Comparing PAH-related Hospitalizations Between Hypothetical Commercial and Medicare Patients Using a Decision Tree Model

Kristin B. Highland, MD[1], Michele Cole, PharmD, MS[2], Yuen Tsang, PharmD, MPH[2], Pinar Bilir, MS[3], William Drake, PharmD[2]

[1]*Cleveland Clinic, Cleveland, OH, USA;* [2]*Actelion Pharmaceuticals US, Inc., South San Francisco, CA, USA;* [3]*IMS Health, San Francisco, CA, USA*

RATIONALE

- Pulmonary arterial hypertension (PAH) is a rare, chronic, and progressive disease that frequently leads to right heart failure and death.[1]
- PAH-related morbidity events often result in hospitalizations, which are independently associated with a poor prognosis.[2]
- Macitentan, an endothelin receptor antagonist (ERA), has demonstrated effectiveness in delaying disease progression, including decreasing PAH-related hospitalizations, and is among guidelines-recommended therapies for PAH.[1,3,4]
- No studies have compared the impact of macitentan on PAH-related hospitalizations in hypothetical commercial or Medicare populations.

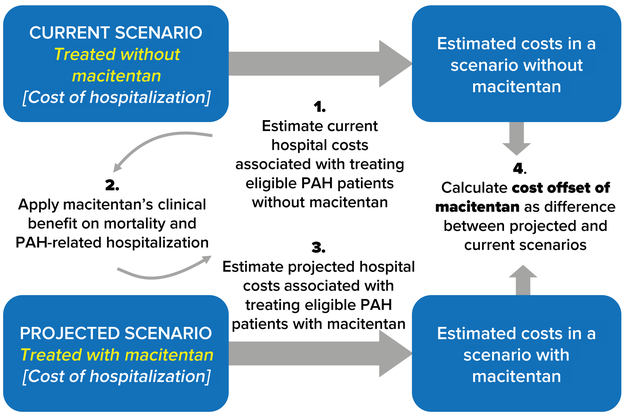
OBJECTIVE

- The objective of this study was to compare the effects of macitentan 10 mg (Opsumit) on length of stay (LOS) and cost savings due to averted PAH-related hospitalizations stratified by insurance type, commercial or Medicare, using a decision tree model.

METHODS

- A decision tree model structure was used to estimate PAH-related hospitalizations and costs associated with the use of macitentan or placebo in hypothetical commercial and Medicare populations over a 1-year timeframe.
- The model estimated the cost offsets associated with macitentan through a comparative cost determination framework (**Figure**).

Figure. Comparative cost determination framework.



- Published data on the epidemiology of PAH informed the incidence and prevalence of PAH.[5,6]
- Published SERAPHIN clinical trial data were used for PAH-related hospitalization and mortality rates for placebo.[3]
- The reduction in hospitalization was 50% for the macitentan-treated group.[4]
- The reduction in hospitalizations is assumed the same for those both older and younger than 65 years of age.[3]
- The model incorporated published dosing regimens, costs for PAH treatments, and unit costs of PAH-related hospitalization for commercial and Medicare patients (**Table**).[7]
  - Costs for PAH treatments (macitentan and background PAH therapies of sildenafil and iloprost) were input from Medispan 2016.

Table. Key inputs in the model.

	Commercial	Medicare
Cost per hospitalization case	$53,679[7]	$18,994[7]
Length of stay (LOS) for placebo, days	14.20[7]	16.70[7]
Length of stay (LOS) for macitentan, days	6.70[4]	7.88[4]

METHODS (cont'd)

- Both the mean reimbursement costs and mean LOS were obtained from a published analysis of claims data.[7]
- Reimbursement costs for hospitalization were calculated by averaging the costs for an initial hospitalization and readmission.
  - The averaged reimbursement cost was $53,679 for the commercial cohort and $18,994 for the Medicare cohort.[7]
- Average LOS in days was 14.2 for commercial versus 16.7 for Medicare.[7]
- Total hospital days for the population included averted hospitalizations and reductions in the LOS.
- The model base-case analysis assumes constant mortality rate (2.6%) for the placebo arm.[3]

RESULTS

- In a commercial plan of 20 million-covered lives, 1473 PAH cases would be eligible for treatment with macitentan, leading to 143 fewer hospitalizations/year (50% reduction), $7,694,706 in hospital-related savings, and 3107 days (76% reduction) in total hospital days.
- In a Medicare plan of 20 million covered lives, 1386 PAH cases would be eligible for treatment with macitentan, leading to 135 fewer hospitalizations/year (50% reduction), $2,561,392 in hospital-related savings, and 3437 days (76% reduction) in total hospital days.

LIMITATIONS

- Although, there were no observed overall differences in safety or effectiveness between subjects older than 65 years of age and those younger than 65 in the SERAPHIN trial, the model does not take into account age-related differences or comorbidities that may exist between the hypothetical commercial and Medicare groups.[3]
- This analysis does not distinguish between an initial hospitalization and readmission; published evidence suggests that readmissions could be more costly and are relatively common.[7]
- By limiting our focus on hospitalizations, this analysis does not account for other types of downstream costs for patients who have had a hospitalization, including readmission, rehabilitation services, additional PAH therapies, or referral for transplantation.

CONCLUSIONS

- Both hypothetical cohorts experienced a reduction in total number and cost of hospitalizations as well as LOS.
- Due to differences in reimbursement, the commercial group experienced greater hospital-related savings.
- Further analyses are needed to quantify the effect of macitentan on hospital-related savings.

REFERENCES

1. Galiè N et al. 2015 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension: The Joint Task Force for the Diagnosis and Treatment of Pulmonary Hypertension of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS): Endorsed by: Association for European Paediatric and Congenital Cardiology (AEPC), International Society for Heart and Lung Transplantation (ISHLT). *Eur Respir J*. 2015;46:903–975.
2. Burger C et al. Characterization of first-time hospitalizations in patients with newly diagnosed pulmonary arterial hypertension in the REVEAL registry. *Chest*. 2014;146:1263-1273.
3. Pulido T et al; SERAPHIN Investigators. Macitentan and morbidity and mortality in pulmonary arterial hypertension. *N Engl J Med*. 2013;369:809-818 and supplemental appendix.
4. Channick RN et al. Effect of macitentan on hospitalizations: results from the SERAPHIN trial. *JACC Heart Fail*. 2015;3:1–8.
5. Frost AE et al. The changing picture of patients with pulmonary arterial hypertension in the United States: how REVEAL differs from historic and non-US contemporary registries. *Chest*. 2011;139:128–137.
6. Kirson NY et al. Prevalence of pulmonary arterial hypertension and chronic thromboembolic pulmonary hypertension in the United States. *Curr Med Res Opin*. 2011;27:1763–1768.
7. Burke JP et al. Characterizing pulmonary hypertension-related hospitalization costs among Medicare Advantage or commercially insured patients with PAH: a retrospective database study. *Am J Manag Care*. 2015;21:S47–S58.

ISPOR 22nd Annual International Meeting
Boston, MA, USA
May 20-24, 2017

Funding provided by
Actelion Pharmaceuticals US, Inc.

ACTELION