

Cost-Analysis of Universal Decolonization with Pure Hypochlorous Acid (pHA*) and Mupirocin to Prevent Infections in Burn Patients

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BACKGROUND

Infections account for 42% to 65% of all deaths in burn patients. [1]Methicillin-resistant Staphylococcus aureus (MRSA) is a particular concern among burn patients. [2] Universal decolonization programs have been shown to reduce MRSA infection rates. [3] The use of pHA (for bathing and treatment) and mupirocin has been effective in reducing MRSA and controlling bacterial bioburden. [4]

OBJECTIVE

The objective of this study was to conduct a cost-analysis of pure hypochlorous acid (pHA) and mupirocin for the prevention of MRSA infection in hospitalized burn patients.

METHODS

A patient-level microsimulation model was used to conduct a cost-analysis from the US health system perspective.

All clinical data was obtained from a retrospective observational trial. [4] The clinical data examined the admitted burn patients for a one-year period prior to the introduction of pHA and mupirocin and one year period post introduction of pHA and mupirocin.

The primary outcome variable was the reduction in MRSA infections per 1000 bed days. Cost data were obtained from the publicly available data sources in 2023 USD using a pragmatic literature review. [5,6]

Deterministic and probabilistic sensitivity analyses (PSA) were performed to gauge the robustness and reliability of the results.

RESULTS

Table 1 shows the parameters used in the model.

Parameter	Values		
	Base	Low	High
Pre-Infection Rate / 1000 days	7.23	5.42	9.04
Post-Infection Rate / 1000 days	2.37	1.78	2.96
Cost of MRSA Infection	\$30,988	\$23,241	\$38,735
Cost of pHA / day	\$75.00	\$56.00	\$94.00
Cost of mupirocin / day	\$6.80	\$5.10	\$8.50

The clinical data found that burn patients prior to the introduction of pHA were 3.05 times more likely to acquire a MRSA infection.

The expected cost to treat solely the MRSA infections in the pre-pHA period was \$224,116 per 1000 bed days; whereas, the expected cost in the post-pHA period was \$73,465 per 1000 patient bed days.

Figure 1 and 2 show the histogram results of the patient level microsimulation model after 10,000 iterations.

FIGURE 1: PRE-pHA MODEL RESULTS

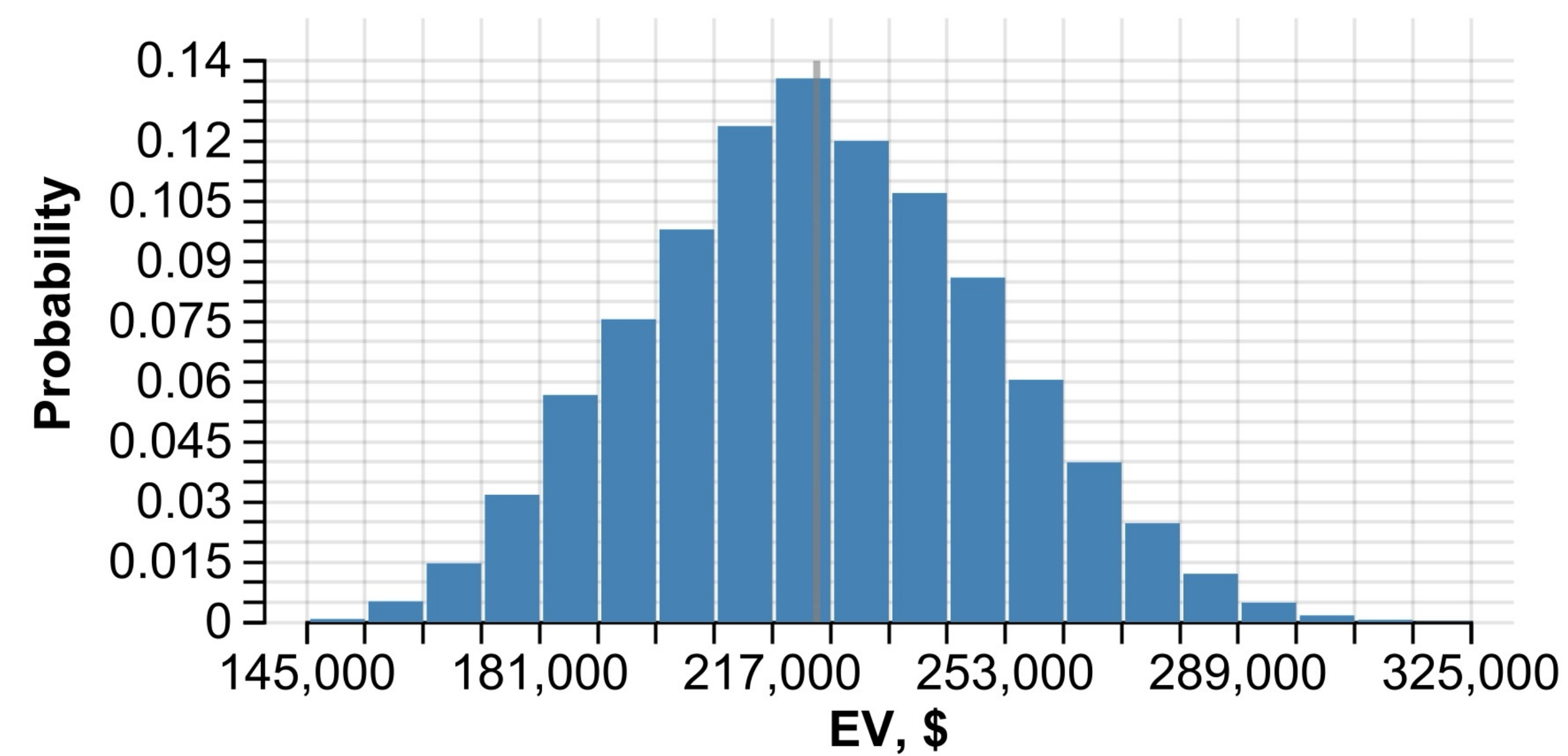


FIGURE 2: POST-pHA MODEL RESULTS

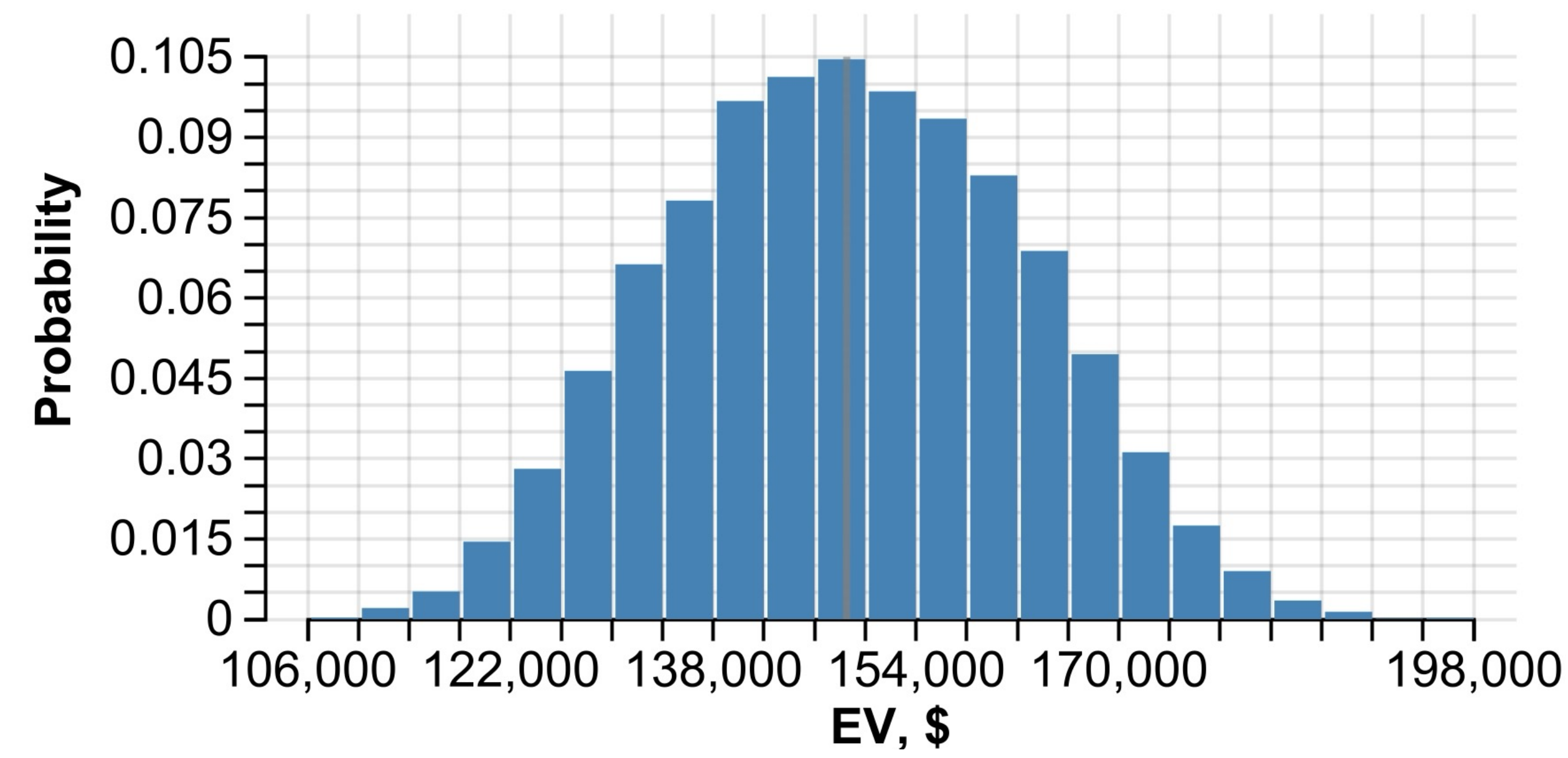
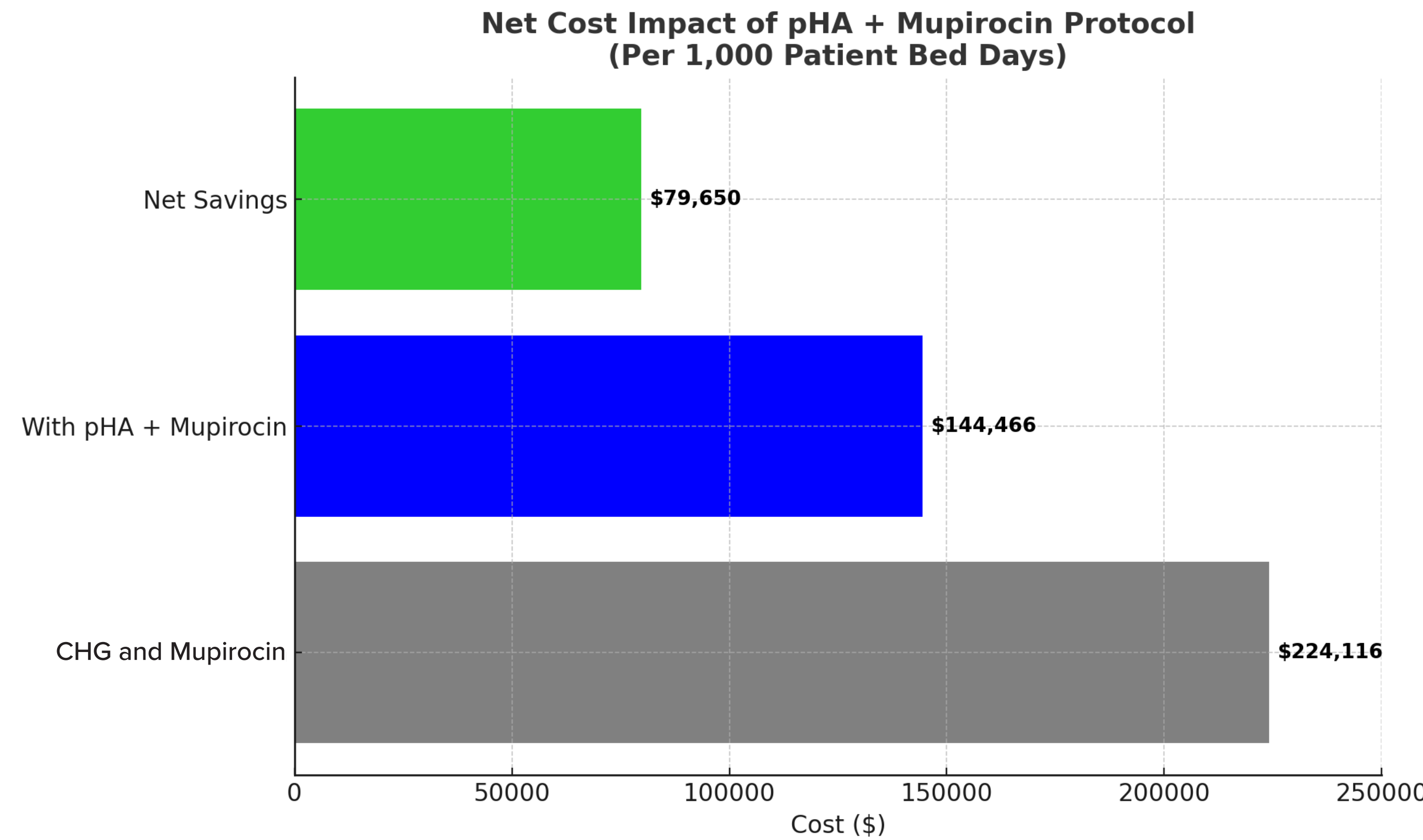


Figure 3 shows the costs pre and post intervention with pHA and mupirocin and the expected net savings.

DISCUSSION

The findings of this study demonstrate that the universal use of pHA and mupirocin for decolonization in burn patients leads to substantial cost savings. MRSA infections substantially increase the length of stay, resource utilization, and overall treatment expenses. By reducing MRSA infections, hospitals can lower antibiotic use, improve bed turnover, increase patient satisfaction and reduce clinical time per patient. The expected savings after accounting for the added cost of pHA and mupirocin equate to \$79.65 per day. In a capitated payment model for inpatient burn care, the expected savings is a direct financial benefit to the hospital.

FIGURE 3: NET COST IMPACT



Adding the cost of pHA (\$71,001), the net savings was expected to be **\$79,650 per 1000 patient bed days** or \$79.65 per bed day. All model iterations show a cost savings associated with pHA and mupirocin.

LIMITATIONS

The results of this analysis were based on a single center burn unit's experience with pHA and mupirocin in a pre- / post-period observational study. Second, this study was limited only to an examination of intervention effect on MRSA. It did not include an assessment of the cost of all treatment, ancillary burn-related services, or labor productivity related to the intervention.

CONCLUSIONS

pHA and mupirocin was expected to be a substantial cost-saving strategy for the prevention of infection in burn patients. Larger and more clinically diverse studies are recommended to confirm these findings.

REFERENCES

- Bloemsma, G.C.; Dokter, J.; Boxma, H.; Oen, I.M. Mortality and causes of death in a burn centre. *Burns* 2008, 34, 1103–1107
- Samuel, P.; Kumar, Y.S.; Suthakar, B.J.; Karawita, J.; Kumar, D.S.; Vedha, V.; et al. Methicillin-Resistant Staphylococcus aureus Colonization in Intensive Care and Burn Units: A Narrative Review. *Cureus*. 2023, 15(1), e47139.
- Hacek, D.M.; Paule, S.M.; Thomson, R.B.; Robicsek, A.; Peterson, L.R. Implementation of a universal admission surveillance and decolonization program for methicillin-resistant staphylococcus aureus (MRSA) reduces the number of MRSA and total number of S. aureus isolates reported by the clinical laboratory. *Journal Clinical Microbiology*. 2009, 47(11), 3749–3752.
- Gray, D.; Foster, K.; Cruz, A.; Kane, G.; Toomey, M.; Bay, C. et al. Universal decolonization with hypochlorous solution in a burn intensive care unit in a tertiary care community hospital. *American Journal of Infection Control*. 2016, 44, 1044–1046.
- Nelson RE, Hatfield KM, Wolford H, Samore MH, Scott RD, Reddy SC, et al. National estimates of healthcare costs associated with multidrug-resistant bacterial infections among hospitalized patients in the United States. *Clinical Infectious Diseases*. 2021;72:S17-S26.
- Mallow PJ, Black J, Chaffin AE, Couch KS, Faust E, Fernandez LG et al. The economic and quality effects of wound cleansing with pure hypochlorous acid: evidence-based evaluation and guidance. *Wounds*. 2024;36(10):S1-S13.