Water-free care

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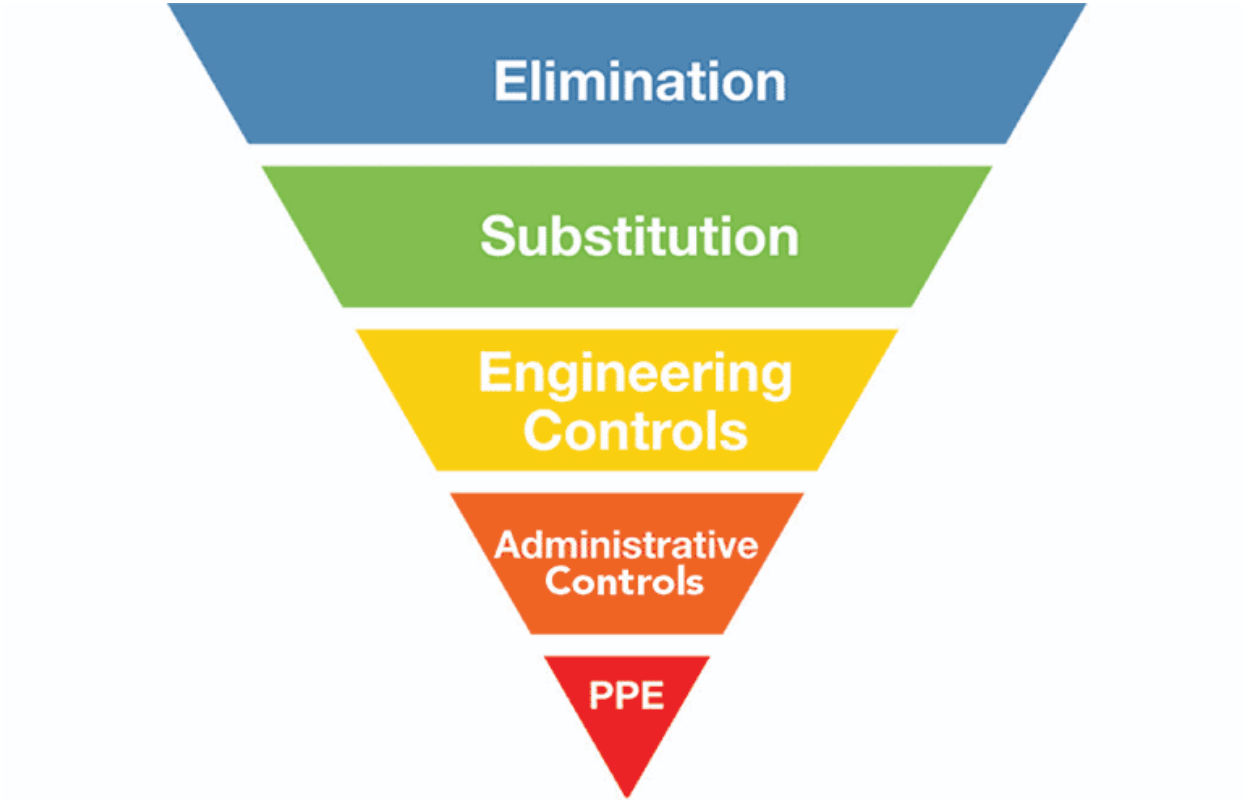
Infection risks from water

- Patient wash-water harbouring micro-organisms
- Contaminated cleaning materials
- Sinks and drains as reservoirs for infection
- Hospital water systems contaminated with *Pseudomonas* and/or *Legionella*
- Contamination during medical device reprocessing
- Contaminated drinking water

Hierarchy of controls



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Patient bathing – the grim washbowl…

Prospective study at 3 acute US hospitals, 92 bath basins, including including basins from 3 intensive care units.[1]

- Bacteria grew in 98% of samples - organisms with the highest positive rates of growth
- Enterococci (54%) – VRE (13%)
- Gram-negative organisms (32%)
- *Staphylococcus aureus* (23%) - MRSA (8%)
- *Pseudomonas aeruginosa* (5%)
- *Candida albicans* (3%)

44-month study period, a total of 1,103 basins from 88 hospitals in the United States and Canada were sampled. The IPC Team cultured the first 10 basins encountered when entering a unit using a uniform standardized sampling method.[2]

- Basins were considered clean and ready to use
- Between use standard practice was rinse with tap water and soap
- 62% cultured at least one pathogen (22% with 2 pathogens)
- 45% Gram-negative bacilli
- 35% Vancomycin-resistant enterococci
- 4% methicillin-resistant *Staphylococcus aureus*

1. Johnson et al. *Am J Crit Care*. 2009;18:31-40.
2. Marchaim et al. *Am J Infect Control* 2012;40:562-564.

The skin ain’t made for water

15 healthy volunteers received 6 different washing and drying techniques on their forearm.

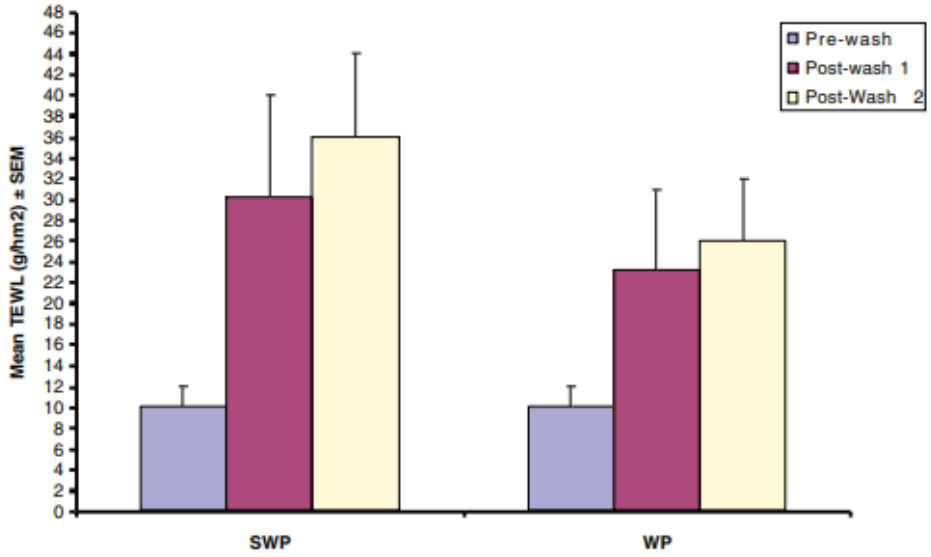

FIGURE 2. **Transepidermal water loss (TEWL) measurements following towel drying using a gentle patting technique.** TEWL was measured for 1 minute at baseline, and immediately following washing with either soap and water or water alone, and then drying the area by patting with a towel until the volunteer stated their skin felt dry. The results shown represent the mean values ± SEM. The values recorded were significantly higher than those obtained in the rest of the study ($P < .01$) and show that the skin had been left wet.

Voegeli D. J Wound Ostomy Continence Nurs 2008;35:84-90.

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Don’t wash your hands (with soap and water…!)

52 nurses randomised to either alcohol hand disinfectant or soap and water for hand hygiene for 8 days.

Deterioration in skin condition was less frequently improved and more frequently worsened by both self-assessment, and clinical assessment by a dermatologist in the alcohol hand disinfectant group.

Table 2. Effectiveness of the hand hygiene procedures against contaminants: comparison of bacterial samples before and after procedures

	+→0 Successful decontamination	0→0 Absence of transient flora	+→+ No effect	0→+ Contamination
Hand wash with non-medicated soap ($n = 50$)	10	16	4	20
Alcohol-based hand rinse ($n = 52$)	16	25	6	5

Winnefeld et al. Br J Dermatol 2000;143:546-50.

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‘Waterless’ bathing

- Pre-formulated (so don’t over-wet)
- Convenient – available at the point of care
- Reduced risk of contamination spread
- Can easily add disinfectant activity (usually chlorhexidine)

How does waterless bathing compare with the traditional bed bath?

Systematic review of studies that objectively measured how waterless bathing compares with the traditional bed bath

- Physiological outcomes
  - Waterless bathing resulted in less skin abnormalities and less dry skin that traditional bathing.
- Stakeholder-related outcomes
  - Staff and patients have a significant preference towards waterless bathing.
- Organisational outcomes
  - Waterless bathing was faster than traditional bed bathing.

Groven et al. BMC Geriatr. 2017;17:31.

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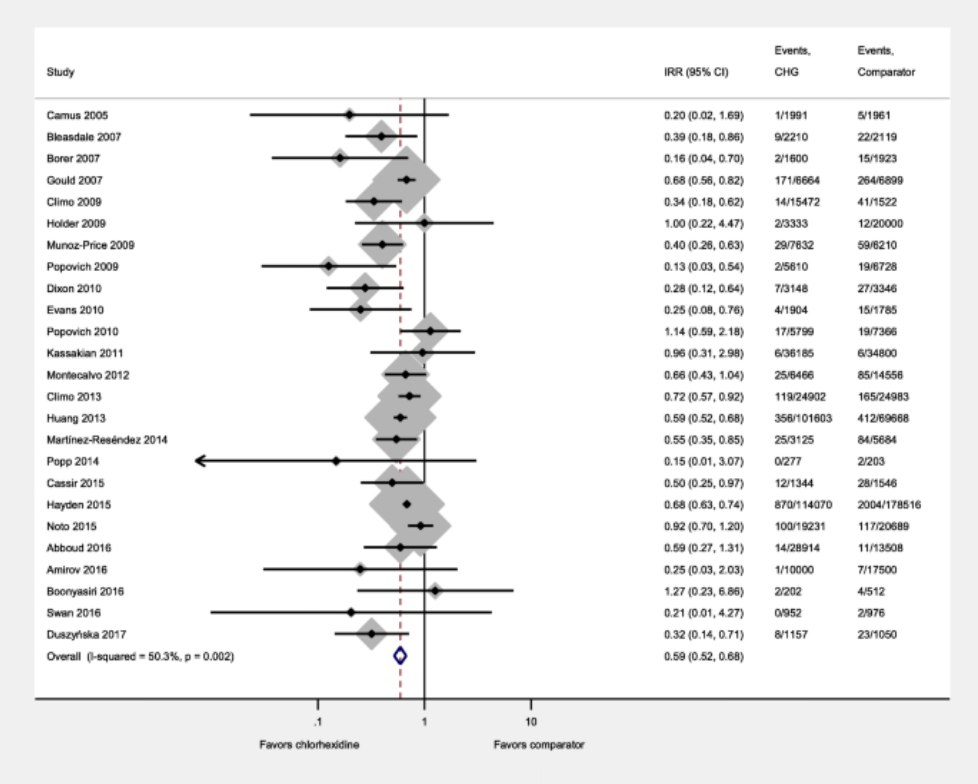
Waterless/CHG bathing and reduction in BSI

Forest plot showing that chlorhexidine bathing reduced the incidence of hospital acquired bloodstream infections



Musuuza et al. BMC Infect Dis. 2019; 19: 416.

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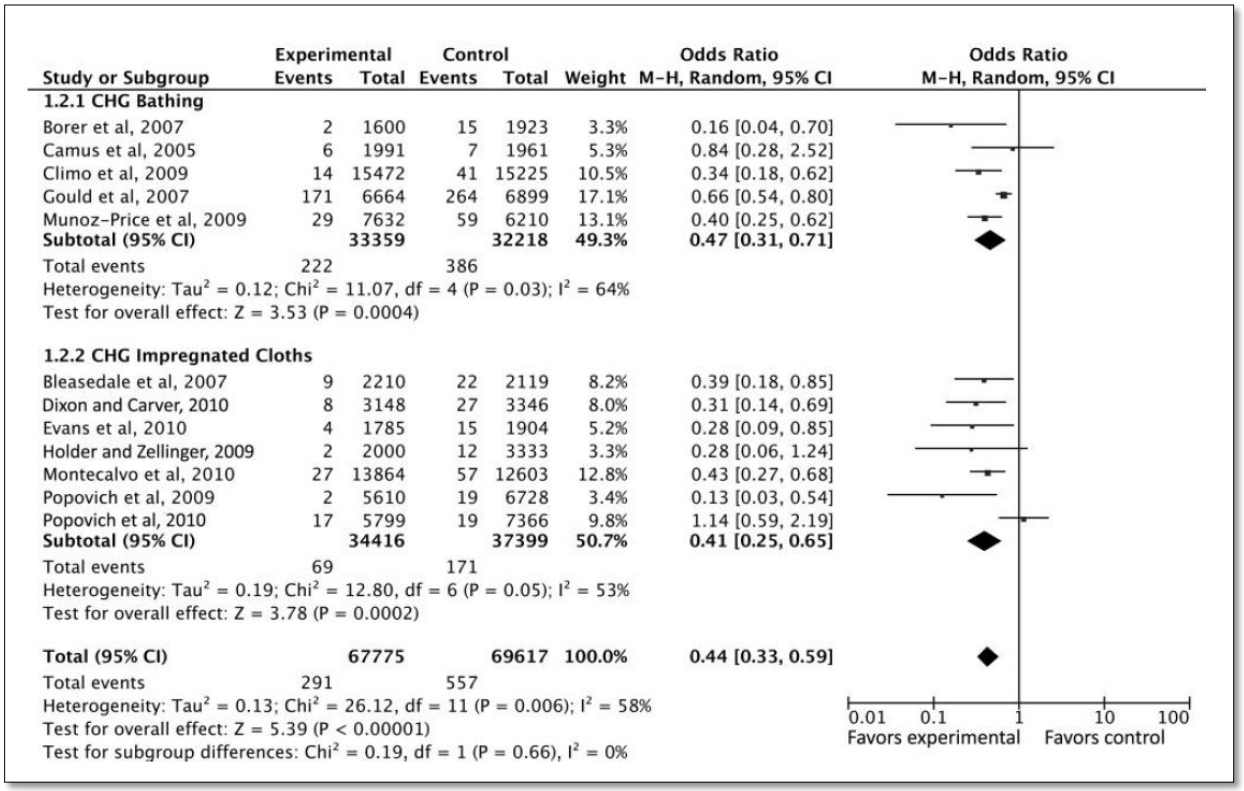
Waterless/CHG bathing and reduction in BSI

The efficacy of daily bathing with chlorhexidine for reducing healthcare-associated bloodstream infections



Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Odds Ratio 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: $Tau^2 = 0.12$; $Chi^2 = 11.07$, df = 4 (P = 0.03); $I^2 = 64\%$						
Test for overall effect: Z = 3.53 (P = 0.0004)						
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]
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: $Tau^2 = 0.19$; $Chi^2 = 12.80$, df = 6 (P = 0.05); $I^2 = 53\%$						
Test for overall effect: Z = 3.78 (P = 0.0002)						
Total (95% CI)		**67775**		**69617**	**100.0%**	**0.44 [0.33, 0.59]**
Total events	291		557			
Heterogeneity: $Tau^2 = 0.13$; $Chi^2 = 26.12$, df = 11 (P = 0.006); $I^2 = 58\%$						
Test for overall effect: Z = 5.39 (P < 0.00001)						
Test for subgroup differences: $Chi^2 = 0.19$, df = 1 (P = 0.66), $I^2 = 0\%$						

O'Horo et al. Infect Control Hosp Epidemiol 2012; 33:257-267.

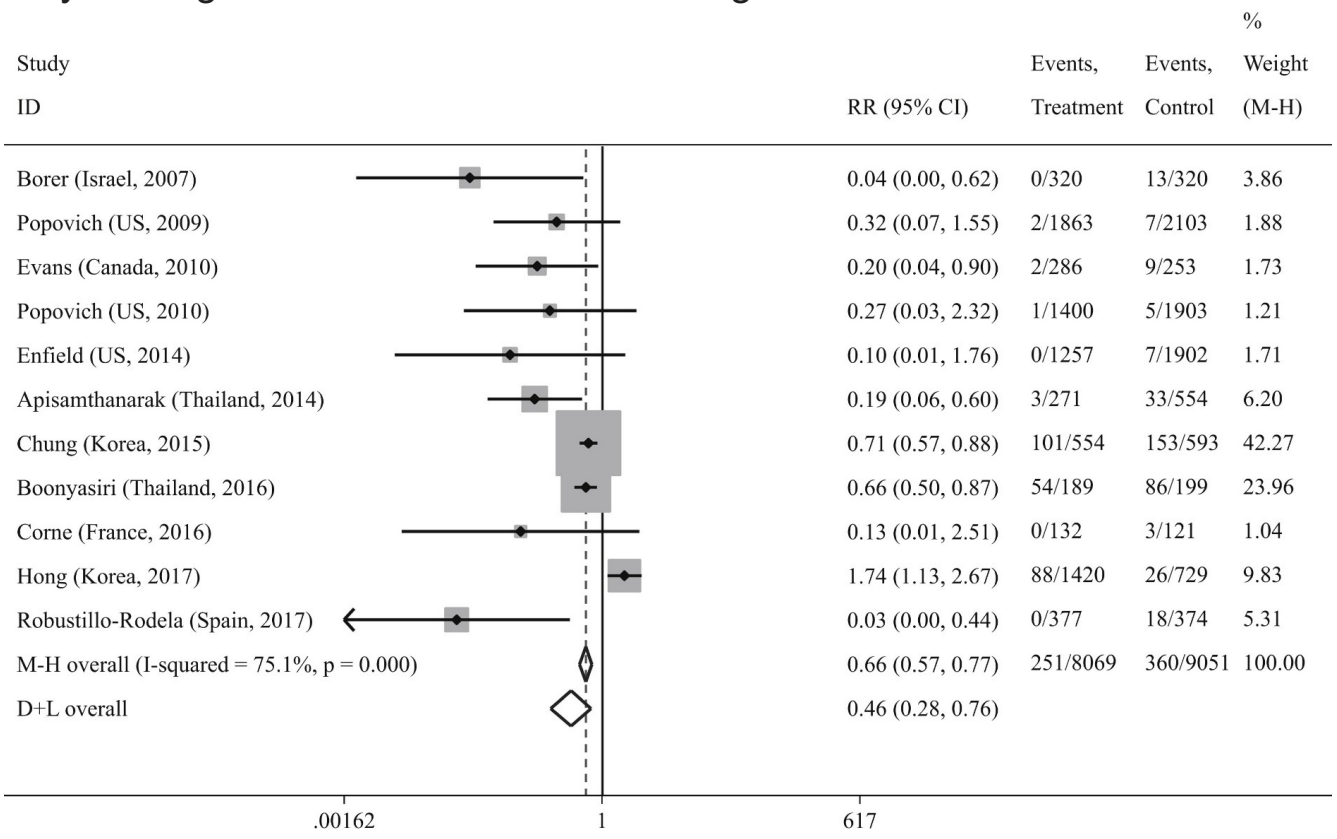
Waterless/CHG bathing and reduction in BSI (outside ICU)

- Cluster RCT showed no benefit to universal decolonisation outside of critical care areas
- **But**
  - statistically significant reduction in MRSA and VRE in those with an indwelling invasive device
    - IV device, urinary catheter etc

Huang et al. Lancet 2019;393:1205-1215.

CHG bathing and reduction in *Acinetobacter baumannii*

The efficacy of daily bathing with chlorhexidine for reducing infection / colonization with *A. baumannii*



Fan et al. J Hosp Infect 2019;103:284-292

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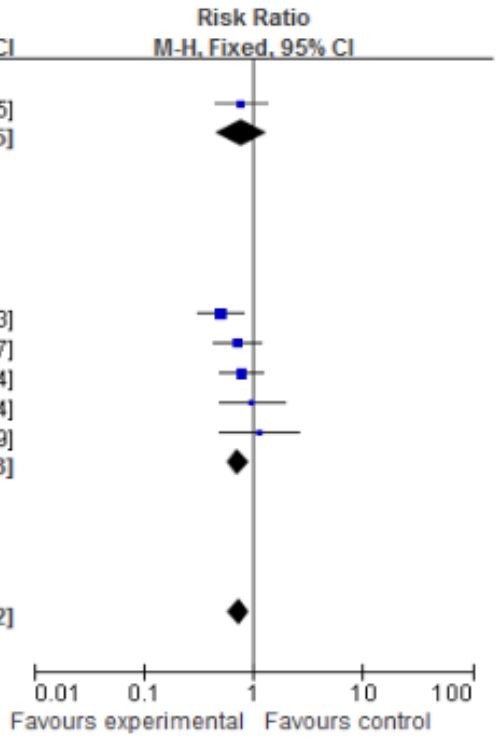
CHG bathing and ventilator-associated pneumonia (VAP)

The efficacy of daily bathing with chlorhexidine for reducing VAP

Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Risk Ratio M-H, Fixed, 95% CI
2.3.1 CHG Bathing						
Camus, 2005	22	1849	28	1830	15.5%	0.78 [0.45, 1.35]
Subtotal (95% CI)		**1849**		**1830**	**15.5%**	**0.78 [0.45, 1.35]**
Total events	22		28			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.89 (P = 0.37)						
2.3.2 CHG Impregnated Cloth						
Martínez-Reséndez, 2014	25	2806	46	2633	26.1%	0.51 [0.31, 0.83]
Popovich,2010	24	2452	48	3518	21.7%	0.72 [0.44, 1.17]
Evans,2010	33	1953	38	1759	22.0%	0.78 [0.49, 1.24]
Bleasdale, 2007	18	2708	15	2206	9.1%	0.98 [0.49, 1.94]
Popovich,2009	10	1581	13	2343	5.8%	1.14 [0.50, 2.59]
Subtotal (95% CI)		**11500**		**12459**	**84.5%**	**0.73 [0.57, 0.93]**
Total events	110		160			
Heterogeneity: $Chi^2 = 4.03$, df = 4 (P = 0.40); $I^2 = 1\%$						
Test for overall effect: Z = 2.58 (P = 0.010)						
Total (95% CI)		**13349**		**14289**	**100.0%**	**0.73 [0.59, 0.92]**
Total events	132		188			
Heterogeneity: $Chi^2 = 4.07$, df = 5 (P = 0.54); $I^2 = 0\%$						
Test for overall effect: Z = 2.72 (P = 0.007)						
Test for subgroup differences: $Chi^2 = 0.05$, df = 1 (P = 0.83), $I^2 = 0\%$						



Chen et al. J Thorac Dis 2015;7:746-753.

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Preventing and treating incontinence related dermatitis

Comparing a perineal care washcloth impregnated with dimethicone 3% versus water and pH neutral soap to prevent and treat incontinence associated dermatitis: a randomised controlled clinical trial; study performed in 11 nursing homes, which were randomised to one of the two interventions

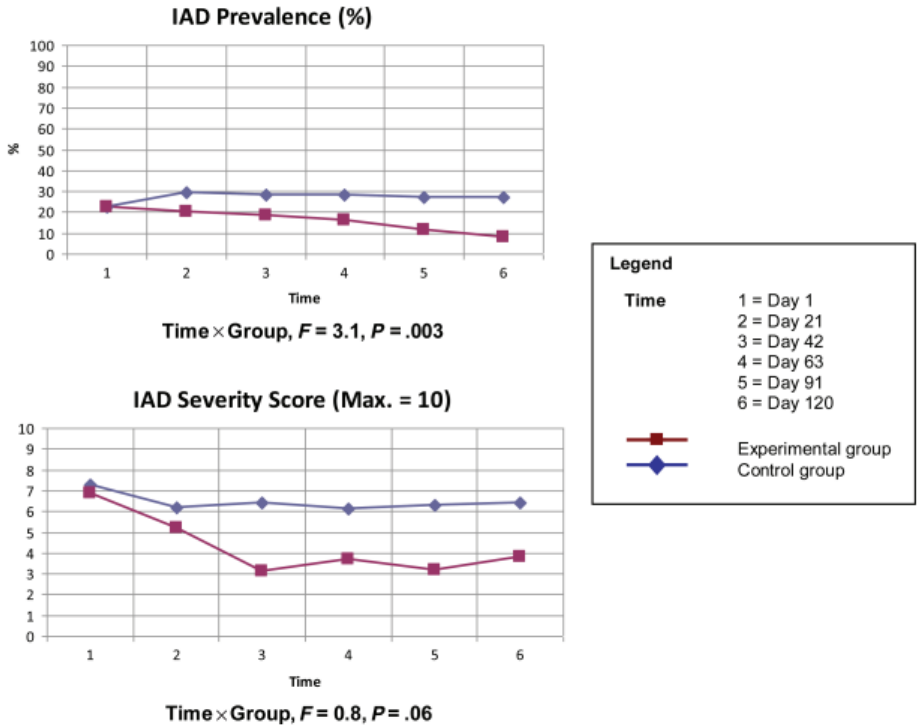

FIGURE 1. Graphic representation of the evolution of incontinence-associated dermatitis (IAD) prevalence and severity over time.

Beeckman et al. J Wound Ostomy Continence Nurs. 2011;38:627-634.

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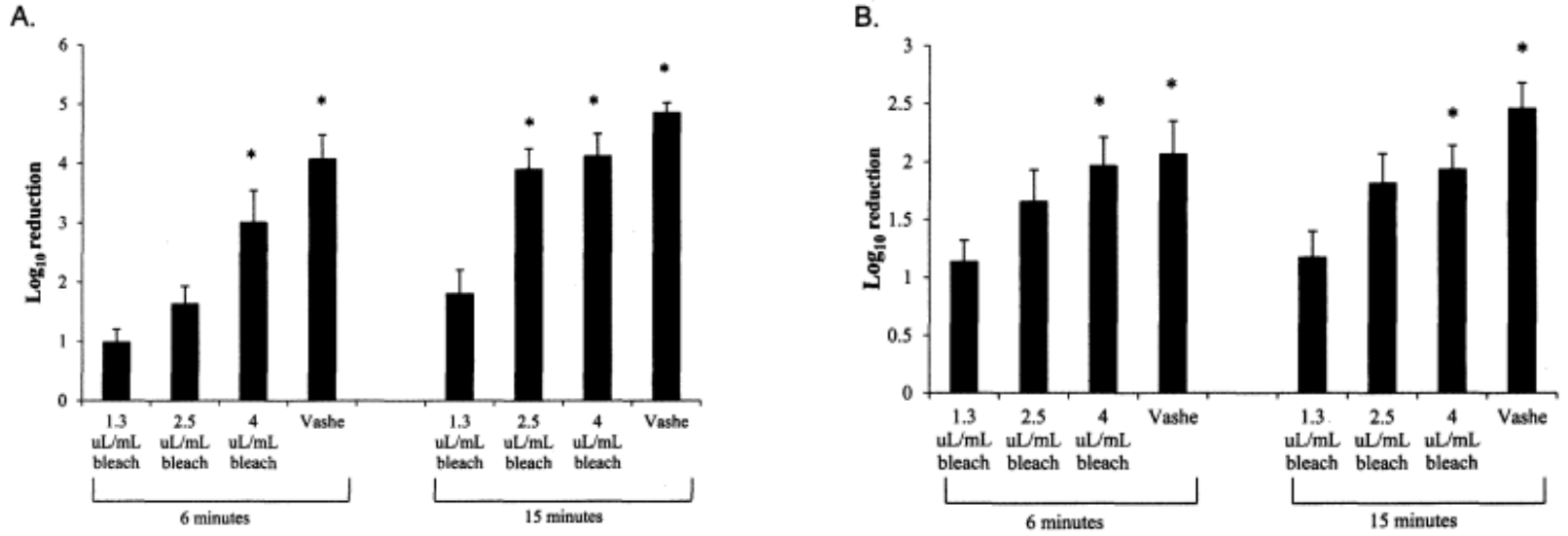
Other potential applications / benefits of waterless bathing

- Time saving[1,2]
  - Waterless bathing associated with greater satisfaction of nurses in terms of preference and perception of cleanliness
  - Time to use old bathing techniques and products was 10 to 60 mins (mean 24.9 mins).
  - When using the new bathing techniques was 5 to 30 mins (mean 12.0 min), a 48.1% reduction in time taken.
- Evidence that CHG meatal cleansing reduces the risk of CAUTI.[3]
- Some evidence that CHG bathing prior to surgery reduces the risk of SSI.[4]

1. Eigsti JE. *Dimens Crit Care Nurs.* 2011;30:169-176.
2. Groven et al. J Clin Nurs. 2021;30:2234-2245.
3. Fasugba, et al. Lancet Infect Dis 2019;19:611-19.
4. NICE SSI prevention guidance.

Alternatives to CHG for skin decolonisation

Effectiveness of dilute sodium hypochlorite or Vashe (0.025% hypochlorous acid) in the inactivation of MRSA on (A) a pig skin laboratory model and (B) polystyrene. The figures below show the mean log reduction from 4 MRSA strains.



Chang et al. Infect Control Hosp Epidemiol 2015.

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Infection risks from water

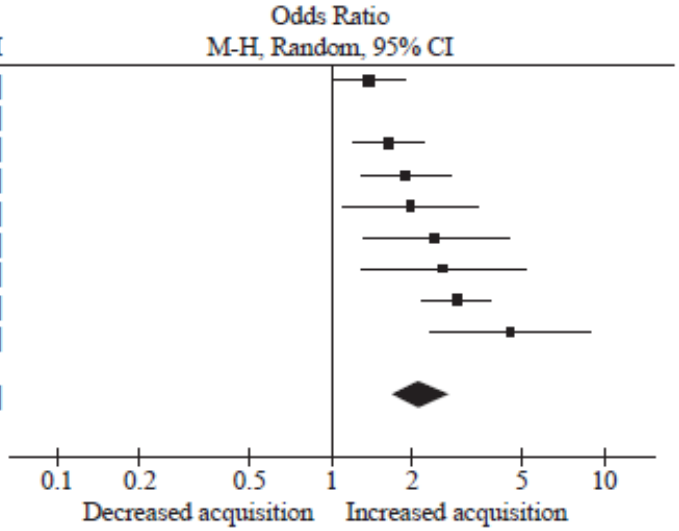
- Patient wash-water harbouring micro-organisms
- **Contaminated cleaning materials**
- Sinks and drains as reservoirs for infection
- Hospital water systems contaminated with *Pseudomonas* and/or *Legionella*
- Contamination during medical device reprocessing
- Contaminated drinking water

Your hospital room can make you sick!

Study or Subgroup	Decreased acquisition Events	Total	Control Events	Total	Weight	Odds Ratio M-H, Random, 95% CI
Huang (MRSA)	57	1454	248	8697	16.2%	1.39 [1.04, 1.86]
Nseir (ESBL producing Gram neg)	8	50	50	461	0.0%	1.57 [0.70, 3.52]
Huang (VRE)	58	1291	256	9058	16.2%	1.62 [1.21, 2.16]
Ajao (Klebsiella sp. or Escherichia coli)	32	648	235	8723	14.2%	1.88 [1.29, 2.74]
Nseir (Pseudomonas)	21	85	61	426	10.4%	1.96 [1.12, 3.45]
Drees (VRE)	19	138	31	500	9.7%	2.42 [1.32, 4.43]
Shaughnessy (Clostridium difficile)	10	91	77	1679	8.3%	2.57 [1.28, 5.15]
Mitchell (MRSA)	74	884	163	5344	16.4%	2.90 [2.18, 3.86]
Nseir (Acinetobacter)	16	52	41	459	8.6%	4.53 [2.32, 8.86]
Total (95% CI)		4643		34886	100.0%	2.14 [1.65, 2.77]
Total events	287		1112			

Heterogeneity: $Tau^2 = 0.09$; $Chi^2 = 21.32$, $df = 7$ ($P = 0.003$); $I^2 = 67\%$

Test for overall effect: $Z = 5.74$ ($P < 0.00001$)



Mitchell et al. *J Hosp Infect* 2015;91:211-217.

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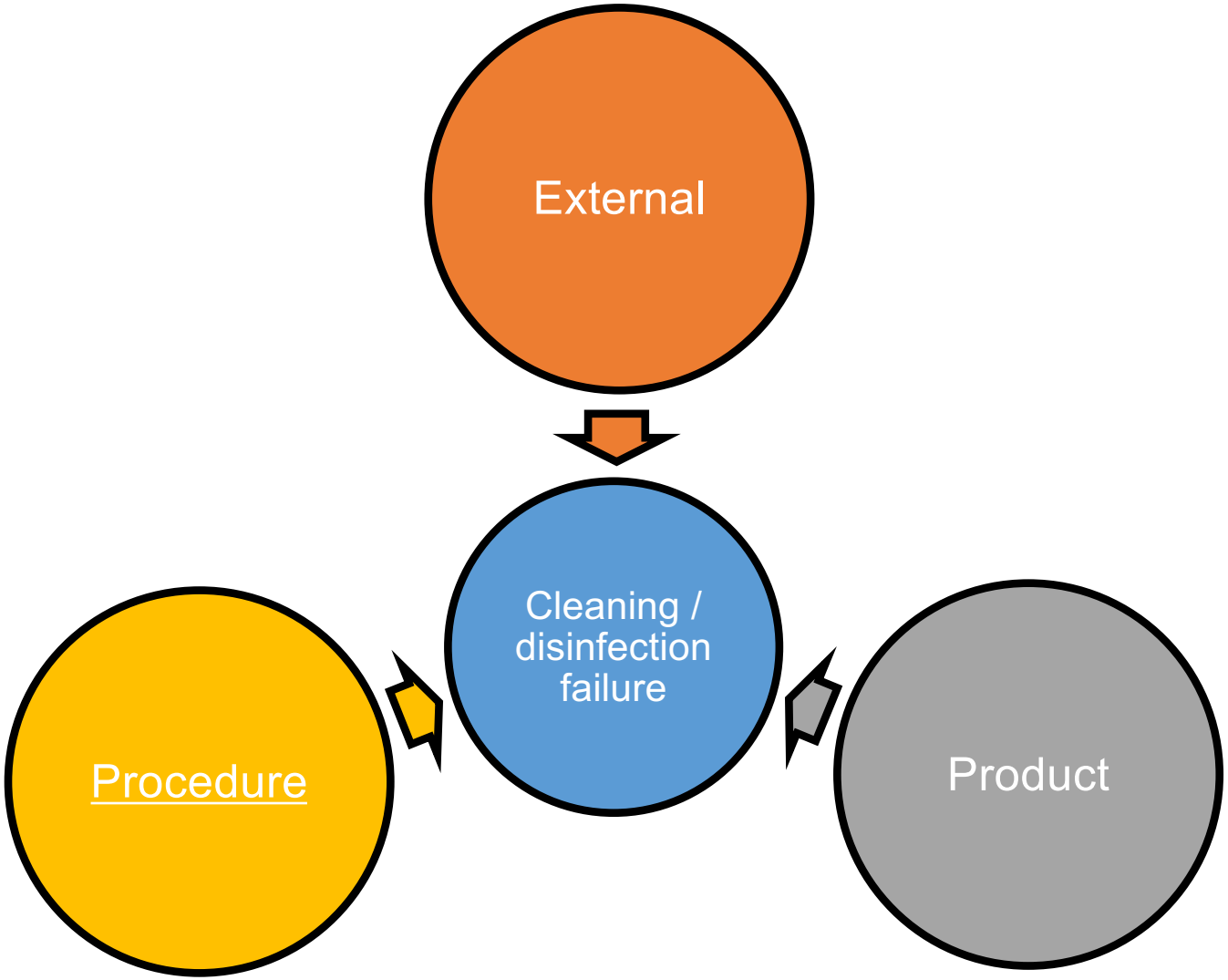
External
Cleaning / disinfection failure
Procedure
Product

Contaminated cleaning materials

TABLE 3. Outbreaks and pseudo-outbreaks due to contaminated antiseptics

Antiseptic
Alcohols
Alcohols
Chlorhexidine
Chlorhexidine
Chlorhexidine
Chlorhexidine
Chlorhexidine
Chlorhexidine
Chlorhexidine
Chlorhexidine

Chlorhexidi	
Chlorhexidi	
Chlorhexidi	
Chlorhexidi cetrimide	
Chlorhexidi cetrimide	
Chloroxyler	
Benzalkoni chloride	
Benzalkoni chloride	
Benzalkoni chloride	
Benzalkoni chloride	

Blood (pseudobacteremia)	Distilled water used to dilute chlorhexidine; low concentration (0.05%)	Maroye et al., 2000 (46)

Benzalkonium chloride	Pseudomonas EO-1	Urine	Contaminated (intrinsic) cleansing-germicide solution	Hardy et al., 1970 (32)
Benzethonium chloride	*Pseudomonas* species	Blood (pseudobacteremia)	Contaminated (intrinsic solution; 0.2%)	Dixon et al., 1976 (20)
Benzalkonium chloride	*Bulkholderia cepacia*, *Enterobacter* species	Blood (pseudobacteremia)	Storage of benzalkonium chloride with cotton/gauze; improper dilution; storage bottles infrequently sterilized	Kaslow et al., 1976 (39)
Benzalkonium chloride	*Bulkholderia cepacia*	Bacteremia	Storage of benzalkonium chloride with rayon balls; failure to disinfect squeeze bottles	Frank and Schaffner, 1976 (25)
Benzalkonium chloride	*Serratia marcescens*	Intravenous catheters (dogs and cats), other sites	Storage of benzalkonium chloride (0.025%) with cotton/gauze	Fox et al., 1981 (24)
Benzalkonium chloride	*Serratia marcescens*	Joint	Storage of benzalkonium chloride with cotton/gauze	Nakashima et al., 1987 (53)
Benzalkonium chloride	*Serratia marcescens*	CSF	Contamination (extrinsic) of stock bottle	Sautter et al., 1984 (78)

Povidone-iodine	*Burkholderia cepacia*	Blood (pseudobacteremia)	Intrinsic contamination	Craven et al., 1981 (19)
Poloxamer-iodine	*Pseudomonas aeruginosa*	Peritoneal fluid, wound	Intrinsic contamination	Parrott et al., 1982 (59)
Povidone-iodine	*Burkholderia cepacia*	Blood (pseudobacteremia), peritoneal fluid	Intrinsic contamination	CDC, 1989 (14); Jarvis, 1991 (36); Panlilio et al., 1992 (58)
Povidone-iodine	*Pseudomonas putida*	Blood, catheter tips	Not determined	Bouallègue et al., 2004 (11)
Triclosan	*Serratia marcescens*	Conjunctiva	Intrinsic contamination	McNaughton et al., 1995 (50)

[a] CSF, cerebrospinal fluid.

B. cepacia proliferating on the deionizing resin in the water system)

Weber et al. Antimicrobial Agents and Chemotherapy 2007;51:4217–4224.

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Contaminated cleaning materials

Hospital-grade disinfectant was found to be contaminated with 9 x 10^4 cfu of *S. marcescens* and *A. xylosoxidans*.

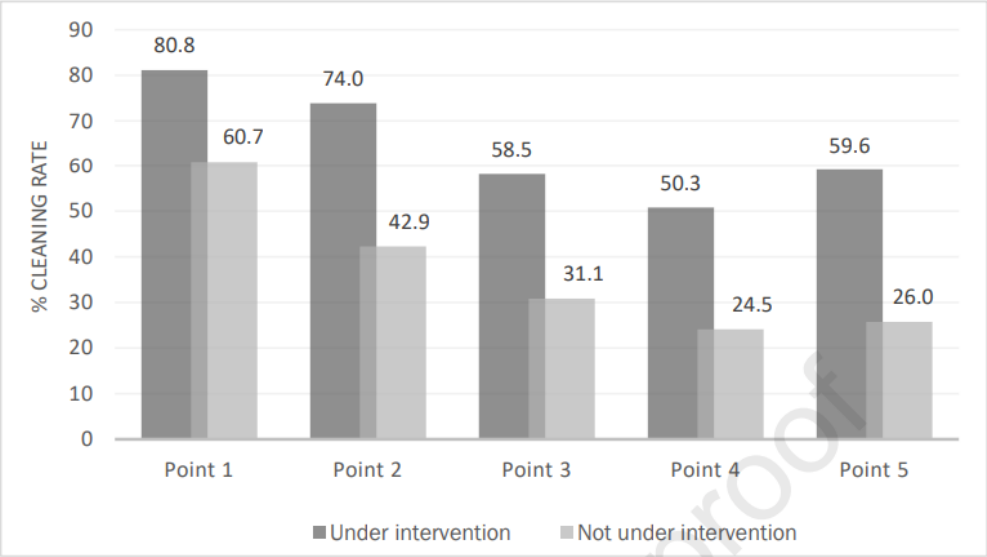
Fig 1. Agar contact plate cultures of bedrail surface in patient room, before and after surface was cleaned by housekeeper.

Boyce & Havill. Am J Infect Control 2022;50:1926-1301.

Water-free cleaning and disinfection: disinfectant wipes

Cluster-randomised cross-over intervention study of replacing “cloth and bucket” chlorine disinfection with detergent/disinfectant wipes.

Figure 3: Percent of Markers Cleaned, by Room Location and Intervention



*Cleaning points refer to: 1) the right bedrail, 2) the tray of the bedside table, 3) under the binder that contains the fluid balance pages, hanging at the foot of the bed, 4) the nurse's call-on button, and 5) the lamp switch. Results were compared to point 1.

Dadon et al. J Hosp Infect 2023 in press.

Water-free cleaning and disinfection: disinfectant wipes

Cluster-randomised cross-over intervention study of replacing “cloth and bucket” chlorine disinfection with detergent/disinfectant wipes.

Table 1: The impact of locating cleaning/disinfecting wipes in patients' units at multipatient rooms, on various hospitalization's outcomes,

Shamir Medical Center (20/10/2016-19/01/2018)

Outcome	Effect (95% CI)	p-value
CLABSI/CAUTI[1]		
IRR	1.6 (0.7, 3.5)	0.3
IRD	12.2/100,000 person-days (-9.7, 34.2)	0.3
CLABSI[1]		
IRR	2.0 (0.5, 8.0)	0.3
IRD	5.2/10,000 person-days (-5.4, 15.7)	0.3
CAUTI[2]		
IRR	1.4 (0.8, 2.4)	0.2
IRD	6.7/10,000 person-days (-4.2, 17.7)	0.2
MDRO Contamination[3]		
OR	0.7 (0.5, 1.0)	0.06
Predicted Probability Difference	-7.0% (-13.6%, -0.5%)	0.04
MDRO Acquisition[4]		
HR	0.4 (0.2, 1.0)	0.04
Risk Difference	-7.6% (-7.7%, -7.4%)	NA
In-Hospital Mortality[5]		
IRR	0.8 (0.7-1.0)	0.03
IRD	-19.8/10,000 person-days (-37.9, -1.6)	NA

1. Calculated using Poisson regression, clustered on a combined variable for unit and study phase
2. Calculated using Poisson regression with a non-clustered model
3. Calculated using a GEE model clustering on unit.
4. Calculated using a Cox proportional-hazard model. The absolute effect was calculated using the Austin method, which only provides a point estimate, along with bootstrapped confidence intervals.
5. Calculated using a non-clustered Poisson regression

Dadon et al. J Hosp Infect 2023 in press.

Infection risks from water

- Patient wash-water harbouring micro-organisms
- Contaminated cleaning materials
- **Sinks and drains as reservoirs for infection**
- **Hospital water systems contaminated with *Pseudomonas* and/or *Legionella***
- Contamination during medical device reprocessing
- Contaminated drinking water

Basically, anything wet…

Water reservoirs containing carbapenemase-producing organisms.

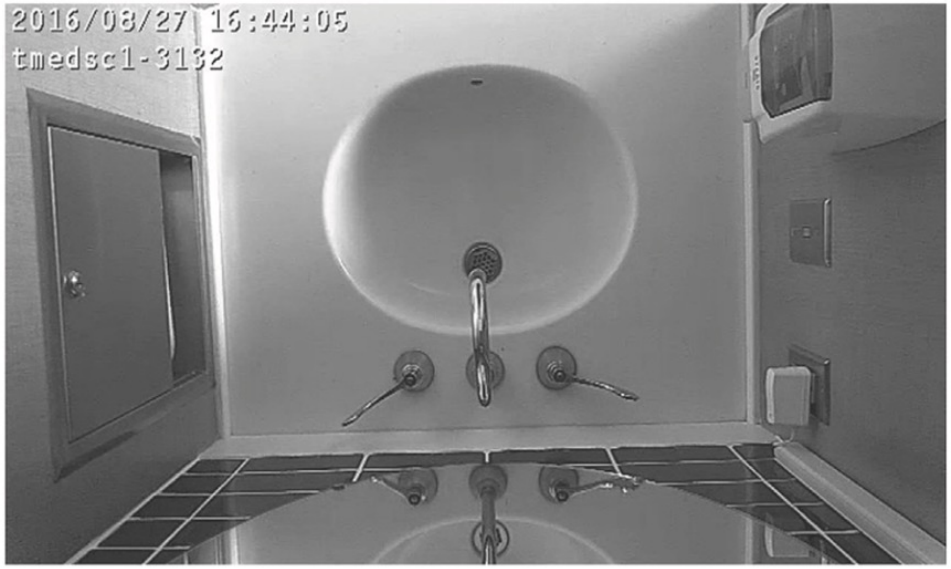
Table 2. Water Reservoirs Containing Carbapenem-Resistant Organisms[a]

Water Reservoir	Studies, No. (N = 32)	References
Drains/drainage systems	17	Peña et al [35], Kotsanas et al [26], La Forgia et al [28], Betteridge et al [7], Leitner et al [20], Wendel et al [29], Breathnach et al [21], Leung et al [24], Snitkin et al [22], Tofteland et al [32], Vergara-López et al [33], Yomoda et al [9], Stjarne Aspelund et al [12], Odom et al [11], Knoester et al [25], Landelle et al [37], Seara et al [34]
Sink surfaces	14	Betteridge et al [7], Wendel et al [29], Knoester et al [25], Podnos et al [23], Wang et al [27], Biswal et al [8], Hong et al [30], Bukholm et al [31], Kouda et al [38], Landelle et al [37], Dewi et al [10], Kaiser et al [13], Ito et al [14], Leung et al [24]
Faucets	8	Odom et al [11], Knoester et al [25], Majumdar et al [17], Pitten et al [36], Hong et al [30], Bukholm et al [31], Alter et al [15], Leung et al [24]
Water	3	Knoester et al [25], Ambrogi et al [18], Bukholm et al [31]
Inflatable hair wash basin	2	Wendel et al [29], Knoester et al [25]
Sensor mixer taps	1	Durojaiye et al [16]
Water/tea dispenser	2	Wong et al [19], Ito et al [14]
Shower/shower equipment	3	Betteridge et al [7], Leung et al [24], Seara et al [34]
Toilet bowl/brush	2	Breathnach et al [21], Kouda et al [38]

Kizny Gordon et al. Clin Infect Dis. 2017;65:1431-1433.

How often are sinks used for hand hygiene?

- Analysis of activity from 2973 sink videos from 60 days in patient rooms and adjoining bathrooms
- Handwashing was [redacted] of observed behaviours
- But there were 56 activities where a variety of nutrients, which could promote microbial growth, were disposed of in the sink



Grabowski et al. J Hosp Infect 2018;100:e115-e122.

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Outbreaks associated with sink/drain contamination

Table 1. Epidemiologic Features of 26 Wastewater Drain–Associated Outbreaks

Reference	Outbreak Organism	Drain Type (% Positive)	Longest Interval Between Cases	Duration of Outbreak before first direct WWD Intervention	Initial Interventions (months)	Subsequent Interventions
2	MDR Pa	Whirlpool Drain 1/1 (100)	N/A	N/A	EIPI (1 mo)	1. Unit closed 2. Whirlpool system replaced
4	MDR Pa	Sinks 21/124 (17)	2 mo	12 mo	1. EIPI 2. Bleach sink decontamination protocol, "no lasting impact" (12 mo)	ICU closed, sinks removed, splash-minimizing sinks installed
5	MDR Ab	Sink	1 mo	9 mo	1. EIPI 2. Single sink replacement (9 mo)	Weekly bleach system flushing protocol using plugged sink flooding of waste pipes. Sinks negative for ObS at 6 mo. Subsequently, new sinks positive and 19 patients colonized
6	KPC	"Multiple patient sinks"	N/A	N/A	1. EIPI 2. Hydrogen peroxide vapor protocol (N/A)	Multiple environmental interventions
7	ESBL Kp	"Sink and surround"	6 mo	7 mo	BIPI (4 mo)	Sink systems replaced
8	ESBL Ko	Sinks 149/910 (16.4)	7 mo	6 mo	1. EIPI 2. Escalating bleach drain disinfection protocols (2) failed (20 mo)	1. Third protocol, thrice daily bleach decontamination decreased positive rate to 4.9%. Rate returned to baseline (16.4%) when compliance decreased. 2. Sink system replacement 3. Continued daily bleach protocol

Carling PC. Infect Control Hosp Epidemiol 2018;39:972-979.

Department of Health

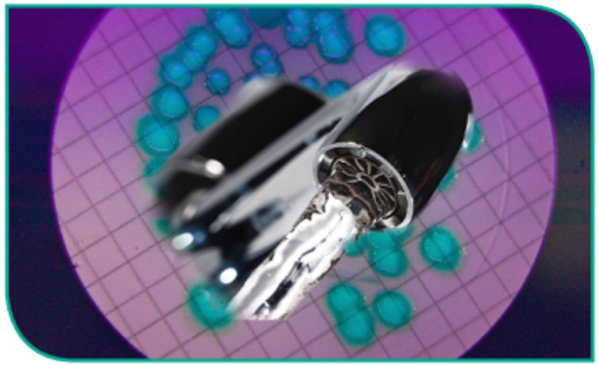
Health Technical Memorandum 04-01: Safe water in healthcare premises

Part B: Operational management

Department of Health

Health Technical Memorandum 04-01: Safe water in healthcare premises

Part C: *Pseudomonas aeruginosa* – advice for augmented care units



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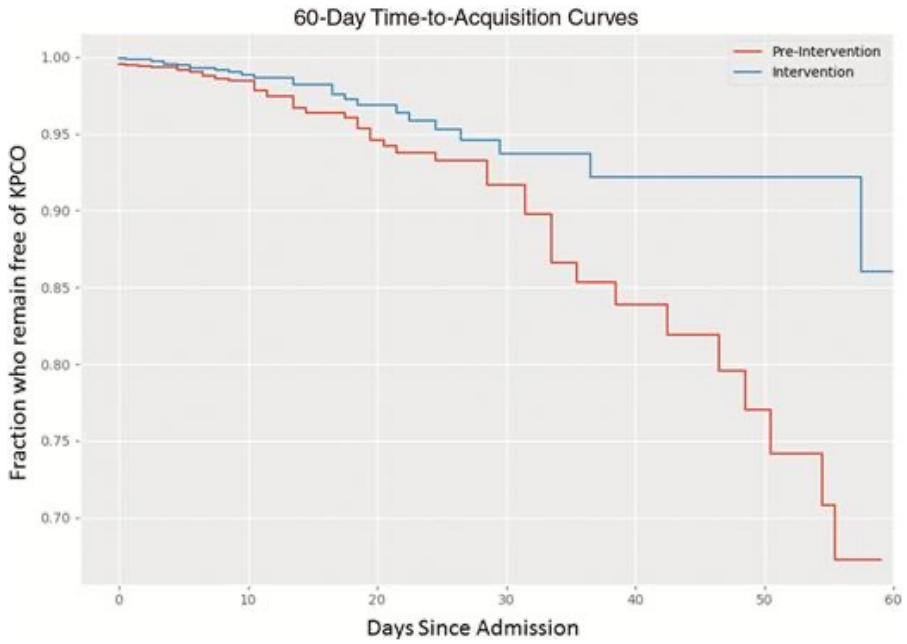
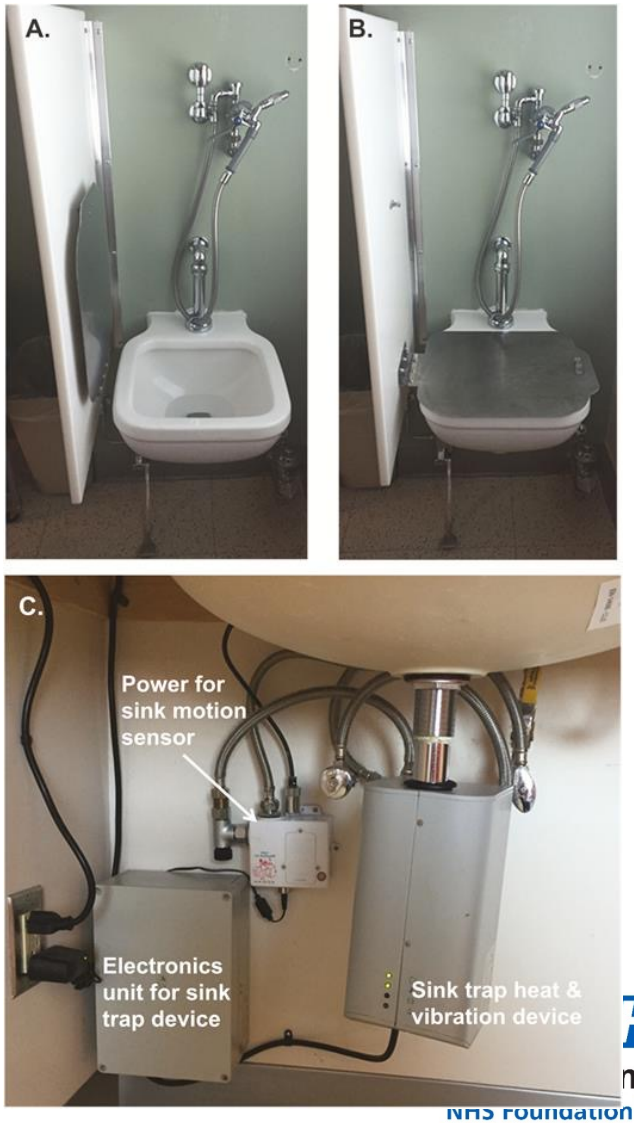
Addressing drain contamination

CPE (*K. pneumoniae*) acquisition and clinical infection halved through improved management of sinks (OR = 0.51 for acquisitons, and 0.29 for clinical cultures) (n=~7,500 pts).





Mathers *et al. Clin Infect Dis* 2018;67:171-178.

Water free critical care

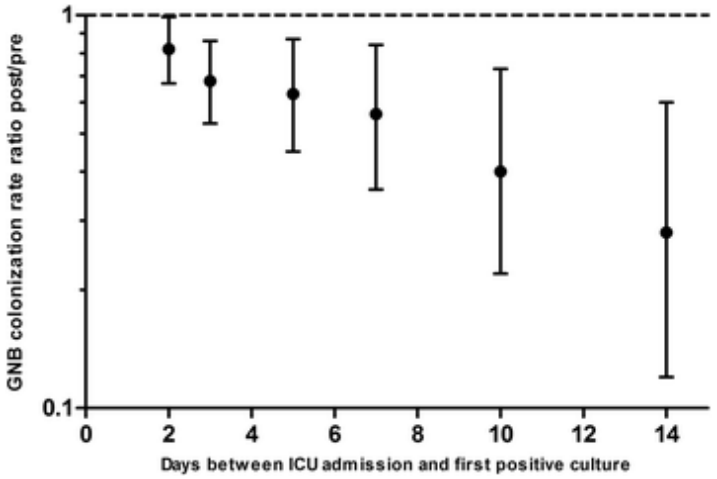
Pre-post study in 5 ICUs in the Netherlands; rates of Gram-negative rod infection/colonisation compared before and after sink removal and the introduction of 'water-free' care.

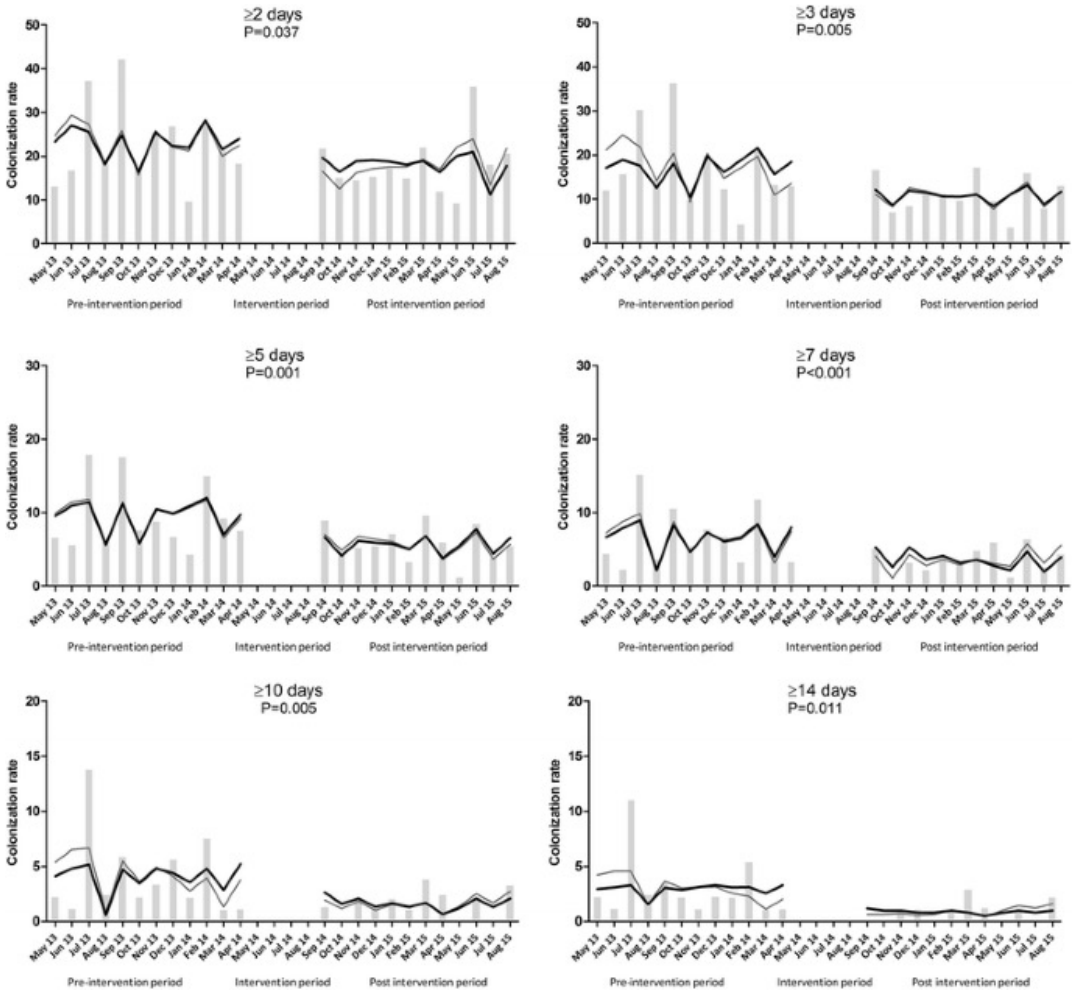
Patient care-related action	New method with 'water-free' working
Hand washing after visual contamination	'Quick & Clean', (Alpheios B.V., Heerlen, The Netherlands) wipes to remove extensive contamination from hands. Followed by disinfection with alcohol-based hand rub
Medication preparation	Dissolving of medication in bottled water (SPA reine, Spa, Belgium)
Drinks	Bottled water (SPA reine, Spa, Belgium)
Canula care	Disposable materials
Hair washing	Rinse-free shampoo cap (Comfort Personal cleansing products, USA)
Washing	Moistened disposable wash gloves, (D-care,Houten, The Netherlands)
Dental care	Bottled (SPA reine, Spa, Belgium)
Shaving	Electric shaving, or with warm bottled water (SPA reine, Spa, Belgium)

Hopman et al. Antimicrobial Resistance & Infection Control 2017;6:59

Water free critical care

Overall rate of Gram-negative rod colonisation rate: were 26.3 GNB/1000 ICU admission days pre-intervention and 21.6 during the intervention (rate ratio 0.82; 95%CI 0.67–0.99; P = 0.02).





Hopman et al. Antimicrobial Resistance & Infection Control 2017;6:59

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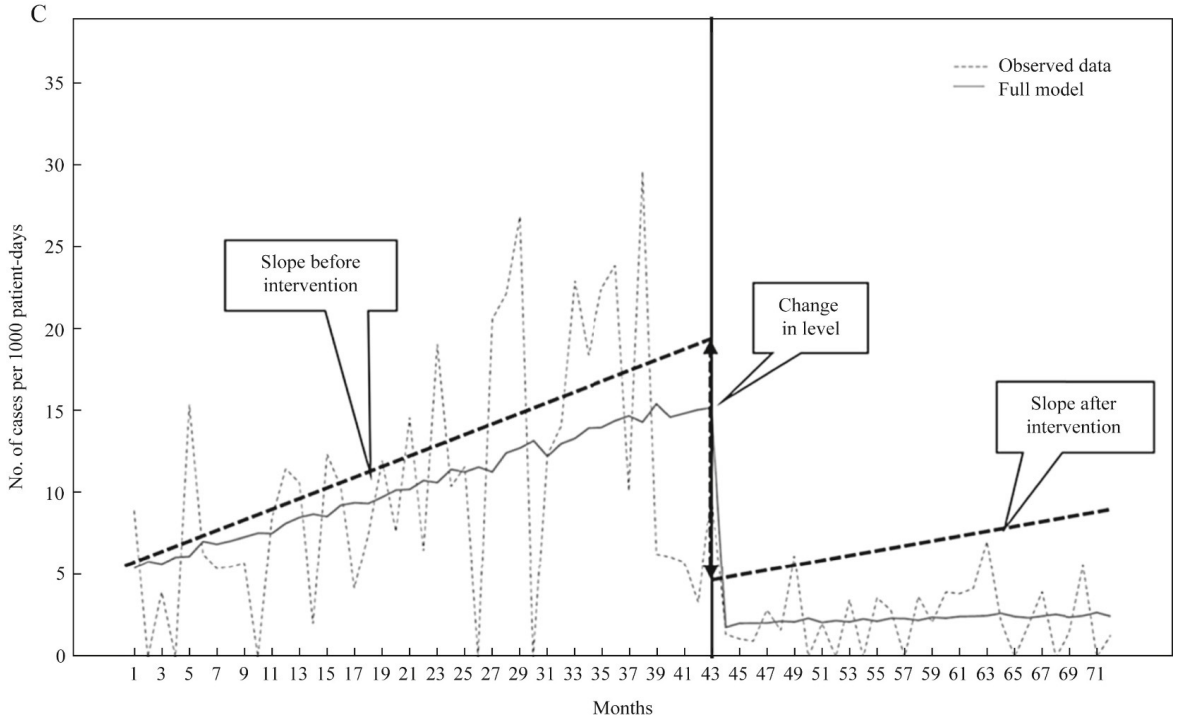
Water free critical care

Pre-post study in 2 ICUs in Spain; rates of multidrug-resistant Gram-negative rod infection/colonisation compared before and after sink removal and the introduction of ‘water-free’ care.



Overall rate of Gram-negative rod colonisation rate: 9.15 per 1000 patient-days before the intervention and 2.20 during. This yielded an RR between both periods of 0.24 (95% CI: 0.17–0.34).

Shaw et al. J Hosp Infect 2018;98:275-281

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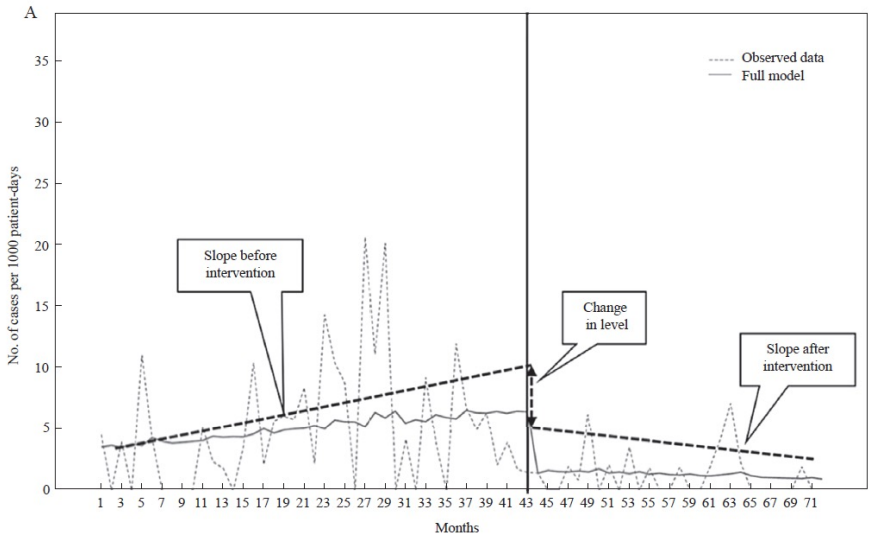
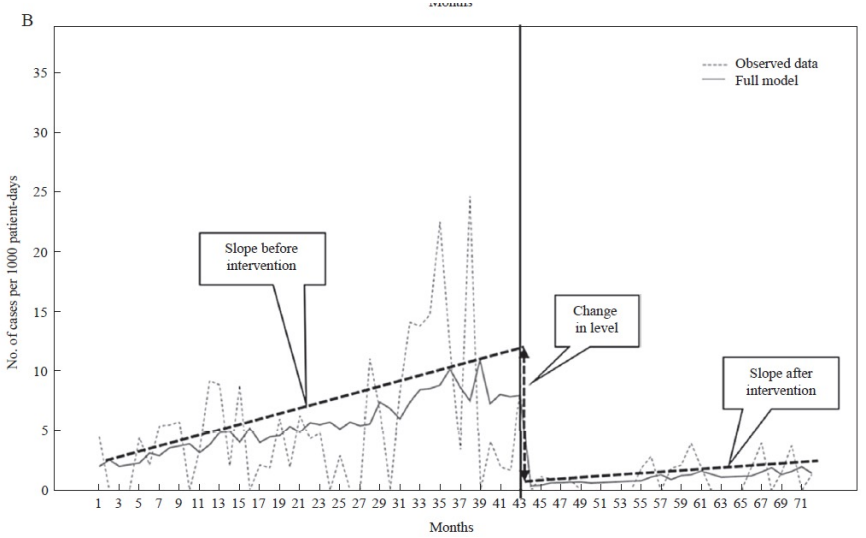
Water free critical care

Pre-post study in 2 ICUs in Spain; rates of multidrug-resistant Gram-negative rod infection/colonisation compared before and after sink removal and the introduction of ‘water-free’ care.



MDR *K. pneumoniae*



MDR *P. aeruginosa*

Shaw et al. J Hosp Infect 2018;98:275-281

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Infection risks from water

- Patient wash-water harbouring micro-organisms
- Contaminated cleaning materials
- Sinks and drains as reservoirs for infection
- Hospital water systems contaminated with *Pseudomonas* and/or *Legionella*
- Contamination during medical device reprocessing
- Contaminated drinking wate

Water-free care

Thanks to Martin Kiernan for some slides!

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March 7, 2024	*(FREE Teleclass)* **INFECTION PREVENTION AND CONTROL CERTIFICATION: OBTAINING YOUR ENTRY LEVEL IPC CERTIFICATION THROUGH CBIC** Speaker: **Jessica Dangles**, Certification Board of Infection Prevention and Control
March 14, 2024	**COVID-19 PREPAREDNESS – WHAT WENT WRONG? WHAT ARE THE NEXT STEPS? THE POINT OF VIEW OF A BIOMEDICAL ENGINEER** Speaker: **Dr. Davide Piaggio**, University of Warwick, School of Engineering, UK
March 21, 2024	**EMERGING FUNGAL INFECTIONS: ENVIRONMENTAL CHANGES BRING ABOUT NEW CHALLENGES** Speaker: **Dr. Tom Chiller**, Centers for Disease Control, Atlanta
April 2, 2024	**COVID-19's CHALLENGES TO INFECTION CONTROL DOGMA** Speaker: **Prof. Michael Klompas**, Harvard University
April 11, 2024	*(FREE Teleclass)* **LESSONS LEARNED FROM A FAILED IMPLEMENTATION** Speaker: **Luize Fábrega Juskevicius** , University of São Paulo, Brazil

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