

Purpose

In 2014 there were 586,530 hospital admissions for skin and subcutaneous tissue infections (SSTI) at a cost to the US healthcare system of over \$15 billion.¹ Hospital costs for these admissions range from \$6,000 to greater than \$20,000 each, with length of stay of 3.5 to 10 days.¹ Yet, research has shown that most patients have no systemic symptoms of infection and few to no comorbidities.² Further, the mortality rate for SSTIs is low, averaging <0.1% across the range of infection severity.²

The high use of the inpatient setting can be partially explained by the need for multi-dose intravenous (IV) antibiotics. A survey sponsored by the Centers for Disease Control and Prevention found that need for IV antibiotics was the sole reason for admission in 41% of patients admitted for SSTI.³

Oritavancin is a once-only dose IV antibiotic which may allow avoidance of hospital admission in patients where the need for IV antibiotics is the primary reason for admission. However, little is known about clinical and economic outcomes of oritavancin treatment in the outpatient setting outside of the pivotal trials.

The purpose of this study was to evaluate the real world clinical and economic outcomes of patients treated with oritavancin in the hospital outpatient infusion setting.

Methods: Study Design

This was a retrospective study of patients 18 years or older treated with oritavancin for acute bacterial skin and skin structure infection (ABSSSI) caused by suspected or confirmed gram-positive pathogens, including methicillin-resistant *Staphylococcus aureus* (MRSA), in the outpatient setting at 3 sites representing 6 US hospitals from 1/1/2015 to 1/31/2016.

Consecutively treated patients were included if they had not been discharged from the inpatient setting within the previous 24 hours and received their single-dose oritavancin treatment at a hospital-based outpatient infusion center.

Index date was defined as the date of oritavancin administration

The primary assessment was clinical success (cure or improved) between 5 to 30 days post treatment.

Healthcare resource utilization (HRU) from index treatment to 30 days post oritavancin administration was also collected and assessed. HRU included subsequent hospital admission, emergency department (ED) visits, antimicrobials and antimicrobial administration, diagnostics and surgical procedures related to the infection.

Methods: Statistical Analysis

Patient demographic characteristics, comorbidities, infection characteristics, and surgical procedures were summarized. Descriptive statistics for continuous variables included means and standard deviations (SD). Categorical variables were summarized by frequencies and percentages.

For clinical efficacy, clinical success (cure or improved) rate was calculated as the number of patients with cure or improved status 5-30 days post treatment divided by the number of patients with cure, improved, or failure. Since the clinical response included the patients with “non-evaluable” (missing) observations, sensitivity analyses were performed by assuming the missing as either “success” or “failure”, in order to explore the robustness of the primary efficacy analysis.

To estimate the total hospital costs of treating ABSSSI with oritavancin, the following data sources of unit cost were utilized:

- The wholesale acquisition cost (WAC) of oritavancin was used to estimate the medication costs.
- The costs of healthcare resources were estimated using data from the Premier Hospital Database. Costs were calculated as the mean and median costs of each service for patients with ABSSSI treated in the outpatient setting with oritavancin across all hospitals included in the Premier database. These costs were applied to healthcare resource utilization observed in this study in order to estimate hospital costs.
- The cost of subsequent hospital admission was taken from the Healthcare Cost and Utilization Project for mean and median hospital cost of admission for skin and subcutaneous tissue infections (Clinical Classifications Software (CCS)=197) in 2013.

The total hospital cost from index treatment up to 30 days post treatment was the sum of medication costs, the costs of all services patients received including medication administration, ED visits, diagnostic tests, and surgical procedures, and the costs of subsequent hospitalization. The costs were calculated and presented in two ways: one was based on the mean of unit costs, another was based on the median of unit costs.

Subsequent hospital admission rate post index treatment up to 30 days was calculated. The admission rate was further analyzed by various clinically relevant subgroups.

IRB approval was obtained from each participating site.

Results

- 115 patients met all inclusion criteria. Patients had a mean age of 59.7 years, 93% of them had at least one comorbidity, and 61.7% met the definition for obesity (BMI ≥ 30 kg/m²).
- In the majority of patients (81.7%) the infection was first diagnosed in a physician’s office and oritavancin treatment was provided in a hospital owned outpatient infusion center (93.9%).
- Sixty-nine (60%) patients had received concomitant antibiotics prior to oritavancin, including 21 with prior IV/IM antibiotics and 63 with prior oral antibiotics.
- Of 56 patients with baseline culture results, MRSA was identified in 27 (48.2%).

Table 1. Patient characteristics

Characteristic	Mean
Mean age	59.7 \pm 15.3
% ≥ 65 years	40.0%
Mean BMI	36.1 \pm 13.4
% BMI ≥ 30 kg/m ²	61.7%
% with any comorbidity	93.0%
Hypertension	53.0%
Hyperlipidemia	20.9%
Diabetes	22.6%

Figure 1. Infection type

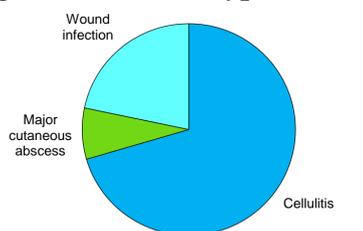
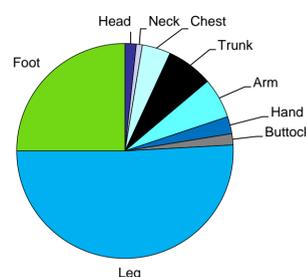


Figure 2. Infection location



Results

Clinical Outcomes

The success rate (defined as cure or improved) was 99.1% at a mean of 13.2 \pm 6.5 days post index treatment. One patient with oritavancin failure was 42 years old, female, 39.4 kg/m², non-diabetic, hypertension, with MRSA. A total of 83.2% of patients achieved clinical cure at follow-up. Sensitivity analysis that included the two patients who were non-evaluable at follow-up found the success rate to range from 97.4% to 99.1%, depending on whether non-evaluable patients were categorized as failures or successes.

Healthcare resource utilization

A total of 6 (5.2%) patients received diagnostic testing as part of their index treatment, which included ultrasonography, X-ray and CT scan. 26 patients (22.6%) received at least one surgical procedure during index treatment. Surgical procedures included: incision and drainage (8 patients), surgical debridement (18 patients), negative pressure wound therapy (1 patient) and other (1 patient). Standard of care was the reason for surgical procedure in all but 1 patient.

One (0.9%) patient visited the Emergency Department within 30 days of index treatment.

Seven patients (6.1%) had a hospital admission within 30 days of index treatment. Three of these admissions (2.6% overall) were infection related. Eleven patients (9.6%) received concomitant antibiotics within 30 days post index treatment.

Total costs were calculated as \$3,698 (mean) and \$3,341 (median).

Table 2. Estimated hospital costs for services provided to patients with ABSSSI

Service	Mean	Median
Oritavancin (WAC)	\$2900.00	\$2900.00
Drug administration (3 hours)	\$514.81	\$238.02
Ultrasonography	\$269.14	\$204.48
X-ray	\$82.48	\$68.97
CT scan	\$180.88	\$127.12
Incision & Drainage	\$101.02	\$78.39
Surgical debridement	\$299.46	\$165.00
Negative pressure wound therapy	\$182.72	\$161.09
ED Visit level IV-V	\$260.67 - \$377.03	\$226.69 - \$331.33
Hospital admission for SSTI	\$6,823.00	\$5,074.00

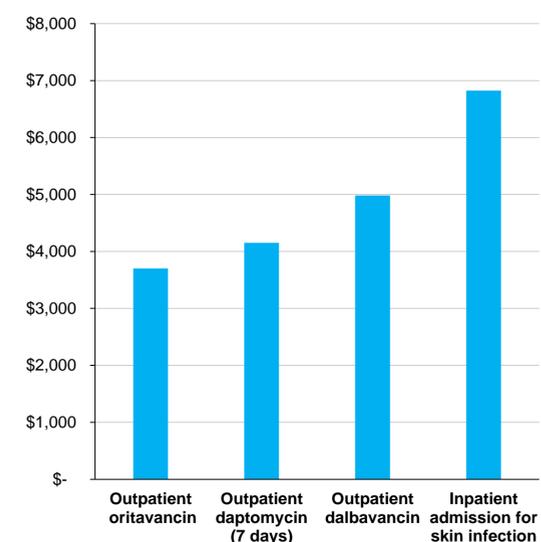
Table 3. All-cause hospital admission rate by sub-group

Subgroup	% (n/N)
Age < 65 years	5.8% (4/69)
Age ≥ 65 years	6.5% (3/46)
BMI < 25 kg/m ²	0% (0/17)
BMI 25 - <30 kg/m ²	7.4% (2/27)
BMI ≥ 30 kg/m ²	7.0% (5/71)
w/ diabetes	7.7% (3/39)
w/o diabetes	5.3% (4/76)
MRSA	3.7% (1/27)
MSSA	4.2% (1/24)

Table 4. Reason for concomitant antibiotics within 30 days post-index treatment

Reason	n (%)
Inadequate treatment response	1 (0.9%)
Relapse of same infection	2 (1.7%)
New gram-positive infection	2 (1.7%)
Primary infection was both gram-positive and gram-negative	4 (3.5%)
Standard of care or hospital protocol	3 (2.6%)

Figure 3. Mean hospital costs of ABSSSI treatment^{1,4,5}



Limitations

As this was a retrospective real world analysis, it is subject to all the limitations of observational real world studies. While this study population is representative of patients with skin infections treated in the outpatient setting at these 6 US hospitals, it may not represent a typical outpatient population at other sites. For example, nearly two thirds of the population was obese. Cost data was not available from the hospitals where this study was conducted, therefore costs were estimated based on a representative sample of skin infection outpatients and does not reflect the true costs to the institutions included in this analysis.

Conclusions

This study assessed the clinical and economic outcomes of treatment of skin infections with oritavancin in the outpatient setting. Results suggest that oritavancin is effective in this setting. Importantly, >60% of patients were obese and clinical response was seen in 99.1% of these patients.

Healthcare resource use data suggest that oritavancin in the outpatient setting may be a cost saving approach to treatment of skin infection. Treatment of skin infections in the inpatient setting are \$6,823 (mean) and \$5,074 (median).¹ Mean cost of outpatient treatment with dalbavancin has been estimated to be \$4,982 and mean costs of 7-14 days of outpatient treatment with daptomycin has been estimated to be \$4,150 to \$8,300. In this study, costs of outpatient treatment with oritavancin, inclusive of follow-up costs, were estimated to be \$3,698 (mean) to \$3,341 (median), suggesting a cost savings relative to inpatient treatment and outpatient treatments with other IV antibiotics.

Overall efficacy of 99%, lower estimated costs relative to other treatment modalities and low rate of infection related hospital admission within 30 days suggest oritavancin represents an opportunity to reduce costs while maintaining high quality care for patients with skin infections.

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