Medical costs in patients with pulmonary arterial hypertension (PAH) on oral triple therapy including selexipag in the United States (US): A retrospective claims-based study

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Poster Number EE227

Introduction

- The 2022 European Society of Cardiology/European Respiratory Society guidelines for the treatment of pulmonary arterial hypertension (PAH) recommend treating patients to achieve low-risk status[1]
- Initial dual combination therapy with an endothelin receptor antagonist and a phosphodiesterase type 5 inhibitor (PDE5i) is recommended in patients presenting at low or intermediate risk[1]
- If low-risk status is not achieved with dual combination therapy, selexipag, a selective prostacyclin receptor agonist, is recommended as an add-on treatment to reduce morbidity and mortality[1]
- Studies have examined the real-world effectiveness of selexipag on clinical outcomes,[2,3] but little information has been reported on medical costs[4]
- This study assessed medical costs among patients with PAH who received triple therapy with macitentan + PDE5i + selexipag in the United States (US)

Methods

- Data were extracted from the Komodo Health Research US claims database between January 1, 2016, and March 31, 2023, to identify adult patients with PAH who were initiated on triple therapy with macitentan + PDE5i (either tadalafil or sildenafil) + selexipag
  - The triple therapy regimen was defined based on receiving all three drugs within a 60-day window, to allow for potential administrative delay in authorizing reimbursement
  - PAH was identified using International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes: I27.0, I27.20, I27.21, and I27.89
- The *index date* was defined as the initiation date of the triple therapy regimen. For example:
  - For a treatment naïve patient starting triple therapy, the date of the first drug initiated was the index date
  - For a patient escalating from monotherapy to triple therapy, the index date was the initiation date of the first of the two additional drugs initiated
  - For a patient escalating from dual to triple therapy, the index date was the initiation date of the new drug added to the regimen
- The *baseline period* was the 6-month pre-index period; and the *study period* was the period after the index date to the earliest of 12 months, death, end of continuous enrollment, or end of data availability (**Figure 1**)
- Patient selection criteria are shown in **Figure 2**
- All-cause and PAH-related medical costs and healthcare resource utilization (HRU) were assessed per patient per month (PPPM) over the study period; PAH-related costs and HRU were associated with the aforementioned ICD-10-CM codes

Figure 2. Patient selection

CTEPH, chronic thromboembolic pulmonary hypertension; **ED**, erectile dysfunction; **ER**, emergency room; **PH**, pulmonary hypertension; **PDE5i**, phosphodiesterase type 5 inhibitor.

Figure 1. Study overview

HRU, healthcare resource utilization; **PAH**, pulmonary arterial hypertension; **PDE5i**, phosphodiesterase type 5 inhibitor.

Results

Patient characteristics

- A total of 413 patients were included in the triple therapy cohort (**Figure 2**)
  - Approximately half the patients received sildenafil as the PDE5i component of triple therapy (50.8%) and half (49.2%) received tadalafil
- Baseline patient demographics were typical for a PAH cohort on triple therapy; median age was 52 years, 72.6% were female, and 42.6% were White (**Table 1**)
- During the baseline period, 14.3% of patients did not receive any PAH treatment, 9.7% received one treatment class, 61.5% received two treatment classes, and 14.5% received three or more treatment classes (**Table 1**)
- Most patients had comorbidities, with 70.9% having a cardiopulmonary comorbidity (**Figure 3**)
- During the 6-month baseline period, 40.2% of patients had a right heart catheterization (RHC), and 86.2% had an RHC at any time during the period covered by the data (**Figure 4**)

Costs and HRU

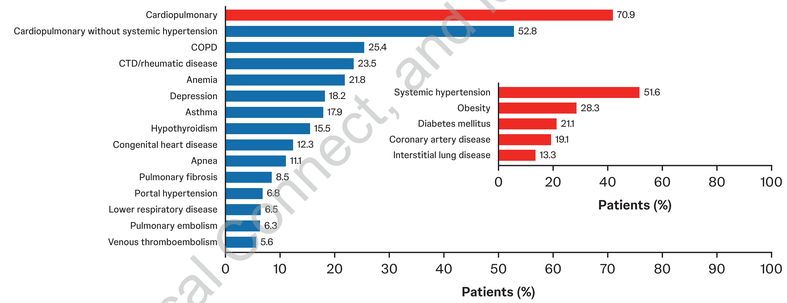
- Mean all-cause total medical costs were $3,237 PPPM (**Figure 5**)
- Mean PAH-related medical costs were $1,857 PPPM (**Figure 5**)

Table 1. Patient demographics on the index date and during the 6-month baseline period

Characteristic	Patients (N=413)
Age, median, years	52
Female sex	300 (72.6)
US region	
South	171 (41.4)
West	131 (31.7)
Midwest	56 (13.6)
Northeast	55 (13.3)
Race	
White	176 (42.6)
Black or African American	42 (10.2)
Hispanic or Latino	85 (20.6)
Asian or Pacific Islander	13 (3.1)
Other	19 (4.6)
Unknown	78 (18.9)
Insurance type	
Commercial	163 (39.5)
Medicaid	168 (40.7)
Medicare	68 (16.5)
Unknown	14 (3.4)
Number of PAH treatment classes before they started the triple therapy regimen (independent of mode of administration)	Mean ± SD: 1.8 ± 0.9
0	59 (14.3)
1	40 (9.7)
2	254 (61.5)
3[a]	59 (14.3)
4	1 (0.2)

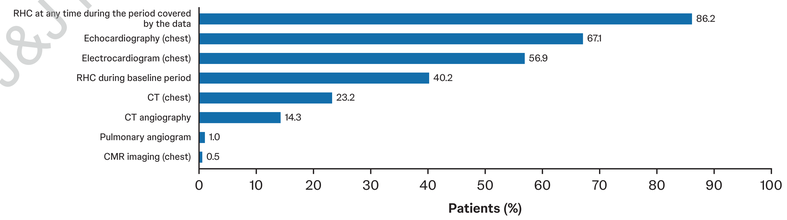
Data are presented as the n (%) unless otherwise indicated. [a]Patients may have received a different triple therapy regimen during the 6-month baseline period and then switched to macitentan + PDE5i + selexipag. **PAH**, pulmonary arterial hypertension; **PDE5i**, phosphodiesterase type 5 inhibitor; **SD**, standard deviation.

Figure 3. Select comorbidities during the 6-month baseline period



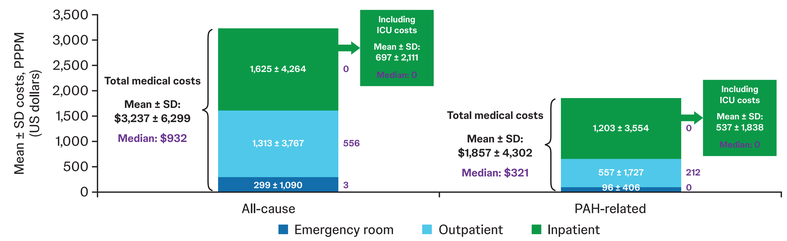
The percentage of patients with any cardiopulmonary comorbidity is shown as an red bar in the main graph; the percentages of patients with individual cardiopulmonary comorbidities are shown in the inserted graph. **COPD**, chronic obstructive pulmonary disease; **CTD**, connective tissue disease.

Figure 4. Patients with PAH-related procedures during the 6-month baseline period



CMR, cardiac magnetic resonance; **CT**, computed tomography; **RHC**, right heart catheterization.

Figure 5. Healthcare costs incurred during the study period



Note: Mean ± SD costs, PPPM, are shown within the bars; median costs, PPPM, are shown beside the bars in purple. **ICU**, intensive care unit; **PAH**, pulmonary arterial hypertension; **PPPM**, per patient per month; **SD**, standard deviation.

- All-cause and PAH-related HRU was similar during the 6-month baseline period when patients were on mono and dual therapies and during the study period when patients were receiving triple therapy (**Table 2**) demonstrating that the addition of selexipag was able to prevent further increases in HRU and subsequent costs

Table 2. Healthcare resource utilization during the 6-month baseline period and the study period

	All-cause, PPPM		PAH-related, PPPM	
	Baseline period	Study period	Baseline period	Study period
Inpatient stay	0.07 ± 0.15	0.06 ± 0.15	0.06 ± 0.14	0.06 ± 0.14
ER visit	0.20 ± 0.88	0.20 ± 0.74	0.05 ± 0.14	0.05 ± 0.15
Outpatient visit	2.82 ± 4.06	2.70 ± 3.98	1.01 ± 2.01	0.99 ± 1.62

Data are presented as the mean ± SD PPPM. **ER**, emergency room; **PAH**, pulmonary arterial hypertension; **PPPM**, per patient per month; **SD**, standard deviation.

Key takeaways

- **Patients with PAH receiving triple oral therapy are medically complex and incur high medical costs**
- **HRU (all-cause or PAH-related) did not increase following the introduction of triple therapy**

Conclusions

- **Findings from this retrospective claims-based analysis suggest that patients with PAH who require treatment with triple therapy have severe (or advanced) disease and will continue to consume HRU**
- **HRU (all-cause or PAH-related) did not increase following the introduction of triple therapy**
- **Mean all-cause total costs were nearly twice as high as PAH-related total costs, indicating that this is a medically complex patient population**
- **Getting patients on guideline-recommended therapy is of the utmost importance to prevent further disease progression and increased HRU and medical costs**

Acknowledgments

This study was funded by Johnson & Johnson. Medical writing was provided by Mary Greenacre, PhD, and Marie-Louise Ricketts, PhD, on behalf of Twist Medical, and was funded by Johnson & Johnson.

Disclosures

CJW is an employee and stockholder of Johnson & Johnson. **YT** was an employee of Johnson & Johnson at the time this study was conducted. **LHY**, **AS**, and **MG-L** are employees of Analysis Group, Inc., a consulting company that provided paid consulting services to Johnson & Johnson, which funded the development and conduct of this study and poster.

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Presented at ISPOR 2025; Montreal, QC, Canada; May 13–16, 2025

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