Economic Impact of Omadacycline Among Acute Bacterial Skin and Skin Structure Infections Patients: Cost-Saving Opportunities due to Avoidable Hospitalizations Using an Antibiotic With IV-to-Oral Switch Capability

Poster P1265
Abstract 1101

LaPensee, KT[1]; Lodise, TP.[2]

[1]Paratek Pharmaceuticals, King of Prussia, PA, USA; [2]Albany College of Pharmacy and Health Sciences, Albany, NY, USA

ABSTRACT

Background: Many patients with acute bacterial skin and skin structure infections (ABSSSI) with zero or stable comorbidities are admitted to the hospital largely for the administration of IV antibiotics. Omadacycline (OMC) is a first-in-class oral (PO) and IV once-daily aminomethylcycline antibiotic with broad spectrum activity, including MRSA, that is under development for the treatment of patients with ABSSSI. Given the costs of inpatient care, the present study examined the cost impact of shifting ABSSSI patients with few or no comorbidities and no life-threatening conditions from inpatient treatment with vancomycin to outpatient treatment with OMC. As part of this analysis, we estimated the proportion of ABSSSI patients that can initially receive OMC as an outpatient that can be subsequently admitted while still conferring cost savings.

Material/methods: A decision-analytic, cost-minimization model from the payer's perspective was constructed to compare the costs of inpatient vancomycin treatment versus outpatient OMC for the treatment of ABSSSI patients with few or no comorbidities and no life-threatening conditions presenting to the emergency department. Treatment scenarios considered for OMC: (1) receiving an IV loading dose of OMC and sent home from emergency department on OMC PO, (2) treated under observation status on IV OMC and discharged home on PO OMC, and (3) treated under observation status, discharged home, and subsequently admitted. Costs associated with vancomycin inpatient treatment of ABSSSI patients were obtained from the Premier Hospital Database™. The costs of IV and PO OMC were varied from 0 to $1,000/day. All OMC patients received OMC PO to complete a 10-day course of therapy.

Results: Treatment with vancomycin fully in hospital was determined to be $6,512 per course of therapy in 2016 US dollars for patients with few or no active comorbidities. Successfully switching an individual patient from vancomycin inpatient treatment to outpatient OMC was estimated to save $2,491 to $3,300 per patient, depending on use of observation unit and inputted daily cost of OMC. It is estimated that up to 48% of OMC patients discharged home from the emergency department could be subsequently admitted, while still maintaining budget neutrality.

Conclusions: Cost-saving for ABSSSI patients may be realized with OMC relative to vancomycin inpatient treatment if hospitalization is avoided due to outpatient management with OMC.

INTRODUCTION

- Acute bacterial skin and skin structure infections (ABSSSI) are among the most common infections observed in the Emergency Department (ED).[1,2]
- A substantial portion of patients who present to the ED with an ABSSSI are admitted to the hospital.[3]
- While patients with ABSSIs have historically received their care in the hospital, many of these patients have zero or few comorbidities and can be effectively and safely managed in the outpatient setting.[3]
  - Data suggest that many ABSSSI patients are often admitted to the hospital solely for the administration of intravenous antibiotics.[4]
- Since inpatient care for ABSSSI costs approximately 2-4 times more than outpatient care[5], it is essential that clinicians identify candidates for outpatient therapy at ED presentation.
- Omadacycline (OMC) is a first in class oral and IV once-daily aminomethylcycline antibiotic with board spectrum activity, including MRSA that is under development for the treatment of patients with ABSSSI.[6]
- Given the costs of inpatient care, the present study examined the cost impact of shifting ABSSSI patients with few or no comorbidities and no life-threatening conditions from inpatient treatment with vancomycin to outpatient treatment with OMC.

OBJECTIVES

- Conceptual healthcare decision models were developed from the payers' perspectives to evaluate the potential economic impact of OMC among patients with no or limited comorbidities and no life-threatening conditions who present to the hospital for the treatment of ABSSSI.
  - Examine the potential cost savings associated with treating adult ABSSSI patients with OMC in the outpatient setting relative to managing patients in the hospital with IV vancomycin.
  - Estimate the proportion of ABSSSI patients that can initially receive OMC as an outpatient that can be subsequently admitted while still conferring cost savings.
  - Characterize the upper end of daily OMC acquisition cost that still conferred cost savings with outpatient OMC relative to inpatient IV vancomycin treatment.

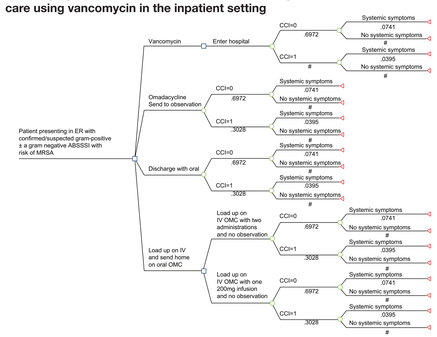
METHODS

Structure and Population

- A decision-analytic, cost-minimization model was constructed to compare the costs of inpatient vancomycin versus outpatient OMC for the treatment of ABSSSI patients with few or no comorbidities (Charlson Comorbidity Index (CCI) score of 0 or 1) and no life-threatening conditions among ABSSSI patients presenting to the ED (**Figure 1**) from the payers' perspective.[7]
- All vancomycin patients were assumed to be admitted as inpatients.

METHODS

Figure 1: Decision model comparing various strategies using OMC PO in the ambulatory setting or using OMC IV in the ER and observation and then discharging on oral OMC in the ambulatory setting versus the standard of care using vancomycin in the inpatient setting



- Three different OMC treatment scenarios were considered:
  - Received an IV loading dose of OMC and sent home from ED on OMC PO.
  - Treated under observation status on IV OMC and discharged home on PO OMC.
  - Treated under observation status, discharged home, and subsequently admitted after 3 or 7 days of OMC.
- Treatment failure and re-hospitalization rates were excluded from the models since studies have demonstrated no significant difference in treatment failure or re-hospitalization rates between antibiotics for treatment of ABSSSI.
- Patients with life-threatening conditions were also excluded from the models as OMC has not been studied in this population.

Model Inputs

- Vancomycin arm
  - Data from a retrospective, observational study that used hospital discharge data from the Premier Hospital Database™ was used to determine the costs associated with hospital inpatient treatment of ABSSSI patients receiving IV vancomycin (**Table 1**).[7]
    - Patients were included in this study if they had a medical encounter with primary diagnosis of ABSSSI between January 1, 2012 and December 30, 2012 and IV vancomycin use on day 1 or 2 of hospital admission.
    - Data from patients with a CCI score of 0 or 1 without any life-threatening conditions were extracted for the decision analytic model.
- Omadacycline arm
  - Emergency department and inpatient treatment costs were assumed to be equal to those derived in the Premier analysis of vancomycin costs as described above.[7]
  - Cost associated with observation care for OMC was derived from Medicare National Limitation amounts.[8]
  - The cost of IV and PO OMC treatment was varied from 0 to $1000/day and all OMC patients received OMC PO to complete a 10-day course of therapy (COT).

Model outputs

- The key output was per patient cost differences between treatment with vancomycin and OMC under different treatment scenarios and daily OMC costs.
  - The cost of IV and PO OMC treatment was varied from 0 to $1000/day to estimate the upper end of daily OMC acquisition cost that still conferred cost savings with OMC treatment relative to inpatient vancomycin.
    - The proportion of patients that initially receive OMC in the outpatient setting for 3 or 7 days that can be subsequently admitted while still conferring cost savings relative to inpatient vancomycin therapy was estimated.
  - Admissions after treatment failure in OMC arm were set at 0, 5, 10, and 20%.
    - Hospitalization costs for admitted OMC patients were assumed to be identical to hospital inpatient treatment of ABSSSI patients receiving IV vancomycin in the Premier Hospital Database™ study.
  - The cost of IV and PO OMC treatment was varied from 0 to $1000/day to estimate the upper end of daily OMC acquisition cost that still conferred cost savings with outpatient OMC treatment with different admission rates relative to inpatient vancomycin.

METHODS

Table 1. Total Costs by Cost Component Associated with Use of Vancomycin among Hospitalized ABSSSI Patients[7]

	Vancomycin				
	Inpatient				
	CCI=0		CCI=1		Total (CCI 0 and 1, inpatient only)
Cost Component	No systemic symptoms	Systemic symptoms	No systemic symptoms	Systemic symptoms	
Emergency department	$269.29	$276.63	$270.44	$284.11	**$270.71**
Observation	—	—	—	—	**—**
IV therapy administration	$91.17	$89.76	$85.60	$101.29	**$90.00**
Drug acquisition[1]	$136.64	$149.55	$141.29	$158.57	**$139.68**
Other pharmacy costs	$625.64	$913.55	$849.91	$1,306.02	**$732.88**
Room and board	$3,101.51	$3,979.04	$3,593.27	$5,061.92	**$3,373.39**
Other[2]	$1,748.48	$2,249.53	$2,018.76	$2,973.42	**$1,905.23**
Total Costs[3]	$5,972.73	$7,658.06	$6,959.26	$9,855.33	**$6,511.89**

CCI: Charlson Comorbidity Index; ED: emergency department; IV: Intravenous; OBS: observation.

1. Drug acquisition costs include only the costs attributed to vancomycin; all other pharmacy-related costs are included in the "Other pharmacy costs" category.
2. Other: includes operating room, central supplies, cardiology/EKG, laboratory, radiology, and respiratory costs.
3. Total costs of patients admitted from the ED excludes costs associated with observation.

RESULTS

Figure 2: Sensitivity analysis of cost-minimizing daily OMC acquisition cost if no patients are discharged on OMC PO fail and are subsequently hospitalized after 7 days, or if they are sent to observation and then discharged on oral.

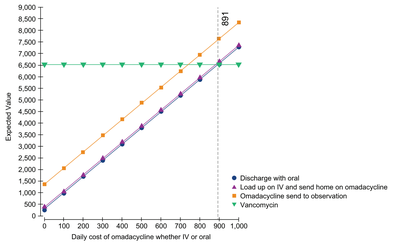
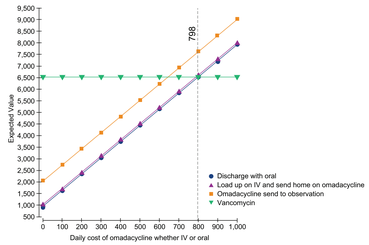


Figure 3: Sensitivity analysis of cost-minimizing OMC price if 10% of patients are sent to observation and discharged home or if they are discharged from the ER on OMC PO fail and are subsequently hospitalized after 7 days of treatment



RESULTS

Figure 4: Sensitivity analysis of cost-minimizing daily OMC acquisition cost if 20% of patients are sent to observation and discharged home or discharged from the ER on OMC PO fail and are subsequently hospitalized after 7 days of treatment

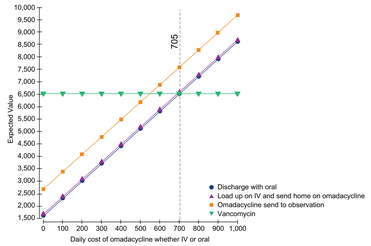


Table 2: Cost minimizing daily OMC acquisition cost at various levels of subsequent treatment failure and hospitalization after 3 and 7 days of treatment with OMC PO

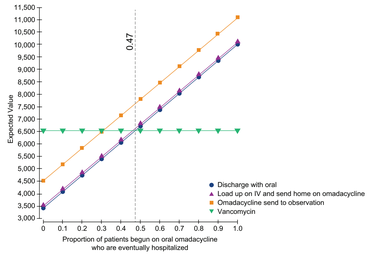
% of patients hospitalized	Maximum cost-minimizing daily OMC acquisition cost after 3 days of OMC	Maximum cost-minimizing daily OMC acquisition cost after 7 days of OMC
0%	$891.59	$891.59
5%	$845.63	$844.98
10%	$799.66	$798.37
20%	$707.53	$705.16

Table 3. Estimated cost savings associated with substituting use of OMC IV loading dose and OMC PO after ER or observation unit visit for inpatient use of vancomycin among ABSSSI patients[7] with few or no comorbidities if daily OMC acquisition cost is $450—approximately half of maximizing cost minimizing daily OMC acquisition cost in Table 2 when no OMC PO patients are admitted

Model (Patients with CCI=0 or 1 only)	OMC arm cost (difference)	Vancomycin arm cost
Compare costs of inpatient vancomycin vs outpatient oral OMC	$3,434.11 ($3077.78)	$6,511.89
Compare costs of inpatient vancomycin vs outpatient OMC presenting to ED, getting a single 200 mg infusion of OMC and sent home on oral OMC	$3,224.86 ($3287.03)	
Compare cost of inpatient vancomycin vs. OMC IV started in dedicated observation unit with discharge home on oral OMC	$4,033.67 ($2478.22)	

RESULTS

Figure 5: Sensitivity analysis of total patient cost on proportion of patients discharged on OMC PO who fail and are subsequently hospitalized after 3 days of treatment when OMC daily cost is $450



- Treatment with vancomycin inpatient treatment was determined to be $6525 in 2016 US dollars per course of treatment. Successfully switching an individual patient from vancomycin inpatient treatment to outpatient OMC was estimated to save $2,478 to $3,3287 per patient, depending on use of observation unit and inputted daily cost of OMC (in this case, ~50% of maximum cost-minimizing daily OMC acquisition cost when no patients treated with OMC PO are admitted).
- It is estimated that up to 47% of OMC patients discharged home from the ED could be subsequently admitted to hospital after 3 days of OMC PO at this cost level while maintaining budget neutrality.

CONCLUSIONS

- Cost-saving for ABSSSI patients may be realized with OMC relative to vancomycin inpatient treatment if hospitalization is avoided due to outpatient management with OMC.

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Presented at: 27th ECCMID, 22-25 April 2017, Vienna, Austria.