The Impact of Patient Hygiene on Hospital Acquired Infections

Kathleen Vollman
ADVANCING NURSING THROUGH KNOWLEDGE & INNOVATION

Kathleen M. Vollman MSN, RN, CCNS, FCCM, FCNS, FAAN
Clinical Nurse Specialist / Educator / Consultant
ADVANCING NURSING
kvollman@comcast.net
Northville, Michigan
www.vollman.com

26043B

Disclosures

- Consultant-Michigan Hospital Association Keystone Center
- Subject matter expert on CAUTI, CLABSI, HAPI, Safety culture for AHA
- Consultant and speaker bureau
  - Stryker's Sage business
  - LaJolla Pharmaceutical
  - Baxter healthcare
  - Potrero Medical

Objectives

- Describe the forces within the current healthcare environment that are targeting reduce bacterial load and HAI's
- Identify and detail the evidence-based practices for bathing critically ill patients
- Discuss possible barriers to practice changes and realistic solutions to assist the team in the implementation process

Notes on Hospitals: 1859

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

- Florence Nightingale

Advocacy = Safety

Protect The Patient From Bad Things Happening on Your Watch

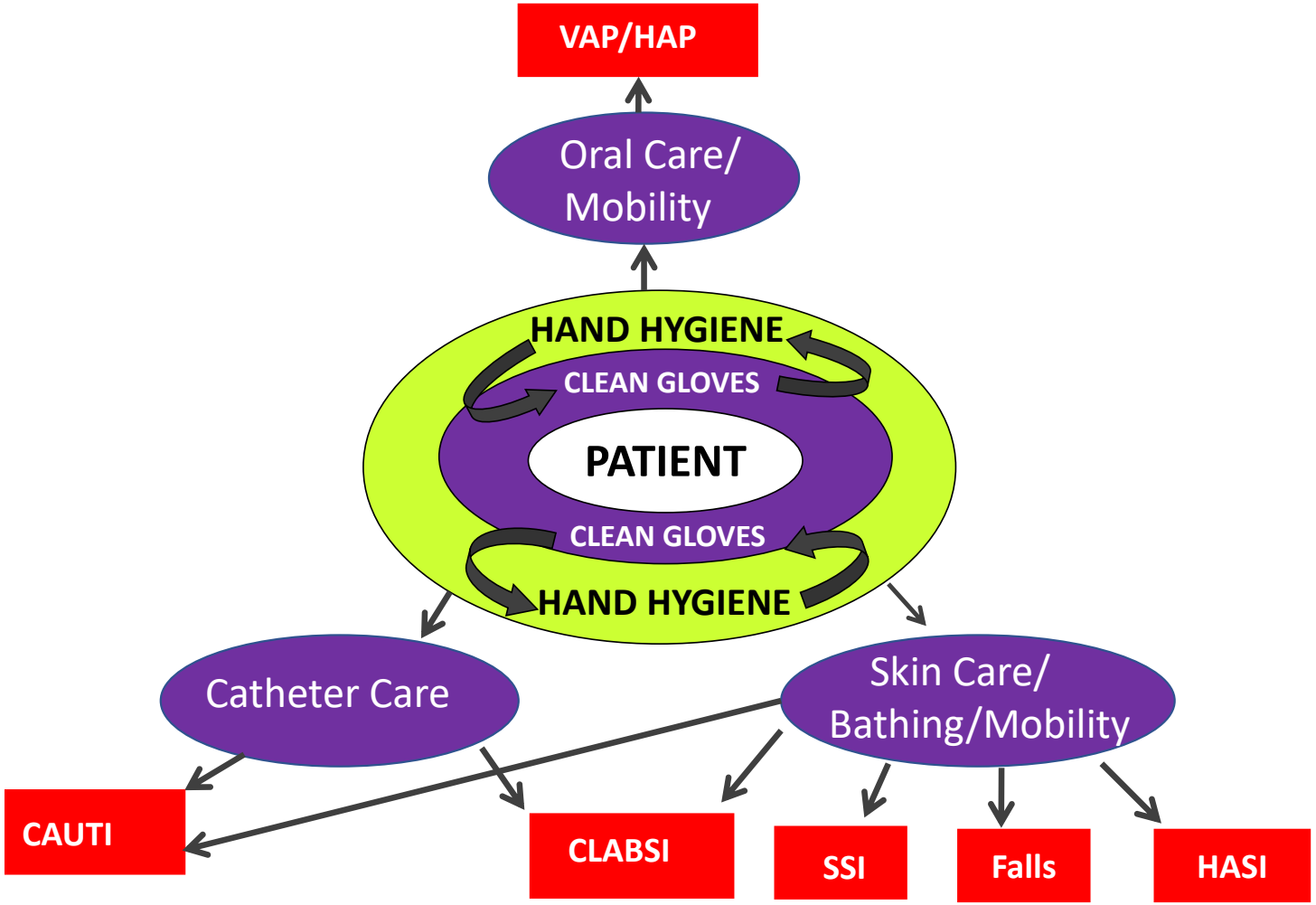
Implement
Interventional Patient Hygiene

Interventional Patient Hygiene

- Hygiene…the science and practice of the establishment and maintenance of health
- Interventional Patient Hygiene….nursing action plan directly focused on fortifying the patient's host defense through proactive use of evidence-based hygiene care strategies

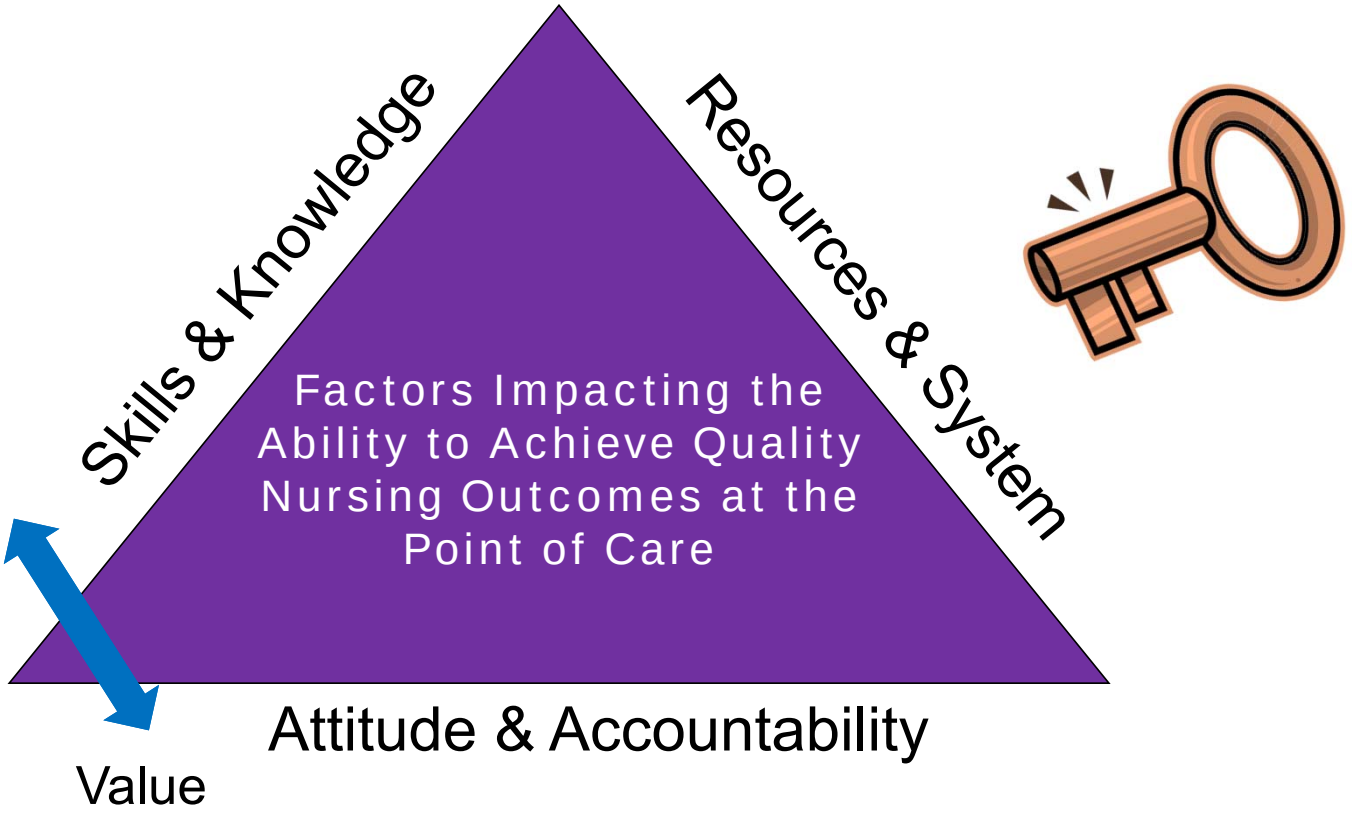
Hand Hygiene	**Comprehensive Oral Care Plan**	**Incontinence-Associated Dermatitis Prevention Program**	**Bathing & Assessment**	**Pressure Injury Risk Reduction**	**Catheter Care**

INTERVENTIONAL PATIENT HYGIENE(IPH)



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

Achieving the Use of the Evidence



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

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

Kalish, R. et al. (2012) Am Jour Med Quality, 26(4), 291-299.

Hospital Variation in Missed Nursing Care

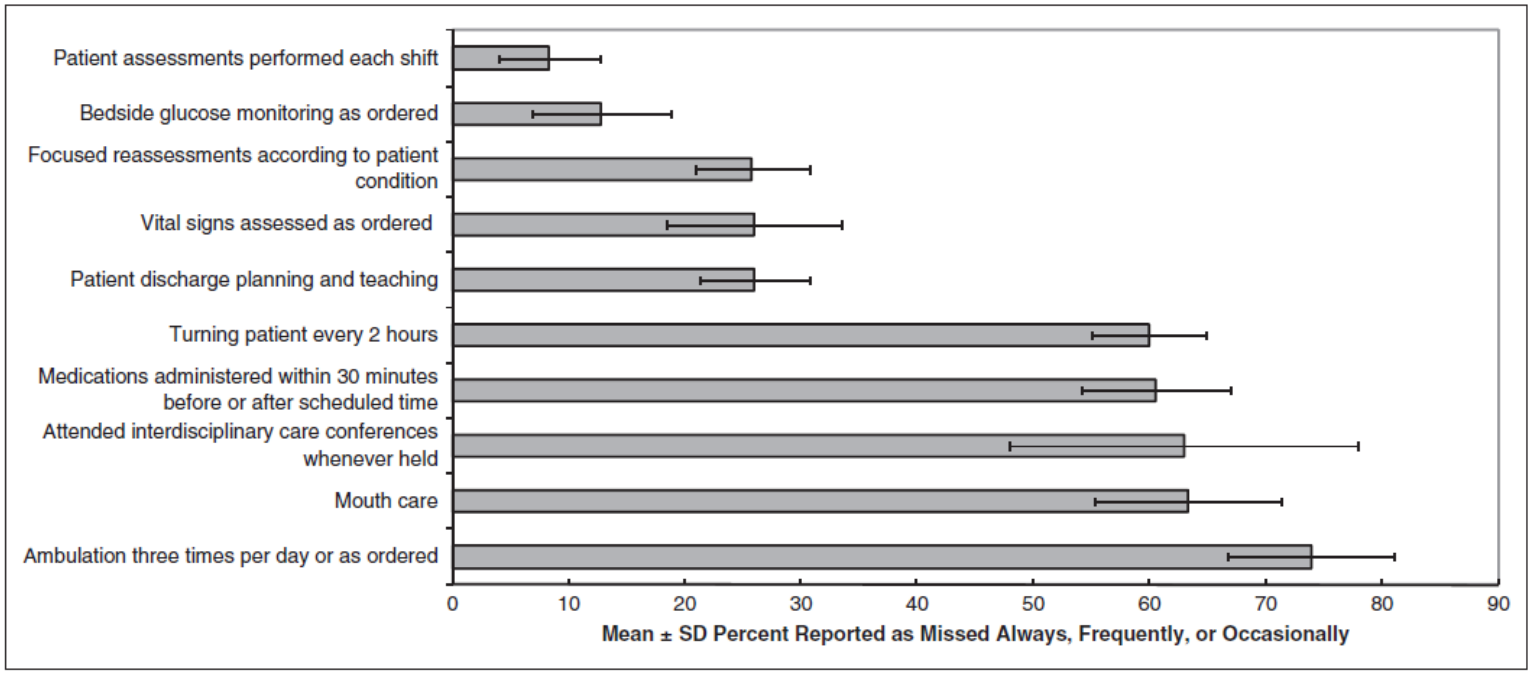


Figure 2. Elements of care most and least frequently missed. The solid bars represent the means across all 10 hospitals, and the range lines indicate the standard deviations.

Kalish, R. et al. (2012) Am Jour Med Quality, 26(4), 291-299.

Patient Perceptions of Missed Nursing Care

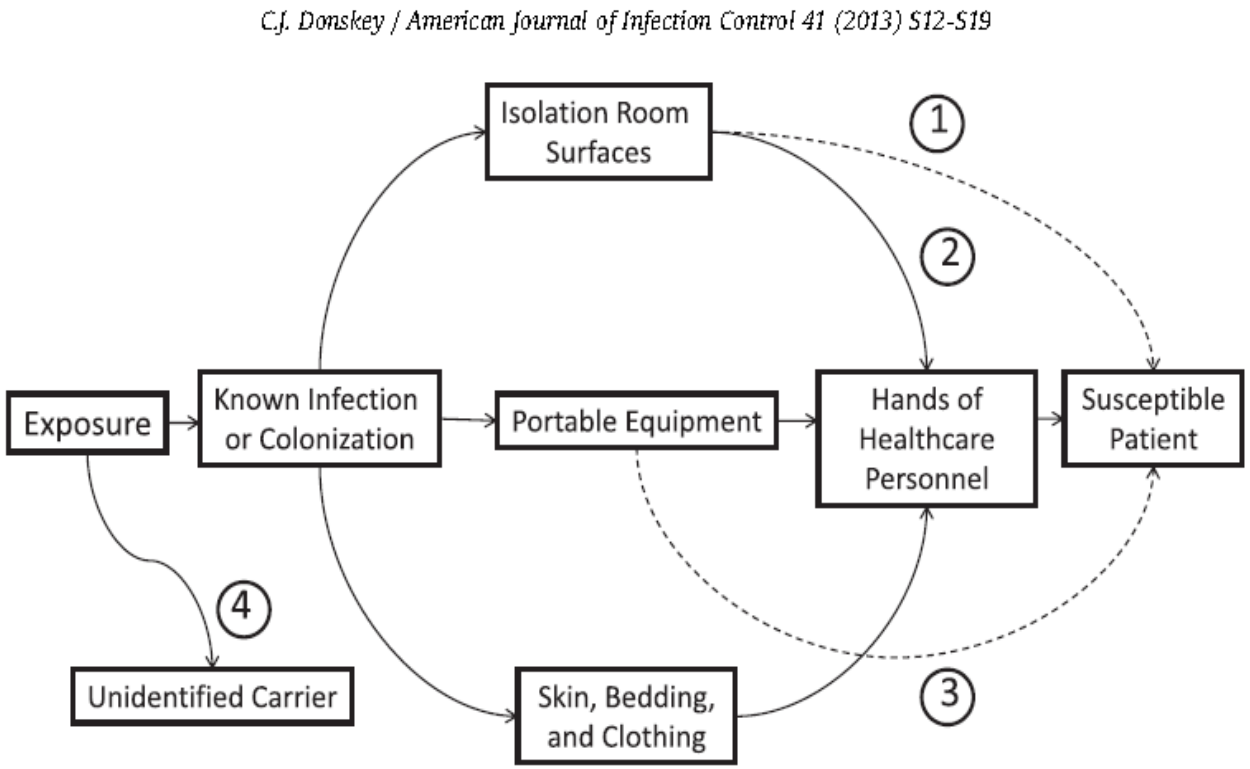
Table 2. Elements of Nursing Care by Ability of Patient to Report and Extent Missed*

	Fully Reportable	Partially Reportable	Not Reportable
			■ Patient assessment ■ Surveillance ■ IV site care
Frequently Missed	■ Mouth care ■ Listening ■ Being kept informed	■ Ambulation ■ Discharge planning ■ Patient education	
Sometimes Missed	■ Response to call lights ■ Response to alarms ■ Meal assistance ■ Pain medication and follow-up	■ Medication administration ■ Repositioning	
Rarely Missed	■ Bathing	■ Vital signs ■ Hand washing	

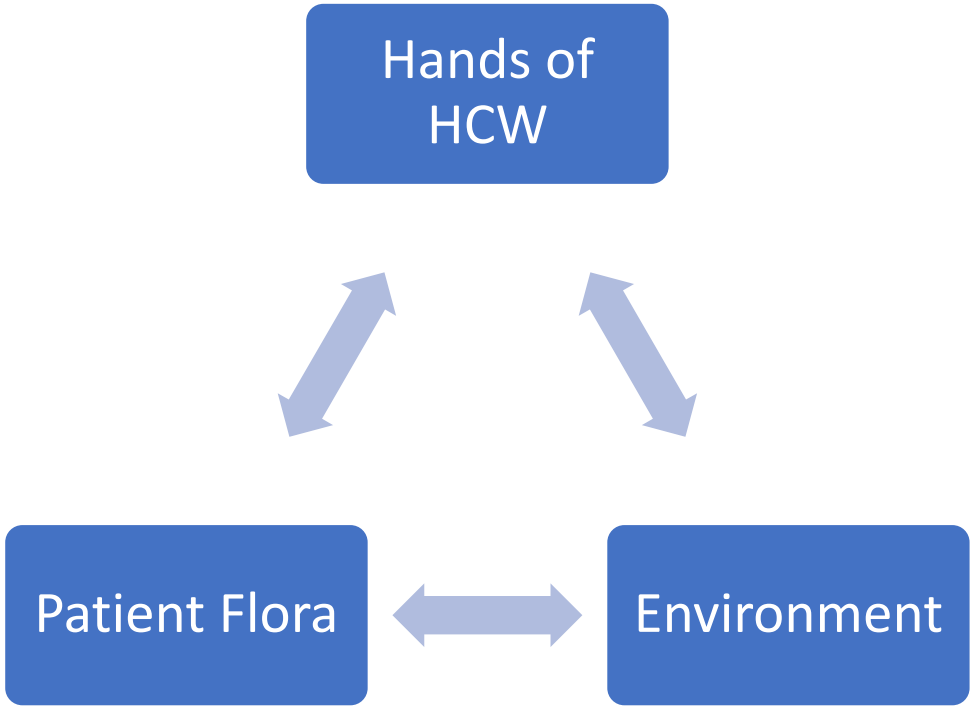
* IV, intravenous.

Kalisch, B et al. (2012). TJC Jour Qual Patient Safety,38(4), 161-167.

Common Routes of Transmission



3 Main Vectors of Infection



Weinstein T.A. Am J Med 1991: 91(Suppl):179S-184S

Impact from the Vectors of Infection

- Patients' endogenous flora (40% - 60%)
- Cross-infection via the hands of healthcare personnel (HCP; 20% - 40%)
- Antibiotic-driven changes in flora (20% - 25%)
- Contamination of the environment (20%).

Weinstein RA.. Am J Med 1991;91(Suppl):179S-184S.

Vertical vs. Horizontal

- Vertical approach refers to a narrow-based program focusing on a single pathogen (selective of the specific MDRO)
  - AST to identify carriers
  - Implementation of measures aimed at preventing transmission from carriers to other patients
    - Isolation
    - Hand hygiene

- Horizontal approach to infection prevention and control measures refers to broad-based approaches attempting reduction of all infections due to all pathogens
  - No screening
  - CHG bathing
  - Universal nasal coverage
  - No isolation
  - Limit lines/tubes
  - Hand hygiene

Wenzel RP and Edmond MB.. International Journal of Infectious Diseases 14S4 (2010) S3–S5

The Bath: The First Line Of Defense

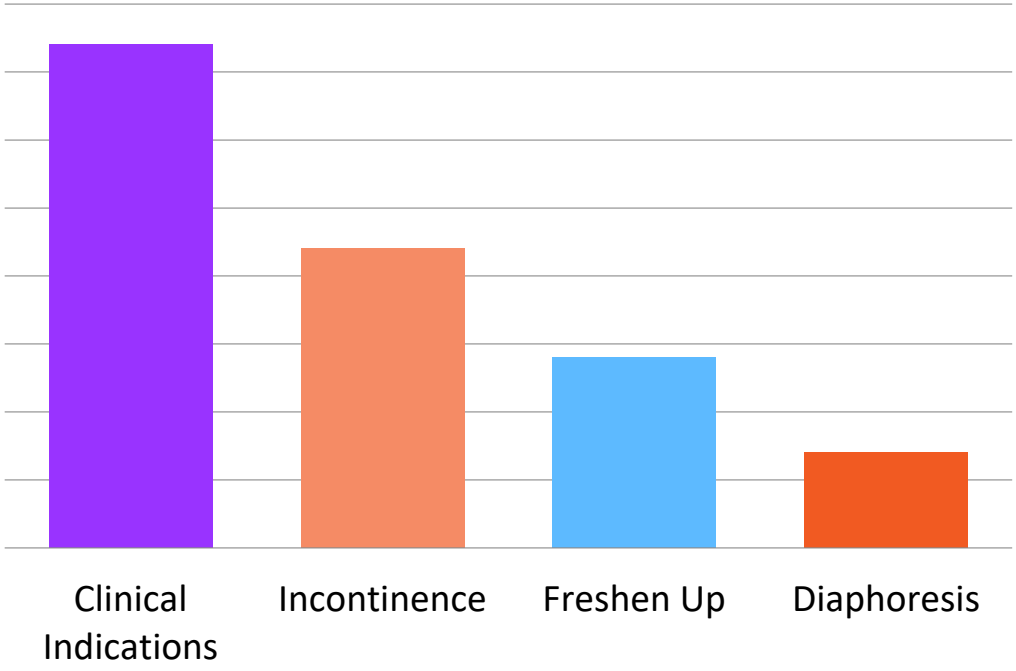
Early Detection of Skin Injury

Reducing Microorganism spread

Efficiency & Effectiveness

Health/Social Wellbeing

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
  - Unit norms

Coyer FM, et al. *Aust Crit Care*. 2001;24:198-209
Celik S, et al. *J Clin Nurs*. 2004;14:102-106
Tamburri LM, et al. *Am J Crit Care*. 2004;392:102-113

Activities That Increase VO_2

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

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

Patients At Risk

- Multi-Drug Resistant Organisms
  - Immunodeficiencies
  - Breaks in skin integrity related to invasive devices
  - Open wounds
  - Co-morbidities
  - Hand transmission
  - Equipment contamination/ Hospital environment
- Damaging the Natural Barriers to Infection…the Skin
  - Bathing techniques
  - Soaps
  - 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)
  - Stable pH discourages colonization of bacteria & ↓ risk of infection
  - Bar soaps may harbor pathogenic bacteria
- Excessive washing/use of soap compromises the water holding capacity of the skin
- 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

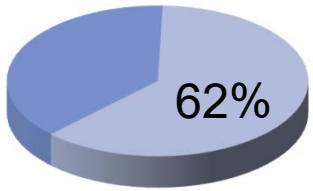
Soap and water basin bath was an independent predictor for the development of a CLABSI

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

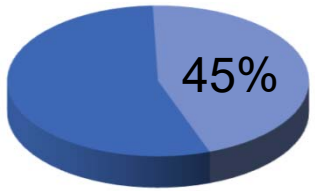
Bath Basins:
Potential Source of Infection

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

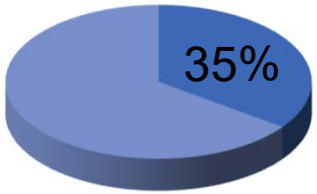
Total hospitals: **88**
Total basins: **1,103**



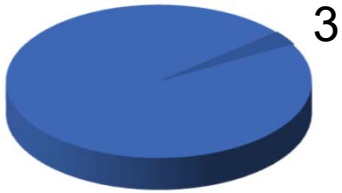
Contaminated
686 basins/88 Hospital



Gram negative bacilli
495 basins/86 hospitals



Colonized w/ VRE
385 basins/ 80 hospitals



MRSA
36 basins/28 hospitals

Marchaim D, et al. *Am J of Infect Control*. 2012;40(6):562-564

Mechanisms of Contamination

- Skin flora
- Multiple-use basins
  - Incontinence cleansing
  - Emesis
  - Product storage
- Bacterial biofilm from tap water

Shannon RJ, et al. *J Health Care Safety Compliance Infect Control*. 1999;3:180-184.
Larson EL, et al. *J Clin Microbiol*. 1986;23(3):604-608.
Johnson D, et al. *Am J Crit Care*, 2009;18(1):31-38, 41.
Marchaim D, et al. *Am J Infect Control*. 2012;40(6):562-564.

Biofilms are Ubiquitous

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

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pathogens

ISSN 2076-0817

www.mdpi.com/journal/pathogens

Review

Opportunistic Premise Plumbing Pathogens: Increasingly Important Pathogens in Drinking Water

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

Clinical Infectious Diseases

INVITED ARTICLE

IDSA Infectious Diseases Society of America | hivma hiv medicine association | OXFORD

HEALTHCARE EPIDEMIOLOGY: Robert A. Weinstein, Section Editor

Healthcare Outbreaks Associated With a Water Reservoir and Infection Prevention Strategies

Hajime Kanamori,[1,2] David J. Weber,[1,2] and William A. Rutala[1,2]

[1]Division of Infectious Diseases, University of North Carolina School of Medicine, and [2]Hospital Epidemiology, University of North Carolina Health Care, Chapel Hill

Health | Local News | Northwest | Puget Sound

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.
- However, contact or ingestion of such water may cause infection in immunocompromised persons or when applied to non-intact skin
- 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

Presented at MSIPC October 6th, 2016, Lansing MI by Dorine Berriel-Cass

*Decker BK, et al. Opin Infect Dis 2013; 26:345–51
Hopman, J., et al. Antimi*crob Resist Infect Control* **6,** 59 (2017).

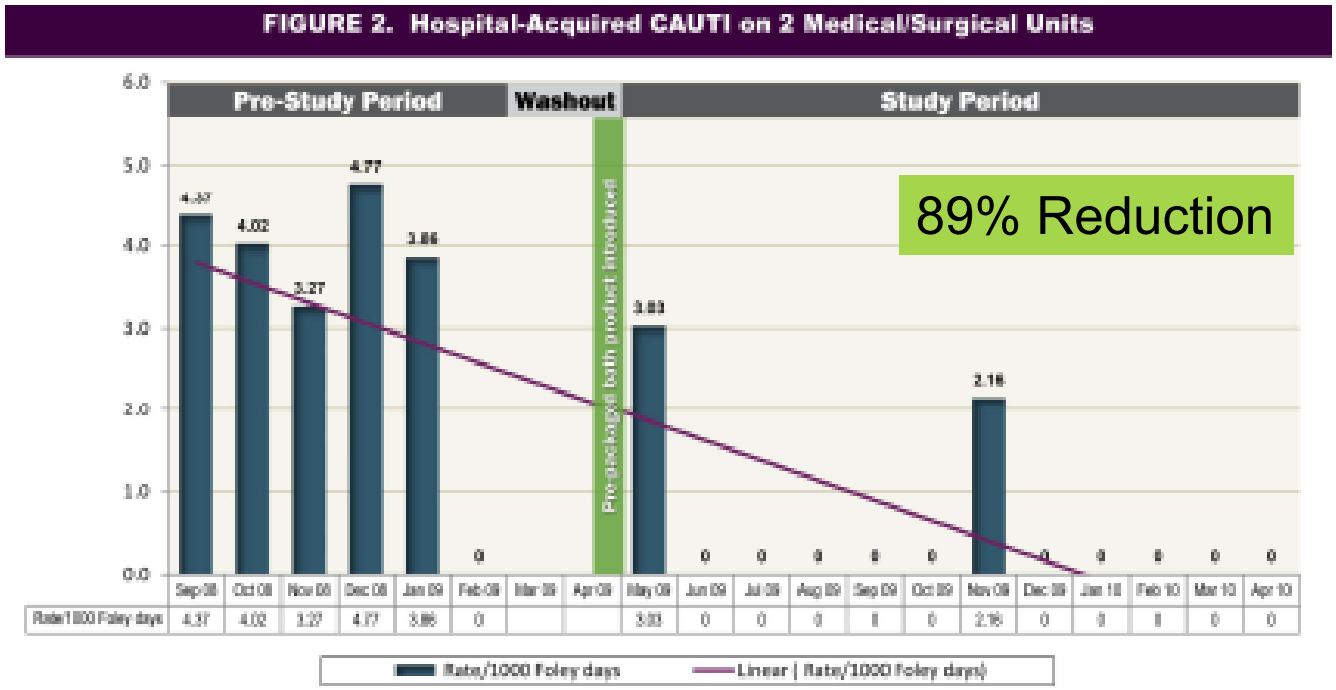
Waterborne Infection

Hospital Tap Water

- Bacterial biofilm
- Most overlooked source for pathogens
- 29 studies demonstrate an association with HAIs and outbreaks
- Transmission:
  - Drinking
  - Sinks
  - Bathing
  - Rinsing items
  - Contaminated environmental surfaces
  - 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,
https://www.pinterest.com/pin/332914597437828576/?l=t
Kanwar A, et al. Am J Infect Control. 2017;45(11):1273-1275.

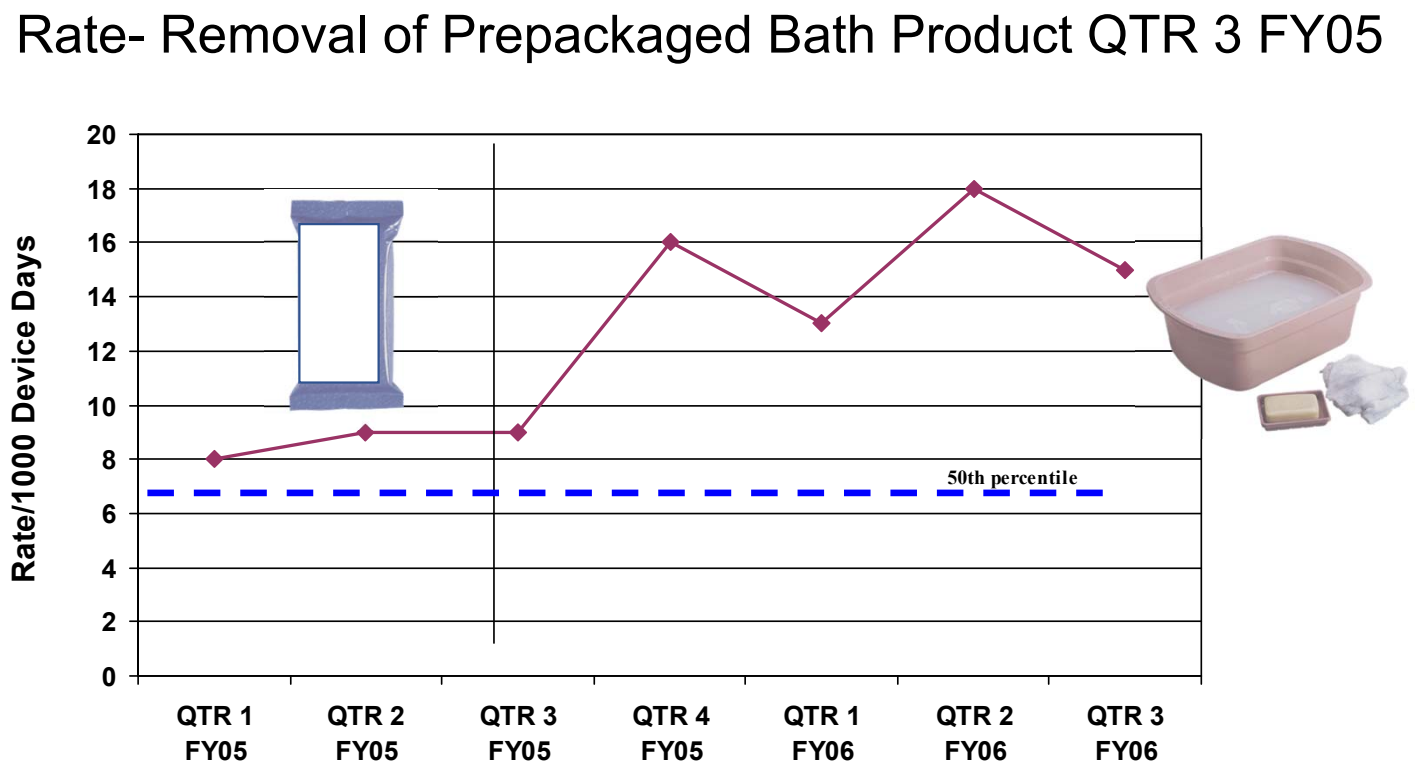
Reducing UTI's Through Basinless Bathing



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

Stone S, APIC 2010

Impact on UTI with Basin Bathing



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[4] LOS 17 Days**	**Median[4] Cost (4857.00)**
I- Pre-Packaged Bathing Washcloths (9 months)	$10,530[1] ($3.00)	25	175	$117,175
II- Basin/Water (9 months)	$3,510[2] ($1.00)	48	336	$224,916
III- Additional Product Cost, UTI, LOS, COSTS	$7,020	23[3]	151	$107,741

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

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

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
- Non medicated basin less 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
  - Studies on going

Strouse AC. Appraising the Literature On Bathing Practices And Catheter-Associated Urinary Tract Infection Prevention. *Urol Nurs*. 2015;35(1):11-17.

Cleansing of Patients with Indwelling Catheter

- Indwelling catheter care should occur with the daily bath (basinless bathing), as a separate procedure using clean technique
- There is no evidence to support 2x a day indwelling catheter care
- If a large liquid stool occurs, bathe the patient with basinless bathing
- Apply barrier cloth to area of skin requiring protection

Comparison of Wash Basin Baths & Disposable Baths

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

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

Table 1 Duration

	Disposable baths (n = 58) Minutes (interval)	*Wash basins (n = 58) Minutes (interval)*	*Wilcoxon signed-rank 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)*
Nhl -1	5	0	0
Llb -2	5	1	0
Nbj -3	12	1	0
Hm -4	11	2	0
Jl -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

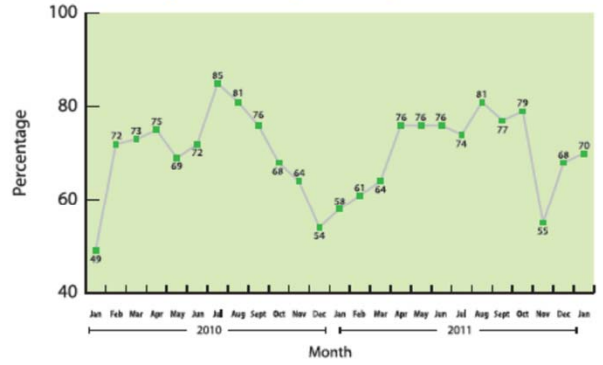
Changing IP Culture at the Unit Level

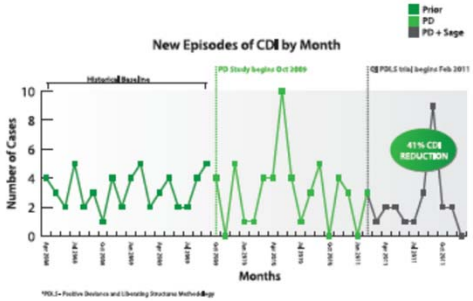
- 2 subacute medical units with ↑ HAI's
- QI initiative to change infection prevention culture
  - Environmental cleaning
  - hand hygiene
  - word policy and procedures
  - patient care
    - basinless bathing/removed basins
    - single use toiletry
    - isolation BP cuffs
    - IP checklist

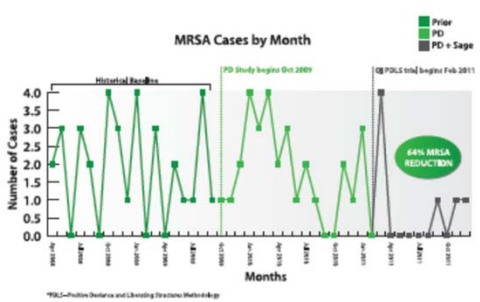
RESULTS

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.

Figure 1. Hand Hygiene Compliance CP7







Crump M, et al. Presented at APIC 2012, June 4-6th, San Antonia TX

For Successful Banning of Basins for Patient Care

- We need to provide alternatives for the other functions:

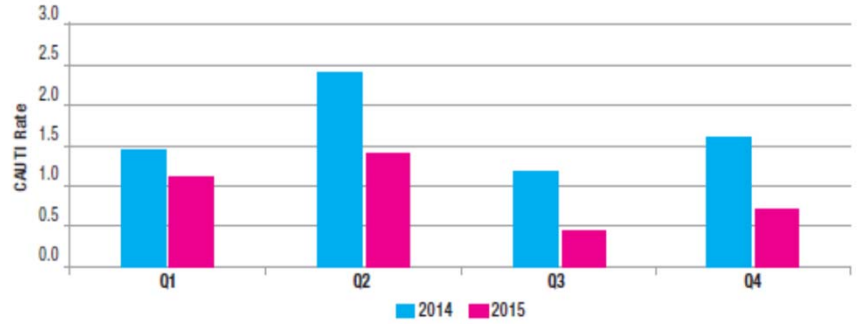
Current	New
Emesis	Emebags being installed in every adult and ped pt. room, ACU, PACU
Storage of patient items	Clear plastic “baggies” Trial of “Concierge List” to decrease waste of unused/unneeded products
Foot soaks	Shampoo caps, prepackaged
Shampoo patient’s hair	Shampoo caps par’d on all units
24 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

Quinn B, et al. Presented at NACNS National Conference, March5-7th, 2015, San Diego Ca

Changing Bathing & Incontinence Management Impacts CAUTI's

- Pre implementation
  - Daily bath with reusable basin & soap and tap water
  - Incontinence cleaning, peri-spray, soap and tap water
- New bathing & incontinence protocol
  - 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

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

"Even if you are on the right track, you will get run over if you just sit there."

Will Rogers

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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Kathleen M. Vollman MSN, RN, CCNS, FCCM, FCNS, FAAN
Clinical Nurse Specialist / Educator / Consultant
ADVANCING NURSING
kvollman@comcast.net
Northville, Michigan
www.vollman.com