

Effect of a Transparent Film Dressing with a CHG Gel Pad on CVC-Associated Bloodstream Infections[‡]

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Background

• Central venous catheters (CVCs) are critical in medical care. However, they can lead to serious complications when bloodstream infections (BSI) occur. Preventative approaches are available to lower the risk of BSI.

• A meta-analysis concluded that the use of chlorhexidine gluconate (CHG) dressing is associated with an overall reduction of catheter-related BSIs.¹

Purpose

• This study compared the use of a transparent film dressing with an integrated chlorhexidine gluconate (CHG) gel pad* versus a CHG containing opaque patch† on the rate of central venous catheter-associated bloodstream infection, hospital length of stay (LOS), and hospitalization costs, as well as contact dermatitis.

Methods

• ICD-10 procedure and CPT codes were used to identify 522,863 CVC inpatient cases using the Premier Healthcare Database^{††} (Q1 2019 to Q3 2020).

• Of these, 17,162 cases received a transparent film dressing with a transparent CHG gel pad.

• 1:1 propensity score matching on patient and facility risk factors of BSI was used to create a control cohort of n = 17,162 CVC cases who received a CHG containing patch.

• BSI was identified with ICD-10 T80.211.

• BSI rates, LOS, hospitalization costs, and contact dermatitis were compared between the matched cohorts using chi-square, t-tests, and Poisson regression.

• Multiple regression models were created for each outcome (BSI, LOS, cost, dermatitis) to control for outstanding variances after matching. Differences in least square means were used to compare the four outcomes between the two cohorts.

• BSI regression model: intervention, propensity score, facility region, number of beds, and Charlson Comorbidity index (CCI).

• LOS and Cost regression models: intervention, propensity score, gender, age, race, CCI, teaching hospital, number of beds, cost type, facility region/location, ICU stay.

• Dermatitis regression model: intervention, age, atopic dermatitis, propensity score, race, gender.

Results

For the CHG gel cohort, 55.5% were 65 years of age or older, 48.4% female, and 72.3% white. Forty-eight percent of the patients had a CCI of 5 or more (**Table 1**).

Table 1. Demographics

		CHG Gel N=17,162
Age, n(%)	<18	432 (2.5%)
	18-35	1,130 (6.6%)
	36-50	1,853 (10.8%)
	51-64	4,221 (24.6%)
	≥65	9,526 (55.5%)
Gender, n(%)	Female	8,298 (48.4%)
	Male	8,864 (51.6%)
Race, n(%)	White	12,400 (72.3%)
	Black	2,518 (14.7%)
	Other	2,244 (13.1%)
CCI, n(%)	CCI=0	1,796 (10.5%)
	CCI=1	1,831 (10.7%)
	CCI=2	1,857 (10.8%)
	CCI=3	1,842 (10.7%)
	CCI=4	1,607 (9.4%)
	CCI≥5	8,229 (47.9%)

CCI: Charlson Comorbidity Index

BSI

• A 45% decrease in BSI rates was demonstrated, with 0.87% for the CHG gel cohort and 1.58% for the CHG patch cohort (p<0.0001) (**Figure 1**).

• After multiple regression to control for outstanding variances after matching, a 53% decrease in BSI rates was statistically significant (p< 0.0001) with an adjusted BSI rate of 1.15% in the CHG patch cohort compared to 0.55% in the CHG gel cohort (**Figure 1**).

LOS

• A 1.5 days shorter hospital stay was found between the cohorts with a mean LOS of 11.8 days for patients with the CHG gel and 13.3 days for CHG patch (p<0.0001) (**Figure 2**).

Results (Cont'd)

Figure 1. Bloodstream Infection Rates

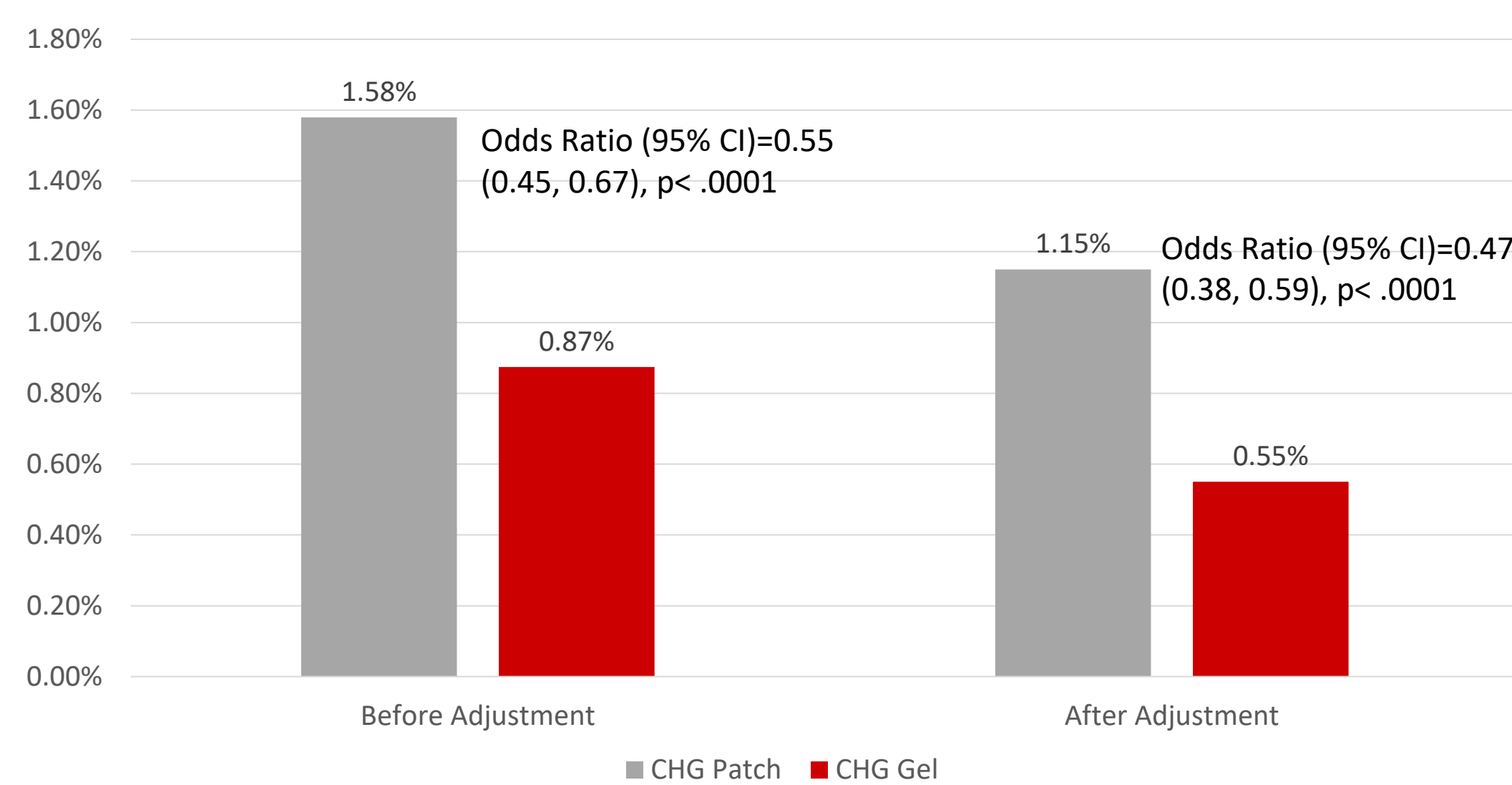


Figure 2. Hospital Length of Stay (days)

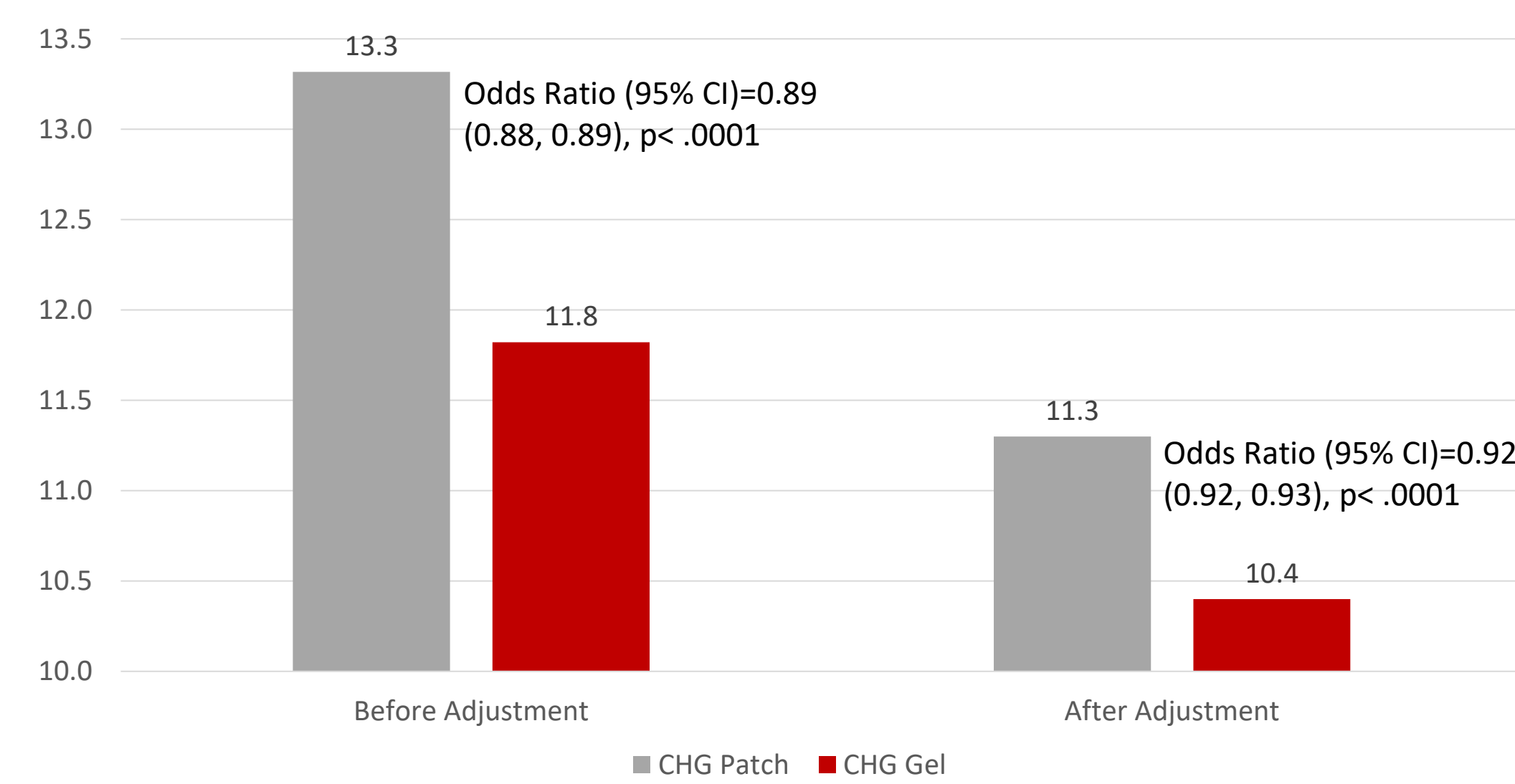
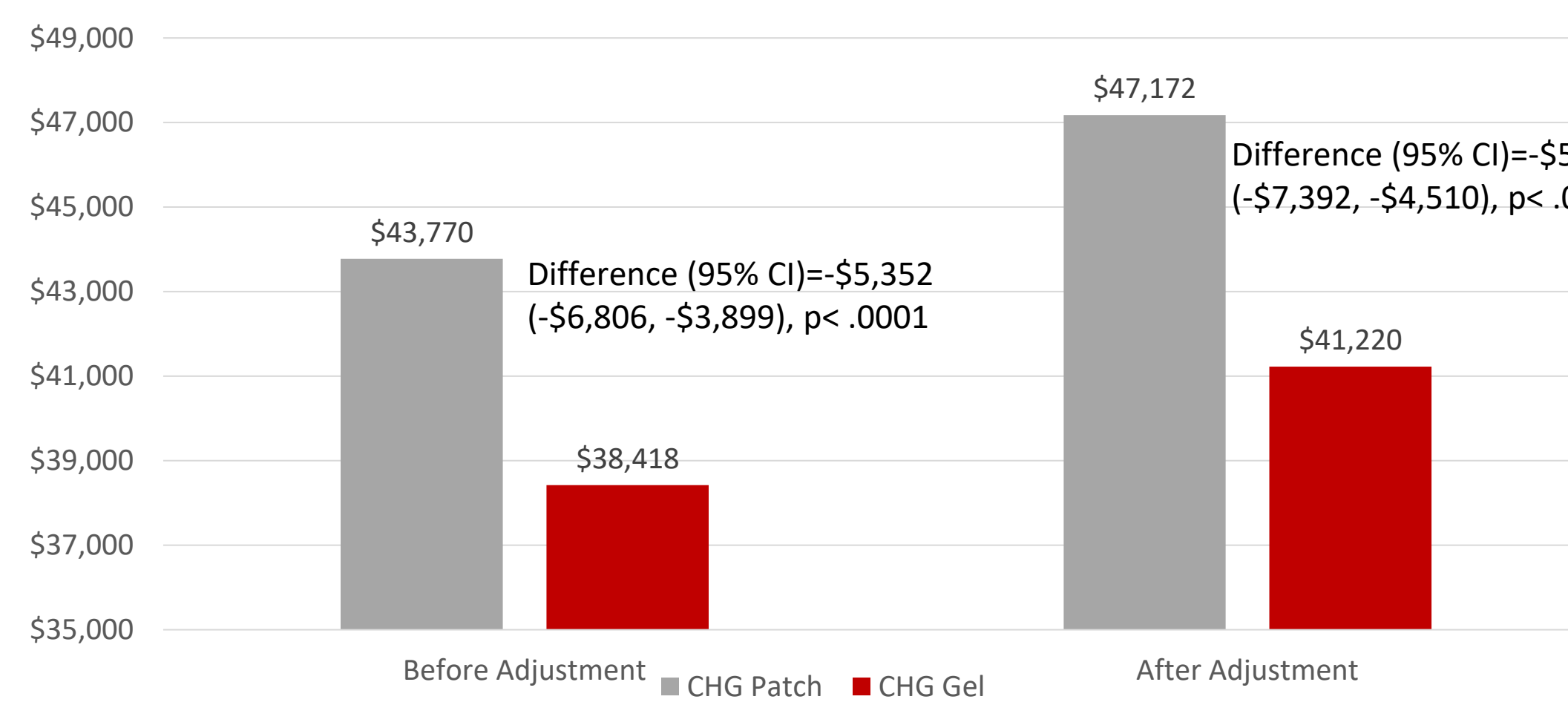


Figure 3. Hospitalization Costs



Results (Cont'd)

LOS

• After adjustment, there was a difference of 0.9 days between the two cohorts, with the CHG gel cohort saving 8% LOS (OR=0.92, 95%CI: 0.92-0.93, p< 0.0001) (**Figure 2**).

Cost

• The hospitalization mean costs were decreased by \$5,352 (p<0.0001) when comparing CHG gel (\$38,418) to CHG patch (\$43,770) (**Figure 3**).

• The adjusted mean costs were \$47,172 and \$41,220 for the CHG patch and CHG gel cohorts respectively, with a difference in cost of \$5,951 (p< 0.0001) per hospital stay (**Figure 3**).

Contact Dermatitis

• There was no significant difference in contact dermatitis rates between the two cohorts before (p=0.508) and after adjustment (p= 0.8431).

BSI: Bloodstream Infection; LOS: Hospital Length of Stay; CI: Confidence Interval

Conclusions

This real-world evidence study indicates that using a CHG gel pad dressing may be a more effective intervention than an opaque CHG patch to help reduce BSI and clinical utilization and costs in an inpatient setting. The difference in efficacy may be due to the method of application and compliance² and deserves to be further investigated. A previous publication³ also suggested better effectiveness for CHG gel over CHG patch dressings to prevent BSI but the data did not reach statistical significance due to an insufficiently powered study. Our work utilizing a large database provides more statistical power.

References

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[‡] The study's title and results have been moderately revised after the abstract was submitted

*3M™ Tegaderm™ CHG Chlorhexidine Gluconate I.V. Securement Dressing (3M Company; St. Paul, MN)

† Biopatch® (Ethicon, Johnson & Johnson Surgical Technologies; Somerville, NJ)

^{††}Premier Healthcare Database (PHD; Premier, Inc.; Charlotte, NC). PHD is a comprehensive, service-level, all-payer database that contains information on inpatient discharges, primarily from geographically diverse non-profit, non-governmental and community and teaching hospitals and health systems across the United States