

# Zero Tolerance to Bloodstream Infections

## Key Clinical Evidence

Tegaderm CHG dressing is now proven and indicated to reduce CRBSIs and catheter colonisation, and thus the only transparent IV dressing with this indication.

- Clinically proven to reduce CRBSIs in patients with central venous and arterial catheters by 60%<sup>1</sup>
- Clinically proven to reduce skin and catheter colonisation in patients with central venous and arterial catheters by 61%<sup>1</sup>
- Offers the same level of antimicrobial activity up to 7 days<sup>2</sup>



## Laboratory/*in vitro* studies

Karpanen TJ, Casey AL, Conway BR, Lambert PA, Elliott TS.

### Antimicrobial activity of a chlorhexidine intravascular catheter site gel dressing.

Journal of Antimicrobial Chemotherapy 2011; 66: 1777-1784.

United Kingdom

#### Design

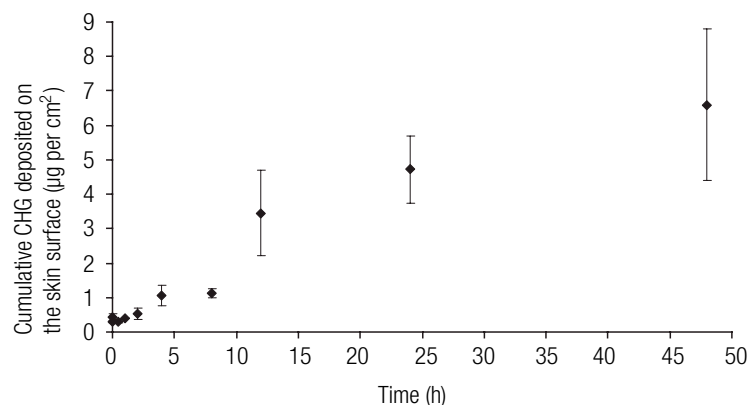
*In vitro* study. The antimicrobial efficacy was evaluated on both silicone membrane and donor skin on diffusion cells following contamination with pathogens *Staphylococcus aureus* (MRSA) and *Escherichia coli* (ESBL) using high inoculum ( $10^6$  CFU/cm<sup>2</sup>) and low ( $10^3$  CFU/cm<sup>2</sup>). Antimicrobial activity was evaluated for up to 7 days.

#### Objectives

To evaluate the antimicrobial efficacy of a chlorhexidine gluconate (CHG) intravascular catheter gel dressing against methicillin-resistant *Staphylococcus aureus* (MRSA) and an extended-spectrum  $\beta$ -lactamase (ESBL)-producing *Escherichia coli*.

#### Key findings

- Tegaderm CHG gel dressing demonstrated rapid and sustained antimicrobial activity in a skin model. The release of CHG from the dressing increased with time, but the dressing kept its antimicrobial activity for at least 7 days.
- In the presence of a catheter segment and serum, the CHG in the gel was still able to eradicate the EMRSA-15 on the skin and catheter surface as well as on the dressing itself, even with a high inoculum of bacteria.
- The results suggest that the performance of the gel allowed delivery of CHG under the catheter. The sustained release of CHG may reduce the microbial load at the catheter insertion site, thereby reducing the risk of catheter-related bloodstream infections.



#### CONCLUSION

“The CHG intravascular catheter site gel dressing had detectable antimicrobial activity for up to 7 days, which should suppress bacterial growth on the skin at the catheter insertion site, thereby reducing the risk of infection.”

## Laboratory/*in vitro* studies

Hensler JP, Schwab DL, Olson LK, Palka-Santini M.

### Growth inhibition of microorganisms involved in catheter-related infections by an antimicrobial transparent IV dressing containing chlorhexidine gluconate (CHG).

Poster session presented at: 19th Annual Conference of the European Society of Clinical Microbiology and Infectious Diseases; 2009 May 16-19; Helsinki, Finland.

United States and Germany

#### Design

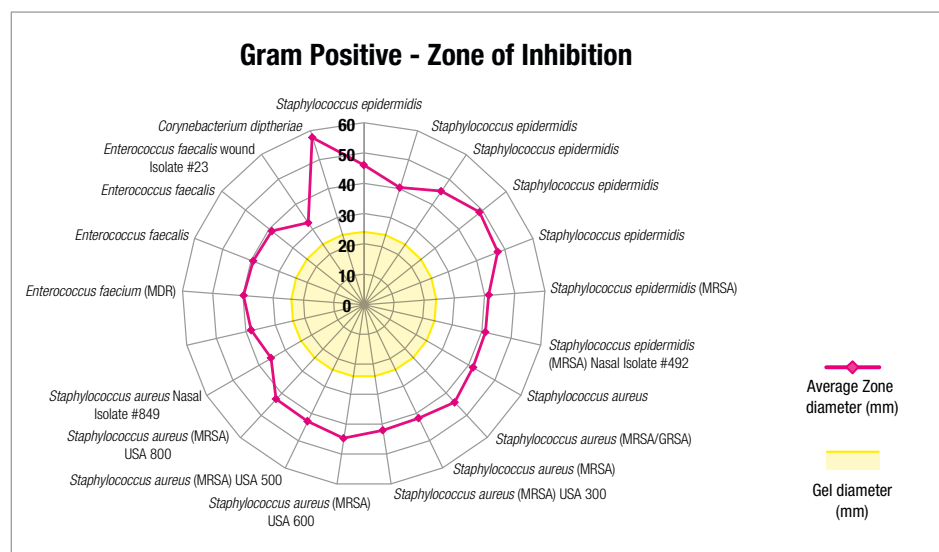
*In vitro* study. The antimicrobial activity of the Tegaderm CHG gel pad was tested against a panel of 37 microorganisms, comprised of 21 Gram-positive and 14 Gram-negative bacteria and 2 yeasts.

#### Objectives

To evaluate the antimicrobial activity of the transparent dressing 3M™ Tegaderm™ CHG Chlorhexidine Gluconate IV Securement Dressing against microorganisms commonly associated with catheter-related (CR) infections using *in vitro* zone of inhibition.

#### Key findings

- Susceptibility to Tegaderm CHG was observed for all 37 microorganisms tested, including Gram-positive and Gram-negative bacteria and yeast.
- Tegaderm CHG dressings retain antimicrobial properties after a period of 22 months in standard aging conditions.



#### CONCLUSION

“The Tegaderm CHG dressing demonstrated broad-spectrum antimicrobial activity against all 37 strains of microorganisms tested. Tegaderm CHG retains its antimicrobial properties as demonstrated by the aged dressing’s ability to produce similar zones of inhibition compared to unaged dressings.”

## Outcome studies

Timsit JF, Mimoz O, Mourvillier B, Souweine B, Garrouste-Orgeas M *et al.*

### Randomized controlled trial of chlorhexidine dressing and highly adhesive dressing for preventing catheter-related infections in critically ill adults.

American Journal of Respiratory and Critical Care Medicine 2012; 186 (12):1272-1278.

France

#### Design

Randomised controlled trial comparing chlorhexidine vs. non-chlorhexidine dressings for securement of vascular catheter.

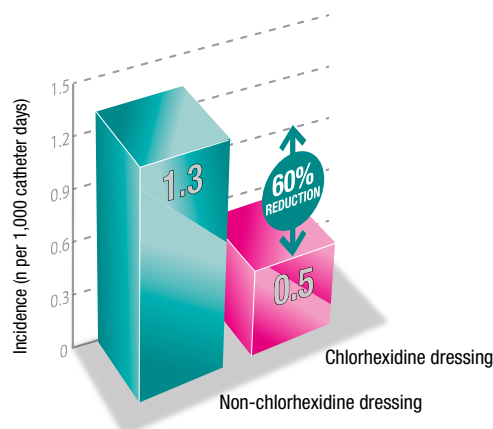
#### Objectives

To determine if chlorhexidine-impregnated and strongly adherent dressings decrease catheter colonisation and catheter-related bloodstream infection rates.

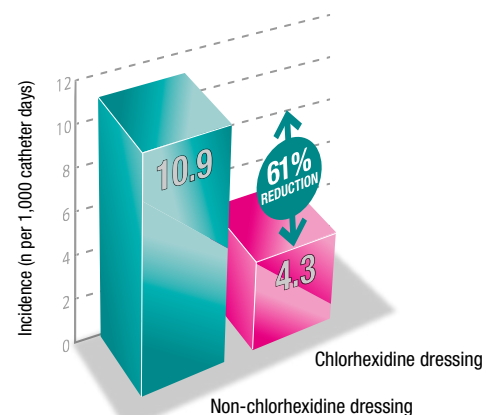
#### Key findings

- With chlorhexidine dressings the CRBSI rate was 60% lower (0.5 per 1,000 vs. 1.3 per 1,000 catheter-days; HR, 0.402; 95% CI, 0.186-0.868; P = 0.02) than with non-chlorhexidine dressings.
- Catheter colonisation incidence was 9.6/1,000 catheter days for the standard dressing and 4.3/1,000 catheter days for the chlorhexidine impregnated dressing.
- Highly adhesive dressings decreased the number of dressings per catheter to two (one to four) versus three (one to five) (P < 0.0001).

#### Catheter-related bloodstream infections



#### Catheter Colonisation



#### CONCLUSION

“Chlorhexidine gel-impregnated dressings decreased the CRBSI rate in patients in the ICU with intravascular catheters.”

## Outcome studies

Scheithauer S, Lewalter K, Schröder J, Koch A, Häfner H, Krizanovic V, Nowicki K, Hilgers RD, Lemmen SW.

### Reduction of central venous line-associated bloodstream infection rates by using a chlorhexidine-containing dressing.

Infection August 2013: 1-5.

Germany

#### Design

The number of catheter-related bloodstream infections and the infection rates were documented with regard to the kind of dressing used (standard vs. chlorhexidine-containing) from November 2010 to May 2012 at two intensive care units and compared to historical data.

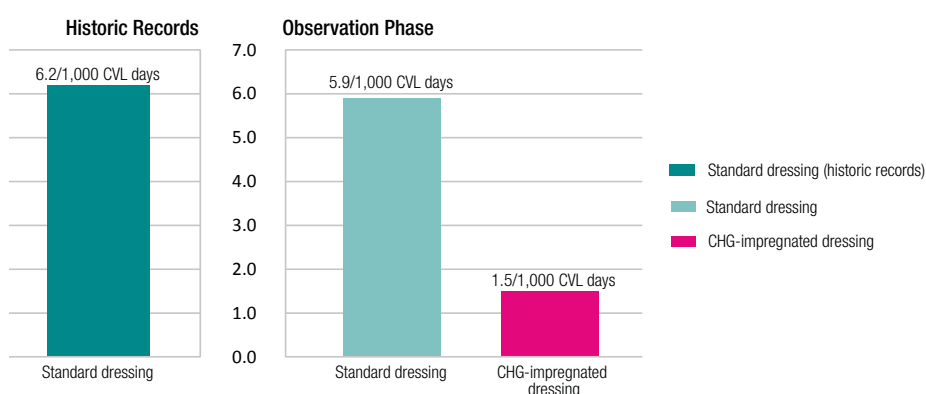
#### Objectives

To assess a chlorhexidine-containing dressing for its potential for infection reduction.

#### Key findings

- Forty CLABSIs occurred in 34 patient. The CLABSI rates in patients with the new dressing were lower at 1.5/1,000 CVL days (95 % CI 0.75–2.70 compared to both historical controls at 6.2/1,000 CVL days and patients cared for at the same time with the standard dressing during the observational study at 5.9/1,000 CVL days (95 % CI 3.93–8.43).

#### CLABSI Rate



**NOTE:** 1,298 patients with 12,220 CVL days were enrolled during the observational phase. 59 % of those were treated with chlorhexidine-containing dressings while 41 % were treated with non-antimicrobial standard dressings. The decision whether to use CHG dressing or not was made by the clinicians at the study site according to the local patient management protocol.

#### CONCLUSION

“In case of high CLABSI rates despite the implementation of standard recommendations, our findings suggest that a chlorhexidine-containing dressing safely decreases CLABSI rates.”

# Tegaderm™ CHG Chlorhexidine Gluconate I.V. Securement Dressings

## Health Economics

Pfaff B, Heithaus T, Emanuelsen M.

### Use of a 1-piece chlorhexidine gluconate transparent dressing on critically ill patients.

Critical Care Nurse 2012; 32(4): 35-40.

United States

#### Design

A quality improvement observational study was done in an adult medical-surgical intensive care unit.

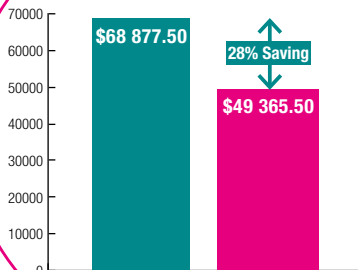
#### Objectives

To compare the effectiveness of a new 1-piece occlusive dressing incorporating a chlorhexidine gluconate patch and a transparent dressing with a 2-piece dressing comprising a chlorhexidine patch and a transparent dressing. The study evaluated the effectiveness of the new dressing to maintain the low rate of catheter-related bloodstream infections, nurses' satisfaction with the new product, and cost of dressing changes.

#### Key findings

- During the study period the infection rate was 0.051 per 1,000 device days, compared with a rate of 0.052 in 2008.
- Nurses preferred the new dressing.
- Cost savings were \$3807 for this ICU for the trial period.

**Saving of: \$19 512.00**



#### Savings estimate for intensive care unit and hospital-wide

Location	No. of dressing changes, July 1-December 31 2009	Cost of 2-piece application @ \$12.07	Projected cost of 1-piece application @ \$8.65	Projected savings, July 1-December 31 2009 @ \$3.42
Intensive care unit	428	\$5 165.96	\$3 702.20	\$1 463.76
Hospital-wide	5707	\$68 877.50	\$49 365.50	\$19 512.00

Projected annual savings hospital-wide: \$39 023.82  
 Actual savings during trial in intensive care unit:  
 Nonuse of chlorhexidine patch @ \$7/patch \$2 996.00  
 Reduced number of dressing kits for same quarter of 2008 (160 fewer) \$811.20  
**Total \$3 807.20**

#### CONCLUSION

“A low rate of catheter-related bloodstream infections can be maintained, nurses’ satisfaction achieved, and cost savings realized with the new dressing.”

## Health Economics

Maunoury F, Motrunich A, Ruckly S, Timsit JF.

### Non-homogeneous cost-effectiveness modeling of a new CHG-Dressing for preventing catheter-related bloodstream infections for patients in intensive care units.

Poster session presented at: 16th Annual European Conference of the International Society for Pharmacoeconomics and Outcomes Research; 2013 November 2-6; Dublin, Ireland.

France

#### Design

The 30-day time non-homogeneous Markovian model comprises eight health states including two absorbent states (death and discharge). The probabilities of events derive from a multicentre RCT on 1,879 patients. 1,000 Monte Carlo simulations of 1,000 patients per dressing strategy are used for probabilistic sensitivity analysis and 95% confidence intervals (CI) calculations. The final health outcome is the number of CRBSI averted. Costs of ICU stay are updated based on a recent French multicentre study.

To evaluate the advantages of routine use of a new CHG-dressing to secure central lines compared to non-antimicrobial dressings from a medico-economic viewpoint.

#### Objectives

- The CHG strategy averted in average 12 infections per 1,000 patients compared to the No-CHG strategy.

#### Key findings

- The mean net saving per patient induced by CHG-dressing use, for a time-horizon of 30 ICU-days, is €344.88 (saving is valued: cost induced – cost averted).

#### CONCLUSION

“The CHG dressing is significantly more efficacious to prevent CRBSI when compared to the reference dressing, contributes to preserve patient’s health capital at the same cost for the ICU. According to the base case scenario the CHG-dressing is more cost-effective than the reference dressing.”

## Overview

Authors	Title of paper	Publication/Date	Design	CONCLUSION
Timsit JF et al.	Randomized controlled trial of chlorhexidine dressing and highly adhesive dressing for preventing catheter-related infections in critically ill adults.	American Journal of Respiratory and Critical Care Medicine 2012; 186 (12):1272-1278	Randomized controlled trial involving 1,879 patients (4,163 catheters/34,339 catheter days). Comparing chlorhexidine vs. non chlorhexidine dressings for securement of vascular catheter.	"Chlorhexidine gel-impregnated dressings decreased the CRI rate in patients in the ICU with intravascular catheters."
Bashir MH, Olson L, Walters S-A.	Suppression of regrowth of normal skin flora under chlorhexidine gluconate dressings applied to chlorhexidine gluconate-prepped	American Journal of Infection Control 2012; 40(4): 344-348.	After prepping the back of 32 healthy subjects with 2% chlorhexidine gluconate (CHG)/70% isopropyl alcohol antiseptic 3 dressings (2 containing CHG) was placed on top in a randomized design. Using the cup scrub method samples of aerobic bacteria were collected and relative suppression of regrowth was compared using an adjusted paired t test.	"Skin flora was not completely eradicated during antiseptics, and bacterial regrowth occurred postantiseptics. The use of CHG dressings helped sustain a reduced bacterial count on the skin. The continuously releasing CHG gel maintained suppression to a greater extent than the CHG disk at 7 days (P = 0.01)."
Madeo M, Lowry L.	Infection rates associated with total parenteral nutrition	Journal of Hospital Infection 2011; 79(4): 373-374.	A prospective 12 month audit involving 175 patients (1,174 catheter days) performed on the use of 2% chlorhexidine gluconate dressing on patients receiving total parenteral nutrition.	"The results showed a decrease in catheter-related bloodstream infection (CRBSI) from eight cases to zero (P=0.057), making this film dressing a possible useful addition in the goal of zero avoidable CRBSIs within this high risk group of patients."
Madeo M, Lowry L, Cutler L.	Product evaluation of a new chlorhexidine gluconate transparent intravenous line dressing.	Journal of Hospital Infection 2010; 75(2): 143-144.	An evaluation at a 22 bed critical care unit running over a two-month period from August to October 2009 involving 25 patients.	"The results of the product evaluation suggest the use of the Tegaderm CHG™ dressing is well tolerated by the patient and shows a good level of adhesiveness and longevity compared to the baseline dressing. The dressing also appears to offer antimicrobial protection."
Pfaff B, Heithaus T, Emanuelsen M.	Use of a 1-piece chlorhexidine gluconate transparent dressing on critically ill patients.	Critical Care Nurse 2012; 32(4): 35-40.	A quality improvement observational study was done in an adult medical-surgical intensive care unit.	"During the study period of 1881 device days, the infection rate was 0.051 per 1000 device days, compared with a rate of 0.052 in 2008. Nurses preferred the new dressing. Cost savings were \$3807."
Scheithauer S, Lewalter K, Schröder J, Koch A, Häfner H, Krizanovic V, Nowicki K, Hilgers RD, Lemmen SW.	Reduction of central venous line-associated bloodstream infection rates by using a chlorhexidine-containing dressing.	Infection August 2013; 1-5.	The number of CVLs (central venous line), CVL days, CLABSIs (central venous line associated bloodstream infections), and CLABSI rates with regard to the kind of dressing (standard vs. chlorhexidine-containing) were documented from November 2010 to May 2012 at two intensive care units and compared to historical records.	"Forty CLABSIs occurred in 34 patient. The CLABSI rates in patients with the new dressing were lower at 1.51/1,000 CVL days (95% CI 0.75–2.70 compared to both historical controls at 6.2/1,000 CVL days and patients cared for at the same time with the standard dressing at 5.87/1,000 CVL days (95% CI 3.93-8.43)."
Olson C, Heilman JM.	Clinical Performance of a New Transparent Chlorhexidine Gluconate Central Venous Catheter Dressing.	Journal of the Association for Vascular Access 2008; 13(1): 13-19.	In-hospital clinical study. Prospective, single site, controlled randomized clinical trial. Evaluating the ease-of-use and the performance characteristics of a new transparent catheter dressing. With 63 patients.	"as easy to use in central venous catheter care clinical practice as the standard of care non-antimicrobial transparent adhesive dressing. No additional training or education was required to properly use it." "Advantages include that it is antimicrobial, handles moderate bleeding, remains transparent and appears to offer greater catheter securement.."
Eyberg CI, Pyrek J.	A Controlled Randomized Prospective Comparative Pilot Study to Evaluate the Ease of Use of a Transparent Chlorhexidine Gluconate Gel Dressing Versus A Chlorhexidine Gluconate Disk in Healthy Volunteers.	Journal of the Association for Vascular Access 2008; 13(3): 112-117.	Prospective, single-site, controlled, randomized, clinical trial comparing Tegaderm™ CHG to a CHG impregnated sponge (BIOPATCH®)	"The clinicians concluded,... that the CHG gel dressing is better in regard to ease of application, ease of applying correctly, ease of removal, ability to visualize the insertion site, ease of training another clinician to apply the dressing, and more intuitive application. Twelve out of 12 clinicians favored the CHG gel dressing over the CHG disk in overall performance"

Biopatch is a trademark of Johnson & Johnson Company

To learn more about Tegaderm CHG dressings or the full line of Tegaderm I.V. dressings, visit us at [www.3m.com/tegadermchg](http://www.3m.com/tegadermchg)

Contact your local 3M Critical and Chronic Care representative for more information.

### References:

- 1 Timsit JF, et al. Randomized Controlled Trial of Chlorhexidine Dressing and Highly Adhesive Dressing for Preventing Catheter-Related Infections in critically ill adults. American Journal of Respiratory and Critical Care Medicine 2012; 186 (12):1272-1278
- 2 Karpanen TJ, et al. Antimicrobial activity of a Chlorhexidine intravascular catheter site gel dressing. Journal of Antimicrobial Chemotherapy 2011; 66: 1777-1784.



3M Health Care  
Carl-Schurz-Str. 1  
41453 Neuss, Germany  
Phone: +49 (0)2131 14 3000

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