

Preoperative Skin Preparation for Caesarean Deliveries in Australian Public Hospitals: Surgical Site Infection and Cost Outcomes Associated with Using Alcoholic Chlorhexidine Gluconate Applicator Versus Bulk Aqueous Povidone Iodine Solution

Kristin Hui Xian Tan^a, Caitlin Asjes^a, Erik P. Erdal^b, Yan Ma^a

^aBecton Dickinson Holdings Pte Ltd, Singapore, Singapore
^bBecton, Dickinson and Company, New Jersey, United States

Introduction

In Australia, there are around 105,000 Caesarean deliveries annually¹. The prevalence of surgical site infection (SSI) in these Caesarean deliveries is approximately 2.1%². This study aims to compare SSI outcomes and costs between adopting sterile alcoholic chlorhexidine gluconate (CHG) solution in a pre-filled applicator versus bulk aqueous povidone iodine (PVI) solution for preoperative skin preparation in Caesarean deliveries in a public hospital setting.

Methods

- A budget impact tool, developed in Microsoft Excel, evaluates the clinical and economic impact of skin preparation methods
- Number of SSIs, skin preparation cost, SSI treatment cost, number of bed-days avoided and time saved from skin preparation were compared for a cohort of 1,000 patients
- Both global and local peer-reviewed data were used
- SSI rate for bulk PVI solution was assumed as the baseline rate (2.1%) observed in Australia²
- SSI rate for CHG applicator was derived by applying SSI reduction between CHG and PVI observed in a meta-analysis³ (42%) to the SSI rate for bulk PVI
- Skin preparation cost comparison between CHG applicator and bulk PVI solution considered local costs of antiseptic, auxiliary equipment and clinical waste disposal (**Table 1**)
- SSI treatment cost was calculated using the additional length of hospital stay due to SSI⁴ (2.1 days) and the average cost per day of stay⁵ (AUD2,074)
- Skin preparation time⁶ per patient was 3.5 minutes using CHG applicator and 8.5 minutes using bulk PVI

Table 1: Local costs of antiseptic, auxiliary equipment and clinical waste disposal for CHG applicator and bulk aqueous PVI solution

Skin Preparation Cost (AUD)	CHG Applicator	Bulk Aqueous PVI Solution
Antiseptic	\$9.90	\$3.00
Auxiliary Equipment	\$0.00	\$2.13
Waste Disposal	\$0.07	\$0.10
Total	\$9.97	\$5.23

References

¹Australian Institute of Health and Welfare. 2017–18, classified using AR-DRG version 8.0. Retrieved from https://www.aihw.gov.au/getmedia/80a14374-9766-4827-8730-59d65fc005d4/AR-DRG_data_cube_2017-18.xlsx.aspx

²Worth et al. Diminishing Surgical Site Infections in Australia: Time Trends in Infection Rates, Pathogens and Antimicrobial Resistance Using a Comprehensive Victorian Surveillance Program, 2002–2013. Infection Control & Hospital Epidemiology 2015;36(4):409–16

³Noorani et al. Systematic review and meta-analysis of preoperative antisepsis with chlorhexidine versus povidone-iodine in clean-contaminated surgery. British Journal of Surgery 2010;97(11):1614–20

⁴Mugford M, et al. Reducing the incidence of infection after caesarean section: implications of prophylaxis with antibiotics for hospital resources. British Medical Journal 1989;229:1003–6

⁵Australian Commission on Safety and Quality in Health Care (2018). Hospital-Acquired Complication 3: Healthcare-Associated Infections

⁶Lundberg PW, et al. Preoperative Antisepsis Protocol Compliance and the Effect on Bacterial Load Reduction. Surgical Infections 2016;17(1):32–7

Conflict of Interest

All authors are employees of Becton Dickinson (BD). No other potential conflict of interest was reported by the authors.

Results

- SSI rate was 1.2% using CHG applicator compared to 2.1% using bulk PVI solution
- Total SSI treatment cost for 1,000 patients was estimated to be around AUD20,700 using CHG applicator and AUD35,700 using bulk PVI while total skin preparation cost was estimated to be around AUD10,000 using CHG applicator and AUD5,200 using bulk PVI (**Figure 1**)
- There is an overall cost savings of AUD10,200
- Around 18 bed-days (AUD37,300 equivalent) can be avoided with the use of CHG applicator
- At least 80 hours can be saved from performing skin preparation using CHG applicator compared with bulk PVI (**Figure 1**)

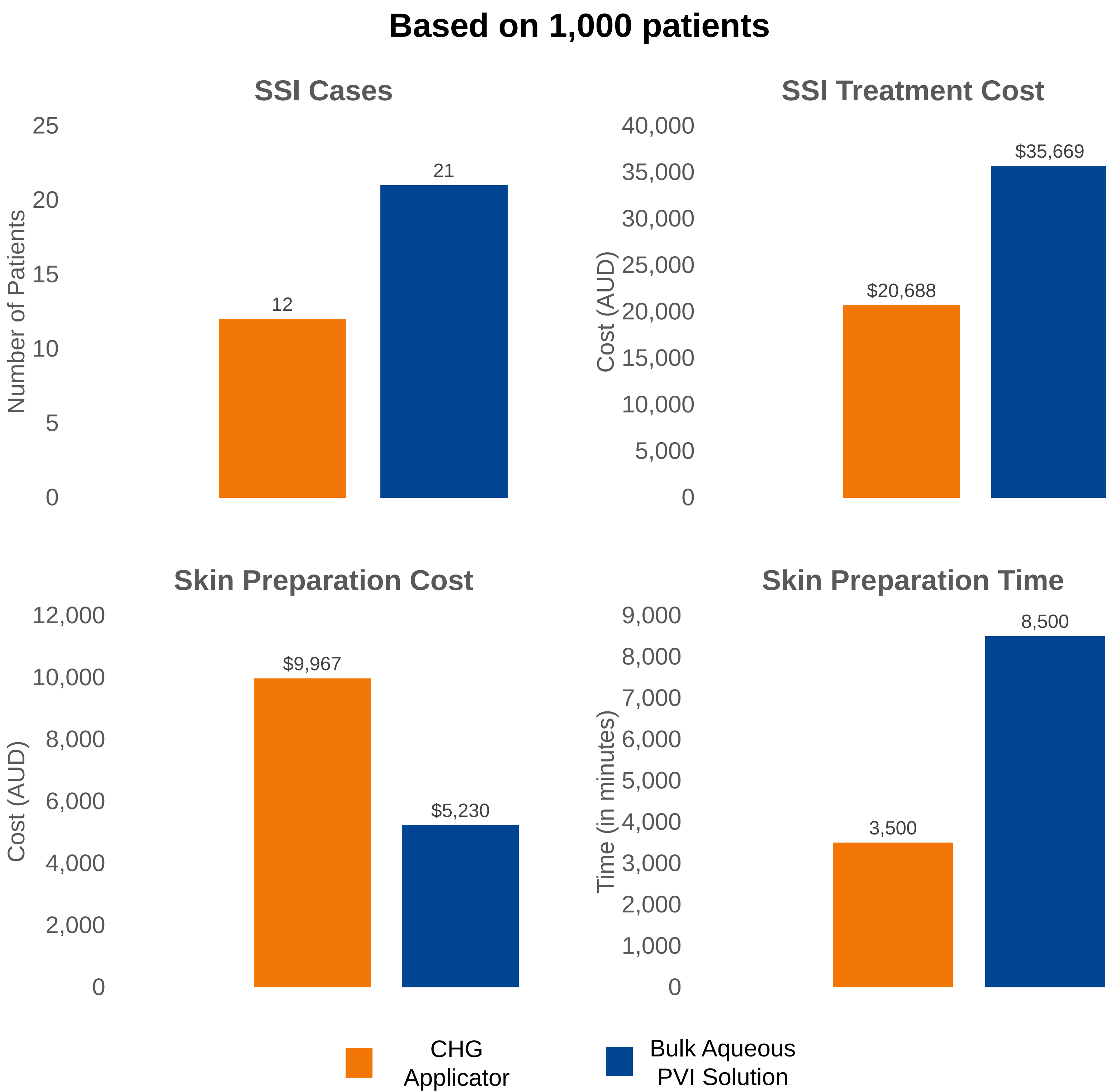


Figure 1: Comparison of clinical and economic outcomes (i.e. number of SSIs, SSI treatment cost, skin preparation cost and skin preparation time) between using CHG applicator and using bulk aqueous PVI solution

Conclusions

This model demonstrates that using a CHG applicator versus bulk aqueous PVI solution may result in lower SSI rates, hence lower overall costs as cost savings from treating fewer SSI cases can offset the additional cost associated with CHG applicator. Fewer SSI cases can also result in reduction in HAC penalties for Australian hospitals. Operational efficiency, in terms of hospital bed utilisation and skin preparation time in the operating theatre, may also be achieved.

