	8	0	0	
Cp -6	6	2	1	
Total	47 (87%)	6 (11%)	1 (2%)	

A significant number of nurses preferred the disposable bath when comparing the two bath types (p < 0.01).

#### Cost equal if labor excluded

Nøddeskou LH, et al. Scand J Caring Sci. 2015;29(2):347-352.

# Changing IP Culture at the Unit Level

- A 2 subacute medical units with HAI's
- A QI initiative to change infection prevention culture
  - $\triangle$  Environmental cleaning
  - $\triangle$  hand hygiene
  - $\bigtriangleup$  word policy and procedures
  - $\triangle$  patient care
    - basinless bathing/removed basins
    - single use toiletry
    - isolation BP cuffs
    - IP checklist

#### RESULTS

Since the commencing of the project in October 2009 to December 2011, hand hygiene compliance has increased by over 30%, MRSA rates have decreased 64% and C. difficile has decreased 41%. Since the removal of the washbasins in January of 2011, there have been no gastroenteritis outbreaks.



## For Successful Banning of Basins for Patient Care



▲ We need to provide alternatives for the other functions:

Current	New
Emesis	Emebags being installed in every adult and ped pt. room, ACU, PACU
Storage of patient items	Clear plastic "baggies" Trial of "Concierge List" to decrease waste of unused/unneeded products
Foot soaks	Shampoo caps, prepackaged
Shampoo patient's hair	Shampoo caps par'd on all units
24 hour urine, ice	Store some basins in lab to be dispensed with each 24 hour jug
Bath cloths with no insulation, cold halfway through bath	Bath cloths with insulation to stay warm longer

### Changing Bathing & Incontinence Management Impacts CAUTI's

#### A Pre implementation

- Daily bath with reusable basin & soap and tap water
- △ Incontinence cleaning, peri-spray, soap and tap water
- A New bathing & incontinence protocol
  - $\triangle$  Basins eliminated
  - △ Prepackage bathing & peri spray/prepackage cloths



#### 59% reduction



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2014 Catheter Days	1,210	1,211	1,063	1,276	999	1,056	1,095	1,121	1,146	1,105	1,076	987
# of CAUTI	2	3	0	3	4	1	2	2	0	2	0	3
2014 CAUTI Rate	1.7	2.5	0.0	2.4	4.0	0.9	1.8	1.8	0.0	1.8	0.0	3.0
2015 Catheter Days	916	710	961	697	714	681	886	822	540	883	866	1050
# of CAUTI	2	0	1	2	0	1	1	0	0	1	1	0
2015 CAUTI Rate	2.2	0.0	1.0	2.9	0.0	1.5	1.1	0.0	0.0	1.1	1.2	0.0

The removal of the basis has been shown to reduce risk feature for UTIel

#### ROI for 12-month intervention: \$33,234.00

Cineas N, Beswick R, Vezina M

Poster presented at the American Association of Critical-Care Nurses National Teaching Institute May 16-19, 2016

## Bathing with CHG Basinless Cloths

- A Prospective sequential group single arm clinical trial
- 1787 patients bathed
  - $\triangle$  Period 1: soap & water
  - △ Period 2: CHG basinless cloth bath\*
  - $\triangle$  Period 3: non-medicated basinless cloth bath





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

# Impact on VRE with 2% CHG Cloth Bathing



Donskey CJ, et al. American Journal of Infection Control 44 (2016) e17-e21 Veron MO et al. Archives Internal Med 2006;166:306-312



#### The Efficacy of Daily Bathing with Chlorhexidine for Reducing Healthcare-Associated Bloodstream Infections: A Meta-analysis

John C. O'Horo, MD;<sup>1</sup> Germana L. M. Silva, MD;<sup>2</sup> L. Silvia Munoz-Price, MD;<sup>3</sup> Nasia Safdar, MD, PhD<sup>4</sup>

	Experin	nental	Cont	rol		Odds Ratio	Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	M-H, Random, 95% CI
1.2.1 CHG Bathing							
Borer et al, 2007	2	1600	15	1923	3.3%	0.16 [0.04, 0.70]	· · · · · · · ·
Camus et al, 2005	6	1991	7	1961	5.3%	0.84 [0.28, 2.52]	
Climo et al, 2009	14	15472	41	15225	10.5%	0.34 [0.18, 0.62]	
Gould et al, 2007	171	6664	264	6899	17.1%	0.66 [0.54, 0.80]	+
Munoz-Price et al, 2009	29	7632	59	6210	13.1%	0.40 [0.25, 0.62]	-
Subtotal (95% CI)		33359		32218	49.3%	0.47 [0.31, 0.71]	•
Total events	222		386				
Heterogeneity: $Tau^2 = 0.1$	2; Chi2 =	11.07, 0	df = 4 (P)	= 0.03);	$1^2 = 64\%$		
Test for overall effect: Z =	3.53 (P =	= 0.0004	4)				
1.2.2 CHG Impregnated (	Cloths						
Bleasedale et al, 2007	9	2210	22	2119	8.2%	0.39 [0.18, 0.85]	
Dixon and Carver, 2010	8	3148	27	3346	8.0%	0.31 [0.14, 0.69]	
Evans et al, 2010	4	1785	15	1904	5.2%	0.28 [0.09, 0.85]	
Holder and Zellinger, 2009	2	2000	12	3333	3.3%	0.28 [0.06, 1.24]	
Montecalvo et al, 2010	27	13864	57	12603	12.8%	0.43 [0.27, 0.68]	
Popovich et al, 2009	2	5610	19	6728	3.4%	0.13 [0.03, 0.54]	2
Popovich et al, 2010	17	5799	19	7366	9.8%	1.14 [0.59, 2.19]	
Subtotal (95% CI)		34416		37399	50.7%	0.41 [0.25, 0.65]	◆
Total events	69		171				
Heterogeneity: $Tau^2 = 0.1$	9; Chi <sup>2</sup> =	12.80, 0	df = 6 (P	= 0.05);	$1^2 = 53\%$		
Test for overall effect: Z =	3.78 (P =	= 0.0002	2)				
Total (95% CI)		67775		69617	100.0%	0.44 [0.33, 0.59]	•
Total events	291		557				
Heterogeneity: $Tau^2 = 0.1$	3; Chi <sup>2</sup> =	26.12, 0	df = 11 (	P = 0.00	5); $I^2 = 5$	8%	
Test for overall effect: Z =	5.39 (P -	< 0.0000	)1)				5 0.01 0.1 1 10 100
Tast for subgroup differen	cos: Chi2	= 0.19	df = 1 (f	P = 0.66	$1^2 = 0\%$		ravois experimental ravois control

The Evidence: Impact of Antisepsis Bathing Evaluate effect of daily bathing with CHG on acquisition of MDRO's and incidence of CLABSI

#### 9ICU's & Bone Marrow Transplant unit Randomly assigned 7727 patient:

- a. No-rinse, Antisepsis washcloths
- b. Non-antimicrobial, no-rinse bath cloths

#### **Results of 2% CHG bathing**







### Impact of Antisepsis Baths

Study to determine the best method for reducing spread of MRSA & MDROs

#### **3 protocols tested:**

a)Swab for MRSA on admission to ICU
△ Isolate if positive
b)Swab for MRSA on admission to ICU
△ Isolate if positive
△ Nasal mucopiricin x 5 days
△ antisepsis bathing for entire ICU stay
c)No swab
△ Nasal mucopiricin x 5 days
△ Antisepsis bath for entire ICU stay

#### Results: No Swab Group Universal Decolonization Demonstrated





## Antisepsis vs. Routine Bathing to Prevent MDRO and CLABSI in General Medical & Surgical Units

- ▲ 53 hospitals in 14 states
- Compared routine bathing (nonmedicated disposable cloth or showering) to decolonization with universal chlorhexidine and targeted nasal mupirocin in noncritical-care units.
- 12-month baseline period, 2 month phase, 21 month intervention

Decolonization with universal chlorhexidine bathing and targeted mupirocin for MRSA carriers did not significantly reduce multidrug-resistant organisms in non-critical-care patients

Patients with medical devices had a 32% greater reduction in all cause bacteremia and a 37% greater reduction in MRSA or VRE clinical cultures compared with the routine care group

#### **CHG Bathing Process**



Figure 3. Agency for Healthcare Research Quality recommended 2% CHG bathing protocol. CHG indicates chlorhexidine gluconate. Adapted from printed guidelines.

\*2% CHG cloth for bathing is consider an off label use of the product.

#### CHG Bathing: Works Upstream



#### **Differential Effects of Antisepsis Skin Cleansing Methods**

Rhee Y, et al. Infect Control Hosp Epidemiol 2018;39:405-411

- Prospective, randomized 2center study with blinded assessment.
- To determine whether 3 different CHG skin cleansing methods yield similar residual CHG concentrations and bacterial densities on skin.



Method A- 2% CHG cloth Method B- 4% CHG liquid poured onto nonmedicated cloth Method C-4% CHG liquid on cotton wash cloth



#### Words of Wisdom for CHG bathing

- Application and training matters
- 🛕 It's not a topcoat
- Commonly missed areas
  - $\bigtriangleup$  The neck ,back of the knee ,between fingers and toes
- Leave on is better than rinsed off
- Avoid cotton material application
- Check compatibility with skin lotions
- Clean wounds and devices
- Clean the perineum
- Clean the face but not near the eyes/ears









#### **Skills Lab Ideas**



- A Hand hygiene demonstration with soap and water
- A Hand hygiene demonstration with alcohol based hand hygiene
- A Bathing with non medicated package bath
- A Bathing with CHG cloth





## The Why: CAUTI Incidence

- ▲ One of the most common healthcare acquired infections (HAIs)- nearly up to 40% of all HAIs<sup>1,2</sup>
- ▲ 70% urinary catheter associated HAIs; up to 95% in the intensive care setting<sup>2</sup>
- ▲ Approximately 20% of hospital patients have urinary catheter at some point in their stay<sup>3</sup>
- ▲ Specific patient impact<sup>4</sup>
  - $\triangle$  Discomfort r/t to mild signs of infection
  - △ Potential urethral trauma
  - △ Embarrassment
  - △ Pyelonephritis
  - △ Urosepsis leading to potential death

2021 CMS Threshold SIR .774

- ▲ For Every 1000 in-hospital CAUTI cases, there are 36 excess deaths<sup>4</sup>
- Catheter-Associated Urinary Tract Infections (CAUTI)<sup>4</sup>
  - $\triangle$  6 studies
  - △ Cost range: \$4,694–\$29,743
  - $\triangle$  Average: \$13,793

- 1. Magill et al NEJM 2014; APIC Guide to Prevention of CAUTI, 2014;
- 2. Chenoweth, C. et al. Infectious Disease Clinics of North America, 2014 28(1), pp.105-119.
- 3. Saint, S et al. *Clinical Infectious Diseases*, 2008 46(2), pp.243-250
- 4. Agency for Healthcare Research and Quality (2017). Retrieved from https://www.ahrq.gov/hai/pfp/haccost2017-results.html.


Isn't this a patient safety issue, not just CAUTI?

## Pathogenesis of CAUTI

- Source: colonic or perineal flora on hands of personnel
- Microbes enter the bladder via extraluminal {around the external surface} (proportion = 2/3) or intraluminal {inside the catheter} (1/3)
- Daily risk of bacteriuria with catheterization is 3% to 10%; by day 30 = 100%



#### Disrupting the Lifecycle of the Urinary Catheter





www.catheterout.org, (Adapted Meddings. Clin Infect Dis 2011)

**Before Placing an Indwelling Catheter** Please Consider if These Alternatives Would be Appropriate:

▲Bedside commode, urinal, or continence garments: to manage incontinence.

▲Bladder scanner: to assess and confirm urinary retention, prior to placing catheter to release urine.

**Straight catheter:** for one-time, intermittent, or chronic voiding needs.

**AExternal catheter:** appropriate for cooperative patients without urinary retention or obstruction.



#### Nurse Driven Removal Protocol: ER/ICU/OR & Floor

- Assessment of criteria for insertion
- Use of the bedside bladder ultrasound to assess urinary retention (reduce rates by 30-50%)<sup>1</sup>
  - $\bigtriangleup$  If minimal or no urine found in the bladder alternative strategies should be considered prior to catheterization
- Examine alternatives to indwelling catheters
  - △ Intermittent catheterization several times per day (post –op)
  - $\bigtriangleup$  External catheters for male patients or female patients without urinary retention or bladder outlet obstruction<sup>2</sup>
- A Prevalence evaluation to determine number of catheters versus the number of catheters that met criteria<sup>1</sup>

Saint S, et al. Clin Infect Dis. 2008;46(2):243-250,
 \*Saint S, et al. J am Geriatr Sco. 2006;54(7)1055-1061

### **Intermittent Catheterization Program**



#### **If retention is suspected pre or post catheter:** A If no voiding within 4-6 hours of assessment pre insertion or post removal, a bladder

- If no voiding within 4-6 hours of assessment pre insertion or post removal, a bladder scan ultrasound used
- Volume < 500mL, encourage the patient to void by using techniques to stimulate bladder reflex (cold water to abdomen, stroke inner thigh, run water, flush toilet)
- △ Continue to assess the patient and repeat the bladder scan in 2 hours if no voiding
- If the bladder volume > 500mL, and intake is less than 3 L a day-catheterize for residual urine volume rather than place an indwelling catheter
- ▲ If volumes are greater/catheter goes back in 24hrs

STOP CAUTI Sample Policy and Procedure <u>http://www.ucdenver.edu/academics/colleges/medicalschool/departments/</u> <u>medicine/hcpr/cauti/documents/Sample%20Policy%20and%20Procedures.pdf</u> University of Virginia Health System nurse driven intermittent cath program

#### iPCaRe: Evidence-Based Algorithms

#### **Continence** Care

J Wound Ostomy Continence Nurs. 2020;47(6):601-618. Published by Lippincott Williams & Wilkins

#### Interventions Post Catheter Removal (iPCaRe) in the Acute Care Setting

An Evidence- and Consensus-Based Algorithm

Mikel Gray 

Terrie Beeson

Dea Kent

Dianne Mackey

Laurie McNichol

Donna L. Thompson

Sandra Engberg



Image retrieved from https://www.wocn.org/blog/the-latest-decision-support-tool-from-wocn/.

#### Buried & Micro Penis







#### **Condom Catheter**



#### **Most common problems are:**

- Skin irritation and maceration
- Difficult to keep the condom from falling off/retraction of the penis or decrease size
- Ischemia and penile obstruction/tightness
- Adherence: required to secure on the shaft & adhesive mechanisms are challenging

#### New Male Devices: Overcoming the Challenges

- ▲ Adjusts to different sized penises △ No sizing chart required
- Prevents backflow with continuous suction
- Diverts urine away from the skin addressing the risk factors of IAD





# Alternative External Collection Devices for the Female Anatomy

#### A How do they work?

- △They are placed between the labia and the urethral opening
- $\bigtriangleup\ensuremath{\mathsf{The}}$  devices are attached to wall suction





#### CDC, SHEA, IDSA and NHS: Indications for Placement of Indwelling Catheter

A Perioperative use for selected surgical procedures

#### Urine output in critically ill patients

A Management of acute urinary retention and urinary obstruction

Assistance in pressure ulcer healing for incontinent patients

At a patient request to improve comfort(SHEA) or for comfort during end of life care (CDC)

How-to Guide: *Prevent Catheter-Associated Urinary Tract Infections*. Cambridge, MA: Institute for Healthcare Improvement; 2011. (Available at www.ihi.org).

## **Examples of Indications for Urinary Catheters**

	2009 HICPAC Guidelines <sup>1</sup>	American Nurses Association's Streamlined Evidence-Based RN Tool: CAUTI Prevention <sup>2</sup>	Ann Arbor Criteria for Appropriate Urinary Catheter Use in Hospitalized Medical Patients <sup>3</sup>
Example Indications	<ul> <li>Acute urinary retention/obstruction</li> <li>Perioperative use for selected surgeries</li> <li>To assist with healing of open wounds in incontinent patients</li> <li>End-of-life care</li> <li>Accurate measurement of urinary output in critically ill patients</li> </ul>	<ul> <li>Acute urinary retention/obstruction</li> <li>Perioperative use for selected surgeries</li> <li>To assist with healing of open wounds in incontinent patients</li> <li>End-of-life care</li> <li>Critically ill and need for accurate measurements of I&amp;O (e.g., hourly monitoring)</li> </ul>	<ul> <li>Indwelling catheters are appropriate for measuring and collecting urine only when fluid status or urine CANNOT be assessed by other means.</li> <li>Location in an ICU alone is NOT an appropriate indication.</li> <li>Criteria for 3 catheter types: indwelling, external and intermittent use catheters</li> </ul>
Comments	<ul> <li>Appropriate use in critically ill patients has varied interpretations</li> </ul>	<ul> <li>Helpful algorithm to make decisions</li> <li>Based on 2009 Guidelines</li> <li>Use in critically ill patients still ambiguous</li> </ul>	<ul> <li>Provides clarification to the 2009 guidelines on use for specific clinical scenarios</li> <li>Includes ICU Daily Checklist for indwelling catheter use</li> </ul>

- 2. <u>ANA: https://www.nursingworld.org/practice-policy/work-environment/health</u> safety/infection-prevention/ana-cauti-prevention-tool/
- 3. Meddings J, et al. Ann Intern Med. 2015 May 5;162(9 Suppl):S1-34.

#### Types Of Treatments Requiring Close UO Monitoring

Bolus fluid resuscitation

▲ Vasopressors

▲Inotropes

▲High dose diuretics

Hourly urine studies to measure life threatening laboratory abnormalities

Are you responding hourly to the patient's urine output??

# Reminder Systems Reduce Inpatient Catheter Use and Associated CAUTIs



# Stop Order 41% reduction



Meddings J et al. Clin Infect Dis, 2010;51:550-560

#### Factors That Affect Success of Reminders, Stop Orders and Nurse Driven Protocols

- ☆ Communication patterns and unit culture relative to urinary catheter use<sup>1</sup>
- A Nurse comfort with urinary catheter removal protocols<sup>1,2</sup>
- ▲ Right urine collection alternatives <sup>1,2</sup>
- ☆ Staff knowledge and skills <sup>1,2</sup>
- ▲ Respect among nurses and physicians <sup>1,2</sup>
- ▲ Ownership by frontline staff, local leadership and quality to review, remind, and reinforce using RCA's or learn from a defect <sup>1,2</sup>
- ▲ Information technology support for data collection<sup>1</sup>
- ▲ Feedback using data on catheter use<sup>1</sup>
- ▲ ICU team's recognition of the hazard of urinary catheters<sup>1,2</sup>



- 1. Meddings J, et al. BMJ Qual Saf. 2014 Apr;23:277-89.
- 2. Quinn M, et al Jt Comm J Qual Patient Saf. 2019 Dec 23.

## The Culture of Culturing





Asymptomatic bacteriuria" (ASB) is the condition of having a specified count of bacteria in an appropriately collected urine sample obtained from a person without clinical signs and symptoms of urinary tract infection.

- 1. Overuse of antibiotics that can potentially cause complications in the individual patient, including *C. difficile*
- 1. The provide a structure of the individual of the i
- Falsely inflates an organization's CAUTI rate as bacteremia is unnecessarily treated<sup>2</sup>
- 4. 23% to 50% antibiotic days for UTI are from ASB  $^2$ 
  - 1. Health Research & Educational Trust (2017). : 2017. Chicago, IL: Health Research & Educational Trust. Accessed at <u>www.hret-hiin.org</u>
  - 2. Garcia, R & Spitzer ED. American J of Infect. Control. 2017;45(10):1143-1153.

### Survey of Doctors and Nurses for Indications to Urine Culture

Order Indication	Physicians	Nurses
Appearance	23%	61%
Odor	42%	74%
Dysuria	54%	35%
Pan culture	38%	45%
UA > 100 WBCs/hpf	58%	43%

Advani SD, et al. Open Forum Infect Dis. 2019 Aug 1;6(8).

#### **Recommendations on Urine Culture Management**



- Establish a preculture strategy that directs efforts at how cultures are ordered rather than solely addressing issues after a UA or UC test is finalized:
  - △ Modify the electronic medical record to include appropriate and inappropriate indications for UAs/UCs that address patient symptomology
  - $\bigtriangleup$  Eliminate automatic orders in care plans where appropriate
  - △ Provide education for all clinicians who order UCs with emphasis on appropriate indications for UCs and UTI symptoms in catheterized and non-catheterized patients
  - $\bigtriangleup$  Carefully evaluate patients with fever and order UCs as appropriate
  - △ Reflex urine testing should be considered only if used in conjunction with careful clinical evaluation for signs and symptoms of UT



#### Modify Your EMR Ordering Process

Incorporated mandatory selection of standardized indications in EMR for ordering a UC in catheterized patients:

- $\triangle$  Suprapubic pain/tenderness
- $\triangle$  Acute gross hematuria
- $\triangle$  Costovertebral angle tenderness
- $\triangle$  New fever/rigors with clinical assessment negative for more likely etiology
- $\bigtriangleup$  Acute alteration of mental status with clinical assessment negative for more likely etiology
- $\bigtriangleup$  Alteration in medical condition with clinical assessment negative for more likely etiology in patient whom fever may not be a reliable sign
- $\triangle$  Increased spasticity or autonomic dysreflexia in patients with altered neurologic sensation

Lowers urine cultures and CAUTI rates

#### **Example:** St. Joseph Mercy Hospital Urine Culturing Tool

#### \*SHOULD THIS PATIENT BE EVALUATED FOR A URINARY TRACT INFECTION?

Does the patient have any of the following without alternate explanation?

- 1. Urgency, frequency, dysuria
- 2. Suprapubic pain/tenderness
- 3. Flank pain or tenderness
- 4. New onset delirium
- 5. Fever >38 C/Rigors
- 6. Acute hematuria
- 7. Increased spasticity or autonomic dysreflexia in a spinal cord injury patient
- 8.  $\geq$ 2 SIRS criteria (T > 38 C or < 35 C, HR > 90, RR >20 or PaCO2< 32 mmHg, WBC >12 K/mm<sup>3</sup> or <4 K/mm<sup>3</sup> or >10% bands) OR shock with concerns for sepsis



\*Symptom based screening is not reliable in the following cases: pregnancy, prior to urologic procedures, patients with complex urinary anatomy (i.e., nephrostomy tubes, urinary tract stents, h/o urinary diversion surgery in the past, or renal transplant), patients admitted to the ICU, or neutropenia. Use your clinical judgment for this population. Version date: 9/19/2012

#### EMPIRIC THERAPY BASED ON CLASSIFICATION OF URINARY TRACT INFECTION (UTI) Empiric choices should take into account recent previous cultures If urine culture is negative & patient was on antibiotics at the time of the culture & patient has symptoms (1-S on the reverse side) it may be appropriate to treat

PATIENT CATEGORY	PREFERRED	2 <sup>ND</sup> LINE	DURATION
ASYMPTOMATIC BACTERIURIA	Do not treat except in pregnancy, prior to urologic procedures, or neutropenia		
Defined as having NONE of symptoms 1-8 on the reverse side	Candiduria: Change catheter. Do not treat except prior to urologic procedures or in neutropenia		
UNCOMPLICATED LOWER TRACT UTI	TMP/SMX or Nitrofurantoin	Ciprofloxacin or Cephalexin	TMP/SMX x 3 days Nitrofurantoin x 5 days (contraindicated if CrCl <60 mL/min) Ciprofloxacin x 3 days Cephalexin x 7 days
COMPLICATED LOWER TRACT UTI Male, urinary catheter present or removal within the last 48 hrs., GU instrumentation, anatomic abnormality or obstruction, significant co-morbidites	Ceftriaxone or TMP/SMX or Cefepime (if risk for resistant gram negatives) or Piperacillin-tazobactam (if risk for resistant gram negatives and enterococcus)	Ciprofloxacin	7 days if prompt resolution 5 days if quinolone used 14 days if delayed response to therapy or bacteremia
SEPSIS WITH UTI, PYELONEPHRITIS, PERINEPHRIC ABSCESS	Ceftriaxone or Cefepime ((if critically ill, septic or recently hospitalized) or Piperacillin-tazobactam (if critically ill, septic or recently hospitalized and concern for enterococcus)	Severe PCN allergy Vancomycin PLUS Aztreonam	Sepsis: 10-14 days Sepsis: with gram negative bacteremia: IV antibiotics or step down to oral quinolone if susceptible Sepsis without bacteremia: Change to oral therapy when stable Uncomplicated pyelonephritis (i.e., healthy young female): Ciprofloxacin x 7 days TMP/SMX x 14 days Beta-lactams x 10-14 days
			Perinephric abscess: prolonged duration - consult ID and urology

Follow culture results and de-escalate therapy based on final results and sensitivities.

FOR EACH ANTIBIOTIC: DOCUMENT INDICATION AND PLANNED DURATION FOR ALL PATIENTS

## Collection & Transport to Reduce Contamination

▲If a catheter placed > 2 weeks, change the catheter before collecting a specimen<sup>1</sup>

▲Clamp tubing 12 inch below sample port allowing urine to fill the tube. Scrub the hub with antiseptic aspiration from the sampling port. Follow by unclamping of the tube.<sup>2</sup>

▲If specimen can't be transported and plated on culture medium within 2 hrs. of collection, then specimen should be refrigerated. <sup>3</sup>

▲To overcome logistic barriers: most use urine collection tubes with preservatives.<sup>3</sup>

- 1. www.apic.org/implementationguides April 2014,
- 2. Lo E, et al. Infect Contr & Hosp Epidemiol. 2014;35(5):464-479
- Garcia, R & Spitzer ED. American J of Infect. Control. 2017;45(10):1143-1153

#### On Transfer

## What devices can be removed before the patient is transferred to a different level of care?



### **Core Recommendations**

- ▲ Insert catheters only for appropriate indications (1B)
- ▲ Leave catheters in only as long as needed (1B)
- ▲ Ensure that only properly trained persons insert and maintain catheters (1B)
- Insert catheters using aseptic technique and sterile equipment (1C)
- ▲ Consider use of alternatives (II)
- ▲ Maintain a close drainage system (1B)
- ▲ Secure the system (1B)
- ▲ Maintain unobstructed urine flow (1B)
- ▲ Key the collecting bag below the level of the bladder at all times (1B)
- ▲ Unresolved:
  - Antiseptic or sterile saline for meatal cleaning before insertion



#### **Securement Devices**













#### Skill Lab Ideas

- Case scenario that requires assessment with bladder scanner, review of protocol, choice of external catheter or internal catheter
- A Placement of external catheters
- A Placement of sterile indwelling catheter



## Central Line -Associated Blood Stream Infections

#### Blood Stream Infection (BSI) Prevention Bundle

- Remove/Avoid unnecessary lines
- \Lambda Hand hygiene
- \Lambda Maximal barrier
- Chlorhexidine for skin prep
- \Lambda Avoid femoral lines

984 Adult ICUs in 632 hospitals: Bundle compliance on all 5 elements > 95% greatest reduction (33% ↓) Bundle compliance of 1 element > 95 % second best reduction Bundle compliance < 75% no change in rates seen</pre>

Furuya EY, et al. Infect Control Hosp Epidemiol, 2016;37:805-810



The Right Catheter for the Right Length of Time for the Right Infusate

#### Magic Guidelines: Peripherally Compatible Infusate

	Proposed Duration of Infusion				
Device Type	≤5 d	6–14 d	15–30 d	≥31 d	
Peripheral IV catheter	No preference between peripheral IV and US-guided peripheral IV catheters for use ≤5 d				
US-guided peripheral IV catheter	US-guided peripheral IV catheter preferred to peripheral IV catheter if proposed duration is 6–14 d				
Nontunneled/acute central venous catheter	Central venous catheter preferred in critically ill patients or if hemodynamic monitoring is needed for 6–14 d				
Midline catheter	Midline catheter preferred to PICC if proposed duration is ≤14 d				
PICC		PICC preferred to midline catheter if proposed duration of infusion is $\ge$ 15 d			
Tunneled catheter				PICC preferred to tunneled catheter and ports for	
Port				infusion 15–30 d	

Inappropriate

DIsagreement

Neutral

Appropriate

2015;suppl

Chopra V, et al. Annals of Internal Medicine.

#### Magic Guidelines: Peripherally Incompatible Infusate

	Proposed Duration of Infusion			
Device Type	≤5 d	6–14 d	15–30 d	≥31 d
Peripheral IV catheter				
US-guided peripheral IV catheter				
Nontunneled/acute central venous catheter	Central venous catheter preferred in critically ill patients or if hemodynamic monitoring is needed for 6–14 d			
Midline catheter				
PICC		PICCs rated as appropriate at all proposed durations of infusion		
Tunneled catheter		Tunneled catheter neutral for for use ≥15 d No preference between tunneled catheter and PICC for proposed durations ≥15 d		
Port				No preference among port, tunneled catheter, or PICC for ≥31 d



Chopra V, et al. Annals of Internal Medicine. 2015;suppl



Appropriate

Neutral

Inappropriate

DIsagreement





Berenholtz SM, et al, Crit Care Med 2004 Oct;32(10):2014-20

#### **Beyond the Bundle**

CHG Dressings/Dressing Integrity/Site Securement

▲Bathing

▲Accessing the site

Antimicrobial impregnated CVC & PICCs

▲ Appropriate nursing staff levels in ICUs

Health Research & Educational Trust (2017). *Central Line-Associated Bloodstream Infections (CLABSI) Change Package: 2017 Update.* Chicago, IL: Health Research & Educational Trust. Accessed at www.hrethiin.org

#### **Dressing Disruption: A Major Risk Factor for Catheter-Related Infections**

- Secondary analysis of an RCT
- ▲ 1,419 patients (3,275 arterial or central venous catheters)
- ▲ 296-Colonize catheters, 29 major catheter related infections and 23 CLA-BSI
- ▲ 11,036, dressing changes and 7,347 (67%) were performed before the planned date



Distribution of disruption rate

#### Impact of Dressing Disruption

- ▲ Dressing cost inversely related to rate of disruption
- ▲ Number of dressing disruptions r/t ↑ risk for colonization of the skin aroun the catheter at removal (p< .0001)</p>
- ▲ Risk of infection increased threefold after 2nd dressing disruption
- A Risk of infection increased 10 fold when the final dressing was disrupted independently of other risk factors of infection

Percentage of dressing disruption: 3/5 dressings= 60%




# RCT of CHG Dressing & Highly Adherent Dressing or ERI

- A RCT in 12 French ICUs in patient with a central line expected to be in longer than 48hrs
- Compared 3 types of dressings
  - $\triangle$  CHG transparent film (3M)
  - △ Tegaderm HP (? Highly adherent)
  - $\triangle$  Tegaderm transparent film
- All dressing changed at 24hrs, then every 3 or 7 days based on unit practice or if soiled
- Catheter insertion followed EBP
- ▲ Measured: CRI, skin colonization, CLA-BSIs

### RCT of CHG Dressing & Highly Adherent Dressing on CRI

Results

 $\triangle$ 4,163 catheters with 34,339 catheter days

- $\triangle$  Infection Data CHG Dressing:
  - CHG dressing rate major CLA-BSIs 2.3 vs. 0.9 per 1,000 catheter days & fewer CLA-BSIs and colonized catheters
- $\triangle$  Dressing change data:
  - 14,019 dressing changes, 30.7% intact, 29.9% detached, 27% soiled, and 12.5% detached and soiled
  - Earlier dressing changes more common at IJ and Femoral sites
- $\triangle$  Highly Adhesive Non CHG vs. Standard Dressing
  - Median # of dressing changes significantly lower in adhesive group: .33 vs. standard at .36 (p <0.0001)</li>
  - Catheter colonization significantly higher in adhesive group (day 9)

### Durability and Costs of Different CVC Dressings

- ▲ Dressing duration was captured prospectively on four different dressings on five critical care units over a 12-month period
- ▲ 590 CVCs with 1,229 dressing changes
- ▲ Staff received training on evidence-based CVC dressing practices and a 'how to guide' was implemented

Phase	Months	CVC dressing evaluated	Other securement techniques	
One	_4	Standard dressings: sterile, transparent, semi-permeable polyurethane dressings (Opsite IV 3000 and 3M Tegaderm®)	None	
Two	5–8	3M Tegaderm® IV Advanced: sterile, transparent, semi-permeable polyurethane dressings	Dressing with an integrated border around the dressing. Separate Hyperfix® border applied to create a further secure 'window' around the edge of the dressing	
Three	9–12	Sorbaview®: sterile, transparent, semi- permeable polyurethane dressings	Integrated two piece dressing, one part for the site with a wide border and second part with a wide supporting bridge	Richardson A, et al. J of Infection Control. 2015;16(6):256-261

#### Durability and Costs of Different CVC Dressings: Results Figure 1. Reasons for dressing removal, all CVC (n=590).

- 3-4 dressings lasted < 48hr, 1 dressing a mean of 68hrs
- Mean time to change the dressing:13.5 min
- Cost range: \$2.85 to \$7.20
- Only 3% lasted 7 days

	Dressings removed for any reason, n=1229			Dressings removed for non-adherence, clamn or bleeding under dressing n=630		
Dressing Type	Number of dressings observed	Dressing duration (hrs) median [IQR]	z value*	Number of dressings observed	Dressing duration (hrs) median [IQR]	z value**
Opsite IV 3000	310	43.5 [21–78]	-1.79	160	36.0 [15-67.5]	-1.21
Tegaderm	237	46.0 [22–85]	-0.33	122	45.5 [22-73.8]	1.17
IV Advanced	262	40.5 [20-85]	-1.12	143	32.0 [14-69.5]	-1.98
Sorbaview	116	68.5 [32–105]	4.51	42	53.0 [30-95]	3.39
Unrecorded	304			163		



Richardson A, et al. J of Infection Control. 2015;16(6):256-261

IQR, inter quartile range; \*P < 0.001 and \*\*P = 0.002 for at least one difference between dressings.

#### Human Factor Engineering of Central Line Maintenance

10 fold decrease

- 29 month prospective
- \land 95 nurses, 151 patients
- 126 observation pre compared with 90 post intervention procedures (kit use)

#### ▲Results

- $\triangle$  Pre CLABSI:2.21/1,000 cath days  $\triangle$  Post CLABSI:0/1,000 cath days
- △ Practice Adherence: Better aseptic technique, better CHG scrub, hand sanitization & disinfecting hub
- $\triangle$  Procedure omission  $\downarrow$  by 44%





Drews FA, et al. American Journal of Infect Control. 2017;45:1224-30

#### **Beyond the Bundle**

CHG Dressings/Dressing Integrity/Site Securement

▲Bathing

▲Accessing the site

Antimicrobial impregnated CVC & PICCs

▲ Appropriate nursing staff levels in ICUs

Health Research & Educational Trust (2017). *Central Line-Associated Bloodstream Infections (CLABSI) Change Package: 2017 Update.* Chicago, IL: Health Research & Educational Trust. Accessed at www.hrethiin.org

#### Passive Disinfection: Meta-Analysis

▲ To compare the effects of antiseptic barrier cap use and manual disinfection on the incidence of CLABSIs

#### \Lambda Outcome

- △ Reduction in CLABSIs per 1,000 catheter-days
- △ Studies were included if 1) conducted in a hospital setting, 2) used antiseptic barrier caps on hubs of central lines with access to the bloodstream, and 3) reported the number of CLABSIs per 1,000 catheter-days when using the barrier cap and when using manual disinfection
- $\bigtriangleup\,$  7 were included in the random effects meta-analysis







Voor in t Holt AF, et al. International Journal of Nursing Studies 69 (2017) 34-40

#### 01-CHSS Blue Plus-Antimicrobial Impregnated

02-Silver Impregnated-Antimicrobial Impregnated

03-Minocycline-Rifampin-Antibiotic

04-Miconazole & Rifampicin -Antibiotic

05-Benzalkonium Chloride Impregnated-Antimicrobial Impregnated

06-CHSS-Antimicrobial coated

Study	Treatment	Control	Peto OR	Weight	Peto OR
or sub-category	n/N	n/N	95% CI	%	95% CI

01 CHSS Blue Plus - Antimicrobial Impregnate Brun-Buisson 2004 - 2/188

Abeger, 201 Ostendorf, Rupp. 2001 Sama, 201

Subtotal (98 Use a chlorhexidine/silver sulfadiazine or Total events Test for hetc Test for over minocycline/rifampin -impregnated CVC in patients 02 Silver in Boswald, Stoiser, 20 whose catheter is expected to remain in place >5 days Bong. 2003 Corral, 200 Moretti, 200 Kalfon, 200 if, after successful implementation of a comprehensive Subtotal (90 Total events Test for hete Test for over strategy to reduce rates of CLABSI, the CLABSI rate is 03 Minocyd Raad, 1997 Marik B. 19 not decreasing.  $(IA)^2$ Chatsinikol Hanna, 200

Leon, 2004						
Subtotal (95% Cl)	603	593	•	20.97	0.26 [0.15, 0.47]	
Total events:9 (Treatment), 39 (C)	ontrol)					
Test for heterogeneity: Chi <sup>p</sup> = 3.69	9.df=4 (P=0.45), I*:	-0%				
Test for overall effect: Z = 4.52 (P -	< 0.00001)					
Of Manageria and Diamolda A	- Mile Mile					
V2eel 2004	nabicac	1 / 1 / 2		0.45	A 10 10 00 6 000	
Rubbel /05% CB	0/118	1/105		0.45	0.12 [0.00, 6.07]	
Total master ( (Teastmant) 1 (Cor	-++0	103		0.40	0.12 [0.00, 0.03]	
Total events: 0 (Treatment), 1 (50	nuor)					
Test for neterogeneity: not applica	0.000					
Test for overall effect: 2 = 1.06 (P	= 0.29)					
05 Benzalkonium Chloride Impres	gnated - Antimicrobia	I impregnated				
Jaeger, 2001	1/25	1/25	<del></del>	0.89	1.00 [0.06, 16.45]	
Subtotal (95% Cl)	25	25		0.89	1.00 [0.06, 16.45]	
Total events: 1 (Treatment), 1 (Con	ntrol)					
Test for heterogeneity: not applica	olde					
Test for overall effect: Z = 0.00 (P =	= 1.00)					
07 CHSS - Antimicrobial Coated						
Bach, 1996b	0/116	3/117		1.35	0.13 [0.01, 1.30]	
Pemberton, 1996	2/32	3/40		2.12	0.83 [0.13, 5.08]	
Logghe, 1997	17/338	15/342	+	13.91	1.15 [0.57, 2.35]	
Maki, 1997	2/208	9/195		4.88	0.25 [0.08, 0.84]	
Tennenberg, 1997	5/137	9/145		6.07	0.58 [0.20, 1.70]	
Colin, 1999	1/98	4/139		2.17	0.41 [0.07, 2.46]	
Hannan, 1999	1/174	3/177		1.81	0.37 [0.05, 2.66]	
Marik A, 1999	1/36	2/39		1.33	0.55 [0.06, 5.43]	
Sheng, 2000	1/113	2/122		1.35	0.55 [0.06, 5.36]	
Subtotal (95% Cl)	1252	1316	•	34.99	0.62 [0.40, 0.98]	
Total events: 30 (Treatment), 50 (k	Control)					
Test for heterogeneity: ChiP = 7.43	3.df=8 (P=0.49).I*:	= 0%				
Test for overall effect: Z = 2.06 (P =	= 0.04)					
Total (95% Cl)	3696	3728	*	100.00	0.49 [0.37, 0.64]	
Total events: 75 (Treatment), 155	(Control)		•			
Test for heterogeneity: Chill = 28.7	8, df = 26 (P = 0.32).	I*=9.7%				
Test for overall effect: Z = 5.32 (P	< 0.00001)					
	· · · · · · · · · · · ·			100 1000		
		0	001 0.01 0.1 1 10	100 1000		

Favours treatment Favours control

1

2. Grady NP, et al. CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011. www.cdc.gov

# <u>% CI)</u>

#### Antimicrobial PICC vs. PICC

- ▲ 597 citations, 8 studies
- ▲ 12,879 patients
- ▲ Studies included adult and pediatric patients from ICU, LTAC, and general ward settings
- \Lambda Results
  - △ incidence of CLABSI in patients with antimicrobial PICCs was 0.2% (95% confidence interval [CI], 0.0%-0.5%) vs. nonantimicrobial catheters was 5.3% (95% CI, 2.6%-8.8%) p=0.022



#### Skill Lab Ideas

- Case base scenario on indications for placement, physicians wanting to place in the femoral discussion, role of the nurse during placement
- Central line dressing change
- ▲ Accessing central line ports



# WHEN WOULD NOW BE A GOOD TIME TO DO THIS?

It is not enough to do your best; you must know what to do, and THEN do your best. ~ W. Edwards Deming

# Preventing NV-HAP & VAP Through Fundamental Nursing Care



#### Build the Will: NV-HAP Causes Harm

- ▲ HAP 1st most common HAI in U.S.<sup>1,2</sup>
- ▲ 1 in every 4 hospital infections are pneumonia<sup>1</sup>
  - $\triangle$  60% non-ventilator
- △ Increased mortality  $\rightarrow$  15.5%-30.9%<sup>3</sup>
  - $\triangle$  8 ½ x more likely to die than equally sick patients who did not get non-vent HAP<sup>4</sup>
- $\land$  Increased morbidity  $\rightarrow$  50% are not discharged home<sup>5,6,7</sup>
  - $\triangle$  Extended LOS  $\rightarrow$  7-9 days<sup>5,6,7</sup>
  - $\triangle$  Increased Cost  $\rightarrow$  \$36K to \$54K per case<sup>6</sup>
  - $\triangle$  2x likely for readmission <30 day<sup>5,6</sup>
  - $\triangle$  46%  $\uparrow$  ICU utilization<sup>5,6</sup>
  - $\bigtriangleup$  Increase antibiotic utilization  $^8$

- 1. Magill SS, et al. NEJM 2018;379:1732-1744
- 2. Strassle PD, et al. Infect Control Hosp Epidemiol. 2020 Jan;41(1):73-79.
- 3. Giuliano K, et al. Am J of Infect Control. 2018;46:322-327
- 4. Micek ST, et al. Chest. 2016 Nov;150(5):1008-1014.
- 5. Baker D, Quinn B et al. J Nurs Care Qual, 2019 1-7
- 6. Giuliano K, et al. Am J of Infect Control. 2018;46:322-327
- 7. Davis J et al. Pa Patient Safety Advisory, 2018;15(3)
- 8. Lacerna CC, et al. Infec control & Hosp Epidemiology 2020;41, 547-552



# **Risk Factors for Pneumonia In Hospital**





Quinn & Baker. (2014). *J Nsg Scholarship*, 46(1), 11-19. Slide courtesy of Barb Quinn

# Risk Factor Categories for Hospital Acquired Pneumonia

Factors that increase bacterial burden or colonization

Factors that increase risk of aspiration





# Single Ecosystem

- Entire respiratory tract is one ecosystem<sup>1</sup>
  - △ Upper-nasal and oral cavities
  - △ Lower-alveoli
- ▲ Not sterile environment<sup>1</sup>
- Oral flora changes in hospitalized patients<sup>2</sup>
- A Relationship between dental plaque and pulmonary lavage fluid<sup>3</sup>



<sup>1.</sup> Huffnagle GB, et al. Mucosal Immunol. 2017 Mar;10(2):299-306

<sup>2.</sup> Johanson WG, et al. N Engl J Med. 1969 Nov 20;281(21):1137-40

<sup>3.</sup> Heo SM, et al. Clin Infect Dis. 2008 Dec 15;47(12):1562-70.

# Where does Pneumonia Start: Oral Bacteria during Hospitalization & Illness

#### ▲ Oral cavity<sup>1</sup>

- $\triangle$  > 1 billion oral microbes
- △ 700-1000 species
- $\triangle$  Replicate's 5 x in 24hr period
- **bisruption of Microbiome**<sup>2</sup>
  - △ Plaque, gingivitis, tooth decay
  - △ Reduced salivary flow/change in pH
- ▲ 24-48 hours for HAP pathogens in mouth<sup>3</sup>
- If aspirated =100,000,000 bacteria/ml saliva into lungs<sup>4</sup>



- 1. <u>http://helios.bto.ed.ac.uk/bto/microbes/biofilm.htm/https:/</u>/www.rdhmag.com/infection-control/water-safety/article/16404976/oral-bacteria-how-many-how-fast
- 2. Lee A, et al. J Periodontol. 2012 Jan;83(1):79-89.
- 3. Scannapieco FA, et al. Crit Care Med. 1992 Jun;20(6):740-5.
- 4. Langmore SE, et al. Dysphagia. 1998 Spring;13(2):69-81

# **Oral Cavity & VAP**

- ▲ 89 critically ill patients<sup>1</sup>
- Examined microbial colonization of the oropharynx through out ICU stay
- Used pulse field gel electrophoresis to compare chromosomal DNA
- ▲ Results:
  - $\triangle$  Diagnosed 31 VAPs
  - 28 of 31 VAPs the causative organism
     was identical via DNA analysis



- 49 elderly nursing home residents admitted to the hospital<sup>2</sup>
- Examined baseline dental plaque scores & microorganism within dental plaque
- Used pulse field gel electrophoresis to compare chromosomal DNA
- \Lambda Results
  - △ 14/49 adults developed pneumonia
  - △ 9 of 14 pneumonias, the causative organism was identical via DNA analysis

2. El-Solh AA, Chest. 2004;126(5):1575-1582.

<sup>1.</sup> Garrouste-Orgeas et. al. Am J Respir Crit Care Med. 1997;156:1647-1655

## Micro Aspiration during Sleep in Healthy Subjects

- A Prospective duplicate full-night studies
- ▲ 10 normal male's 22-55 years of age
- ▲ Methods:
  - Radioactive 99 mTc tracer inserted into the nasopharynx
  - Lung scans following final awakening
  - No difference in sleep efficacy between 2 study nights
- ▲ Results:



In the lung parenchyma



## 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





# Body Position: Supine versus Semi-recumbent

#### **Results:**

- A Radioactive contents higher in endobronchial secretions in supine patients
- ▲ Time dependent:
  - Supine: 298cpm/30min vs.
     2592cpm/300min
  - HOB: 103cpm/30min vs.
     216cpm/300min



Same microbes cultured in all 3 areas

- HOB: 32%
- Supine: 68%

# Stewardship of Stress Ulcer Prophylaxis (SUP)

- A The most common complication of SUP is pneumonia
- ICU enteral fed patients
  - $\triangle$  no benefit & may increase risk for pneumonia (Huang study)
  - △ Avoid unnecessary use
- Acute Stroke patients (Systematic Review & Meta-Analysis)
  - △ Acid suppressive medications are an important contributor to pneumonia development, especially PPIs
- May lead to loss of protective bacteriostatic effect of gastric acid
- A Higher risk of Clostridium difficile infection when combined with antibiotics







#### SUP: Impact on Bleeding Risk

Comparison		Odds Ratio (95% CI)
H2RA vs Placebo Direct Indirect Network		0.53 (0.23, 1.19) 1.36 (0.29, 6.51) 0.64 (0.32, 1.30)
PPI vs H2RA Direct Indirect Network	▶ - <b>8</b> - 1 ▶ - <b>8</b> - 1 ▶ - <b>8</b> - 1	0.35 (0.18, 0.69) 0.86 (0.11, 7.02) 0.38 (0.20, 0.73)
H2RA vs Sucralfate Direct Indirect Network	▶₩	0.86 (0.48, 1.55) 0.32 (0.04, 2.67) 0.80 (0.46, 1.40)
PPI vs Placebo Direct Indirect Network		0.66 (0.12, 3.74) 0.17 (0.06, 0.49) 0.24 (0.10, 0.60)
Sucralfate vs Placebo Direct Indirect Network		1.15 (0.41, 3.23) 0.48 (0.14, 1.64) 0.80 (0.37, 1.73)
PPI vs Sucraifate Direct Indirect Network		0.23 (0.02, 2.30) 0.32 (0.13, 0.76) 0.30 (0.13, 0.69)
	0.01 0.05 0.1 0.5 1 5	

Alhazzani W, et al. Intensive Care Med (2018) 44:1–11

#### SUP: Impact on Risk of Pneumonia

Comparison		Odds Ratio (95% CI)
H2RA vs Placebo Direct Indirect Network		1.09 (0.70, 1.71) 1.94 (0.73, 5.20) 1.19 (0.80, 1.78)
PPI vs H2RA Direct Indirect Network	┝ <u></u> ┝ <u></u> ┝ ┣ ■ ■	1.15 (0.85, 1.57) 2.10 (1.04, 4.21) 1.27 (0.96, 1.68)
H2RA vs Sucralfate Direct Indirect Network	▶ <b>▶ - 8 - 1</b> ▶ - <b>8 - 1</b> ▶ - <b>8 - 1</b>	1.32 (0.98, 1.77) 1.35 (0.64, 2.86) 1.30 (1.08, 1.58)
PPI vs Placebo Direct Indirect Network	P	1.48 (0.55, 3.99) 1.53 (0.90, 2.59) 1.52 (0.95, 2.42)
Placebo vs Sucralfate Direct Indirect Network		0.67 (0.34, 1.32) 1.54 (0.84, 2.80) 1.09 (0.72, 1.66)
PPI vs Sucralifate Direct Indirect Network		2.16 (1.24, 3.77) 1.44 (0.97, 2.14) 1.65 (1.20, 2.27)
	0.5 1 5	_

Alhazzani W, et al. Intensive Care Med (2018) 44:1–11



Treat patients at high risk of stress bleed?

Huang HB, e tal. Crit Care. 2018;22:20 This Photo by Unknown Author is licensed under <u>CC BY-SA</u>



Receiving EN, pharmacologic SUP offered no beneficial effect GI bleeding and other clinically important outcomes.

# Weak Host: Who is at Highest Risk?

#### \Lambda Male

\Lambda Elderly

#### \Lambda Surgical

💪 ICU

\Lambda Chronic disease

ightarrow DM, CHF, CKD, COPD, alcoholism

Immunocompromised
More than 6 medications
Low albumin
On antibiotics
Dependent for ADLs
Smokers



Slide courtesy of Barb Quinn

#### NV-HAP SMCS Research Findings: 2010

#### Incidence:

- \Lambda 115 adults
- 🛕 62% non-ICU
- \land 50% surgical
- \land Average age 66
- Common comorbidities:
  - CAD, COPD, DM, GERD
- Common Risk Factors:
  - Dependent for ADLs (80%)
  - CNS depressant meds (79%)

#### 24,482 patients and 94,247 pt days

#### Cost:

- ▲ \$4.6 million
- ▲ 23 deaths
- ▲ Mean Extended LOS 9 days
- ▲ 1,035 extra days



#### **SMCS HAP Prevention Plan**

#### Phase 1: Oral Care

- Formation of new quality team: Hospital-Acquired Pneumonia Prevention Initiative (HAPPI)
- A New oral care protocol to include non-ventilated patients
- A New oral care products and equipment for all patients
- Staff education and in-services on products
- A Ongoing monitoring and measurement
  - $\triangle$  Monthly audits







#### **Consider Oral Assessment**

#### **Oral Health Assessment**

	1 (normal)	2 (mild)	3 (moderate)	4 (severe)
Lips, Tongue, Gums and Palate	Normal- smooth, pink, moist, intact	Mild-slightly dry, one or two isolated reddened areas or blisters.	Dry and somewhat swollen, generalized redness, one or two isolated lesions or blisters, cracked lips and/or tongue, caked secretions.	Extremely dry and edematous, significantly inflamed, coating or caked secretions, multiple blisters or ulcers.
Teeth	Clean, no debris, or no teeth	Minimal debris, mostly between teeth	Moderate debris clinging to half of visible enamel	Covered with debris
Saliva, Secretions, Vocal Quality	Thin, watery, plentiful. Normal amount of secretions and normal voice.	Mildly increased secretions. Hoarse or soft voice, wet vocal quality cleared with spontaneous swallow.	Moderate secretions requiring suction. Hoarse, soft and/or wet gurgly voice that clears with suction.	Copious secretions requiring suction. Hoarse, soft voice with wet gurgly vocal quality, and still wet after suctioning.
Swallowing	Regular diet	Modified diet	Difficulty swallowing	Unable to swallow, NPO due to aspiration risk
Level of Dependence	Able to do own mouth care	Minimal assistance	Moderate assistance	Dependent on oral care
Level of Consciousness	Alert	Minimal decline in mental status or level of alertness	Moderate decline in mental status or level of alertness	Comatose, sedated, unresponsive

Total Oral Care Score	Risk Category	Supplies	Oral Care Frequency
6	Self Care	Toothbrush, toothpaste, oral rinse	Daily or as needed
7-11	Mild	Toothbrush, toothpaste, oral rinse, mouth moisturizer	2-3x/day, ideally after a meal
12-24	Moderate-Severe	Non-Vent : Suction Swab and Toothbrush System	4x/day
	Severe	Ventilator: Oral Cleaning and Suctioning System	6x/day

Hartford tool

## Protocol – Plain & Simple

Patient Type	Tools	Procedure	Frequency
Self Care / Assist	<ul> <li>Brush, paste, rinse, moisturizer</li> <li>Soft-bristled toothbrush</li> <li>Toothpaste with dentifrice</li> <li>Antiseptic mouth rinse (alcohol-free)</li> <li>Moisturizer (Petroleum-free)</li> </ul>	Provide tools Brush 1-2 minutes Rinse	4X / day
Dependent / Aspiration Risk	Suction toothbrush kit (4)	Package instructions	4X / day
Dependent / Vent	<ul><li>ICU Suction toothbrush kit (6)</li><li>CHG for vent &amp; cardiac surgery patients</li></ul>	Package instructions	6X / day
Dentures	Denture cup, brush Cleanser Adhesive	Remove dentures & soak Brush gums, mouth Rinse	4X / day

# NV-HAP Incidence 50 % Decrease from Baseline



#### Open Heart Surgery Patients: NV-HAP Reduced 75%



#### Return on Investment

- ▲ 60 NV-HAP avoided Jan 1 Dec. 31 2013
- \$2,400,000 cost avoided
- <u>- 117,600</u> cost increase for supplies
- \$2,282,400 return on investment

# 8 lives saved

# PRICELESS



### NV-HAP $\downarrow$ 70% from baseline!



Post-Operative NV-HAP (all adult inpatient surgery) Incidence 6 months Pre-Oral Care vs. 6 Months After


# Sustainability Hospital Wide Oral Care from .25 to 2.89 (almost 3x a day)

Figure 1: Statistical process control R and X-bar-charts: International Statistical Classification of Diseases and Related Health Problems (ICD) codes (3 standard deviations)



Baker, Quinn, Ewan, Giuliano (2018) Sustaining quality improvement: LT reduction of NVHAP. J Nurs Care Qual, 1-7.

# American Dental Association Approved Oral Care for Acute Care Setting

Oral care type	Tools	Procedure	Frequency
Self/assist (may require setup)	Soft-bristled toothbrush, toothpaste with fluoride, sodium bicarbonate (optional), alcohol-free antiseptic mouth rinse, mouth and lip moisturizer (nonpetroleum-based)	Brush for 1-2 min with toothpaste, rinse with anti- septic; moisturize as needed.	2-4 times/d
Dependent/aspiration risk/nonventilated	Soft-bristled suction toothbrush, cleansing and alcohol-free antiseptic solution, mouth and lip moisturizer (nonpetroleum-based)	Brush with suction for 1-2 minutes using liquid cleansing/antiseptic solution; moisturize as needed.	2-4 times/d
Dependent/ventilated	Soft-bristled or swab suction toothbrush, cleansing and alcohol-free antiseptic solution, mouth and lip moisturizer (nonpetroleum-based)	Brush/swab with suction for 1-2 min using liquid cleansing/antiseptic solution; moisturize as needed. Optional: Brush/swab with suction 1 min with chlorhexidine 0.12%	About every 4 h or 6 times/d Optional: Chlorhexidine 0.12% every 12 h
Dentures or edentulate (not caps)	Denture storage cup, denture brush, denture cleanser adhesive (optional)	Remove and brush/rinse dentures; brush gums and mouth; may soak dentures at night with com- mercial cleanser.	2 times/d Remove dentures while patient is sleeping

Quinn B, et al. Am J Infect Control. 2020;48(5S):A23-A27.

Outcomes: From the Beginning to 2014

- A Between May 2012 and December 2014
- ▲ Sutter Medical Center avoided 164 cases of NV-HAP:
  - $\triangle$  \$5.9 million
  - $\triangle$  **31 lives**
  - $\bigtriangleup\,$  656-1476 extra days in the hospital



# Nurse Driven Oral Care Protocol to Improve NV-HAP

- A QI project, 650 bed level 1 trauma center
- Data measure retrospectively/prospectively using ICD 9
   & 10 codes not POA for NV-HAP and VAP
- A 7 months baseline, 7 months intervention
- ▲ Method:
  - $\bigtriangleup$  Evaluated current practice, the literature and oral care supplies
  - △ Pilot program with new oral care protocols/supplies for self care, assisted oral care and ventilator oral care
  - $\triangle$  Expanded to whole hospital post pilot area



# Results

Staff adherence to protocol 76% (36%-100%)

## \Lambda NV-HAP

- △ Baseline: 202 charts/52 NV-HAP's-20 deaths
- △ Post: 215 charts/26 NV-HAP's (p< 0.0001)-4 deaths

### 💪 VAP

- △ Baseline: 56 VAE's/ 12 VAP's (2.87 per 1000 vent days)
- △ Post: 49 VAE's/3 VAP's (1.26 per 1000 vent days

50% reduction in NV-HAP, avoided 16 deaths & 1.4 million dollars

#### Figure 2. Patient Education Information Sheet

#### A Healthy Mouth Is Important for Your Health

Your mouth has more than 700 types of germs, some of which can lead to pneumonia. One of the best ways to reduce the risk of pneumonia in the hospital is by taking care of your mouth. This includes brushing your teeth, using a mouth rinse and making sure your mouth doesn't get too dry.



After you get out of the hospital, it's important to continue to take care of your mouth by brushing your teeth two times a day for two minutes, flossing at least one time a day and visiting your dentist regularly. For more information on oral health, go to: www.deltadentalmi.com

Sparrow Health System and Delta Dental of Michigan have partnerd to make sure you have the tools you need to help prevent pneumonia. They include: a soft toothbrush and/or oral swabs, an antiseptic mouth rinse, a baking soda toothpaste and mouth moisturizer.

At Sparrow, there are three types of oral care kits available:

#### Short-term Oral Care Kit At-risk Oral Care Kit

#### Use this kit if you can:

Swallow without difficulty
 Spit without difficulty
Recommended for use <u>at least four</u>
<u>times per day</u>, including after meals
and at bettime.

Use this kit if you can: • Trouble swallowing • Difficulty spitting • Recent stroke • Tracheostomy without a ventilator

Recommended for use <u>at least four times</u> <u>per day</u>, including after meals and at bedtime. If you are unable to eat or drink, the recommended scheduled times are 8 a.m., noon, 4 p.m. and bedtime.

If you or your family are unable to

provide your oral care, a staff member

Use this kit if you are on a ventilator, have a breathing tube (endotracheal tube) or a tracheostomy in place.

Ventilator Oral Care Kit

The hospital staff will provide oral care <u>every four hours</u> and use a special chlorhexidine (CHG) mouth rinse every 12 hours.

For more information, please ask a nurse on any patient unit. 6300 v1 PA 8/15

will assist you.

# A Successful Program to $\downarrow$ NVHAP in a Large Hospital System

- 21 hospital system
- Longitudinal observational design
- Intervention
  - △ Upright for meals, mobilization, swallow evaluation, sedation restrictions, rigorous oral care, feeding tube care (ROUTE)
- Additional results
  - $\bigtriangleup\$  Reduction in antibiotic days
    - Carbapenem, quinolone, aminoglycoside & vancomycin
  - $\land \downarrow$  Benzodiazepine use



# **Oral Care-Prevention of NVHAP**

- ▲ 800 bed facility
- A Randomize 4 units -2 experimental/2 control
- Experimental received enhanced oral care & targeted education
- ▲ Freq of oral care 4x daily
- Control units received edu on usual oral care

#### EOUIPMENT Self-care and Soft toothbrush, ADA approved staff-assist. Toothpaste and mouth rinse, ADA approved Able to expectorate Mouth moisturizer prn or mouthwash (spit) Dental floss or interdental cleansers (optional) Lip balm (optional) FREOUENCY After each meal and before bedtime. If patient is NPO, oral care should be done 2-4 times daily. PROCEDURE EQUIPMENT Suction toothbrush with oral cleaning solution packet 1. Moisten suction or regular toothbrush as noted. Dependent for (as appropriate and available) 2. Assist the patient to brush all surfaces of the oral care. Soft toothbrush moistened with clean tap water or teeth until clean (1-2 minutes). Not able to alcohol-free mouthwash Suction debris from mouth. expectorate (spit). Mouth moisturizer prn 4. Apply mouth moisturizer using an oral swab, to At risk for Dental floss or interdental cleansers (optional) the interior of the oral cavity and apply lip balm. aspiration. Lip balm (optional) Discard disposable equipment in appropriate receptacle. FREQUENCY After each meal and before bedtime. If patient is NPO, oral care should be done 2-4 times daily. EQUIPMENT PROCEDURE Suction toothbrush/ oral swab Dependent on Oral cleansing solution oral care. Mouth moisturizer Patient on a May consider chlorhexidine oral rinse ventilator. per hospital policy - current studies are unclear as to benefit and harm FREQUENCY Every four hours and pm to remove oral and lips. debris. PROCEDURE EQUIPMENT Denture cup, labeled Denture care or Denture brush is preferred when patients with available, otherwise soft toothbrush or swab. no teeth. ADA approved denture cleanser (for soaking) Before the patient goes 2 oral swabs to sleep, remove and clean dentures and place Denture adhesive (optional) them in a denture Mouth rinse

Mouth moisturizer prn or mouthwash

#### FREOUENCY

 Dentures are removed for cleaning at bedtime. Remove dentures when sleeping

#### PROCEDURE

- Set patient up at sink or in bed with all equipment.
- 2. Instruct patient to brush teeth for 1-2 minutes.
- Use mouth rinse twice a day, swish for 20 to 30 seconds. If patient is able and supply is available, use floss or
- interdental cleansers.
- May moisturize interior of mouth and lips using an oral swab prn.
- 6. Discard disposable equipment/swab in appropriate receptacle.

- 1. Provide suction prn to remove oropharyngeal secretions that can migrate down the tube and settle on top of the cuff.
- 2. Obtain suction toothbrush/oral swab and moisten with oral cleansing solution.
- Connection suction toothbrush to continuous suctions.
- If chlorhexidine is used, remove the debris and cleanse the gums, tongue, and inside of cheeks with the solution-saturated oral swab. Suction debris from mouth.
- Apply moisturizer using oral swab to the interior of the oral cavity
- 7. Discard disposable equipment/swab in appropriate receptacle.
- 1. After removing dentures, place in a labeled denture cup.
- 2. Brush the palate, buccal surfaces, gums, and tongue with the toothbrush
- 3. Patient can swish and spit mouthwash, or use oral swab to apply moisturizer. 4. Line the sink with paper towel and add water to cushion the dentures in
- case you drop them. Carefully brush dentures with warm tap water. Do not use toothpaste as this may scratch the surface of the dentures.
- Clean and dry equipment and return to patient's bedside table.
- Assist patient in inserting dentures into mouth.
- 7. If patient needs denture adhesive to hold firmly in place, follow manufacture directions.
- Soak dentures in a denture cleanser in the denture cup at bedtime.



# **Oral Care-Prevention of NVHAP**

## ▲ 8709 patients

- $\triangle$  Control: 4163
- △ Experimental: 4546
- Medical control-7x more likely to develop NVHAP
- Surgical units' difference did not reach statistical difference
- Freq of oral care;
  - $\triangle$  Intervention: 2.02-2.25
  - △ Control: .95-1.18

	NV-HAP			
Treatment Group	No	Yes	Total	Incidence Rate per 1,000 Patient-Days
Medical Control, No. (%)	2,059 (99.2)	16 (0.8)	2,075	1.40
Medical Intervention, No. (%)	2,706 (99.9)	3 (0.1)ª	2,709	0.21
Total	4,765	19	4,784	-85 (% difference)
Surgical Control, No. (%)	2,075 (99.4)	13 (0.6)	2,088	1.17
Surgical Intervention, No. (%)	1,830 (99.6)	7 (0.4) <sup>b</sup>	1,837	0.51
Total	3,905	20	3,925	-56 (% difference)

CI = confidence interval; NV-HAP = nonventilator hospital-acquired pneumonia; OR = odds ratio.

<sup>a</sup> OR for medical control vs. medical intervention units (OR: 7.1; 95% Cl, 2.01-24.1, P = 0.002).

<sup>b</sup> OR for surgical control vs. surgical intervention units (OR: 1.6; 95% Cl, 0.65-4.1, P = 0.29).



# Non-Ventilator Pneumonia: SHEA Recommendations

- \Lambda Provide regular oral care
- A Diagnosis and management of dysphagia
- A Early mobilization
- ▲ Use of a bundled approach



# Skill Lab Ideas

- \Lambda Oral assessment
- ▲ Brushing teeth
- △ Using a kit to provide oral hygiene



The Forgotten Organ: Evidence Based Strategies of Pressure Injury Prevention in Acutely III Patients

## **Pressure Injury Impact**

- A HAPU are the 4th most common preventable medical error in the United States<sup>1</sup>
- 2.5 million patients are treated for HAPU annually in acute care<sup>1</sup>
- A cute care: 0-12%, critical care: 3.3% to 53.4% (International Guidelines)<sup>2</sup>
- ▲ Most severe pressure ulcer: sacrum (44.8%) or the heels (24.2%)<sup>1,2</sup>
- △ Cost Stage 1-2 \$2,770.54, Stage 3-4 \$71,000 to \$127,000<sup>3,4</sup>
  - 17,000 lawsuits are related to pressure ulcers annually
  - Targeted pressure injury prevention to patients with low Braden scores < 15 vs standard care does save money and results in better quality per life year (QALYs)
- 60,000 persons die from pressure ulcer complications each year in US/Pain & Suffering
- ▲ National healthcare cost \$26.8 billion per year in US<sup>3,4</sup>



3. Padula WV, et al. *Int Wound J*. 2019;16(3):634-640.

<sup>1. &</sup>lt;u>http://www.ahrq.gov/professionals/systems/hospital/pressureulcertoolkit/putool1.html#11</u>

European Pressure Ulcer Advisory Panel/ National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers/injuries Clinical Practice Guideline. Emily Haesler (Ed).EPUAP/NPIAP/PPPIA. 2019

<sup>4.</sup> Padula WV. Et al BMJ Qual Safety, 2019;28:132-41

# Clarification of Definitions:

- ▲ Pressure Injury to replace Pressure Ulcer
- ▲ Accurately describes pressure injuries of both intact and ulcerated skin

Stage I and Deep Tissue Injury (DTI) describe intact skin Stage II through IV describe open ulcers







## **Top-Down vs Bottom-Up Tissue Damage**







# • Stage 3, 4, Unstageable, DTI

Scott Triggers <sup>®</sup> PLLC

Wound Ostomy and Continence Nurses Society. (2016) Bottom-Up (Pressure Shear) Injuries. In D. Doughty, and L. McNichol (Ed). Core Curriculum Wound Management. (pp. 313-332). Philadelphia, Wolters Kluwer.

# **Pressure Injuries**

▲ A pressure injury is localized damage to the skin and/or underlying soft tissue usually over a bony prominence or related to a medical or other device. The injury can present as intact skin or an open ulcer and may be painful. The injury occurs as a result of intense and/or prolonged pressure or pressure in combination with shear. The tolerance of soft tissue for pressure and shear may also be affected by microclimate, nutrition, perfusion, co-morbidities and condition of the soft tissue.

The term *"pressure injury"* replaces *"pressure ulcer"* in the National Pressure Ulcer Advisory Panel Pressure Injury Staging System according to the NPUAP. Consensus conference Chicago III April 8-9, 2016





Stage 1 Pressure Injury -Caucasian

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Intact skin with a localized area of non-blanchable erythema, which may appear differently in darkly pigmented skin. Presence of blanchable erythema or changes in sensation, temperature, or firmness may precede visual changes. Color changes do not include purple or maroon discoloration.





# Stage 1 Pressure Injury Non - Caucasian





Stage 2 Pressure Injury

Partial-thickness loss of skin with exposed dermis. The wound bed is viable, pink or red, moist, and may also present as an intact or ruptured serum-filled blister.





Full-thickness loss of skin, in which adipose (fat) is visible in the ulcer and granulation tissue and epibole (rolled wound edges) are often present. Slough and/or eschar may be visible

# Stage 3 Pressure Injury







Stage 4 Pressure Injury

Full-thickness skin and tissue loss with exposed or directly palpable fascia, muscle, tendon, ligament, cartilage or bone in the ulcer. Slough and/or eschar may be visible. Epibole (rolled edges), undermining and/or tunneling often occur

# Deep Tissue Pressure Injury





**Persistent non-blanchable deep red, maroon or purple discoloration** Intact or non-intact skin with localized area of persistent non-blanchable deep red, maroon, purple discoloration or epidermal separation revealing a dark wound bed or blood filled blister

www.npuap.org



# Unstageable Pressure Injury with Dark Eschar

Full thickness tissue loss in which actual depth of the ulcer is completely obscured by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed





# Unstageable Pressure Injury with Slough



# Undermining

# Moisture Injury: Incontinence-Associated Dermatitis

- Inflammatory response to the injury of the water-protein-lipid matrix of the skin<sup>1</sup>
  - Caused from prolonged exposure to urinary and fecal incontinence
  - Contributing factors of friction and secondary infection<sup>2</sup>
- ▲ Top-down injury<sup>1,2</sup>
- ▲ Physical signs on the perineum & buttocks<sup>1</sup>
  - Erythema, swelling, oozing, vesiculation, crusting, and scaling
- △ Skin breaks 4x more easily with excess moisture than dry skin<sup>3</sup>





1. Doughty D, et al. JWOCN. 2012;39(3):303-315

- 2. Beele H, et al. Drugs Aging 2018;35:1-10
- 3. Kottner J, et al. Clin Biomech, 2018;59:62-70

# IAD: Multistate Epidemiology Study

- 5,342 patients in 189 acute care facilities in 36 states
- A Prevalence study
  - To measure the prevalence of IAD, describe clinical characteristics of IAD, and analyze the relationship between IAD and prevalence of sacral/coccygeal pressure ulcers
- A Results: 2,492 patients incontinent (46.6%)
  - 57% both FI and UI, 27% FI, 15% UI
  - 21.3% IAD rate overall/14% also had fungal rash
  - 45.7% in incontinent patients
    - 52.3% mild
    - 27.9% moderate
    - 9.2% severe
  - 73% was facility-acquired
  - ICU a 36% rate
  - IAD alone and in combination with immobility statistically associated with FAPI





#### Category 1: Persistent redness

#### 1A - Persistent redness without clinical signs of infection



#### Critical criterion · Persistent redness

A variety of tones of redness may be present. Patients with darker skin tones, the skin may be paler or darker than normal, or purple in colour.

#### Additional criteria

- · Marked areas or discolouration from a previous (healed) skin defect
- · Shiny appearance of the skin
- Macerated skin
- Intact vesicles and/or bullae
- · Skin may feel tense or swollen at palpation
- . Burning, tingling, itching or pain

#### 1B - Persistent redness with clinical signs of infection



#### Critical criteria Persistent redness

A variety of tones of redness may be present. Patients with darker skin tones, the skin may be paler or darker than normal, or purple in colour.

Signs of infection

Such as white scaling of the skin (suggesting a fungal infection) or satellite lesions (pustules surrounding the lesion, suggesting a Candida albicans fungal infection).

#### Additional criteria

· Marked areas or discolouration from a previous (healed) skin defect

· Shiny appearance of the skin

· Macerated skin

· Intact vesicles and/or bullae

- . The skin may feel tense or swollen at palpation
- · Burning, tingling, itching or pain

#### Category 2: Skin loss

#### 2A - Skin loss without clinical signs of infection



#### Critical criterion

· Skin loss Skin loss may present as skin erosion (may result from damaged/eroded vesicles or bullae), denudation or exce The skin damage pattern may be diffuse.

#### Additional criteria

#### Persistent redness

- A variety of tones of redness may be present. Patients with darker skin tones,
- the skin may be paler or darker than normal, or purple in colour
- · Marked areas or discolouration from a previous (healed) skin defect
- · Shiny appearance of the skin
- · Macerated skin
- · Intact vesicles and/or bullae
- . Skin may feel tense or swollen at palpation
- · Burning, tingling, itching or pain

#### 2B - Skin loss with clinical signs of infection



#### Critical criteria

 Skin loss Skin loss may present as skin erosion (may result from a eroded vesicles or bullae), denudation or excoriation. The skin damage pattern may be diffuse.

#### Signs of infection

#### Such as white scaling of the skin (suggesting a fungal in or satellite lesions (pustules surrounding the lesion, sug-Candida albicans fungal infection), slough visible in the (yellow/brown/greyish), green appearance within the w (suggesting a bacterial infection with Pseudomonas aer excessive exudate levels, purulent exudate (pus) or a shi appearance of the wound bed.

#### Additional criteria · Persistent redness

- A variety of tones of redness may be present. Patients with darker skin tones,
- the skin may be paler or darker than normal, or purple in colour
- · Marked areas or discolouration from a previous (healed) skin defect
- · Shiny appearance of the skin
- · Macerated skin
- · Intact vesicles and/or bullae
- · Skin may feel tense or swollen at palpation
- · Burning, tingling, itching or pain

Beeckman D. et al. The Ghent Global IAD Categorisation Tool (GLOBIAD). Skin Integrity Research Group - Ghent University 2017. Available to download from www.UCVVGent.be

# Identify Patients at High Risk





# Risk Assessment on Admission, Daily, Change in Patient Condition<sup>1,2</sup>

- Use standard EBP risk assessment tool
- Research has shown risk assessment tools are more accurate than RN assessment alone

Epidemiological study risk factors	Braden Scale <sup>146</sup>	Norton Scale <sup>147</sup>	Waterlow Score <sup>148</sup>	Cubbin-Jackson Scale <sup>149</sup> (critically ill individuals)	SCIPUS <sup>150</sup> (individuals with SCI)	Braden Q Scale <sup>151</sup> (children)
Activity and mobility limitations	• Mobility* • Activity* • Friction-shear*	• Mobility* • Activity*	Mobility	• Mobility • Hygiene	<ul> <li>Mobility</li> <li>Level of activity</li> <li>Complete SCI</li> <li>Autonomic dysreflexia/ severe spasticity</li> </ul>	• Mobility* • Activity* Friction-shear*
Skin status	Not included	Not included	Skin type (in visual areas, partial measure of skin status)	General skin condition	Not included	Not included
Diabetes	Not included	Not included	Not included	Not included	Blood glucose levels	Not included
Perfusion and oxygenation	Not included	Not included	Special Risk (partial measure of perfusion)	Oxygen requirements     Respiration     Hemodynamics	Tobacco use     Cardiac disease	Tissue perfusion     oxygenation
Poor nutritional status	Nutrition .	Food intake     Fluid intake (modified scale)	Appetite     Build (weight for     height)	Weight/tissue viability     Nutrition	Not included	Nutrition
Increased skin moisture	Moisture*	Incontinence	Continence	Incontinence	Urine incontinence or constant moistness	Moisture*
Increased body temperature	Not included	Not included	Not included	Not included	Not included	Not included
Advanced age	Not included	Not included	Gender/Age	Age	Age	Not included
Sensory perception	Sensory perception*	Not included	Neurological Deficit	Not included	Not included	Sensory perception*
Abnormal laboratory blood results	Not included	Not included	Not included	Not included	Albumin     Hematocrit	Not included
General health status	Not included	Physical condition     Mental condition*	Major Surgery/Trauma     Medications	Mental condition     Past medical     condition	Respiratory disease     Renal disease     Impaired cognitive     function	• Not included

1. Garcia-Fernandez FP, et al. JWOCN, 2014:41(1):24-34

2. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers/injuries :Clinical Practice Guideline. Emily Haesler (Ed).EPUAP/NPIAP/PPPIA. 2019

# Picking the Right Scale

Scales (cut-off)	Sensitivity Median (range)	Specificity Median (range)	Positive likelihood ratio	Negative likelihood ratio	AUROC Median (range)	Relative Risk (95% Cl)
Braden	0.74"	0.68*	2.31*	0.38*	0.77 <sup>b</sup>	4.26 <sup>†</sup>
(s 18) <sup>118,135</sup>	(0.33 to 1)	(0.34 to 0.86)			(0.55 to 0.88)	(3.27 to 5.55)
Norton	0.75°	0.68 °	2.34 °	0.37 °	0.74 <sup>c</sup>	3.69 <sup>9</sup>
(s 14) <sup>118,135</sup>	(0 to 0.89)	(0.59 to 0.95)			(0.56 to 0.75)	(2.64 to 5.16)
Waterlow	1.00, 0.88 <sup>d</sup>	0.13, 0.29 d	1.15,	0.0, 0.41 <sup>d</sup>	0.61°	2.66 <sup>h</sup>
(≥ 10) <sup>118,135</sup>			1. 24 <sup>d</sup>		(0.54 to 0.66)	(1.76 to 4.01)
Cubbin-Jackson	0.72	0.68	_	_	0.763 <sup>j</sup>	8.63 <sup>k</sup>
(≤ <b>24)</b> <sup>135,145</sup>						(3.02 to 24.66)
SCIPUS	0.85"	0.38 <sup>m</sup>	1.4 <sup>m</sup>	-	0.64 <sup>m</sup>	
(≥ 8) <sup>130</sup>					(0.59 to 0.70)	
Braden Q	0.86 <sup>p</sup>	0.59 <sup>₽</sup>	2.09Þ	_	0.72 <sup>p</sup>	
(≤ 13) <sup>152</sup>	(0.76 to 0.96)	(0.55 to 0.63)	(0.95 to4.58)		(0.76 to 0.78)	
and a second second second second	°16 studie	s, n=5,462	⊳7 s	tudies, n=4,811	۲5 st	udies, n=2,809
	<sup>d</sup> 2 studies, n=419 <sup>9</sup> 15 studies, n=4,935 <sup>k</sup> 2 studies, n=151		°4 studies, n=2,559       f31 studie         h12 studies, n=2,408       j 1 stud         m 1 study (n=759)       P1 stud		f31 studies, n=7,137	
					study, n=829	
					P 1 study, n= 625	

European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers/injuries :Clinical Practice Guideline. Emily Haesler (Ed). EPUAP/NPIAP/PPPIA. 2019

# It's About the Sub-Scales

- A Retrospective cohort analysis of 12,566 adult 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)



## IAD Assessment Tool

#### Hospital Survey on Incontinence & Related Skin Injury

#### Unit / Mark Area

sage10141C

	Unit / Work Area		
Instructions:	Patient Unit:		
This survey is limited to inpatie	int care areas and excludes the foll	owing:	
Labor & Delivery, Obstetrics, N	lursery, Emergency Department &	Operating Room.	
Note: Complete ONLY ONE for	Patient Gender:		
			Fernale
Date of Survey://	/	Unit:	
Please check the unit specialty that b	cest describes the care provided.		
Burn	LTAC	Psychiatric - Geriatric	inconfinence = inability to contro Check all that apply
Cardiac Surgery	LTC	Rehabilitation	Urine:
CCU - General	Medical	Renal/Urology	Continent
CCU - Interventional	Med/Surg	Respiratory/Pulmonary	Marc A patient with a Poley Cath- is desmed "conditions."
ICU - Cardiovascular	Neurology	SNF/Transitional Care	Patient has Folay
ICU - General	Oncology	Skilled Care (LTC)	incontinent
ICU - Medical	Orthopedic	Stepdown/Transition	
ICU - Neuro	Other	Surgical	
ICU - Neonatal	PACU	Telemetry - General	
ICU - Pediatric	Pediatrics	Telemetry - Medicine	
ICO - Surgical	Psychiatric - General	Telemetry - Surgical	Check all that apply.
		Would Care	Low albumin Anilbictics
Patient Census of Unit at Tim	ne of Survey:		
Patient census of onit at this			Clostidium difficile stoci po
	Incontinence Collection Produc	ts:	Tube feeding
Check all that apply to a specific unit	/work area		
Pad/Chux	Diaper/Brief	Collection Device	Check products used on patient
Reusable cloth	Reusable cloth		Greathaing: ScepWeint@eain
Disposable plastic-backed	Disposable plastic-backed		Part-Wiesh (spray)
Disposable air flow-backed	Disposable air flow-backed		Weshcloth (strategye)
			reusable / disposable
Inc	(this, not exercise bit)		
Check all product categories that are	available in a specific unit/work area.		Moleturizers:
Classical	Develop Destantion (Tabas		Lotion
Cleansing:	Barrier Protection (Tubes	Bottles or Sprays):	Citem
Constanting (Doning	Must contain one of the "Active Ingredients" liste	d below	
Soap/water/Basin	Petroleum		
Cleansing Foam	Zind Oxide		Complete only for in
Washcloth (circle type)	Liquid Film Barrier		Check all that apply
reusable / disposable	Other		Condition:
Premoistened Wipe			Incontinence Associated D
(thin, not washcloth)			Red and dry
			Fresent on Admission
Moisturizers:	All-in-one products:		Designed Line in the
	Must combine cleansing, moisturizing & barrier p	votection	How many?
Lotion	Barrier cloth with skin protectant		Encode and Advantage of Advanta
Cream			
Ointment			Fungallyeast appearing rate

segret Strettic

Patient Information (from UnitWork Area data collection form) Section 1 - Complete for all patients surveyed Demographic Information: Patient Age Group: \_\_\_\_0 to 12 months 40 to 49 yrs \_\_\_\_1 to 3 yrs \_\_\_\_4 to 19 yrs 20 to 29 yrs 30 to 39 yrs Continence Status: s the flow of urine and/or stool in the preceding 24 hours Stool: \_\_\_\_ Continent Note: A patient with an individing facal collection device is descent "Inconfigured." \_\_\_\_ Incortinent \_\_\_\_ Uquid or semi-liquid stools Frequency Patient has indiveiling fecal collection device Patient has external fecal collection device Section 2 - Complete only for Incontinent patients Contributing Factors & Co-Morbidities Diabelic with recent hyperglycemia. Breden Score Clearly with deep groinflow abdomen skin folds Mobility Score Friction & Shear Score \_\_\_\_immunocompromised \_\_\_\_Other \_\_\_\_Nutrition Score Incontinence Cleanup & Skin Protection: Barrier Protection: (Tubec, Bottles or Sprays) Must contain use of the "Autive ingradients" John being \_\_\_\_ Petroisum Zinc Oxide Dimethicone ---- Uguid Film Danier Other All-in-one products: Must combine cleansing, mointucking & Lawley projection \_\_\_\_Barrier Cloth with skin protectant Section 3 continent patients with rachiredness of buttook or perineal skin Perineal Skin Injury Area Affected: Containment Produots: emailie FlexiSeal Fecal Collection Device Buttocks \_\_\_\_ ----Corryx Zazzi Fecal Collection Device \_\_\_\_ Rectal Area Nesal Trumpet \_\_\_\_ -Scrotum/Lable \_ Other \_\_\_\_ x or include Lower Abdomen Upper Thighs \_\_\_\_ ¥ N is there leakage around device at the anus? **Gluteal cleft** \_\_\_\_ N Was there an underpad present? Grains × \_\_\_\_ Reusable cloth Disposable plastic-backed \_\_\_\_ Fungal/yeast appearing rash \_ ----\_\_\_\_ Other Disposable air flow-backed Gpecity \_\_\_\_\_ Y N Were incontinence briefs worn by patient?

Junkin J, Selek JL. J WOCN 2007;34(3):260-269

# "One's mind, once stretched by a new idea, never regains its original dimensions." Oliver Wendell Holmes



# **The Goal: Patient & Caregiver Safety**




Pressure & Shear as a Risk Factor



# EBP Recommendations to Achieve Offloading & Reduce Pressure

- A 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<sup>4</sup>
  - $\triangle$  Consider right surface with right frequency<sup>1,4</sup>
  - △ Cushioning devices to maintain alignment /30° side-lying & prevent pressure on bony prominences<sup>1,2</sup>
    - Between pillows and wedges, the wedge system was more effective in reducing pressure in the sacral area (healthy subjects)
    - Between pillows and wedges, wedges maintain lateral position better
  - △ Assess whether actual offloading has occurred<sup>4</sup>
  - △ Use lifting device or other aids to reposition & make it easy to achieve the turn<sup>4</sup>



- 1. McNichol L, et al. J Wound Ostomy Continence Nurse, 2015;42(1):19-37.
- 2. Bush T, et al. WOCN, 2015;42(4):338-345
- 3. Kapp S, et al. Int Wound J. 2019;1-7
- European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers/injuries :Clinical Practice Guideline. Emily Haesler (Ed). EPUAP/NPIAP/PPPIA. 2019

### How Well Are We Really Doing at Q 2 Turning?

- ▲ Body position: clinical practice vs standard
  - Study of 74 patients in which the change in body position was recorded every 15 minutes for an average observation time of 7.7 hours
  - △ 49.3% of observed time showed no body position change for >2 hrs, and 2.7% had every-2-hour demonstrable body position change
- A Positioning prevalence
  - Prospectively recorded, 2 days, 40 ICUs in the United Kingdom
  - △ Average time between turns, 4.85 hours





#### **EBP Recommendations to Reduce Shear & Friction**

- Loose covers & increased immersion in the support medium increase contact area
- A Prophylactic dressings: emerging science
- A Reposition the individual to relieve or redistribute pressure using manual handling techniques and equipment that reduce shear & friction.
  - △ Mechanical lifts
  - △ Transfer sheets
  - △ 2-4 person lifts
  - △ Turn & assist features on beds
- Do not leave moving and handling equip underneath the patient, unless it is specifically designed for this purpose



European Pressure Ulcer Advisory Panel/ National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers/injuries :Clinical Practice Guideline. Emily Haesler (Ed).EPUAP/NPIAP/PPPIA. 2019

# Systematic Review: Use of Prophylactic Dressing in Pressure Ulcer Prevention

- A 21 studies met the criteria for review
- A 2 RCTs, 9 had a comparator arm, 5 cohort studies, 1 within-subject design where prophylactic dressings were applied to one trochanter with the other trochanter dressing free

	Experim	ental	Conti	rol		<b>Risk Ratio</b>	<b>Risk Ratio</b>	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% C	M-H, Random, 95% Cl	
Callaghan 1998	2	8	8	10	3.8%	0.31 (0.09, 1.08	1	
Huang 2009	6	10	8	8	21.7%	0.63 (0.37, 1.05	)	
Weng 2008	28	60	29	30	74.6%	0.48 (0.37, 0.64	1	
Total (95% CI)		78		48	100.0%	0.50 (0.39, 0.64	1 ♦	
Total events	36		45					
Heterogeneity: Tau <sup>2</sup> = 0.00; Chi <sup>2</sup> = 1.42, df = 2 (P = 0.49); I <sup>2</sup> = 0%					); I²= 0%			
Test for overall effect Z = 5.61 (P < 0.00001)						Favours experimental Favours control	00	

	Experime	ental	Contr	rol		Risk Ratio	Risk	Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% Cl	M-H, Randi	om, 95% Cl	
Forni 2011	2	56	21	49	45.2%	0.08 (0.02, 0.34	-		
Santamaria 2013	3	161	12	152	54.8%	0.24 (0.07, 0.82)	-		
Total (95% CI)		217		201	100.0%	0.15 (0.05, 0.41)	•		
Total events	5		33						
Helerogeneity: Tau² = 0.10; Chi² = 1.21, df = 1 (P = 0.27); i² = 18%						6		40	100
Test for overall effect. Z = 3.65 (P = 0.0003)							Favours experimental	Favours contr	rol

Evaluated sacral pressure ulcer prevention

Evaluated nasal bridge device ulcer prevention

#### **EBP Recommendations to Reduce Shear & Friction**

- Loose covers & increased immersion in the support medium increase contact area
- A Prophylactic dressings: emerging science
- A Reposition the individual to relieve or redistribute pressure using manual handling techniques and equipment that reduce shear & friction.
  - △ Mechanical lifts
  - △ Transfer sheets
  - △ 2-4 person lifts
  - △ Turn & assist features on beds
- Do not leave moving and handling equip underneath the patient, unless it is specifically designed for this purpose



European Pressure Ulcer Advisory Panel/ National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers/injuries :Clinical Practice Guideline. Emily Haesler (Ed).EPUAP/NPIAP/PPPIA. 2019

#### **Turn Teams**

- Evaluate the impact of a dedicated turn team to reduce HAPI's
- ▲ 507 patients, 20 bed university ICU
- A 24/7 q 2hr turn performed by a team
- 278 patients before
- ▲ 229 patients after
- ▲ Results:
  - $\triangle$  42 PI vs 12 PI (p < 0.0001)
  - △ Braden 16.5 vs. 13.4 (p= 0.04)



### Lift/Mobility Technicians Impact on PI & Staff Injuries



- ▲ 900 bed tertiary hospital
- A Problem: Increase pressure injuries & safe handling injuries
- Multidisciplinary team formed in May 2011 to address problem
- Measured pressure injury rates and staff handling rates before & after intervention
- 🛕 6 unit pilot
- Intervention: Oct 2011
  - △ Mobilization of patients occurred with a dedicated trained lift technicians
  - △ ICU's & Stepdown
  - $\triangle$  24/7 coverage
  - $\triangle$  Assist with moving and lifting of all patients > 200lbs & Braden < 18 or PI present

#### **Staff Injury Reduction**

High satisfaction for the team, job & staff felt like they were cared about by the organization

**TABLE 1.** Patient Handling-Related Employee Injuries onPilot Units Versus Nonpilot Units

	FY 2011	FY 2012 Target	FY 2012	
Pilot units Patient handling-related injuries per 1000	0.276	0.134	0.134	
patient-days Raw number	13	$5 P \le 0.001$	8	38%↓
Nonpilot units Patient handling-related injuries per 1000 patient-days	0.371	0.347	0.319	
Raw number	78	$\begin{array}{c} 74\\ P = 0.031 \end{array}$	71	

#### Comparing Pilot and non Pilot units



= 2005 = 2006 = 2007













**Specialty Bed** 

Disposable Glide /Slide Sheets

Breathable Shear Reduction Glide Sheet

#### Current Practice: Turn & Reposition

#### Draw Sheet/Pillows/Layers of Linen

**Lift Device** 







- 50% of nurses required to do repositioning suffered back pain<sup>1</sup>
- High physical demand tasks<sup>1,2</sup>
  - 31.3% up in bed or side to side
  - 37.7% transfers in bed
- 40% of critical care unit caregivers performed repositioning tasks more than six times per shift<sup>3</sup>
- Number one injury causation activity: Repositioning patients in bed<sup>3</sup>

- 1. Smedley J, et al. J Occupation & Environmental Med,1995;51:160-163)
- 2. Knibbe J, et al. Ergonomics1996;39:186-198)
- 3. Fragala G. AAOHN, 2011;59:1-6

#### Oh, My Aching Back!

#### **Back Pain Incidence in Nursing:**

- 8 out of 10 nurses work despite experiencing musculoskeletal pain<sup>1</sup>
- 62% of nurses report concern regarding developing a disabling musculoskeletal injury<sup>1</sup>
- 56% of nurses report musculoskeletal pain is made worse by their job<sup>1</sup>
- Nursing assistants had the 2<sup>nd</sup> highest and RNs had the 6<sup>th</sup> highest number of musculoskeletal disorders in the U.S.<sup>2</sup>





1. American Nurses Association. (2013). ANA Health and Safety Survey. Retrieved from <a href="http://www.nursingworld.org/MainMenuCategories/WorkplaceSafety/Healthy-Work-Environment/2011-HealthSafetySurvey.html">http://www.nursingworld.org/MainMenuCategories/WorkplaceSafety/Healthy-Work-Environment/2011-HealthSafetySurvey.html</a> 2. U.S. Department of Labor, Bureau of Labor Statistics. (2014). Table 16. Number, incidence rate, and median days away from work for nonfatal occupational injuries and illnesses involving days away from work and musculoskeletal disorders by selected worker occupation and ownership, 2014. Retrieved from <a href="http://www.bls.gov/news.release/osh2.tl6.htm">http://www.bls.gov/news.release/osh2.tl6.htm</a>

#### **Contributing Factors to Injury**

- Healthcare is the only industry that considers 100 pounds to be a "light" weight
- A Other professions use assistive equipment when moving heavy items
- On average, nurses and assistants lift 1.8 tons per shift (ANA, n.d.)





(Kelly, 2015)

Number, Incidence Rate, & Median Days Away From Work for Occupational Injuries RN's with Musculoskeletal Disorders in US, 2003 – 2014

Year	Ownership ;C	ocupation	Total Indi Cases R	dence M <sub>e</sub> e ate	dial Days Away From Work
2009	private industry	RNs	8,760 5	1.6	8
2010	Private industry	RN	9,260	53.7	6
2011	Private industry	RN	10,210		8
2012	Private industry	RN	9,900	58.5	8
2013	Private Industry	/ RN	9,820	56.2	7
2014	Private Industry	r RN	9,820	55.3	9
2014	Private Industry	v NA	18,510		6

\* Incidence rate per 10,000 FTE

#### Achieving the Use of the Evidence for Pressure Injury Reduction



- ▲ Resource & System
  - △ Breathable glide sheet/stays
  - $\triangle$  Foam wedges
  - △ Microclimate control
  - △ Reduce layers of linen
  - Wick away moisture body pad
  - △ Protects the caregiver



#### Impact of a Turn & Position Device on PI & Staff Time

- ▲ Prospective, QI study (1 SICU & 1 MICU)
- \land 2 phases
  - SOC: pillows, under pads, standard low air loss bed and additional staff if required
  - Interventional: turn and position system, a large wicking pad (part of the product)
- Inclusion criteria: newly admitted, non-ambulatory, required 2 or more to assist with turning/ repositioning
- △ Turning procedures were timed/admitting till ICU discharge

#### \Lambda Results

- No difference in sociodemographic and clinical data between the groups
- Phase 1: 14 patients (28%) Stage II sacral PI
- Phase 2: zero sacral PI (p<.0001)
- Timing:
  - Phase 1: 16.34 mins (range 4-60min) SD= 10.08
  - Phase 2: 3.58 mins (range 1.12-8.48) SD = 2.31 (p=0.0006)

#### Reducing HAPI & Patient Handling Injuries

- Compared pre-implementation turning practice: pillows/draw sheet vs turn and position system (breathable glide sheet/foam wedges/wick away pad)
- ▲ Baseline: November 2011-August 2012
- Implementation period: November 2012 to August 2015
- ▲ 3660 patients
- Compared HAPU rates, patent handling injuries, and cost

PATIENT HANDLING INJURY AND COSTS 74% reduction								
	January 2012 to October 2012 (Before)	November 2012 to August 2013 (After)	November 2013 to August 2014 (After)	November 2014 to August 2015 (After)				
Injuries/Cost	19/\$427,500	8/\$180,000	2/\$45,000	5*/\$112,500				

Average cost calculated by estimating \$22,500 per injury.<sup>17</sup>

\*1 PCI in critical care, 4 PCIs in medical. We were unable to determine if the patients were eligible for the repositioning system.



Way H, Am JSPHM, 2016;6(4):160-165

# 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<sup>1,2</sup>
  - △ Microclimate management<sup>1</sup>
  - $\triangle$  Heel protection<sup>2</sup>
  - $\triangle$  Early mobility programs<sup>2</sup>
  - Seated support surfaces for patients with limited mobility when sitting in a chair<sup>2</sup>



- 1. Reger SI et al, OWM, 2007;53(10):50-58
- European Pressure Ulcer Advisory Panel/ National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers/injuries :Clinical Practice Guideline. Emily Haesler (Ed).EPUAP/NPIAP/PPPIA. 2019

#### In-Bed Technology















## EBP Recommendations to Achieve Offloading & Reduce Pressure



- △ Heel protection devices should elevate the heel completely (off-load) in such a way as to distribute weight along the calf
- $\bigtriangleup$  The knee should be in slight flexion
- $\bigtriangleup$  Remove device periodically to assess the skin









European Pressure Ulcer Advisory Panel/ National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers/injuries :Clinical Practice Guideline. Emily Haesler (Ed).EPUAP/NPIAP/PPPIA. 2019

#### RCT: Prevention of Heel Injuries and Plantar Flexion Contractures

- Surgical intensive care unit, medical intensive care unit, and neurotrauma intensive care unit.
- Inclusion criteria; 5 days of sedation related to care for a critical illness, immobility for 6 to 8 hours before study initiation. Braden < 18, mobility subscale < 2 & pre-existing PI</p>
- ▲ 54 subjects: 37 intervention 19 control
- Measured pressure injury and goniometric scores
- ▲ Intervention: Heel protector Control: Pillows
- ▲ Results:
  - PI: 0% versus 41% developed by day 2
  - △ Goniometric scores: Significant day 3 lower goniometric score as well as last study day.
    - 10 patients had improved PFC in intervention group
    - 1 patient had improved PFC in control group



- ▲ 490 bed facility
- A Evidence-based quality improvement initiative
- 4 tier process 5
  - Partnership  $\Delta$
  - Comprehensive product review  $\Delta$
  - Education & engagement  $\Delta$
  - Support structures & processes  $\Delta$

#### 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
  - △ Microclimate management
  - $\triangle$  Heel protection
  - △ Early mobility programs
  - △ Seated support surfaces for patients with limited mobility when sitting in a chair



Reger SI et al, OWM, 2007;53(10):50-58, <u>www.ihi.org</u> European Pressure Ulcer Advisory Panel/ National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers/injuries :Clinical Practice Guideline. Emily Haesler (Ed).EPUAP/NPIAP/PPPIA. 2019

#### Transition: In-Bed to Out-of-Bed & Back



#### Out-of-Bed Technology











#### **Current Seating Positioning Challenges**





Frequent repositioning & potential caregiver injury

Potential risk of sliding from chair



#### Repositioning patients in chairs: an improved method (SPS)

- Study the exertion required for 3 methods of repositioning patients in chairs
- 31 caregiver volunteers
- Each one trialed all 3 reposition methods
- A Reported perceived exertion usin the Borg tool, a validated scale





Method 1: 2 caregivers using old method of repositioning 246% greater exertion than SPS Method 2: 2 caregivers with SPS Method 3: 1 caregiver with SPS 52% greater exertion than method 2

#### **Ambulation Assist Devices**









### **Prevention Strategies for IAD**





#### **Evidence-Based Components of an IAD Prevention Program**

- Skin care products used for prevention or treatment of IAD should be selected based on consideration of individual ingredients in addition to consideration of broad product categories such as cleanser, moisturizer, or skin protectant. (Grade C)
  - △ A skin protectant or disposable cloth that combines a pH balanced no rinse cleanser, emollient-based moisturizer, and skin protectant is recommended for prevention of IAD in persons with urinary or fecal incontinence and for treatment of IAD, especially when the skin is denuded. (Grade B)
  - Commercially available skin protectants vary in their ability to protect the skin from irritants, prevent maceration, and maintain skin health. More research is needed.
    (Grade B)



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

- △ Clean the skin as soon as it becomes soiled<sup>2,4</sup>
- △ Use an incontinence pad and/or briefs that wick away moisture<sup>1,2,4</sup>
- △ Use a protective cream or ointment<sup>1,2,4</sup>
  - $\bigtriangleup$  Disposable barrier cloth recommended by IHI & IAD consensus group
- Ensure an appropriate microclimate & breathability<sup>4</sup>
- ▲ < 4 layers of linen<sup>3</sup>
- ▲ Barrier & wick away material under adipose and breast tissue<sup>2,4</sup>
- ▲ Support or retraction of the adipose tissue (i.e. KanguruWeb)<sup>4</sup>
- ▲ Pouching device or a bowel management system<sup>2,4</sup>



- 2. Doughty D, et al. JWOCN. 2012;39(3):303-315
- 8. Williamson, R, et al (2008) Linen Usage Impact on Pressure and Microclimate Management. Hill-Rom
- 4. European Pressure Ulcer Advisory Panel/ National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers/injuries :Clinical Practice Guideline. Emily Haesler (Ed).EPUAP/NPIAP

<sup>1. &</sup>lt;u>www.ihi.org</u>

### Current Practice: Moisture Management





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

- △ Clean the skin as soon as it becomes soiled<sup>2,4</sup>
- △ Use an incontinence pad and/or briefs that wick away moisture<sup>1,2,4</sup>
- △ Use a protective cream or ointment<sup>1,2,4</sup>
  - $\bigtriangleup$  Disposable barrier cloth recommended by IHI & IAD consensus group
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- 4. European Pressure Ulcer Advisory Panel/ National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers/injuries :Clinical Practice Guideline. Emily Haesler (Ed).EPUAP/NPIAP

<sup>1. &</sup>lt;u>www.ihi.org</u>

#### IAD/HAPU Reduction Study

- A Prospective, descriptive study
- △ 2 Neuro units
- A Phase 1: prevalence of incontinence & incidence of IAD & HAPU
- A Phase 2: Intervention
  - $\triangle$  Use of a 1 step cleanser/barrier product
  - $\triangle$  Education on IAD/HAPU
- ▲ Results:
  - △ Phase 1: incontinent 42.5%, IAD 29.4%, HAPU 29.4%, LOS 7.3 (2-14 days), Braden 14.4
  - △ Phase 2: incontinent 54.3%, IAD & HAPU 0, LOS 7.4 (2-14), Braden 12.74

#### IAD Prevention Practices: Implementation Science Approach

- △ Identified evidence gaps in previous study (4 hospitals-250 patients
- Using implementation science approach to introduce evidence based IAD practices
- IAD committee: education about correct pad sizing, washable and disposable pads and plastic sheets removed from the wards. All in one barrier cloth that cleans, protects and moisturizes was introduced
- A Nurses from wards ask to participate in 1 of 6 focus groups post implementation
#### IAD Prevention Practices: Results

Variable	Pre-Implementation N=250	Post Implementation N=259	P value
IAD	23 (9.2%)	6 (2.3%)	.015
НАРІ	9 (3.6%)	2 (0.8%)	.034
Bed protection use	154 (64.7%)	6 (2.3%)	<.01
Continent patients with incontinent products	73 (29.2%)	28 (10.8%)	<.01

#### Nurse Focus Groups: 31 nurses, 4 themes

- Benefit to patient: improved skin condition, patient comfort
- Usability: fewer steps
- Problems encountered: not seeing barrier in place
- Related factors: confusion between IAD and pressure injury

#### **Urine and Fecal Containment Device**







10% incidence in a recent metanalysis

- 26% nasal oxygen tubing
- 9% airway pressure masks
- 7.7% sequential compression devices
- 5.6% nasal oxygen prongs
- 5.5percent tracheostomy tubes under flange
- 5% nasogastric tube
- 2.4% cervical collar under the rim

Jackson D, et al. International J of Nursing Studies. 2019;92:109-120



Having a medical device you are 2.4 x more likely to develop a HAPU of any kind (p=0.0008)

### Prevention of MDR's-HAPI<sup>1,2</sup>

- Selected based on their ability to cause the least degree of damage from pressure or shear forces
  - $\bigtriangleup$   $\$ use devices made of softer material
- ▲ Sized correctly to avoid excessive pressure
  - △ tension on securement device should be checked regularly and adjusted
- Securement devices that splint the tubes (for NG's) allowing them to float
- A Remove as soon as clinical possible
- Skin under device assessed minimum q 12 (more freq if fluid shifts or localized edema seen)
- △ Devices lifted at frequent intervals or rotated
- Subscription Use dressings to cushion medical devices



#### Best Practices for Prevention of Medical Device-Related Pressure Ulcers in Critical Care

- Choose the correct size of medical device(s) to fit the individual
- Cushion and protect the skin with dressings in high-risk areas (e.g., nasal bridge)
- Inspect the skin in contact with device at least daily (if not medically contraindicated)
- Avoid placement of device(s) over sites of prior or existing pressure ulcer
- Educate staff on correct use of devices and prevention of skin breakdown
- $\bullet$  Be aware of edema under device(s) and potential for skin breakdown
- Confirm that devices are not placed directly under an individual who is bedridden or immobile

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2. Cooper KD, et al. Amer J of Crit Care. 2020;29(2):150-154

# The Why





# **DELIRIUM...WHAT IS IT?**

- \land ICU Psychosis
- \Lambda Sun-downing
- Altered mental status
- \land Reversible dementia
- ▲ Organic brain syndrome
- A Hallucinations
- \Lambda Confusion
- \land Crazy
- \Lambda Mean
- \Lambda Demented
- A Pleasantly confused



#### Diagnostic and Statistical Manual of Mental disorders: DSM-5

- Delirium is defined as disturbance in attention (top mandatory feature) that develops over a short period of time, is associated with additional
  - △ Disturbances in cognition that are not better explained by another preexisting, established or evolving neurocognitive disorder, and do not occur in the context of a severely reduced level of arousal,



30% of Patients in the Hospital will Develop Delirium

# **DELIRIUM...WHAT IS IT?**

- "Disease induced syndrome" (PAD Guidelines)
- Sudden change in mental status that develops over hours to days



#### **Clinical signs:**

- Decreased attention span
- Disorganized thinking
- Altered sleep/wake cycles
- Increased or decreased psychomotor activity
- \Lambda Perceptual disturbances
  - $\triangle$  Illusions
  - $\triangle$  Hallucinations
- \land Wax & wane
  - $\bigtriangleup$  May be normal at times

### 3 Types of Delirium

- A Hyperactive (agitated and restless)
  - $\triangle$  Distracted
  - $\triangle$  Pulling lines out, picking at linen
  - $\triangle$  Combative
  - $\triangle$  Startled
  - $\triangle$  Wandering
- 4 22% of ICU patients
- Easily recognized
- ▲ Better prognosis





Holle Cl, et al. Nursing Management. March 2018 la Cour, K.N., et al. *Crit Care* **26**, 53 (2022).

#### Hypoactive Delirium

- ▲ Hypoactive (flat affect)
  - $\triangle$  Apathy
  - $\triangle$  Lethargy
  - $\triangle$  Decreased responsiveness
  - △ Disengaged/withdrawn
  - $\triangle$  Decrease motor activity
  - $\triangle$  "pleasantly confused"

▲ 50% of ICU patients
▲ Hard to diagnosis
▲ ↑ in pts > 65yrs old







la Cour, K.N., et al. Crit Care 26, 53 (2022).

#### la Cour, K.N., et al. Crit Care 26, 53 (2022).

# Mixed Delirium

Mixed hyper/hypoactive states, where patients fluctuate among these states





#### Melissa and Doug's Story: Live After the ICU



<u>http://www.icudelirium.org/testimonials.html</u>



#### Patient Risk Factors

- ▲ Immobility<sup>1</sup>
- A Number of days on mechanical ventilation<sup>1</sup>
- ▲ Length of stay in the ICU<sup>1</sup>
- ▲ Heavy sedation<sup>1</sup>
- ▲ Age >65 & >85<sup>4</sup>
- ▲ Surgery<sup>4</sup>
- ▲ Fracture<sup>4</sup>
- ▲ Sepsis<sup>2</sup>
- ▲ Severity of illness<sup>2,3</sup>





1. Brummel NE, Balas MC, Morandi A, et al: Crit Care Med 2015; 43:1265–1275

- 2. Desai SV, Law TJ, Needham DM:. Crit Care Med 2011; 39:371–379
- 3. Lee M, et al. Aust Crit Care. 2020;33(3):287-294.
- 4. Holle Cl, et al. Nursing Management. March 2018



## **Delirium Impact for Medical Surgical Patients**

- ▲ Physical & cognitive decline
- Increased institutionalization
- \Lambda Higher mortality
- \Lambda Long term cognitive decline
- A Higher rate of falls
- \land 个 LOS



## **Recognition & Prevention is Key**



Minimizing Risk Factors



## **Blending Priorities**

Clinical implementation of PADIS guidelines

Inter-professional Team development

The ABCDEFBundle for the ICU

Delirium Prevention for Medical Surgical Areas

#### Interventions for Delirium

- \Lambda In ICU: A-F bundle
- \Lambda Pain management
- \Lambda Mobility
- \Lambda Constipation relief
- A Nutrition and fluid repletion
- Sensory assistive devices (vision and hearing)
- Cognitive stimulation/rehabilitation

# Delirium: First Focus on Prevention

- A Pain and sedation scores
- Analgesia and Sedative Algorithm
  - $\triangle$  Control pain first, then anxiety
  - △ Use intermittent meds first before continuous
- ▲ Target RASS + 1 to -1
- Daily SAT (spontaneous awakening trial)
- Daily SBT (spontaneous breathing trial)
- Implement non-pharmacological strategies



## ASSESS, PREVENT & MANAGE PAIN





#### **Recommendations/Guidelines**

**Society of Critical Care Medicine** 

August 2018

- ▲ Severe pain negatively effects ICU patients
- Vital Signs and behaviors are flags to investigate.
- Recommend use of a protocol-based pain assessment and management program
- \Lambda Treat pain first

Use a valid and reliable assessment tool

Numeric

СРОТ

**Behavioral Pain Scale** 

#### The American Society of Pain Management Nursing

July 2011

- Inability to self report = lack of recognition
- A Poor pain control
- ▲ Vital signs are not "sensitive"

# CPOT is acceptable for the critically ill/unconscious

#### Critical Care Pain Observation Tool (CPOT)

Indicator	Description	Score	
Facial expression	No muscular tension observed	Relaxed, neutral	0
	Presence of frowning, brow lowering, orbit tightening, and levator contraction	Tense	1
	All of the above facial movements plus eyelid tightly closed	Grimacing	2
Body movements	Does not move at all (does not necessarily mean absence of pain)	Absence of movements	0
	Slow, cautious movements, touching or rubbing the pain site, seeking attention through movements	Protection	1
	Pulling tube, attempting to sit up, moving limbs/ thrashing, not following commands, striking at staff, trying to climb out of bed	Restlessness	2
Muscle tension	No resistance to passive movements	Relaxed	0
Evaluation by passive flexion and	Resistance to passive movements	Tense, rigid	1
extension of upper extremities	Strong resistance to passive movements, inability to complete them	Very tense or rigid	2
Compliance with the ventilator (intubated patients)	Alarms not activated, easy ventilation	Tolerating ventilator or movement	0
	Alarms stop spontaneously	Coughing but tolerating	1
OR	Asynchrony: blocking ventilation, alarms frequently activated	Fighting ventilator	2
Vocalization (extubated patients)	Talking in normal tone or no sound	Talking in normal tone or no sound	0
	Sighing, moaning	Sighing, moaning	1
	Crying out, sobbing	Crying out, sobbing	2
Total, range			0-8



#### **Common Barriers to Implementation**

- ▲ Inappropriate skill mix, lack of equipment
  - △ No equipment required, already available in EMR
  - △ RN will perform
- A Peer group barriers
  - Surveyed nursing staff
  - Potential confusion using a 0-8 and 0-10 scale by members of health care team
- ∧ Knowledge, attitude & skill
  - $\triangle$  VS not predictive of presence of pain—common current belief
  - △ CPOT not a severity of pain scale like the 0-10 self report scale
  - $\bigtriangleup$  Pain contributes to agitation & delirium so treat first
- ▲ Communication/teamwork
  - $\bigtriangleup$  Healthcare team application of CPOT into daily practice



#### Over Arching Pain Management: Acute Care Patients

- Initial treatments may include nonpharmaceutical interventions (e.g., physical therapy, ice, and immobilization), nonopioid analgesics, or a combination of nonopioid treatments.
- ▲ If these approaches are effective in relieving the acute pain within the projected healing period for that condition, opioids may not be necessary.
- Surgical: Programs such as enhanced recovery and implementing the wider use of nonopioid and multimodal analgesia

National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Health Care Services; Committee on Evidence-Based Clinical Practice Guidelines for Prescribing Opioids for Acute Pain. Framing Opioid Prescribing Guidelines for Acute Pain: Developing the Evidence. Washington (DC): National Academies Press (US); 2019 Dec 19. 2, Managing Acute Pain. Available from: https://www.ncbi.nlm.nih.gov/books/NBK554977/

#### Agitation



#### A Light sedation suggested:

- △ Sedative medications should be titrated to maintain **lighter** levels of sedation, unless clinically contraindicated.
- △ Use daily awakening or a titrated sedation strategy to maintain patient wakefulness.

#### ▲ Choice of sedative:

△ Suggest using propofol or dexmedetomidine over benzodiazepines to improve clinical outcomes in mechanically ventilated ICU patients.

#### ▲ Cardiac surgery patients

△ Suggest using propofol over a benzodiapine



#### Agitation

- Assess q 4hrs or prn with change in dose or patients' condition
- Use validated tool (RASS or SAS)
- RASS target -1 to +1
- SAS target 3 to 4



#### **RICHMOND AGITATION SEDATION SCALE (RASS)**

+ 4	Combative, violent, danger to staff
+ 3	Pulls or removes tube(s) or catheters; aggressive
+ 2	Frequent nonpurposeful movement, fights ventilator
+1	Anxious, apprehensive, but not aggressive
0	Alert and calm
- 1	awakens to voice (eye opening/contact) >10 sec
- 2	light sedation, briefly awakens to voice (eye opening/contact) <10 sec
- 3	moderate sedation, movement or eye opening. No eye contact
- 4	deep sedation, no response to voice, but movement or eye opening to physical stimulation
- 5	Unarousable, no response to voice or physical stimulation

#### **RASS goal for most patients -1 to +0**



https://www.sccm.org/ICULiberation/Home/ABCDEF-Bundles Under Celement

## Delirium Assessment & Management

- Delirium Assessment:
  - ICU-CAM
  - ICU Delirium Screening Checklist
- Frequency:
  - Q shift & prn

#### Confusion Assessment Method in the ICU



# Screen for delirium: upon admission, every shift and with change in condition-Med-Surg areas

#### Brief Confusion Assessment Method (bCAM) Flow Sheet



### Delirium Screening bCAM

- bCAM is the assessment tool used for adult patients in the non-critical care areas and should be performed at least once per shift (shift may be 4 hour, 8 hour or 12hours) and prn with changes in the patient's condition, mentation or behavior.
- The bCAM assesses for the presence of 3 out of 4 features.
  - an acute change or fluctuations in a patient's mental status (feature 1),
  - inattention(feature 2),
  - and altered level of consciousness (feature 3)
  - and disorganized thinking(feature 4).
- Features 1 & 2 must be present and then in addition feature 3 or 4 for the patient to screen positive for delirium

Delirium can only be assessed for patients who are arousable to verbal stimuli. If you can only get the patient to open their eyes to painful stimuli or if the patient does not respond to pain, then the patient is considered to be in a stupor or coma and cannot be assessed for delirium.

#### bCAM

# Step 1: Assess for Altered mental status or Fluctuating Course

- Assess for a change or fluctuation mental status by answering the question " Is there an acute change from the patient's baseline mental status" meaning are they different from how they usually are prior to this admission. Consider the baseline their normal mental status, not how they appeared 'yesterday'
- If the patient does not have an acute change from their baseline they are bCAM negative and they do not have delirium. The bCAM screen is complete.
- For patients whose admission is related to a neurologic injury (eg: stroke, traumatic brain injury, drug overdose, anoxic brain injury) they are assessed for their "new normal", not how they were previous to their neurologic injury.
- If the patient DOES have a change or fluctuating mental status, assess Step 2

#### bCAM Step 2: Assess for Inattention

- Assess for inattention by asking the patient to recite the months backwards from December to July
- Scoring:
- Non-delirious patients should be able to recite the months backwards without stopping. If there is a significant pause (>15 seconds or if the patient perseverates on a specific month for a significant amount of time (>15 seconds), then the task can be stopped.
- Each missing month is assigned one error
- If a patient switches two months (December, October, November, September, August, July, then this is counted as two errors since tow of the months are in the incorrect order
- A patient is considered to have inattention (feature 2 positive) if they make 2 or more errors.
- If the patient refuses to recite the months backwards or is unable to perform this task, then the patient is considered to have made 6 errors and is feature 2 positive.

Other signs of inattention:

- Patients who are easily distractible or have difficulty keeping track of what you say are likely inattentive
- If you frequently have to repeat your questions to the patient and he/she does not have a history of hearing impairment, then
  the patient is likely inattentive
- Patients who fall asleep during your assessment are likely inattentive





bCAM

#### Step 3: Assess for Altered Level of Consciousness

- Does the patient have a Richmond Agitation and Sedation Scale (RASS) score other than 0?
- IF the RASS is anything other than 0, they are bCAMpositive, the patient is delirious and the screen is complete.
- If the RASS is 0 continue to Step 4 (to test for feature 4)

Score	Term	Description		_
+4	Combative	Overtly combative, violent, immediate danger to staff		
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive		
+2	Agitated	Frequent non-purposeful movement, fights ventilator		
+1	Restless	Anxious but movements not aggressive vigorous		
0	Alert and calm			
-1	Drowsy	Not fully alert, but has sustained awakening	)	
		(eye-opening/eye contact) to voice (≥10 seconds)	L	Verbal
-2	Light sedation	Briefly awakens with eye contact to voice (<10 seconds)	ŕ	Stimulation
-3	Moderate sedation	Movement or eye opening to voice (but no eye contact)	J	
-4	Deep sedation	No response to voice, but movement or eye opening	í	
		to physical stimulation	Ļ.	Physical Stimulation
-5	Unarousable	No response to voice or physical stimulation	J	Camalation

#### Procedure for RASS Assessment

1. Observe patient

a. Patient is alert, restless, or agitated.	(score 0 to +4)
---	-----------------

- If not alert, state patient's name and say to open eyes and look at speaker.
  - b. Patient awakens with sustained eye opening and eye contact. (score -1)
  - c. Patient awakens with eye opening and eye contact, but not sustained. (score -2)
  - d. Patient has any movement in response to voice but no eye contact. (score -3)
- When no response to verbal stimulation, physically stimulate patient by shaking shoulder and/or rubbing sternum.
  - e. Patient has any movement to physical stimulation. (score -4)
  - f. Patient has no response to any stimulation. (score -5)

### bCAM Step 4: Assess for Disorganized thinking

- Ask the patient the following questions:
  - Will a stone float on water?
  - Are there fish in the sea?
  - Does one pound weigh more than two?
  - Can you use a hammer to pound a nail?
- Then ask the patient to follow this command: "hold up this many fingers " (hold up 2 fingers) "Now do the same thing with the other hand" (do not demonstrate) OR can request they "add one more finger" if the patient is unable to move both arms
- No errors is bCAM negative (patient does not have feature 4), patient is not delirious and the screen is complete.
- Any error is bCAM positive, the patient has screened positive and is delirious.

	Delirium	Dementia	Depression
Onset:	Rapid	Slow	Recent Onset
<b>Reversible:</b>	Can be	Νο	Yes
Deficit:	Global Cognition Inattention, nonsense talk	Global Cognition memory loss, speech loss	Poor Concentration and poor effort on questioning
Etiology:	DIMMAND	Alzheimers, Vascular, Korsakoff's etc.	Familial, Stress Etc.
Course:	Acute and fluctuating	Progressive	Acute on chronic
Hallucinations:	Usually Visual	Often absent	Auditory Predominant
<b>Delusions:</b>	Fleeting, poorly systematized	Often absent	Often absent
Orientation:	Usually impaired at least for a time	Often impaired	Can be impaired
Degree of Cognitive Impairment:	Significant, acute, and fluctuating	Variable, but evident on exam	Often mild, recent onset and subjective in nature



Delirium Management

- Stop, THINK, and medicate
  - △ Stop: directs clinicians to assess prior to any intervention
  - $\triangle$  THINK:
  - △ Medicate: this should be the last intervention

**T**: Toxic situations H: Hypoxemia I: Infection/sepsis, immobilization N: Nonpharmacological interventions **K**: Electrolyte problems

According to a new meta-analysis, the best thing to do for a patient with hyperactive delirium is to:

- A. Treat with Ativan
- B. Treat with Versed
- c. Treat with Haldol
- D. Treat with risperidone
  - Let them sleep & "ride it out"


# **Medication Management of Delirium!**

- ▲ Meta-analysis 19 studies
- ▲ 10,877 patients
- ▲ Anti-psychotics vs. placebo
- \Lambda Haloperidol, Risperidone, Quetiapine

#### B Delirium Duration in Hospitalized Patients

	Antipsychotics		Control			Mean Difference			
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	N
Devlin 2010	1.8	1.8	18	5.1	3.5	18	11.4%	-3.30 [-5.12, -1.48]	
Girard 2010	5.1	4	30	4.8	4	18	8.9%	0.30 [-2.04, 2.64]	
Girard 2010	4.9	3.7	35	4.8	4	18	9.4%	0.10 [-2.12, 2.32]	
Hakim 2012	3	1.5	51	3	0.8	50	19.1%	0.00 [-0.47, 0.47]	
Han 2004	4.2	2.5	12	4.2	2.1	12	11.3%	0.00 [-1.85, 1.85]	
Kalisvaart 2005	5.4	4.9	32	11.8	7.5	36	6.6%	-6.40 [-9.38, -3.42]	
Larsen 2010	2.2	1.3	28	1.6	0.7	82	18.9%	0.60 [0.10, 1.10]	
Page 2013	5.3	3.8	71	5.3	4.1	70	14.4%	0.00 [-1.31, 1.31]	
Total (95% CI)			277			304	100.0%	-0.65 [-1.59, 0.29]	
Heterogeneity: Tau <sup>2</sup> =	1.14; Ch	$i^2 = 35$	5.67, df	= 7 (P <	0.00	001); P	<sup>2</sup> = 80%		-4
reactor overall energy		0.00							Favor Antipsy



#### c Delirium Severity in Hospitalized Patiens

	Antips	ychot	ics	C	ontro			Std. Mean Difference	Std. Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	IV, Random, 95% CI
Breitbart 1996	11.6	6.1	11	11.9	6.7	13	8.0%	-0.05 [-0.85, 0.76]	-
Grover 2011	10.1	6.4	10	11.7	7.2	21	8.4%	-0.22 [-0.98, 0.53]	
Grover 2011	10.1	6.4	10	12	6.8	23	8.5%	-0.28 [-1.02, 0.47]	
Han 2004	21.8	4.4	12	23.5	4.2	12	7.9%	-0.38 [-1.19, 0.43]	
Kalisvaart 2005	14.4	3.4	32	18.4	4.3	36	11.3%	-1.01 [-1.52, -0.51]	-
Larsen 2010	16.4	3.7	28	14.5	2.7	82	12.1%	0.63 [0.20, 1.07]	
Maneeton 2013	-21.7	6.7	28	-22.9	6.9	24	10.8%	0.17 [-0.37, 0.72]	+-
Tahir 2010	7.1	3.3	21	7.4	3.3	21	10.1%	-0.09 [-0.69, 0.52]	-
Yoon 2013	8.5	4.6	7	8.8	6	18	7.3%	-0.05 [-0.92, 0.82]	
Yoon 2013	8.5	4.6	8	9.8	6.7	21	7.8%	-0.20 [-1.02, 0.61]	
Yoon 2013	8.5	4.6	8	7.6	3.7	18	7.7%	0.22 [-0.62, 1.05]	
Total (95% CI)			175			289	100.0%	-0.11 [-0.43, 0.22]	+
Heterogeneity: Tau <sup>a</sup> =	= 0.18; Ch	i² = 25	.55, df	= 10 (P	= 0.0	04); I <sup>2</sup> :	= 61%		
Test for overall effect	Z = 0.65	(P = 0.	52)						Favor Antipsychotics Favor Control

# **Medication Management of Delirium**



 Total (95% Cl)
 655
 745
 100.09

 Heterogeneity: Tau<sup>2</sup> = 0.38; Chi<sup>2</sup> = 76.26, df = 7 (P < 0.00001); l<sup>2</sup> = 91%
 Test for overall effect: Z = 1.28 (P = 0.20)



Neufeld KJ, et al. J Am Geriatr Soc. 2016;64(4):705-714.

# Non-Pharmacological Strategies<sup>1,2</sup>

### **Sleep Promotion**

- Appropriate Medications
- \Lambda Bath during day
- Chair position
- \Lambda Lighting
- \Lambda Television
- A Hearing/Vision Aids/Dentures
- \Lambda Control Noise

#### Other

- ▲ Cognitive Stimulation/Music
- A Familiar objects in room/pictures

#### **Mobility Promotion**

- Evaluate for Physical Therapy
- A Range of Motion
- \Lambda Sleep
- \Lambda 🛛 Work with PT
- Spontaneous Awakening Trial

### **Sedation Interruption**

- Sleep Promotion
- \land Mobility



- Liang S, et al. BMC Nursing. 2022;21(1):235
- 2. Devlin J. Crit Care Med. 2018 Sep;46(9):e825-e873

## Effectiveness of Multicomponent Nonpharmacological Delirium Interventions: A Meta-analysis

able 1. Characteri	stics of Studies								
		Study	n	Mean					
Sourc							ons <sup>b</sup>		
ndro 12							H, V, W)		
abin 013 rates							H, P, V, W)		
bos Evid	ence-based	non	pharmacologi	cal in <sup>.</sup>	terventions		P, W)		
ogar 003 inclu	ide the follo	win	g:				H, P, V, W)		
aplar arpe 007 hen (H),	nition or orio sleep-wake	enta cycle	tion (C), early e preservation	mobi (P), a	ility(E), hear and hydratio	ring on	v, w)		
olt e (W)	ite (W)								
iouye 999 Jates 2ffs e 013							H, P, V, W)		
ratz, 008 (United tates)	Nonrandomized cunicat trial (non-RMT)	30	Medical/surgical (n = 137)	≥70.0	1/6 (0)	6/6 (C, E	, H, P, V, W)		
undström et al, <sup>17</sup> 007 (Sweden)	Randomized clinical trial (RMT)	32	Surgical (n = 199)	82.2	5/6 (A, I, O, S, X)	1/6 (E)			
lartinez et al, <sup>32</sup> 012 (Chile)	Randomized clinical trial (RMT)	9	Medical (n = 287)	78.2	6/6 (A, B, I, O, S, X)	3/6 (C, H	i, v)		
tenvall et al, <sup>18</sup> 007 (United tates)	Randomized clinical trial, single-blind (RMT)	32	Surgical (n = 199)	82.2	5/6 (A, B, I, S, X)	3/6 (E, H	ł, P)		
11	Nonrandomized clinical	18	Medical/geriatric (n = 542)	84.0	1/6 (0)	6/6/C 0			

Abbreviation: RMT, randomized or matched trial.

<sup>a</sup> Quality measures include the following: allocation concealment (A); blinding of participants, personnel, and outcome assessors (B); completeness of outcome data (I); selective outcome reporting (O); random-sequence generation or balanced allocation (S); and other sources of bias (X).

<sup>b</sup> Evidence-based nonpharmacological interventions include the following: cognition or orientation (C), early mobility (E), hearing (H), sleep-wake cycle preservation (P), vision (V), and hydration (W).



## Effectiveness of Multicomponent Nonpharmacological Delirium Interventions A Meta-analysis

**Delirium Incidence**:

 11 studies, involved 4267 patients that showed odds of delirium were 53% lower in the intervention group compared with control;

NNT:14.3

Delirium Incidence	Odds Ratio (95% CI)	Decreased delirium delirium Incidence favors Incidence favors favors control	w
Andro et al, <sup>27</sup> 2012	0.36 (0.15-0.89)		
Bo et al, <sup>28</sup> 2009	0.39 (0.17-0.93)		
Caplan and Harper, <sup>20</sup> 2007	0.11 (0.01-0.99)		
Chen et al, <sup>16</sup> 2011	0.03 (0.00-0.44)		
Holt et al, <sup>29</sup> 2013	0.31 (0.13-0.74)		
Inouye et al, <sup>5</sup> 1999	0.62 (0.41-0.94)	-	
Jeffs et al, <sup>30</sup> 2013	0.79 (0.40-1.57)		
Kratz, <sup>31</sup> 2008	0.35 (0.09-1.39)		
Lundström et al, <sup>17</sup> 2007	0.42 (0.21-0.80)		
Martinez et al, <sup>32</sup> 2012	0.38 (0.16-0.91)		
Vidán et al, <sup>26</sup> 2009	0.59 (0.34-1.00)		
Fixed-effect model: P<.001	0.47 (0.38-0.58)	•	
Heterogenelty: I <sup>2</sup> = 18%, P = .27	NNT = 14.3 (95% CI, 11.1-20.0)		
			10

Hshieh, T et al JAMA Internal Medicine 2015;175(4):512-520

#### A MULTICOMPONENT INTERVENTION TO PREVENT DELIRIUM IN HOSPITALIZED OLDER PATIENTS

- **Sample:** studied 852 patients of 70 years of age or older who had been admitted to a medical-surgical units at a teaching hospital
- Interventions: standardized protocols of the management of six risk factors for delirium: cognitive impairment, sleep deprivation, immobility, visual impairment, hearing impairment and dehydration
- **Results:** Delirium developed in 9.9% of the intervention group, as compared with 15.% of the usual-care group. Total number of days with delirium (105 vs 161 p=0.02) and total number of episodes (62 vs 90 p=0.03). Overall rate of adherence was 87%



# Normal Sleep

- ▲ REM: 20-25%
- A NREM-changes through life
  - $\triangle$  Light
  - △ Deep
- ▲ Sleep-wake cycle
  - $\triangle$  Circadian rhythm
    - Dark/light
    - Melatonin
  - $\triangle$  Homeostatic control
    - Temperature
    - Glucose
    - Blood pressure

## Do you have insomnia?

#### **EEG RECORDINGS DURING SLEEP**



Weinhouse G, et al. In ICU Liberation 2<sup>nd</sup> 2020 SCCM Amutair AL Dimension in Critical Care 2020;39(4):203-208

# Sleep Time in the Hospital

## A Hospital Sleep

- △ Overall sleep time reduced
- △ ↓ sleep efficacy & ↑ sleep fragmentation

## ▲ ICU Sleep

- A Highly fragmented
- △ Frequent arousals
- △ Poor nocturnal sleep efficiency
- $\land \uparrow$  in stage 2 (N2) sleep
- △ ↓ or absence of deep or slow wave (N3) sleep
- △ ↓ or absence of rapid eye movement (REM) sleep
- △ 40 to 60 percent of sleep occurring during typical waking daytime hours for ICU patients

# Risk Factors for Sleep Disruption the Hospital



# Impact of Common Medications on Stage of Sleep

Medication Class	Effect on REM	Effect on NREM
Antidepressants	Ļ	1 N2
benzodiazepine's	Ļ	<b>1</b> N2
Alpha agonists (dexmedetomidine)	Ļ	<b>1</b> N3
Opioids	Ļ	📕 N3
Typical antipsychotics	📕 mild	1 mild
Atypical Antipsychotics (risperidone)		<b>1</b> N3
Corticosteroids	Ļ	Ļ
Vasopressors	Ļ	
Melatonin	No effect	No effect on N2 or N3

Weinhouse G, et al. In ICU Liberation 2nd 2020 SCCM

# Physiological & Psychological Consequences of Poor Sleep

## A Respiratory function

- △ Hypoxic and hypercapnic chemosensitivity
- △ Impaired control of ventilation
- △ Inspiratory muscle endurance
- △ ICU: late noninvasive ventilation failure and prolonged weaning times

#### Immune function, Inflammation & Metabolism

- △ Impaired immune function
- △ Heightens inflammatory response
- △ Delayed wound healing process
- △ Disruption in metabolism regulated hormones

#### Cognitive and neurobehavioral consequences

- △ NREM-3 important for memory and severely impaired in ICU sleep
- NREM & REM impaired sleep could render patients more suspectable to delirium
- △ Associated with delirium

https://www.uptodate.com/contents/poor-sleep-in-the-hospital-contributing-factors-and-interventions Amutair AL Dimension in Critical Care 2020;39(4):203-208 Weinhouse G, et al. In ICU Liberation 2nd 2020 SCCM

# Pharmacology and Sleep

- Melatonin and melatonin receptor agonists
  - △ Improvements in sleep and sleep quality with 1 to 5 mg of melatonin at night.
  - △ Melatonin is well tolerated, and proper timing of the dose may help to regulate circadian rhythms.
- A typical dose is 1 to 3 mg scheduled at 9 to 10pm
  - △ Immediate release melatonin preparations should be given 30 to 60 minutes before bedtime
  - $\triangle$  Sustained release preparations should be given one to two hours before bedtime.
  - A Ramelteon: mixed results



#### PADIS no recommendation for or against use

Weinhouse G, et al. In ICU Liberation 2nd 2020 SCCM <u>https://www.uptodate.com/contents/poor-sleep-in-the-hospital-contributing-factors-and-interventions</u>

# Pharmacology and Sleep

## \Lambda Dexmedetomidine

- △ May be the least harmful sedate if medication with regards to sleep
- △ Increases stage 2 NREM sleep and may reduce the incidence of delirium

- ADIS guideline recommendation
  - We make no recommendation regarding the use of dexmedetomidine at night to improve sleep
  - △ If a sedated infusion is indicated for hemodynamically stable critically ill adults overnight , dexmedetomidine may be a reasonable option

## Non-Pharmacological Sleep Promotion

# Nursing Care



# Non-Pharmacological Sleep Promotion

- A Noise reduction
  - Ear plugs/mask for patients
  - Improved patient-reported sleep quality.
  - Reduced delirium
  - 20% increased chance of achieving 4 hours of sleep
  - Sound masking (white noise)
  - △ Installing sound proofing acoustic materials
  - △ Behavioral modifications
    - "quiet time" protocols
    - Traffic light







PADIS Recommendation: We suggest using noise and light reduction strategies to improve sleep in critically ill adults.

Devlin, JW, et al. Crit Care Med 2018; 46; e825-873 Hu RF, et al *Cochrane Database Syst Rev*. 2015;2015(10):







Blue light is very important in regulating circadian rhythm

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# Additional Interventions

- A Reducing nighttime interruptions
  - △ 49 percent reduction in asneeded sedatives as part of a comprehensive plan included reduced interruptions
  - △ May not improve overall quality of sleep
  - $\triangle$  More studies needed
  - $\bigtriangleup$  Care to be individualized

### ▲ Relaxation techniques

- $\triangle$  Low quality evidence
- △ Music, massage, guided imagery, and aromatherapy achieve minor improvements in subjective or nurse-determined sleep quality and duration
- △ Given the safety and relatively low cost of many of these interventions (eg, music), implementation is worth considering on a case-by-case basis.

# Multi Modal Intervention

- Multifaceted protocols aimed at improving sleep and decreasing use of sedative-hypnotic sleep aids have shown promise in the literature
- A Programs require broad cultural and behavioral shifts
  - $\bigtriangleup$  Ensuring adherence to interventions
  - △ Most effective strategies combine efforts to create a more sleepconducing inpatient environment with healthcare staff education and feedback



Kamdar BB, et al. Am J Med Qual. 2014 Nov-Dec;29(6):546-54. Epub 2013 Nov 22 Milani RV, et al. Am J Med. 2018;131(8):961. Devlin, JW, et al. Crit Care Med 2018; 46; e825-873

# **Sleep Protocols**

- A Before & after studies
- Showed delirium reduction
- A PADIS Recommendation: We suggest using a sleep-promoting, multicomponent protocol in critically ill adults. (Conditional recommendation)





## Components of Sleep Protocol

- ▲ Sleep assessment
- ▲ Optimizing the environment
  - $\triangle$  Control of light & noise
- ▲ Cluster care activities
- ▲ Decrease stimuli at night
  - △ Ear plugs, eye mask, music, relaxation techniques
  - $\triangle$  Passive VS monitoring
- ▲ Increase activity during the day

Individualize to patients needs and previous sleep patterns

Sleep Assessment

- \Lambda On Admission
  - $\triangle$  Normal sleep hours
  - $\triangle$  Sleep comorbidities
  - $\bigtriangleup$  Use of sleep aids
    - Pharmacological
    - Nonpharmacological

# \Lambda Daily

0	10
Worst	Best
Night	Night

- What woke you up: pain, anxiety, noise, light, staff, other
- Consider using Richards-Campbell
   Sleep Questionnaire



# Multidisciplinary Team

- A Nurse lead QI initiative
- A Representative member from each discipline (include night shift staff)
- A Review the PADIS guideline section on Sleep & additional literature
- Identify and address barriers to implementation
- ▲ Measure impact
  - △ Process: checklist of interventions
  - △ Outcomes: (sleep questionnaire, delirium status, RAAS level



# **Creating an Environment Conducive to Sleep**

## \Lambda Daytime

- $\triangle$  Raise blinds
- $\triangle$  Lighting: natural blue light
- $\triangle$  Minimize caffeine
- △ Patient mobilization
- $\bigtriangleup$  Activities to prevent napping

In <u>stable patients</u>, define a period of protected time at night available for tailored sleep promotion 6hr/4hr minimum

#### ▲ Nighttime

- △ Close room curtains
- △ Dim room lights/Use red lights or flashlights if possible when entering rooms or troubleshooting equipment.
- △ Prevent unnecessary alarms
- △ Minimize nurse interventions
- $\triangle$  Warm bath before 10:00 PM
- △ Turn off television
- $\triangle$  Control pain
- △ Optimize temperature
- Cluster medication administration

# What Does Minimize Nursing Interventions Mean?

- Mhen do baths normally occur in your unit?
- Mhen are chest x-rays done in your unit?
- Mhen is daily lab draws done in your unit ?
- Mhat activities can be coordinated together to reduce interruptions?
  - $\triangle$  Assess for suctioning
  - $\triangle$  Turning
  - △ Oral hygiene
  - $\triangle$  Vital signs (if automatic cuff)



# What I Can Do Individually

- ▲ Ask the patient or family usual sleep/bedtime routine
- A Request ear plugs and eye masks for the unit (to be used based on patient preference
- Schedule care interruptions in > 120-minute blocks or longer if possible
- A Perform fundamental nursing care activities prior to 10pm (i.e bath)
- A Environmental actions:
  - △ Individual patient room: close room curtain, dim lights, turn off television, manage pain, optimize room temperature
  - △ Unit: dim hallway lights, address sources of loud noise

## Make it the New Way to Do Business!!!

- Conduct in service sessions regarding the evidence to support sleep interventions
- A Develop the protocol (individualize as appropriate)
- Mork with other departments in rearranging timing of care interventions (e.g. X- Ray, lab)
- Solution A Construction A Constru
- Incorporate into orientation
- Continue to measure till part of the new routine



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# Skill Lab Ideas

- ▲ Agitation Assessment
- ▲ Delirium Assessment



# Mobility is Medicine



# Effects of Immobility on Respiratory Function

- A Decreased movement of secretions
- A Decreased respiratory motion
- Increased risk of pulmonary embolism
- Increased dependent edema
- Increased risk of atelectasis
- Increased risk of pneumonia
- A Decreased arterial oxygen saturation





## Effects of Immobility on Cardiovascular Function

🛕 Fluid shift

- $\bigtriangleup$  Occurs when the body goes from upright to supine position^{1,2}
- △ 10% of total blood volume is shifted from lower extremities to the rest of the body; 78% of this is taken up in the thorax<sup>3,4</sup>
- $\triangle$  Decreased blood volume (~15% of plasma volume is lost after 4 weeks of bed rest)<sup>2</sup>
- Cardiac effects
  - △ Increased resting heart rate (an increase of ~10 beats/min is observed after 4 weeks of bed rest)<sup>1,2</sup>
  - $\triangle$  Cardiac deconditioning<sup>2</sup>
- A Orthostatic intolerance
  - △ Increased in bedridden patients due to decreased baroreceptor sensitivity, reduced blood volume, cardiac deconditioning, decreased venous return and stroke volume, and venous distensibility<sup>1,2</sup>



## Effects of Immobility on Integumentary Function

- NDNQI data base: critical care: 7% med-surg: 1-3.3%
- Most severe pressure ulcer: sacrum (44.8%) or the heels (24.2%)
- Pressure ulcers cost \$9.1-\$11.6 billion per year in the US.
  - Cost of individual patient care ranges from \$20,900 to \$151,700 per pressure ulcer
  - 17,000 lawsuits are related to pressure ulcers annually

Hospital-acquired conditions. Centers for Medicare & Medicaid Services website. http://www.cms.gov/HospitalAcqCond/06\_Hospital-Acquired\_Conditions.asp. Accessed 6/24/2020. Jankowski IM, Nadzam DM. *Jt Comm J Qual Patient Saf*. 2011;37:253-264. http://qualityimprovementrcpi.blogspot.com/2014/01/pressure-ulcers-prevalence-and.html

## **Skeletal Muscle Deconditioning**

- △ What % of skeletal muscle strength do we lose daily with bedrest?
  - $\triangle$  1-1.5% per day
- ▲ Without activity the muscle loses protein
- A Healthy individuals on 5 days of strict bed rest develop insulin resistance and microvascular dysfunction
- 2 types of muscle atrophy
  - $\triangle$  Primary: bed rest, space flight, limb casting
  - $\triangle$  Secondary: pathology



# **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 if bedrest occurs



How much reconditioning is needed after 1 day of bedrest to restore baseline muscle strength?

## 2 weeks!!

Siebens H, et al, J Am Geriatr Soc 2000;48:1545-52 Topp R et al. Am J of Crit Care, 2000;13(2):263-76 Wagenmakers AJM. Clin Nutr 2001;20(5):451-4 Candow DG, Chilibick PD J Gerontol, 2005:60A:148-155 Berg HE., et al. J of Appl Physiol, 1997;82(1):182-188 Hamburg NM,. Arterioscler Thrombo Vasc Biol, 2007;7(12):2650-2656 DeJonnge B, et al. Crit Care Med, 2007;39:2007-2015 Zhang et al. 2008 GenomProtBioinf: 6Kortebien et al. 2008 JGerontolMedSci: 63)




We put patient safety above all else

Northampton General Hospital

Ten days in hospital leads to...

...the equivalent of ten years ageing in the muscles for people over 80

Providing

the Best

Possible

Care

\*Functional impact of 10 days of bed rest in health older adults, J Gerontol A Biol Sci Med Sci. 2008

# 2Green

#Last1000days

Ask your ward manager for a RED to GREEN information pack Download the SAFER guidelines from the intranet homepage Contact Christopher Field@ngh.nhs.uk ext/3470

# Cumulative Impact on Quality of Life

- "New Walking Dependence" occurs in 16-59% in older hospitalized patients<sup>1</sup>
- 65% of patients had a significant functional mobility decline by day 2<sup>2</sup>
- 27% still dependent in walking 3 months post discharge<sup>1</sup>





Average ICU patients spends how much time in bed?

99% - 100%

Average medical-surgical patient spends how much time sitting or in bed?

87% - 100%

Fazio S, et al. Applied Nursing Research. 2020;51

# **Outcomes of Early Mobility Programs**

- $\land \downarrow$  incidence of VAP<sup>1</sup>
- $\checkmark$   $\downarrow$  time on the ventilator<sup>2,3,4</sup>
- $\land \downarrow$  days of sedation<sup>4</sup>
- $\checkmark$   $\downarrow$  incidence of skin injury<sup>5</sup>
- ▲ ↓ delirium<sup>4</sup>
- ▲ ↑ ambulatory distance<sup>6</sup>
- $\land$   $\uparrow$  function<sup>4</sup>
- $\land \downarrow$  in hospital readmissions<sup>5</sup>
- $\land \downarrow$  ICU & hospital LOS<sup>3</sup>



- 1. Staudinger t, et al. Crit Care Med, 2010;38.
- 2. Bassett RD, et al. Intensive Crit Care Nurs, 2012 Apr;28(2):88-97
- 3. Morris PE, et al. Crit Care Med, 2008;36:2238-2243
- 4. Schweickert WD, et al. Lancet, 373(9678):1874-82.
- 5. Azuh O, et al. Am J Med. 2016;129(8):866-871.
- 6. Pohlman MC, et al. Crit Care Med, 2010;38:2089-2094



# IF AT FIRST YOU DON'T SUCCEED, YOU'RE RUNNING ABOUT AVERAGE

# Systematic Review of Inpatient Mobilization

- Literature review of research studies that provides evidence to the consequences of mobilizing or not mobilizing hospitalized adult patients
- 36 studies were included, studies showed strong quality
- Finding in four theme areas:
  - △ Physical outcomes include pain relief, reduced deep vein thrombosis, less fatigue, less delirium, less pneumonia, improved physical function (no relationship to falls)
  - $\triangle$  Psychological outcomes include less anxiety,  $\downarrow$  depressive mood,  $\downarrow$  distress symptoms,  $\uparrow$  comfort and  $\uparrow$  satisfaction
  - $\triangle$  Social outcomes include  $\uparrow$ quality of life and more independence
  - $\bigtriangleup$  Organizational outcomes include  $\downarrow length$  of stay,  $\downarrow mortality$  and  $\downarrow Cost$



#### How Do We Get It Done?



#### Assessment

- Assessing the patient's ability to move and how to safely move him/her before each mobility event is important for both patient and staff safety
- We want to use standard, validated, evidence-based tools to conduct assessments involving safe patient handling and mobility
- Different tools offer different advantages and provide a different piece of the clinical puzzle surrounding safe patient handling and mobility

# On Admission + Discharge 6 Clicks Mobility

A The 6 clicks tool is an abbreviated version of a therapy tool the Boston AM-PAC (activity measure for post-acute care) Boston University AM-PAC™ "6 Clicks" Basic Mobility Inpatient Short Form

Please check the box that reflects your (the patient's) best answer to each question.

1. Turning over in bed (including adjusting bedclothes, sheets and blankets)? <ul> <li>1</li> <li>2</li> <li>3</li> <li>4</li> </ul> 2. Sitting down on and standing up from a chair with arms (e.g., wheelchair, bedside commode, etc.) <ul> <li>1</li> <li>2</li> <li>3</li> <li>4</li> </ul> 3. Moving from lying on back to sitting on the side of the bed? <ul> <li>1</li> <li>2</li> <li>3</li> <li>4</li> </ul>	How much help from another person does the patient currently need	Total	ALot	A Little	None
<ul> <li>2. Sitting down on and standing up from a chair with arms (e.g., wheel chair, bedside commode, etc.)</li> <li>3. Moving from lying on back to sitting on the side of the bed?</li> </ul>	<ol> <li>Turning over in bed (including adjusting bedclothes, sheets and blankets)?</li> </ol>	1	2	3	4
3. Moving from lying on back to sitting on the side of the bed?	2. Sitting down on and standing up from a chair with arms (e.g., wheel chair, bedside commode, etc.)	<b>1</b>	2	□3	4
	3. Moving from lying on back to sitting on the side of the bed?	1	2	3	4

How much help from another person does the patient currently need	Total	ALot	A Little	None
4. Moving to and from a bed to a chair (including a wheelchair)?	<b>1</b>	2	3	4
5. Need to walk in hospital room?	<b></b> 1	2	□3	4
6. Climbing 3-5 steps with a railing?	<b></b> 1	2	□3	4



# Defining "Unable," "A lot," "Little," or "None"

- Unable = total assistance
- Total assistance: patient requires assistance from staff for 100% of the skill
- A lot = moderate or maximum assistance
  - Moderate assistance: patient can complete some of the activity independently but completes no more than 50% of skill independently
- Maximum assistance: patient requires assistance from staff for at least 75% of the skill
- Little = minimum assistance/supervision
  - Minimal assistance: patient can complete the majority of the activity without assistance but requires up to 25% assistance from staff (tactile cues)
  - Supervision: low probability of the patient having a problem performing the activity, but helper should be within arm's reach
- None = independent
- Independent: patient is consistently able to perform the activity safely on his/her own



# 6 Clicks Mobility Short Form

- The 6 clicks should be completed on admission and at discharge to perform a functional reconciliation
  - This will answer the question: "What function did the patient come into the hospital with and what function is he/she leaving the hospital with?"
- The tool does not have to be an assessment, you can verbally ask the patient
- Hint: this is helpful for the last question "How much help from another person does the patient currently need climbing 3-5 steps with a railing?"



# Consider Creating a Mobility Card

- A Mobility Card is meant to help walk you through the key steps of safe patient handling and mobility program (example)
  - Step One: ICU safety screen (only for ICU patients)
  - Step Two: BMAT (Bedside Mobility Assessment Tool)
  - Step Three: Mobility level and mobility plan for the shift
  - Step Four: Equipment selection



# BMAT—Bedside Mobility Assessment Tool

- A The BMAT has four functional assessments, assessing in order:
- Trunk strength and seated balance
- Lower extremity (ankle) strength and stability
- Lower extremity (quadriceps) strength for standing
- Standing balance and gait

*Functional Assessment	Pass	Fail
<ul> <li>Sit and Shake (trunk strength and seated balance) Instructions: Obtain necessary assistive device, cane or walker.</li> <li>1) From a semi-reclined position, ask patient to sit or assist the patient to the side of the bed. May use bed rail.</li> <li>2) Note patient's ability to sit for more than two minutes without caregiver assistance.</li> <li>3) Ask patient to reach out and grab your hand and shake making sure patient reaches across midline</li> </ul>	If patient can sit unassisted, reach across midline and shake your hand, continue to Stretch and Point Assessment *May assist patient to side of bed, but must then sit unassisted continue to Stretch and Point Assessment	If patient cannot sit unassisted, reach across midline and shake your hand, he/she is a mobility Bed. Follow mobility Bed interventions and equipment below.
<ul> <li>Stretch and Point (lower extremity strength and stability) Instructions:</li> <li>1) With patient seated, have patient place both feet on floor and knees no higher than hips.</li> <li>2) Ask patient to stretch one leg and straighten knee, then bend the ankle/flex and point toes. If appropriate, repeat with other leg. May test with only one leg (i.e., ankle cast, stroke).</li> </ul>	If patient can stretch and point both legs (or one, if appropriate) continue to Stand Assessment	If patient cannot stretch and point both legs (or one, if appropriate), he/she is a mobility Dangle. Follow mobility Dangle interventions and equipment below.
<ul> <li>Stand (lower extremity strength for standing)</li> <li>Instructions: Consider patient's cognitive ability, orientation and presence of delirium.</li> <li>1) Ask patient to elevate off the bed or chair (seated to standing). May use assistive device (cane, bedrail).</li> <li>2) Patient should be able to raise buttocks off of bed and hold for count of five. May repeat once. May test with only one leg (i.e., ankle cast, stroke).</li> </ul>	If patient can hover his/her buttocks off the bed for a count of five, continue to Walk Assessment.	If patient cannot hover his/her buttocks off the bed for a count of five, he/she is a mobility Chair.
<ul> <li>Walk (standing balance and gait)</li> <li>Instructions: Use assistive device if needed.</li> <li>1) Ask patient to march in place at bedside.</li> <li>2) Then ask patient to advance step and return each foot.</li> <li>3) Assess patient's balance, stability and safety awareness.</li> </ul>	If patient can advance a step (ie., put one foot in front of the other) he/she is a mobility Ambulation. Follow mobility Ambulation interventions and equipment below.	If patient cannot advance a step (ie., put one foot in front of the other) he/she is a mobility Chair. Follow mobility Chair interventions and equipment below.

#### Safety Assessment

A Patient
 Mobility
 Assessment

#### Suggestive use of equipment for mobility

Addit bedside Mobility Assessing	int roor	DMAT IOI NUISES
ASSESSMENT	TEST	INTERVENTIONS
Safety Screen Assessment: M: Myocardial O:Oxygenation V:Vasoactive E: Engaged S: Special Considerations	$\xrightarrow{\text{FAIL}}$	Strict Bedrest         Initiate falls bundle, if indicated         Use equipment for repositioning in bed         ROM exercises, minimum 5 repetitions         Continue with Sit and Shake Assessment
Sit and Shake Assessment (trunk strength and seated balance)Instructions: (Obtain necessary assistive device, cane or walker.)Instructions: (Obtain necessary assistive device, 	FAIL PASS	<ul> <li>Mobility Level 1 – Bedfast/Dependent</li> <li>Initiate falls bundle, if indicated</li> <li>ICU: consider PT/OT consult for RASS score -2 to +2</li> <li>Use equipment for repositioning in bed</li> <li>Use chair position in bed or sit in chair for meals and/or ADLs</li> <li>Use equipment for transfers OOB</li> <li>Initiate Level 1 ROM exercises*</li> <li>Continue to Stretch and Point Assessment</li> </ul>
Stretch and Point Assessment (lower extremity strength and stability)         Instructions:         1. With patient seated, have patient place both feet on floor with knees no higher than hips.         2. Ask patient to stretch one leg and straighten knee, then bend the ankle/flex and point toes. If appropriate, repeat with other leg. May test with only one leg (e.g. ankle cast, stroke).		Mobility Level 2 - Chairfast         Initiate falls bundle         Use equipment for repositioning in bed         Sit on edge of the bed or chair for meals and/or ADLs         Use equipment for transfers OOB         Initiate Level 2 ROM exercises*         Continue to Stand Assessment
Stand Assessment (lower extremity strength for standing)         Instructions: (Consider patient's cognitive ability, orientation, & presence of delirium.)         1. Ask patient to elevate off the bed or chair (seated to standing). May use assistive device (cane, bedrail).         2. Patient should be able to raise buttocks off bed and hold for count of 5. May repeat once. May test with only one leg (e.g. ankle cast, stroke).	PASS	Mobility Level 3 – Stand         Initiate falls bundle         Sit on the edge of bed or chair for meals and/or ADLs         Use equipment for transfers OOB and standing         Initiate Level 3 ROM exercises*         Continue to Walk Assessment
Walk Assessment (standing balance and gait)         Instructions: (Use assistive device if needed.)         1. Ask patient to march in place at bedside.         2. Then ask patient to advance step and return each foot.         3. Assess patient's balance, stability, and safety awareness.	$\xrightarrow{\text{FAIL}}$ PASS $$	Mobility Level 3 – Stand Implement Level 3 activities as above Mobility Level 4 – Walk Initiate falls bundle, if indicated Walking in room and in hallway as able Use assistive devices as needed Encourage out of bed for meals and/or ADLs Initiate Level 4 ROM exercises*

Always default to the safest patient handling equipment if there is any doubt in patient's ability to perform task. \*Consider notifying provider to place PT/OT consult for patient not at baseline or who demonstrates declining mobility/ADL. https://lhatrustfunds.com/assets/uploads/d ocuments/15-BMAT-Adult.pdf

# Activity Duration: JH-HLM—John's Hopkins Highest Level of Mobility

The John's Hopkins Highest Level of Mobility (JH-HLM) is a 1-8 scale delineating how active the patient was able to be

Standardize way to measure mobility

	250+ FEET	8
WALK	25+ FEET	7
	10+ STEPS	6
STAND	1 MINUTE	5
CHAIR	TRANSFER	4
	SIT AT EDGE	3
BED	TURN SELF / ACTIVITY	2
	LYING	1

## **GET-UP MUST DO'S!**



- 1. Walk in, walk during, walk out!
- 2. Grab and Go Mobility Aids!
- 3. (3) laps a day keeps the nursing home at bay!



# **Tips for Promoting Mobility**

#### Order Modifications

- $\triangle$  Delete orders for
  - Bedrest
  - Ad lib
- $\triangle$  Replace with specific orders
  - Times, activities, distance

#### A Promote Team Mobility Management

- $\bigtriangleup\,$  Delegation of patient mobility
  - Replace sitters with a mobility aide
- $\bigtriangleup$  Define patients mobility abilities on whiteboard
- $\bigtriangleup$  Rehab and Nursing face-to-face bedside handoffs





# Components of successful mobility program

# Nurse driven; therapy supported

Need a defined safety screen and process (stages/levels) Physicians must value its importance to team and patient

Mobility is medicine—treat it as an intervention as important as antibiotics for an infection or anticoagulant for a DVT Must be discussed everyday on rounds with what is their current mobility, and what are our goals for today—be specific

Ensure there is the appropriate equipment and resources



## Skill Lab Ideas

- Assessment of mobility status
- ▲ Determine mobility level
- A Plan mobility activity based on assessment





"I have learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel."



Maya Angelou



# WHEN WOULD NOW BE A GOOD TIME TO DO THIS?

It is not enough to do your best, yo have to know what to do and then do your best.

E Deming

Forbid yourself to be deterred by poor odds just because your mind has calculated that the opposition is too great. If it were easy, everyone would do it.



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