

Analysis of Surgical Site Infection  
Rates and Cost Benefits Associated  
with Plain Gauze Dressings verses  
Gauze Dressings Impregnated with  
Polyhexamethylene Biguanide (PHMB)

# Analysis of Surgical Site Infection Rates and Cost Benefits Associated with Plain Gauze Dressings versus Gauze Dressings Impregnated with Polyhexamethylene Biguanide (PHMB)

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## ABSTRACT

**Background/Objectives:** In 1992, the Centers for Disease Control and Prevention (CDC) estimated that healthcare-associated infections (HAIs) cost approximately \$4.5 billion a year with costs of surgical site infections (SSIs) averaging \$15,646/SSI.<sup>1</sup> In 2005, Stone quotes a cost figure of \$25,546/SSI.<sup>2</sup> With a 4% yearly rate increase, this figure becomes \$27,631/SSI for 2007. This facility performs a large annual volume of cardiac, orthopedic, and spinal surgeries and had previously implemented the Surgical Infection Prevention (SIP) and Surgical Care Improvement Project (SCIP) measures in an attempt to decrease SSI rates and associated costs. This study was undertaken to assess an additional intervention aimed at further decreasing SSIs and their associated costs and to justify the conversion from less expensive, traditional plain gauze surgical dressings to Polyhexamethylene Biguanide-impregnated (PHMB) gauze in targeted surgical procedures.

**Methods:** This study was performed in a large healthcare institution in West Texas with an average daily census of 554 patients in FY 2007. Utilizing CDC criteria, baseline period (BP) and evaluation period (EP) SSIs occurring within 30 day post-operative period were identified in targeted surgical procedures by the same infection control professional through review of microbiology reports, emergency department visits, returns to surgery and post discharge questionnaires mailed to surgeons. Conversion from plain gauze surgical dressings to 0.2% PHMB gauze dressings was accomplished wherever applicable. Because of similarities between the two products, no changes in protocols or processes were required. Product exchange occurred throughout 2006; therefore baseline data for this retrospective surveillance study was obtained from 2005 rather than 2006.

**Results:** This facility's risk-stratified SSI rates were compared to the National Nosocomial Infection Surveillance (NNIS) rate benchmarks for both BP and EP. BP was 1/1/2005 through 12/31/2005 and EP was 1/1/2007 through 12/31/2007. Targeted surgical procedures included coronary artery bypass grafts (CABG), chest and donor site (BP 2.16,

EP 2.04); coronary artery bypass grafts, chest only (BP 6.67, EP 0.00); spinal fusions (BP 1.34, EP 0.00); laminectomies (BP 1.38, EP 3.74); total hip (BP 1.05, EP 0.00); and total knee prosthesis (BP 0.57, EP 0.00); with no statistical significance noted between BP and EP rates. A SSI rate reduction of 24.56% was demonstrated from the BP infection rate of 1.14/100 surgical procedures to the EP infection rate of 0.86/100 surgical procedures. The combined NNIS rate for the targeted procedures was 2.50. The Standard Infection Ratio (SIR) showed the following results: CABG, chest and donor site (BP 0.43, EP 0.41); CABG, chest only (BP 3.39, EP 0.00), spinal fusions (BP 0.40, EP 0.00); laminectomies (BP 0.88, EP 2.40); hip prosthesis (BP 0.63, EP 0.00); and knee prosthesis (BP 0.33, EP 0.00). Using \$27,631/SSI, 37 BP SSIs would have resulted in 2007 costs of approximately \$1,022,347 compared to the 23 evaluation SSIs with costs of approximately \$635,513. A cost savings of \$386,834 was realized.

**Conclusion:** A rate reduction of 25%, coupled with a cost savings of \$386,834 provided the justification for the continued use of PHMB in this facility. Because healthcare facilities are currently faced with decreased reimbursement and a renewed focus on patient safety and satisfaction, by decreasing the incidence of SSIs, healthcare facilities can improve patient outcomes and help preserve their fiscal integrity.

## INTRODUCTION

In 1992, the Centers for Disease Control and Prevention (CDC) estimated that healthcare-associated infections (HAIs) cost approximately 4.5 billion dollars a year with costs of surgical site infections (SSIs) averaging \$15,646 each.<sup>1</sup> In 2005, Stone estimated the cost had increased to \$25,546/SSI.<sup>2</sup> Considering a 4% cost of living increase per year, the figure becomes \$27,631/SSI in 2007.

Covenant Health System performs a large annual volume of cardiac, orthopedic, and spinal surgeries and had previously implemented the Surgical Infection Prevention (SIP) and Surgical Care Improvement Project (SCIP) measures in an attempt to decrease SSI rates and associated costs.

## PURPOSE

This study was conducted to assess an additional intervention aimed at further decreasing SSIs and their associated costs and to justify the conversion from less expensive, traditional plain gauze surgical dressings to Polyhexamethylene Biguanide-impregnated (PHMB) gauze in targeted surgical procedures.

## METHODS

Utilizing CDC criteria, baseline period (BP) and evaluation period (EP) SSIs occurring within 30 day post-operative period were identified in targeted surgical procedures by the same infection control professional through:

- Review of microbiology reports
- Emergency department visits
- Returns to surgery
- Post-discharge questionnaires mailed to surgeons

Conversion from plain gauze surgical dressings to 0.2% PHMB gauze dressings was accomplished whenever possible. Because of similarities between the two products, no changes in protocols or processes were required.

Baseline data for this retrospective surveillance study was obtained from 2005 as the product exchange took place throughout 2006. The evaluation period was from 1/1/2007 through 12/31/2007.

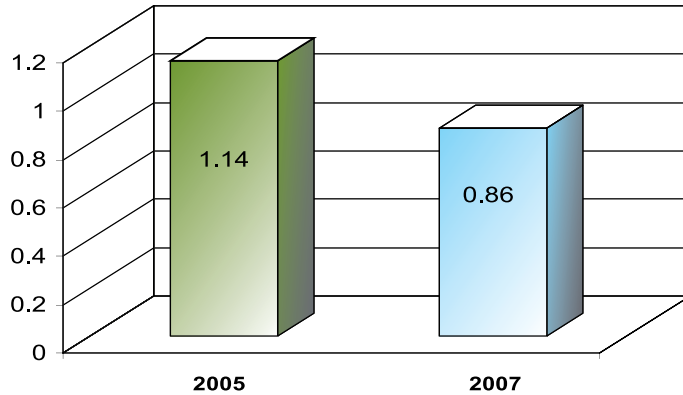
During the evaluation period 4 of 6 procedures reached a SIR of zero. Although 4 of the post evaluation period SIRs have demonstrated slight increases since the evaluation period, all but 1 of the post EP SIRs remain <1.00 and 4/6 have post EP SIRs below their original baseline period SIRs.

### Standard Infection Ratio (SIR) = Your Hospital Infection Rate / National Infection Rate; should be <1.00

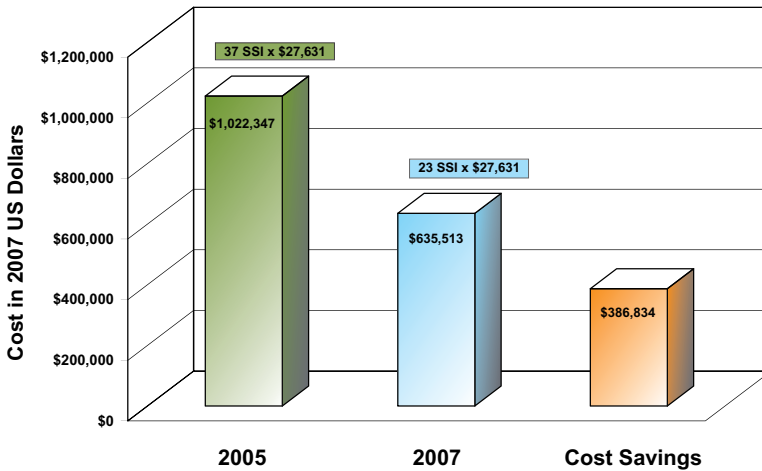
Risk Index Category	CABG Chest + Donor Site	CABG Chest Only	Spinal Fusion	Laminectomy	Hip Prosthesis	Knee Prosthesis
Covenant Health System Rate, Post Evaluation Period (4/1/07-12/31/07)	2.58	0.00	0.82	1.2	1.93	0.13
*NNIS/NHSN Rate	4.96	1.97	3.34	1.56	1.68	1.47
Baseline Period SIR	0.43	3.39	0.40	0.88	0.63	0.33
Evaluation Period SIR <i>compared to baseline period</i>	0.41 ↓	0.00 ↓	0.00 ↓	2.40 ↑	0.00 ↓	0.00 ↓
Post Evaluation Period SIR (4/1/07-12/31/07) <i>compared to evaluation period</i>	0.52 ↑	0.00	0.25 ↑	0.77 ↓	1.15 ↑	0.09 ↑

\*National Nosocomial Infection Surveillance (NNIS)/National Healthcare Safety Network (NHSN)

**Infection Rate for 100 Surgical Procedures**



**SSI Cost Comparison**



**RESULTS**

In 2005 there were 37 actual SSIs compared to 23 actual SSIs in 2007. These actual cases compared to the total number of targeted surgical procedures at the facility indicate a rate of 1.14 per 100 surgical cases in 2005 compared to 0.86 per 100 surgical cases in 2007. (The combined NNIS rate for the targeted procedures was 2.50 per 100 surgical procedures.)

From 2005 to 2007 the SSI rate was reduced 24.56%. Based on the estimated cost of \$ 27,631 per SSI, the 37 actual SSIs in 2005 would have resulted in a 2007 cost of approximately \$1,022,347 compared to the 23 actual SSIs in 2007 with a cost of \$ 635,513. The total cost savings would be \$386,834.

**CONCLUSION**

A rate reduction of 25%, coupled with a cost savings of \$386,834, provided the justification for the continued use of PHMB in this facility. Because healthcare facilities are currently faced with decreased reimbursement and a renewed focus on patient safety and satisfaction, by decreasing the incidence of SSIs, healthcare facilities can improve patient outcomes and help preserve their fiscal integrity.

**REFERENCES**

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- 2 Stone, P.W., Braccia, D., Larson E., Systematic review of economic analyses of health care-associated infections *American Journal of Infection Control*, 2005;33:9, 501-509.

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