

Healthcare Resource Utilization for High-Risk Patients Treated with Dalbavancin in Physician Office Infusion Centers

Quyên Luu, MD¹, Barry Statner, MD, FRCPC, FIDSA²; Robin H. Dretler, MD, FIDSA³; H. Barry Baker, MD, FACP⁴; Brian S. Metzger, MD, MPH⁵; Thomas C. Hardin, PharmD⁶; Claudia P. Schroeder, PharmD, PhD⁶; Lucinda J. Van Anglen, PharmD⁶

¹Central Georgia Infectious Diseases, Macon, GA; ²Mazur, Statner, Dutta, Nathan, PC, Thousand Oaks, CA; ³Infectious Disease Specialists of Atlanta, P.C., Decatur, GA; ⁴Infectious Disease Physicians, Miami, FL; ⁵Austin Infectious Disease Consultants, Austin, TX; ⁶Healix Infusion Therapy, Sugar Land, TX



Abstract

Background: Medicare beneficiaries and patients (pts) ≥65 years comprise the highest risk for utilization of healthcare resources including emergency department (ED) visits and hospitalizations (hosp). Dalbavancin (DAL) is a long-acting lipoglycopeptide approved for treatment of bacterial skin and skin structure infections, well suited for outpatient therapy due to a 1-2 dose regimen. We investigated the use of healthcare resources following DAL with associated costs compared to national data.

Methods: A multi-center, retrospective chart review was conducted of all high-risk pts receiving DAL during 2017 at participating sites. Data included demographics, diagnosis, Charlson index, prior/post IV therapies, DAL regimen, and adverse drug reactions (ADRs). ED visits and hosp within 30 days post DAL were assessed and compared to Healthcare Cost and Utilization Project Nationwide Inpatient Sample and Nationwide Emergency Department Sample stratified by diagnosis. The inpatient length of stay (LOS) was used to calculate hospital charges.

Results: DAL was administered to 124 pts (mean age 71±10 years, mean Charlson index of 4.6, 55% male) in 10 POICs. Most pts (92%) received a 1-dose regimen. Diagnoses included cellulitis (32%), abscess (22%), diabetic foot infection (15%), osteomyelitis (10%), surgical site infections (9%), prosthetic device infection (9%) and musculoskeletal infections (3%). 55% were treated from the community, IV therapy with other agents was provided prior to DAL in 44% and following DAL in 6%. Moderate to severe ADRs were seen in 12 pts (10%) with 4 admitted to the ED and 3 hosp. Median onset of ADRs was 5 days post DAL. All cause ED visits were 10 (8.1%), compared to a national rate of 10.6% based on diagnosis and age ≥65. All cause 30-day hosp admissions were 11.3% (14/124) compared to a national rate of 16.1% based on diagnosis. Mean inpatient LOS was 4.9 days compared to 5.3 days, resulting in healthcare resource cost savings of \$97,014.

Conclusion: Use of DAL in high-risk, comorbid pts treated in POICs was associated with lower usage of both healthcare resources and corresponding costs than national estimates for respective diagnoses. ADRs contributed to healthcare resource use. DAL provides a convenient outpatient treatment option for high-risk pts that may save use of healthcare resources.

Background

Dalbavancin (DAL) is a lipoglycopeptide approved to treat acute bacterial skin and skin structure infections (ABSSSIs) with a prolonged half-life allowing for a one or two dose infusion ideal for outpatient infusion centers.¹

A recent multicenter study of hospital use of DAL demonstrated a reduction of length of stay and associated costs.² Real-world outpatient data on healthcare resource utilization following DAL use in the highly comorbid and aged population remains sparse.

This study evaluates the use of healthcare resources in high-risk pts within 30 days following DAL administration at POICs.

Methods

A retrospective study was conducted including all high-risk pts (age ≥65 years and/or Medicare beneficiaries) treated with DAL in Physician Office Infusion Centers (POICs) from January through December 2017.

Data collection: Data included demographics (age, gender, payor, location prior to OPAT), primary diagnosis, clinical characteristics (Charlson index, comorbidities, prior surgery and antibiotics), DAL treatment characteristics (regimen, IV/PO antibiotics ≤3 days prior to and IV antibiotics post DAL) and ADRs. Healthcare resource utilization was assessed as ED visits and hosp within 30 days following DAL infusion.

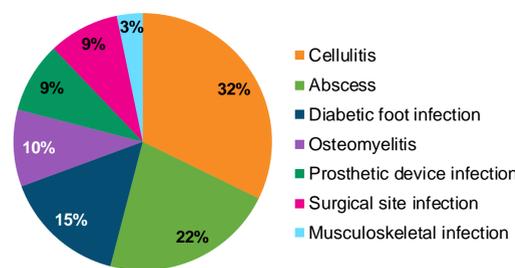
Data analysis: Safety: ADRs and associated healthcare resource utilization was captured.

Healthcare resource utilization: This was calculated as rates of ED visits and hosp for DAL study pts and compared to nationally representative data using HCUP Nationwide Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS) stratified by age and diagnosis with Clinical Classification Software (CCS).³ Daily national inpatient costs were obtained from HCUP national inpatient charges and mean inpatient LOS (iLOS) stratified by principal diagnosis. DAL costs (\$) derived from multiplying the diagnosis-specific national inpatient cost per day with the total number of hosp days acquired by study pts. The national estimate was calculated by the mean national hosp charge (\$) multiplied by number of study pts. Statistical analysis was performed using Pearson's Chi Squared test⁴ with a significance p<0.05.

Demographics

Characteristics	Results (n=124)
Patient classification, n (%)	
Age ≥65 years	107 (86%)
Medicare beneficiaries <65 years of age	17 (14%)
Age (mean years±SD)	71±10
Gender, male, n (%)	68 (55%)
Body mass index ≥30 kg/m²	60 (48%)
Payor, n (%)	
Medicare	113 (91%)
Commercial	11 (9%)
Location Prior to OPAT, n (%)	
Community	68 (55%)
Hospital	56 (45%)

Primary Diagnosis



Clinical Characteristics

Characteristics	Results (n=124)
Charlson index (mean±SD)	4.6±2.1
Common comorbidities, n (%)	
Hypertension	70 (56%)
Diabetes mellitus	57 (46%)
Cardiovascular disease	48 (39%)
Hyperlipidemia	42 (34%)
Cancer	27 (22%)
Renal disorders	26 (21%)
No. of comorbidities, n (%)	
0	3 (2%)
≥3	87 (70%)
Surgical intervention prior to DAL, n (%)	60 (58%)
Incision and drainage	54 (44%)
Amputation of toe	4 (3%)
Hardware removal	2 (2%)

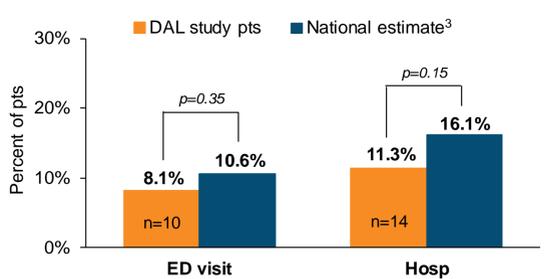
Results

DAL Treatment Characteristics

Variable, n (%)	Results (n=124)
DAL single-dose regimen	114 (92%)
Prior IV antibiotic therapy	54 (44%)
vancomycin	45 (36%)
cefazolin	6 (5%)
daptomycin	6 (5%)
ceftriaxone	4 (3%)
others ¹	4 (3%)
Length of prior IV therapy, median (range)	5 days (1 - 47)
Prior PO antibiotic therapy²	30 (24%)
Length of prior PO therapy, median (range)	10 days (7 - 42)
Post IV antibiotic therapy³	8 (6%)

¹; others incl. piperacillin/tazobactam (n=3), clindamycin (n=1).
²; excluding concomitant IV therapy.
³; vancomycin (n=3), daptomycin (n=3), cefazolin (n=1), cefepime (n=1), ceftazidime (n=1)

All Cause 30-Day Resource Utilization



No significant differences were found between ED and hosp rates of DAL study pts and national average estimates.

Safety and Resource Utilization Due To ADRs

ADR	No. of Events	Onset (Mean day*)	Resource Utilization (No. Pts)
Rash			
moderate	5	6±3	ED (n=1)
severe	1	4	ED & Hosp (n=1)
Nausea	2	2±1	-
Urticaria	2	8±1	-
Chest tightness	1	1	-
Elevated SCr	1	2	ED & Hosp (n=1)
Headache	1	2	-
Severe epistaxis	1	9	ED & Hosp (n=1)
Stomatitis	1	3	-

*; applies only to onset with ≥1 adverse events.

12 pts (10%) experienced significant ADRs; mean onset of 4.8 days

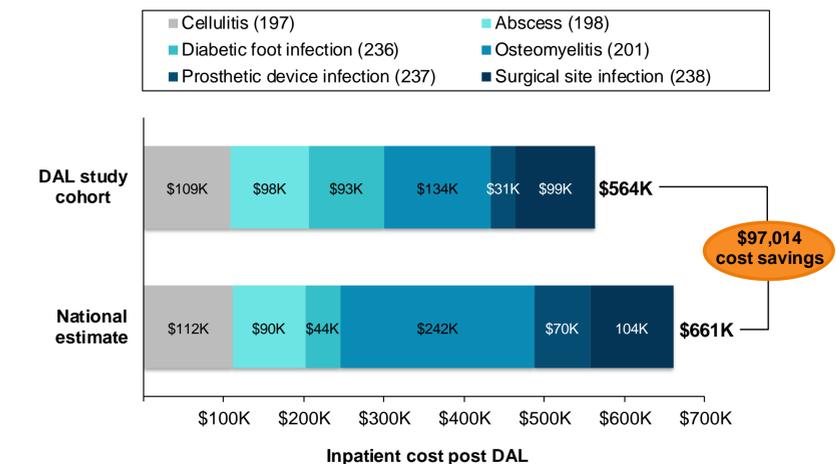
Inpatient Admissions Post-DAL: Reasons and Costs

Admission Diagnosis (CCS code*)	No. Pts	Reason for Admission	Total iLOS (days)	Daily Inpatient Cost*	Cost per Diagnosis
Hosp admission from ED (n=8)					
Cellulitis (197)	3	disease progression (n=2) ADR (n=1)	12	\$6,969	\$83,628
Osteomyelitis (201)	3	disease progression (n=2) ADR (n=1)	14	\$7,875	\$110,244
Prosthetic device infection (237)	1	ADR	3	\$10,412	\$31,235
Surgical Site infection (238)	1	disease progression	4	\$8,914	\$35,658
Hosp admission without ED (n=6)					
Diabetic foot infection (236)	2	disease progression	15	\$11,599	\$173,981
Abscess (198)	1	disease progression	2	\$8,315	\$16,631
Cellulitis (197)	1	disease progression	4	\$6,345	\$25,380
Osteomyelitis (201)	1	disease progression	3	\$7,779	\$23,337
Surgical Site infection (238)	1	disease progression	7	\$9,092	\$63,642

*Mean daily cost derived from Healthcare Cost and Utilization Project Nationwide Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS) stratified by Clinical Classification System (CCS) diagnosis³.

- 14 of 124 pts (11.3%) were admitted to the hosp within 30 days post DAL
- 3 of 8 pts (38%) admitted from the ED were due to ADRs from DAL
- Overall mean iLOS for was 4.9 days for DAL study pts vs. 5.3 days national average

Costs of Inpatient Stay Post-DAL Compared to National Data³



No statistically significant differences were found between diagnosis-specific inpatient costs for DAL study pts and national average³ (p=0.605)

Discussion

We investigated the impact of outpatient use of DAL on utilization of healthcare resources in high-risk pts (age≥65, Medicare beneficiaries) 30 days following administration of DAL and compared estimated costs to national average estimates.

- 124 pts (86% ≥65 years, 91% Medicare beneficiaries) met study criteria
- DAL was used to treat a wide variety of infections including off-label diagnoses, however, most frequent were cellulitis and abscess.
- The majority of pts had received PO or other IV antibiotics prior to DAL
- Healthcare resource utilization included ED visits in 8.1% and hosp in 11.3%. There was no significant difference compared to national estimates of 10.6% (p=0.35) and 16.1% (p=0.15), respectively.
- ADRs were noteworthy and occurred in 10% of pts. Onset was delayed after a mean of 5 days post DAL. ADRs led to ED visits in 4 pts, with subsequent hospitalization in 3 pts.
- Overall, 14 pts were hospitalized within 30 days post DAL
- Total costs for inpatient stay following outpatient use of DAL was \$564,000. The national average of inpatient cost³ stratified by the same diagnosis was \$661,000 for overall cost savings of \$97,014 for DAL pts.
- Of note, costs associated with ED visits were not compared to national estimates due to inconsistent availability of data with our population. Inclusion of these costs would contribute to more cost savings with DAL.

Conclusion

DAL was successfully administered to high-risk patients with multiple types of infections.

Healthcare resource utilization and costs were less in the DAL study population compared to overall national sample, however, this was not statistically significant.

ADRs were notable and contributed to utilization of healthcare resources.

References

- Guest JF, Esteban J, Manganelli AG et al. Comparative efficacy and safety of antibiotics used to treat acute bacterial skin and skin structure infections: Results of a network meta-analysis. *PLoS One*. 2017 12(11): e0187792.
- Bouza E, Valerio M, Soriano A et al. Dalbavancin in the treatment of different gram-positive infections: A real life experience. *Int J Antimicrob Agents*. 2018 (51): 571-577.
- Healthcare Cost and Utilization Project (HCUP). US Department of Health and Human Services, Agency for Healthcare Research and Quality. Nationwide Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS) 2015. <https://hcupnet.ahrq.gov/#setup> Accessed April 12, 2018.
- McHugh ML. The Chi-square test of independence. *Biochemia Medica*. 2013; 23(2): 143-149.