

Mission: Zero

to help reduce and eliminate HAIs,
including CAUTI and CLABSI as a part of
your infection control bundle.

Agenda

- What we know – Identified Gaps in Care
- Pathophysiology
- A Clear Solution
- Discuss Next Steps





Infections

by the Numbers:



UTIs are the **#1** infection in healthcare.^{1,2}



CAUTI Estimated Event Cost **\$13,500 +**

CLABSI Estimated Event Cost **\$34,600 +**



Identified that **>50%** of all organisms **infecting Foleys and Central Lines** are **gut related organisms**.³



Found that most hospitals decolonize patients with CHG but do not address **perineum decolonization**.³



CLABSIs are one of the most deadly types of HAIs, with a mortality rate of **12%-25%**.⁵



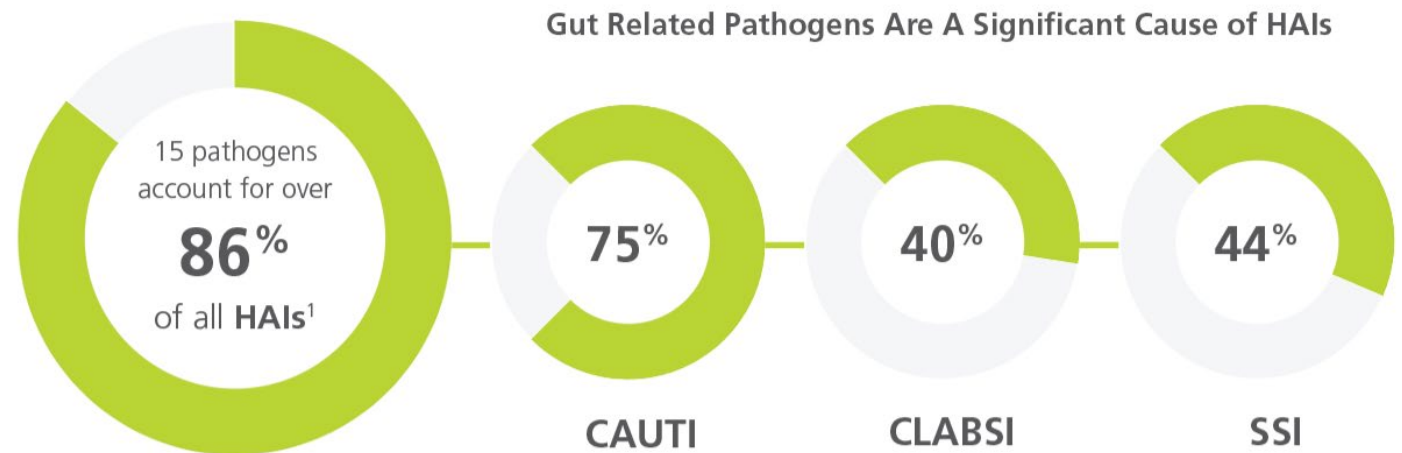
UTIs are ranked the **6th** most common cause of readmission.⁶



UTIs account for **30%-60%** of all antibiotics prescribed.⁴

Here Is What We Know

The CDC implicates **15 pathogens** that account for **over 86%** of healthcare-associated infections (HAIs)⁷. Of these pathogens, **10 are considered gut-related**.





The CDC implicates **15** Pathogens that cause over **86%** of the most common healthcare-associated infections (HAIs). **10** of these Pathogens are considered gut related.



PATHOGEN:	OVERALL No. (%) of pathogens. Rank		CLABSI No. (%) of pathogens. Rank		CAUTI No. (%) of pathogens. Rank		SSI No. (%) of pathogens. Rank	
<u>Escherichia coli</u>	62,571 (15.4%)	1	6,469 (7.3%)	5	33,804 (32.7%)	1	21,746 (14.1%)	2
Staphylococcus Aureus	42,132 (11.8%)	2	10, 263 (11.5%)	2	2,066 (2%)	10	26,970 (17.5%)	1
<u>Selected Klebsiella spp</u>	31,530 (8.8%)	3	7,651 (8.6%)	3	15,066 (14.6%)	2	7,789 (5.1%)	6
Pseudomonas aeruginosa	28,513 (8%)	4	3,664 (4.1%)	8	14,481 (14%)	3	8,956 (5.8%)	5
<u>Enterococcus faecalis</u>	28,236 (7.9%)	5	6,731 (7.5%)	4	9,236 (8.9%)	4	12,267 (8%)	3
Coagulase-negative Staphylococci	24,199 (6.8%)	6	10,539 (11.8%)	1	2,550 (2.5%)	9	11,106 (7.2%)	4
<u>Enterobacter spp.</u>	16,568 (4.6%)	7	3,446 (3.9%)	9	5,124 (5%)	6	7,178 (4.7%)	8
<u>Enterococcus faecium</u>	13,687 (3.8%)	8	6,015 (6.7%)	7	3,155 (3.1%)	8	4,515 (2.9%)	11
<u>Proteus spp.</u>	11,463 (3.2%)	9	NA ()	11	6,012 (5.8%)	5	4,357 (2.8%)	12
<u>Candida Albicans</u>	11,043 (3.1%)	10	6,171 (6.9%)	6	NA (%)	11	4,847 (3.1%)	10
<u>Other Enterococcus spp.</u>	11,020 (3.1%)	11	1,718 (1.9%)	10	3,857 (3.7%)	7	5,444 (3.5%)	9



Over **50%** of all **HAIs**, Over **40%** of **CLABSIs**, over **44%** of **SSIs**, and over **75%** of **CAUTIs** were caused by **gut related Pathogens**.¹



PATHOGEN:	OVERALL No. (%) of pathogens	CLABSI No. (%) of pathogens	CAUTI No. (%) of pathogens	SSI No. (%) of pathogens
Escherichia coli	62,571 (15.4%)	6,469 (7.3%)	33,804 (32.7%)	21,746 (14.1%)
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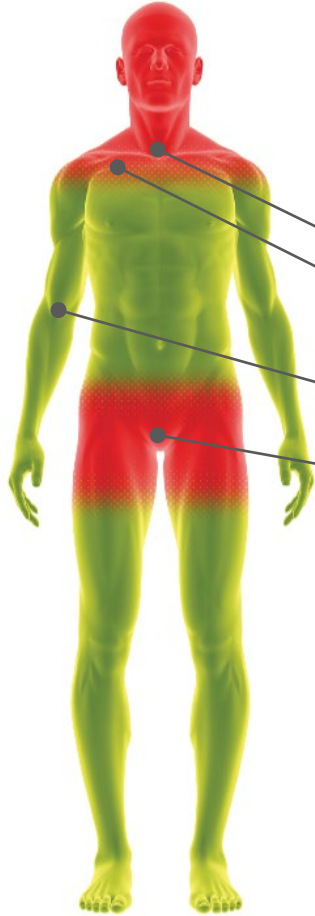
Gut Related Organisms

Frequency of Adult Device-Associated Healthcare-Associated Infection (HAI) Pathogens, by HAI and Location Type, 2015–2017₇



Location Type ^a	CLABSI		CAUTI		PVAP ^b	
	No. of Units ^c	No. (%) Pathogens (n = 89,203)	No. of Units ^c	No. (%) Pathogens (n = 103,260)	No. of Units ^c	No. (%) Pathogens (n = 10,037)
Hospital Wards ^a	9,648	34,788 (39.0)	11,850	44,790 (43.4)	101	289 (2.9)
Hospital ICUs	4,179	27,396 (30.7)	4,626	40,755 (39.5)	1,728	9,233 (92.0)
Hospital Oncology Units	698	16,191 (18.2)	554	2,274 (2.2)	9 ^d	33 (0.3)
LTACHs	687	10,828 (12.1)	699	11,366 (11.0)	194	482 (4.8)
IRFs ^e	1,025	4,075 (4.0)	0	0 (0.0)

Here Is What We Know



Gaps In Protection

Most hospitals decolonize patients with Chlorhexidine Gluconate (**CHG**) but do not address perineum decolonization.

Current Practice Does Not Address Gut Related Pathogens In The Perineum, Which Can Lead To Infections In:

- Tracheotomy tube
- Central venous catheter
- PICC line
- Urinary catheter
- Surgical sites

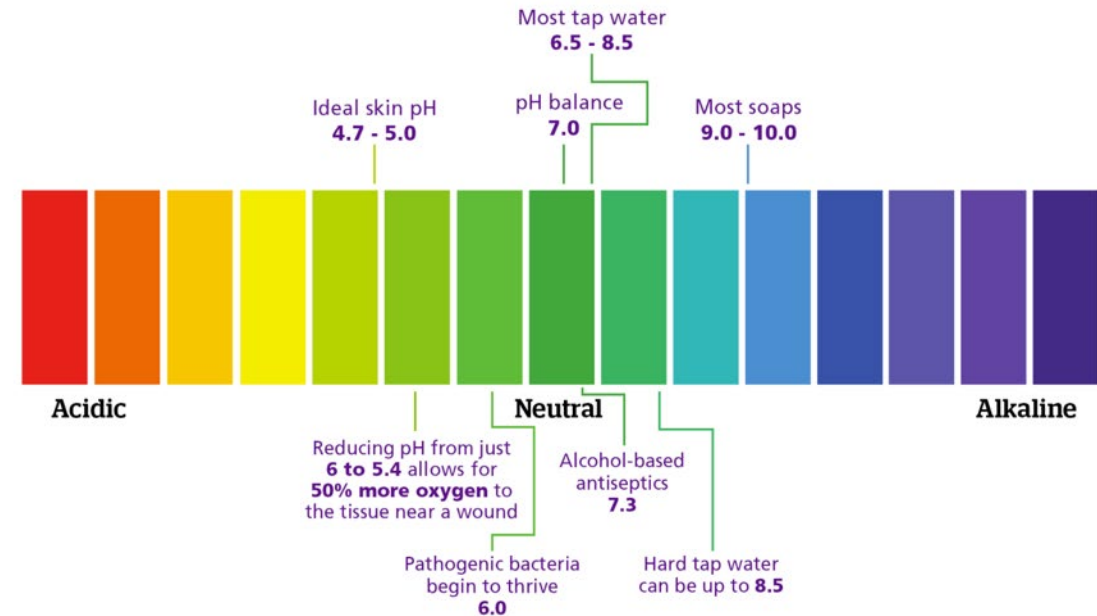
Soap and water or equivalent wipes do not decolonize the perineum and can strip away the skin's natural antimicrobial barrier and defensive functions. Most products that can decolonize the skin are either contraindicated for use in the perineum and in mucosa or lack safety and efficacy data.



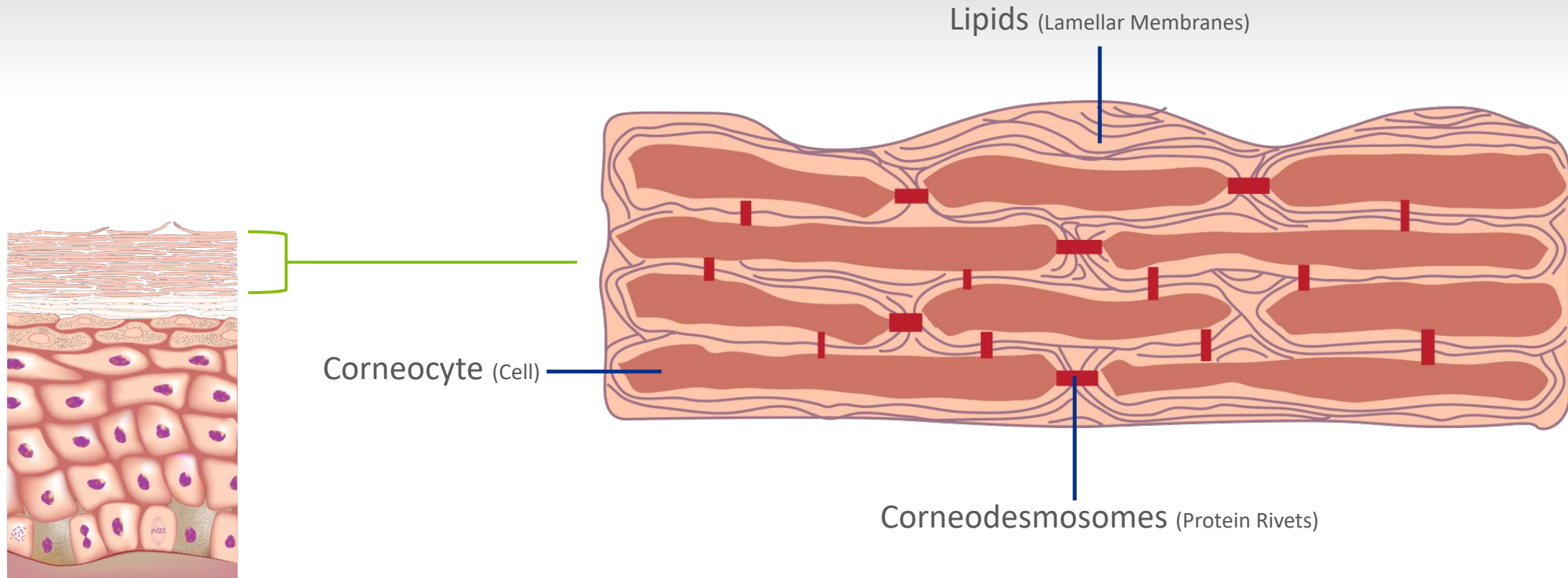
pH Matters: Addressing Skin pH Topically

Healthy skin (mucosa) thrives in an optimal low pH environment. It competes successfully for nutrition and space on the skin surface, protecting against invasion by pathogens and resulting infections.

When pH rises, the normal healthy microbiome suffers, and pathogenic bacteria capitalizes on the change in pH.



Stratum Corneum: Healthy Skin Barrier for Structural Protection



The stratum corneum, the skin's outermost layer and interface with the outside world is now well recognized as the barrier that prevents unwanted materials from entering, and excessive loss of water from exiting the body.



pH Matters: Biochemical Protections

- Free fatty acids are antimicrobial and envelop invading
- Over 40 different antimicrobial peptides
- LL-37, a cathelicidin, the most effective antimicrobial peptide
- Sphingosine, an amino alcohol is also antimicrobial
- Production and presence of all of these is pH dependent

A Clear Solution: pH Matters



An ideal acidic skin pH creates a hostile environment to pathogens, while supporting skin integrity and proper skin function. Theraworx Protect's unique low pH formulation **supports 4 systems** that are critical to driving quality and safety **while helping to reduce hurt and harm.**

pH Acidic Systems

Key ingredient:
Citrus Paradisi
(Grapefruit Seed Extract)

Surfactant Systems

Key ingredient:
Cocamidopropyl Betaine

Barrier Systems

Key ingredients:
Dimethicone, Allantoin

Preservative Systems

Key ingredient:
Colloidal Silver



Mechanisms of Action

Effective And Safe For Use Head-to-toe, Including The Perineum And Mucosa



pH Acidic Systems:

Inhibits the colonization of pathogens.

- **Key Ingredients:** Citrus Paradisi (Grapefruit) Seed Extract, Cocamidopropyl Betaine and Lauryl Glucoside (low-pH Surfactants).

Surfactant Systems:

Lowering the surface tension on the skin making it increasingly difficult for pathogenic adherence & disruptive to biofilm.

- **Key Ingredients:** Cocamidopropyl Betaine and Lauryl Glucoside (low-pH Surfactants).

Preservative Systems:

Safe for use on mucosa with effective ingredients that should not interact with mucosa.

- **Key Ingredients:** Citrus Paradisi (Grapefruit) Seed Extract, Tetrasodium EDTA, Colloidal Silver, Beta Glucan, Aloe Barbadensis Leaf Juice.

Barrier Systems:

Utilizing skin as the first line of defense, assuring that skin is intact and pliable.

- **Key Ingredients:** PEG/PPG-4/12 Dimethicone, Allantoin, Tocopheryl Acetate, Glycerin.

A Clear Solution: pH Matters



Theraworx Protect provides advanced total body and perineum care, trusted by hospitals and health care settings as a part of their infection control bundles.

Theraworx Protect Addresses the Gaps

- Advanced perineum care
- One step to total body and perineum protection—reducing time and human error
- Safe for use on compromised skin
- Low-pH formulation supports the skin's natural antimicrobial barrier and defensive functions
- Improve quality and safety while helping to reduce hurt and harm
- No contraindications



CAUTI & CLABSI

by the Numbers:

What would the impact be on Quality and Safety if you could reduce CAUTI & CLABSI rates by decolonizing the perineum?



Identified that **>50%** of all organisms infecting **Foleys** and **Central Lines** are **gut related organisms**.³



Found that most hospitals decolonize patients with CHG wipes but do not address **perineum decolonization**.³

Case Study:
Current Theraworx User



Hospital Performs Below Average ■ ■ ■ Above Average



National Healthcare CNO Summit

Vizient's "Gone in 60 Days" and use of Theraworx

Richard Beaver - AVP

February 11, 2022



vizient.



Vizient's "Gone in 60 Days" approach to infection prevention

- Identifies the 2 or 3 process metrics that contribute to 80% of infections
- Identified that > 50% of all organism infecting Foleys and central lines are gut related organisms
- Found that all hospitals decolonize patients with CHG wipes but do not address perineum decolonization
- One of the key process metrics found to speed reduction of infection is the use of Theraworx for perineum and full body decontamination
- Realized statistically significant reduction of infection in rapid time

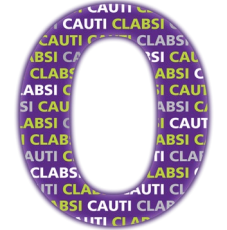
CLABSI Bundle

1. Remove unnecessary Central Lines (No Central Line, No Infection)
 - Vizient knows target use rate for hospitals based on bed size and severity of illness
2. Advanced perineum care for decolonization
 - 40% to 60% of Central Line (includes Foley) infecting organisms originate in the groin
 - Current practice is soap and water (includes wipes) which does not provide decolonization over a 12-hour period
3. Dressing clean, dry and intact
4. Line flushed and hubs disinfected

CAUTI Bundle

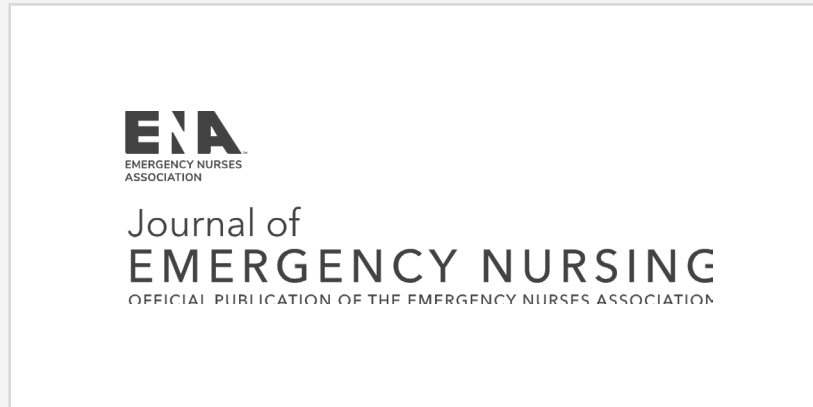
1. Remove unnecessary Foleys (No Foley, No Infection)
 - Vizient knows target use rate for hospitals based on bed size and severity of illness
2. Advanced perineum care for decolonization
 - 40% to 60% of Foley (and Central Line) infecting organisms originate in the groin
 - Current practice is soap and water (includes wipes) does not provide decolonization over a 12-hour period
3. Pull Foley before urine sample collection for fresh catch
 - Prevents a colonized Foley from creating an HAI

Evidenced Based



Mission: Zero

Published Clinical Studies in:



Learn about Theraworx Protect's clinical data, visit
hcp.theraworxprotect.com/learn



Closing Gaps In The Current Standard Of Care



2 Pack Peri Care System

- Theraworx[®]**
PROTECT
Advanced
Hygiene
And
Barrier
System

TOWELS
contains 2 towels
USA

OPEN HERE

DO NOT FLUSH. DO NOT MICROWAVE.

USE:
Apply every 4 to 12 hours (Q4 to Q12). Safe to use as often as needed. Safe for mucous membranes and safe for multiple skin types. Do not rinse. Allow to air dry. Store between 32° and 120° Fahrenheit. **DO NOT FLUSH.**

2 Towel Application System:

1st Towel: Apply to meatus and perineal area, flushing front to back for females and in concentric circles around the glans penis for males.

2nd Towel: Apply to all areas from the umbilicus to the mid thigh, creating the Zone of Protection (include all skin folds and perianum).

ZONE OF PROTECTION

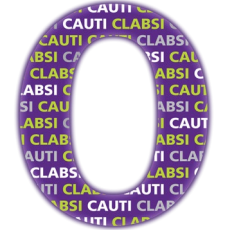
1ST TOWEL APPLICATION AREA
2ND TOWEL APPLICATION AREA

INGREDIENTS:
Water, Cocamidopropylamine Oxide, Aloe Barbadensis Leaf Juice, Sodium Chloride, Tromethamine, Glycerin, Aloe Vera, Allantoin, Beta Glucan, Panthenol, Geraniol, Cetyl Alcohol, Hexyl Cetyl Stearate, Laureth Sulfate, Potassium Sorbate, Phenoxyethanol, Citric Acid, Potassium Hydroxide, Fragrance, Methylparaben, Propylparaben.

PRECAUTIONS:
Intended for oral ingestion. If extended effects occur, continue use. May cause eye irritation. If eye contact occurs, flush thoroughly with water.

DISPOSITION:
After Flushing
Theraworx[®] is a trademark of and
patented by
Gallie Health, Inc.
Dallas, TX 75203
17-0217-2723
© 8800FF + MA-2 120
theraworx.com

Protocol



Mission: Zero

2 Pack Peri Care System



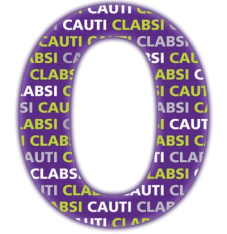
Peri Care Protocol: Catheter insertion, maintenance & post incontinence. Skin friendly and safe for mucous membranes. Non-toxic, non rinse.

Use: Apply every 6 to 12 hours (Q6 to Q12). Safe to use as often as needed. Safe for mucous membranes and safe for multiple skin types.

Two Cloth Application System:

1. Apply to meatus and perineum area, finishing front to back for women and in concentric circles around the glans of the penis for men.
2. Apply to all areas from the umbilicus to the mid-thigh, creating the Zone of Protection (includes all skin folds and perineum).

Protocol



Mission: Zero

Bathing System



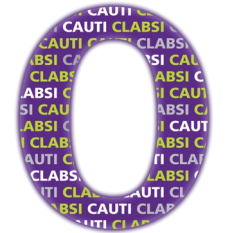
Patient Bathing Instructions:

Theraworx Protect is Safe for all skin types and even the most sensitive areas. It should be applied all over the body including the face, groin, and genitals

TO USE:

Clean with either side of cloth. Use all (8) cloths for a full bath (diagram on package). Allow to air dry.

Two-Pack to U-Pak: Two-pack for in-hospital use and U-Pak when discharged for continued protection



Mission: Zero

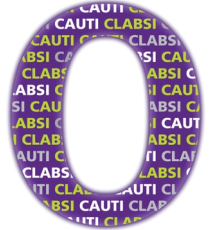


Two-Pack: In-Hospital Program:
Utilize Theraworx Protect Two-Pack for perineal and catheter care while in the hospital



U-Pak Discharge Program: Utilize Theraworx Protect U-Pak and protocol for patients being discharged from the hospital for 30 days of perineal and catheter care.

Summary



Mission: Zero

CAUTI



CLABSI



SSI | CDI | MRSA



- Safety – Theraworx Protect can be used on the face, perineum, mucosa, and compromised skin types as often as needed. **NO GAPS IN PROTECTION**
- AJIC 2018 – Theraworx Protect has been shown equally as effective as 4% CHG.
- Supply Chain Confidence
 - No interruptions in product supply
 - No backorders or reallocations to date
- Product is gamma irradiated to protect from potential contamination

Choose from several products to meet your care setting needs.



Learn about Theraworx Protect's clinical data, visit
hcp.theraworxprotect.com/learn



References

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3. Vizient Unpublished data from 62 hospitals.
4. Benoit SR, Nsa W, Richards CL, et al. Factors associated with antimicrobial use in nursing homes: a multilevel model. *J Am Geriatr Soc*. 2008;56:2039-2044.
5. CDC. Guidelines for the prevention of intravascular catheter-related infections. MMWR 2002;51(No. RR-10)
6. Simmering JE, Tang F, Cavanaugh JE, et al. The increase in hospitalizations for urinary tract infections and the associated costs in the United States, 1998-2011. *Open Forum Infect Dis*. 2017;4(1):ofw281. doi: <https://doi.org/10.1093/ofid/ofw281>. Accessed October 15, 2020.
7. Dudeck MA et al., Antimicrobial-resistant pathogens associated with adult healthcare-associated infections; Summary of data reported to the National Healthcare Safety Network, 2015-2017. *Infection Control and Hospital Epidemiology* (2020), 41, 1-18. Doi:10.1017/ice.2019.296

Appendix

Article: Infection Control & Hospital Epidemiology

Infection Control & Hospital Epidemiology (2020), 41, 1–18
doi:10.1017/ice.2019.296



Original Article

Antimicrobial-resistant pathogens associated with adult healthcare-associated infections: Summary of data reported to the National Healthcare Safety Network, 2015–2017

Pathogen ^a	No. (%) Pathogens	Rank
<i>Escherichia coli</i>	62,571 (17.5)	1
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Selected <i>Klebsiella</i> spp	31,530 (8.8)	3
<i>Pseudomonas aeruginosa</i>	28,513 (8.0)	4
<i>Enterococcus faecalis</i> ^b	28,236 (7.9)	5
Coagulase-negative staphylococci	24,199 (6.8)	6
<i>Enterobacter</i> spp	16,568 (4.6)	7
<i>Enterococcus faecium</i> ^b	13,687 (3.8)	8
<i>Proteus</i> spp	11,463 (3.2)	9
<i>Candida albicans</i> ^b	11,043 (3.1)	10
Other <i>Enterococcus</i> spp ^{b,c}	11,020 (3.1)	11
<i>Bacteroides</i> spp	8,251 (2.3)	12
Viridans group streptococci	6,575 (1.8)	13
Other <i>Candida</i> spp ^{b,c}	6,467 (1.8)	14
<i>Candida glabrata</i> ^b	5,152 (1.4)	15
Other ^d	49,226 (13.8)	
Total	356,633 (100.0)	

TABLE 3. Distribution and Rank Order of the 15 Most Frequently Reported Pathogens Across All Types of Adult Healthcare-Associated Infections (HAIs), 2015–2017

Original Article

Antimicrobial-resistant pathogens associated with adult healthcare-associated infections: Summary of data reported to the National Healthcare Safety Network, 2015–2017

Location Type ^a	CLABSI		CAUTI		PVAP ^b	
	No. of Units ^c	No. (%) Pathogens (n = 89,203)	No. of Units ^c	No. (%) Pathogens (n = 103,260)	No. of Units ^c	No. (%) Pathogens (n = 10,037)
Hospital Wards ^a	9,648	34,788 (39.0)	11,850	44,790 (43.4)	101	289 (2.9)
Hospital ICUs	4,179	27,396 (30.7)	4,626	40,755 (39.5)	1,728	9,233 (92.0)
Hospital Oncology Units	698	16,191 (18.2)	554	2,274 (2.2)	9 ^d	33 (0.3)
LTACHs	687	10,828 (12.1)	699	11,366 (11.0)	194	482 (4.8)
IRFs ^e	1,025	4,075 (4.0)	0	0 (0.0)

Frequency of Adult Device-Associated Healthcare-Associated Infection (HAI) Pathogens, by HAI and Location Type, 2015-2017

Original Article

Antimicrobial-resistant pathogens associated with adult healthcare-associated infections: Summary of data reported to the National Healthcare Safety Network, 2015–2017

Pathogen	Hospital Wards ^c		Hospital ICUs ^a		Hospital Oncology Units ^a		LTACHs ^a	
	No. (%) Pathogens	Rank	No. (%) Pathogens	Rank	No. (%) Pathogens	Rank	No. (%) Pathogens	Rank
<i>Staphylococcus aureus</i>	5,386 (15.5)	1	2,497 (9.1)	3	1,163 (7.2)	6	1,217 (11.2)	3
Coagulase-negative staphylococci	3,792 (10.9)	2	3,789 (13.8)	1	1,681 (10.4)	2	1,277 (11.8)	2
Selected <i>Klebsiella</i> spp	3,344 (9.6)	3	1,708 (6.2)	8	1,441 (8.9)	4	1,158 (10.7)	4
<i>Enterococcus faecalis</i> ^d	2,636 (7.6)	4	2,117 (7.7)	5	664 (4.1)	8	1,314 (12.1)	1
<i>Candida albicans</i> ^d	2,469 (7.1)	5	2,844 (10.4)	2	216 (1.3)	15	642 (5.9)	7
<i>Escherichia coli</i>	2,279 (6.6)	6	1,129 (4.1)	9	2,667 (16.5)	1	394 (3.6)	10
Other <i>Candida</i> spp ^{d,e,f}	1,876 (5.4)	7	2,186 (8.0)	4	559 (3.5)	9	739 (6.8)	5
<i>Enterococcus faecium</i> ^d	1,673 (4.8)	8	1,981 (7.2)	6	1,670 (10.3)	3	691 (6.4)	6
<i>Candida glabrata</i> ^d	1,460 (4.2)	9	1,836 (6.7)	7	249 (1.5)	12	489 (4.5)	9
<i>Enterobacter</i> spp	1,453 (4.2)	10	1,078 (3.9)	10	532 (3.3)	10	383 (3.5)	11
<i>Pseudomonas aeruginosa</i>	1,407 (4.0)	11	1,061 (3.9)	11	701 (4.3)	7	495 (4.6)	8
<i>Serratia</i> spp	678 (1.9)	12	588 (2.1)	12	100 (0.6)	18	256 (2.4)	13
<i>Acinetobacter</i> spp	660 (1.9)	13	392 (1.4)	14	66 (0.4)	22	245 (2.3)	14
Other <i>Enterococcus</i> spp ^{d,e}	577 (1.7)	14	545 (2.0)	13	339 (2.1)	11	257 (2.4)	12
Viridans group streptococci	430 (1.2)	15	223 (0.8)	19	1,386 (8.6)	5	33 (0.3)	22
Other	4,668 (13.4)		3,422 (12.5)		2,757 (17.0)		1,238 (11.4)	
Total	34,788 (100.0)		27,396 (100.0)		16,191 (100.0)		10,828 (100.0)	

Distribution and Rank Order of the 15 Most Frequently Reported Adult Central Line-Associated Bloodstream Infection (CLABSI) Pathogens, by Location Type, 2015–2017

Original Article

Antimicrobial-resistant pathogens associated with adult healthcare-associated infections: Summary of data reported to the National Healthcare Safety Network, 2015–2017

Pathogen	Hospital Wards ^b and ICUs		Hospital Oncology Units ^a		LTACHs		IRFs ^a	
	No. (%) Pathogens	Rank	No. (%) Pathogens	Rank	No. (%) Pathogens	Rank	No. (%) Pathogens	Rank
<i>Escherichia coli</i>	29,348 (34.3)	1	653 (28.7)	1	2,389 (21.0)	2	1,414 (34.7)	1
Selected <i>Klebsiella</i> spp	12,143 (14.2)	2	337 (14.8)	2	1,882 (16.6)	3	704 (17.3)	2
<i>Pseudomonas aeruginosa</i>	10,982 (12.8)	3	300 (13.2)	3	2,570 (22.6)	1	629 (15.4)	3
<i>Enterococcus faecalis</i> ^c	7,958 (9.3)	4	266 (11.7)	4	739 (6.5)	6	273 (6.7)	4
<i>Proteus</i> spp	4,756 (5.6)	5	79 (3.5)	9	933 (8.2)	4	244 (6.0)	5
<i>Enterobacter</i> spp	4,232 (4.9)	6	111 (4.9)	6	555 (4.9)	7	226 (5.5)	6
Other <i>Enterococcus</i> spp ^{c,d}	3,420 (4.0)	7	80 (3.5)	8	249 (2.2)	8	108 (2.7)	7
Coagulase-negative staphylococci	2,271 (2.7)	8	83 (3.6)	7	111 (1.0)	15	85 (2.1)	8
<i>Enterococcus faecium</i> ^c	2,242 (2.6)	9	115 (5.1)	5	765 (6.7)	5	33 (0.8)	12
<i>Citrobacter</i> spp	1,763 (2.1)	10	48 (2.1)	11	201 (1.8)	9	83 (2.0)	9
<i>Staphylococcus aureus</i>	1,757 (2.1)	11	60 (2.6)	10	166 (1.5)	11	83 (2.0)	9
<i>Serratia</i> spp	844 (1.0)	12	23 (1.0)	13	146 (1.3)	12	45 (1.1)	11
<i>Morganella</i> spp	777 (0.9)	13	24 (1.1)	12	116 (1.0)	14	29 (0.7)	13
<i>Acinetobacter</i> spp	455 (0.5)	14	15 (0.7)	14	174 (1.5)	10	13 (0.3)	14
<i>Providencia stuartii</i>	297 (0.3)	15	2 (0.1)	25	136 (1.2)	13	9 (0.2)	16
Other	2,300 (2.7)		78 (3.4)		234 (2.1)		97 (2.4)	
Total	85,545 (100.0)		2,274 (100.0)		11,366 (100.0)		4,075 (100.0)	

Distribution and Rank Order of the 15 Most Frequently Reported Adult Catheter-Associated Urinary Tract Infection (CAUTI) Pathogens, by Location Type, 2015–2017

Original Article

Antimicrobial-resistant pathogens associated with adult healthcare-associated infections: Summary of data reported to the National Healthcare Safety Network, 2015–2017

Pathogen	Hospital ICUs ^d		Hospital Wards ^{a,c}		LTACHs ^a	
	No. (%) Pathogens	Rank	No. (%) Pathogens	Rank	No. (%) Pathogens	Rank
<i>Staphylococcus aureus</i>	2,673 (28.8)	1	58 (20.1)	2	102 (21.2)	2
<i>Pseudomonas aeruginosa</i>	1,192 (12.9)	2	63 (21.8)	1	157 (32.6)	1
Selected <i>Klebsiella</i> spp	936 (10.1)	3	38 (13.1)	3	50 (10.4)	3
<i>Enterobacter</i> spp	781 (8.4)	4	18 (6.2)	4	21 (4.4)	7
<i>Haemophilus influenzae</i>	550 (5.9)	5	10 (3.5)	8	1 (0.2)	16
All <i>Streptococcus</i> spp ^e	527 (5.7)	6	6 (2.1)	10	1 (0.2)	16
<i>Escherichia coli</i>	520 (5.6)	7	14 (4.8)	7	18 (3.7)	8
<i>Serratia</i> spp	428 (4.6)	8	6 (2.1)	10	24 (5.0)	6
<i>Stenotrophomonas maltophilia</i>	372 (4.0)	9	17 (5.9)	5	25 (5.2)	5
<i>Acinetobacter</i> spp	294 (3.2)	10	17 (5.9)	5	32 (6.6)	4
<i>Proteus</i> spp	134 (1.4)	11	7 (2.4)	9	14 (2.9)	9
<i>Citrobacter</i> spp	110 (1.2)	12	6 (2.1)	10	6 (1.2)	10
<i>Moraxella catarrhalis</i>	71 (0.8)	13	0 (0.0)	...	4 (0.8)	12
<i>Morganella</i> spp	32 (0.3)	14	0 (0.0)	...	0 (0.0)	...
<i>Burkholderia cepacia</i>	26 (0.3)	15	0 (0.0)	...	0 (0.0)	...
<i>Haemophilus</i> NOS	26 (0.3)	15	1 (0.3)	19	0 (0.0)	...
Other	594 (6.4)		28 (9.7)		27 (5.6)	
Total	9,266 (100.0)		289 (100.0)		482 (100.0)	

Distribution and Rank Order of the 15 Most Frequently Reported Adult Possible Ventilator-Associated Pneumonia (PVAP) Pathogens, by Location Type, 2015–2017

Original Article

Antimicrobial-resistant pathogens associated with adult healthcare-associated infections: Summary of data reported to the National Healthcare Safety Network, 2015–2017

Pathogen	All Surgery Types ^b		Abdominal ^c	Orthopedic ^d	Ob/Gyn ^e	Cardiac ^f
	No. (%) Pathogens	Rank	No. (%) Pathogens	No. (%) Pathogens	No. (%) Pathogens	No. (%) Pathogens
<i>Staphylococcus aureus</i>	26,970 (17.5)	1	6,193 (7.4)	13,968 (38.6)	3,092 (15.2)	2,331 (27.0)
<i>Escherichia coli</i>	21,746 (14.1)	2	16,378 (19.7)	1,737 (4.8)	2,778 (13.7)	478 (5.5)
<i>Enterococcus faecalis</i> ^g	12,267 (8.0)	3	8,053 (9.7)	1,779 (4.9)	1,862 (9.2)	281 (3.2)
Coagulase-negative staphylococci	11,106 (7.2)	4	2,980 (3.6)	4,693 (13.0)	1,476 (7.3)	1,288 (14.9)
<i>Pseudomonas aeruginosa</i>	8,956 (5.8)	5	4,787 (5.7)	2,184 (6.0)	907 (4.5)	658 (7.6)
Selected <i>Klebsiella</i> spp	7,789 (5.1)	6	4,894 (5.9)	1,167 (3.2)	917 (4.5)	518 (6.0)
<i>Bacteriodes</i> spp	7,321 (4.7)	7	5,968 (7.2)	150 (0.4)	1,100 (5.4)	38 (0.4)
<i>Enterobacter</i> spp	7,178 (4.7)	8	3,691 (4.4)	1,797 (5.0)	793 (3.9)	538 (6.2)
Other <i>Enterococcus</i> spp ^{g,h}	5,444 (3.5)	9	4,279 (5.1)	491 (1.4)	503 (2.5)	85 (1.0)
<i>Candida albicans</i> ^g	4,847 (3.1)	10	4,131 (5.0)	259 (0.7)	216 (1.1)	142 (1.6)
<i>Enterococcus faecium</i> ^g	4,515 (2.9)	11	3,942 (4.7)	324 (0.9)	139 (0.7)	53 (0.6)
<i>Proteus</i> spp	4,357 (2.8)	12	1,542 (1.9)	1,356 (3.8)	888 (4.4)	400 (4.6)
Viridans group streptococci	4,267 (2.8)	13	3,112 (3.7)	323 (0.9)	601 (3.0)	101 (1.2)
<i>Citrobacter</i> spp	2,099 (1.4)	14	1,395 (1.7)	249 (0.7)	275 (1.4)	105 (1.2)
<i>Serratia</i> spp	1,904 (1.2)	15	357 (0.4)	649 (1.8)	230 (1.1)	475 (5.5)
Other	23,367 (15.2)		11,595 (13.9)	5,021 (13.9)	4,568 (22.5)	1,156 (13.4)
Total	154,133 (100.0)		83,297 (100.0)	36,147 (100.0)	20,345 (100.0)	8,647 (100.0)

Distribution and Rank Order of the 15 Most Frequently Reported Adult Surgical Site Infection (SSI) Pathogens, by Surgical Category, 2015–2017

Distribution and Rank Order of the 15 Most Commonly Reported Pathogens From All Types of Pediatric Healthcare-Associated Infections (HAIs), 2015–2017

Pathogen ^a	No. (%) Pathogens	Rank
<i>Staphylococcus aureus</i>	3,079 (15.4)	1
<i>Escherichia coli</i>	2,464 (12.3)	2
Coagulase-negative staphylococci	2,425 (12.1)	3
Selected <i>Klebsiella</i> spp	1,848 (9.3)	4
<i>Enterococcus faecalis</i> ^b	1,730 (8.7)	5
<i>Enterobacter</i> spp	1,302 (6.5)	6
<i>Pseudomonas aeruginosa</i>	1,164 (5.8)	7
Viridans group streptococci	826 (4.1)	8
Other <i>Candida</i> spp ^{b,c}	647 (3.2)	9
<i>Candida albicans</i> ^b	600 (3.0)	10
<i>Serratia</i> spp	501 (2.5)	11
<i>Enterococcus faecium</i> ^b	350 (1.8)	12
Other <i>Enterococcus</i> spp ^{b,c}	314 (1.6)	13
<i>Bacteroides</i> spp	195 (1.0)	14
<i>Acinetobacter</i> spp	176 (0.9)	15
Other ^d	2,357 (11.8)	
Total	19,978 (100.0)	

Antimicrobial-resistant pathogens associated with pediatric healthcare-associated infections: Summary of data reported to the National Healthcare Safety Network, 2015–2017

Distribution and Rank Order of the 15 Most Frequently Reported Pediatric Central Line-Associated Bloodstream Infection (CLABSI) Pathogens, by Location Type, 2015-2017

Pathogen	NICUs ^b		Pediatric ICUs ^a		Pediatric Oncology Units ^a		Pediatric Wards ^{a,b}	
	No. (%) Pathogens	Rank	No. (%) Pathogens	Rank	No. (%) Pathogens	Rank	No. (%) Pathogens	Rank
<i>Staphylococcus aureus</i>	1,381 (25.2)	1	420 (12.6)	2	266 (7.7)	5	313 (12.4)	2
Coagulase-negative staphylococci	1,145 (20.9)	2	345 (10.4)	4	316 (9.1)	4	289 (11.4)	3
<i>Escherichia coli</i>	596 (10.9)	3	151 (4.5)	9	429 (12.4)	2	205 (8.1)	5
<i>Enterococcus faecalis</i> ^c	483 (8.8)	4	492 (14.8)	1	179 (5.2)	7	264 (10.4)	4
Selected <i>Klebsiella</i> spp	408 (7.5)	5	368 (11.0)	3	374 (10.8)	3	375 (14.8)	1
<i>Candida albicans</i> ^c	243 (4.4)	6	130 (3.9)	10	41 (1.2)	14	94 (3.7)	9
<i>Enterobacter</i> spp	229 (4.2)	7	278 (8.3)	5	218 (6.3)	6	191 (7.5)	6
<i>Pseudomonas aeruginosa</i>	156 (2.8)	8	167 (5.0)	7	173 (5.0)	8	78 (3.1)	10
<i>Serratia</i> spp	150 (2.7)	9	166 (5.0)	8	20 (0.6)	20	66 (2.6)	11
Other <i>Candida</i> spp ^{c,d,e}	141 (2.6)	10	207 (6.2)	6	138 (4.0)	9	120 (4.7)	7
<i>Streptococcus agalactiae</i> (GBS)	130 (2.4)	11	8 (0.2)	24	7 (0.2)	35	6 (0.2)	23
<i>Acinetobacter</i> spp	47 (0.9)	12	43 (1.3)	13	24 (0.7)	18	29 (1.1)	14
Other <i>Enterococcus</i> spp ^{c,d}	46 (0.8)	13	38 (1.1)	14	60 (1.7)	11	36 (1.4)	13
<i>Candida glabrata</i> ^c	36 (0.7)	14	32 (1.0)	15	21 (0.6)	19	23 (0.9)	16
<i>Citrobacter</i> spp	27 (0.5)	15	19 (0.6)	18	25 (0.7)	17	23 (0.9)	16
Other	256 (4.7)		468 (14.0)		1,177 (33.9)		418 (16.5)	
Total	5,474 (100.0)		3,332 (100.0)		3,468 (100.0)		2,530 (100.0)	

Antimicrobial-resistant pathogens associated with Pediatric healthcare-associated infections: Summary of data reported to the National Healthcare Safety Network, 2015–2017

Distribution and Rank Order of the 15 Most Frequently Reported Pediatric Surgical Site Infection (SSI) Pathogens, by Location Type, 2015-2017

Pathogen	All Surgery Types ^b		Abdominal ^c	Orthopedic ^d	Neurosurgical ^e	Cardiac ^f
	No. (%) Pathogens	Rank				
<i>Staphylococcus aureus</i>	622 (17.6)	1	175 (7.9)	157 (32.2)	117 (27.9)	152 (48.7)
<i>Escherichia coli</i>	616 (17.5)	2	536 (24.2)	53 (10.9)	15 (3.6)	5 (1.6)
<i>Pseudomonas aeruginosa</i>	292 (8.3)	3	181 (8.2)	58 (11.9)	33 (7.9)	14 (4.5)
Coagulase-negative staphylococci	258 (7.3)	4	69 (3.1)	34 (7.0)	86 (20.5)	56 (17.9)
<i>Enterobacter</i> spp	236 (6.7)	5	150 (6.8)	39 (8.0)	33 (7.9)	9 (2.9)
<i>Enterococcus faecalis</i> ^g	199 (5.6)	6	168 (7.6)	10 (2.1)	5 (1.2)	9 (2.9)
Viridans group streptococci	175 (5.0)	7	152 (6.9)	3 (0.6)	12 (2.9)	7 (2.2)
<i>Bacteroides</i> spp	171 (4.8)	8	159 (7.2)	9 (1.8)	0 (0.0)	0 (0.0)
Selected <i>Klebsiella</i> spp	138 (3.9)	9	92 (4.2)	17 (3.5)	17 (4.1)	8 (2.6)
<i>Candida albicans</i> ^g	91 (2.6)	10	74 (3.3)	10 (2.1)	3 (0.7)	3 (1.0)
Other <i>Enterococcus</i> spp ^{g,h}	90 (2.6)	11	85 (3.8)	2 (0.4)	1 (0.2)	0 (0.0)
<i>Serratia</i> spp	60 (1.7)	12	14 (0.6)	18 (3.7)	16 (3.8)	10 (3.2)
<i>Proteus</i> spp	45 (1.3)	13	19 (0.9)	24 (4.9)	1 (0.2)	0 (0.0)
<i>Enterococcus faecium</i> ^g	42 (1.2)	14	39 (1.8)	1 (0.2)	1 (0.2)	1 (0.3)
<i>Citrobacter</i> spp	39 (1.1)	15	27 (1.2)	7 (1.4)	2 (0.5)	2 (0.6)
Other <i>Candida</i> spp ^{g,h}	39 (1.1)	15	25 (1.1)	1 (0.2)	9 (2.1)	3 (1.0)
Other	413 (11.7)		250 (11.3)	44 (9.0)	68 (16.2)	33 (10.6)
Total	3,526 (100.0)		2,215 (100.0)	487 (100.0)	419 (100.0)	312 (100.0)

Antimicrobial-resistant pathogens associated with Pediatric healthcare-associated infections: Summary of data reported to the National Healthcare Safety Network, 2015–2017