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A Longitudinal Cost Analysis For Patients Diagnosed With Polycythemia Vera

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OBJECTIVES

- PV is a chronic-phase Philadelphia-negative myeloproliferative neoplasm (MPN) and is characterized by clonal hematopoietic proliferation leading to erythrocytosis, potential bleeding complications, an elevated risk of cardiovascular events and thrombocytosis and is characterized by mutations in the Janus kinase gene *JAK2*^{V617F}.
- Long term clinical sequelae of PV patients also include leukemic transformation, i.e acute myeloid leukemia (AML) [3%] and fibrotic transformation to myelofibrosis (MF)[9%] within a median of 7 years post diagnosis.
- The estimated prevalence of PV is 45-57 cases per 100,000 persons in the USA and is associated with reduced survival compared to age-and sex-matched population in the USA.
- Studies reported patients with PV incur significantly higher healthcare expenditures, increased health care utilization, and long-term care, compared to the general population.
- We conducted a year-by-year longitudinal cost analysis to provide a comprehensive financial profile of the disease burden.

CONCLUSION

These results underscore the substantial economic burden associated with PV and emphasize the need for optimized management strategies where early interventions may help to address rising costs and disease burden associated with PV.

METHODS

STUDY DESIGN: A longitudinal analysis utilizing retrospective medical pharmacy and lab claims data

DATA SOURCE: Blue Health Intelligence claims data on (2014 – Apr/2024)

STUDY POPULATION:

- Patients diagnosed with PV (ICD 10 CM Diagnosis code: D45) between Jan/1/2017 and 12/31/2019
- Patients continuous enrolled one year prior to and five years post index diagnosis
- Patients with pre-existing MF and AML diagnosis were excluded in the study.
- Patients without PV diagnosis in the prior year of index diagnosis date were defined as first diagnosed PV patients, otherwise patients were defined as existing PV patients

OUTCOMES:

- Claim paid allowed amounts were used to estimate the overall healthcare costs.
- Annual cost based on claim types of facility, professional, and pharmacy were analyzed separately.
- Cost were inflation adjusted to April 2024 with Consumer Price Index (CPI) of medical care

STATISTICAL ANALYSIS

- Generalized linear models (GLM) with gamma distribution and generalized estimating equations (GEE) were used to estimate annual cost increases which were adjusted for potential confounder and cluster effects.
- Independent variables adjusted in the model include age, gender, risk of thrombosis, place of service in index date, and rendering physician specialty.

References

1. Harrison, C. N. (2021). The economic burden of polycythemia vera: A review. Journal of Hematologic Disorders, 18(3), 215–223.
2. Yu, J., Nelson, J., Marlin, T., & Braunstein, E. (2024). Direct and indirect costs for patients with myeloproliferative neoplasms. Leukemia & Lymphoma.
3. https://www.bls.gov/cpi/data.htm

RESULTS - PATIENTS CHARACTERISTICS

After applying the selection criteria, 3,933 PV patients were included in the analysis. The mean age was 52.5 years (±SD=9.27), and 75.2% (n=2,956) were male. Half (n=1,971) were previously diagnosed with PV prior to index date and 73.9% (n=2,906) were low-risk.

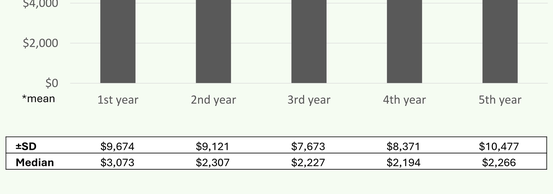
	Existing PV Patients		First Diagnosed PV Patients		Overall	
Age	**n**	**%**	**n**	**%**	**n**	**%**
30 yrs and younger	35	1.8%	50	2.6%	85	2.2%
31 - 40	117	5.9%	188	9.6%	305	7.8%
41 - 50	453	23.0%	577	29.4%	1,030	26.2%
51 - 60	1,037	52.6%	910	46.4%	1,947	49.5%
61 - 70	288	14.6%	204	10.4%	492	12.5%
71 - 80	41	2.1%	33	1.7%	74	1.9%
Gender						
Female	541	27.5%	436	22.2%	977	24.8%
Male	1,430	72.6%	1,526	77.8%	2,956	75.2%
Risk						
High	586	29.7%	441	22.5%	1,027	26.1%
Low	1,385	70.3%	1,521	77.5%	2,906	73.9%
Place of Service (Index date)						
Office	1,363	69.2%	1,495	76.2%	2,858	72.7%
On Campus Outpatient Hospital	430	21.8%	294	15.0%	724	18.4%
Other	178	9.0%	173	8.8%	351	8.9%
Rendering Physician Specialty						
Hematology	290	14.7%	275	14.0%	565	14.4%
Medical Oncology	312	15.8%	215	11.0%	527	13.4%
Family Practice/Internal	644	32.7%	878	44.8%	1,522	38.7%
Other / Unknown	725	36.8%	594	30.3%	1,319	33.5%

RESULTS – COST ANALYSIS

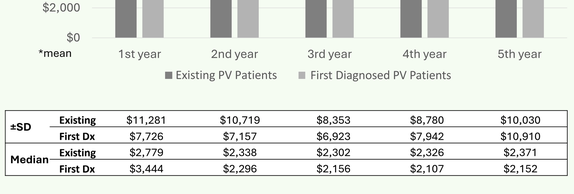
Total Annual Cost

	N	Mean	±SD	Median	Range
Existing PV Patients	1,971	$19,925	$48,197	$5,230	($0 -$1,286,958)
First Diagnosed PV Patients	1,962	$15,557	$39,175	$5,006	($0 -$1,454,008)
Overall	3,933	$17,746	$43,982	$5,086	($0 -$1,454,008)

Annual Total Cost* Overall and by Patient Type

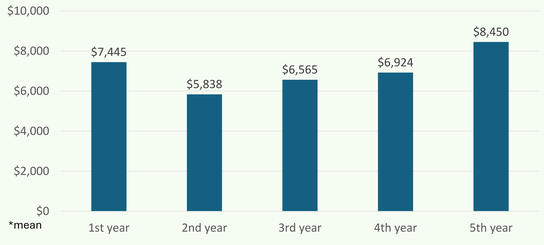


		1st year	2nd year	3rd year	4th year	5th year
±SD		$39,809	$37,010	$42,999	$43,389	$54,513
Median		$6,409	$4,829	$4,645	$4,598	$4,924

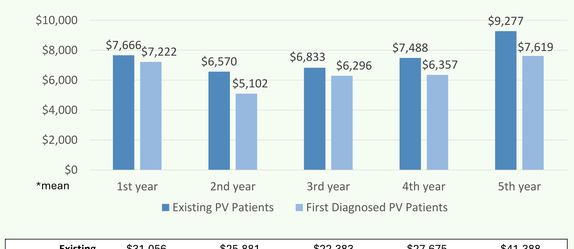


		1st year	2nd year	3rd year	4th year	5th year
±SD	**Existing**	$45,102	$42,738	$41,623	$49,646	$59,528
	First Dx	$33,605	$29,980	$44,240	$35,902	$48,851
Median	**Existing**	$5,992	$5,066	$4,799	$4,874	$5,304
	First Dx	$6,978	$4,643	$4,460	$4,411	$4,526

Annual Facility Claim Cost* Overall and by Patient Type

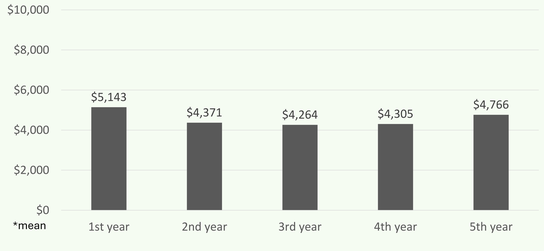


		1st year	2nd year	3rd year	4th year	5th year
±SD		$28,528	$23,043	$30,020	$24,386	$37,572
Median		$1,198	$664	$618	$622	$694



		1st year	2nd year	3rd year	4th year	5th year
±SD	**Existing**	$31,056	$25,881	$22,383	$27,675	$41,388
	First Dx	$25,746	$19,766	$36,105	$20,551	$33,292
Median	**Existing**	$1,244	$844	$768	$719	$912
	First Dx	$1,142	$490	$481	$533	$475

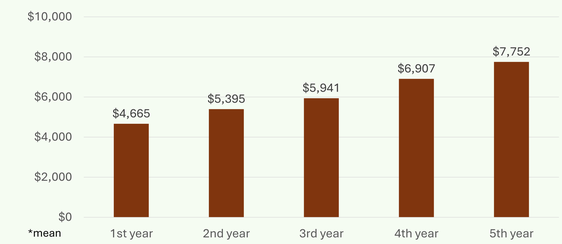
Annual Professional Claim Cost* Overall and by Patient Type



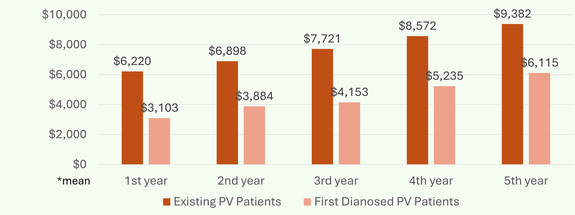
		1st year	2nd year	3rd year	4th year	5th year
±SD		$9,674	$9,121	$7,673	$8,371	$10,477
Median		$3,073	$2,307	$2,227	$2,194	$2,266

		1st year	2nd year	3rd year	4th year	5th year
±SD	**Existing**	$11,281	$10,719	$8,353	$8,780	$10,030
	First Dx	$7,726	$7,157	$6,923	$7,942	$10,910
Median	**Existing**	$2,779	$2,338	$2,302	$2,326	$2,371
	First Dx	$3,444	$2,296	$2,156	$2,107	$2,152

Annual Pharmacy Claim Cost* by Year



	1st year	2nd year	3rd year	4th year	5th year
±SD	$19,752	$23,132	$24,347	$28,690	$30,737
Median	$179	$152	$142	$105	$116



		1st year	2nd year	3rd year	4th year	5th year
±SD	**Existing**	$25,283	$27,433	$29,382	$33,245	$34,646
	First Dx	$11,629	$17,672	$17,747	$23,119	$26,137
Median	**Existing**	$173	$164	$158	$103	$129
	First Dx	$185	$144	$128	$106	$103

ADJUSTED STATISTICS

	Estimate	Standard Error	95% Confidence Limits		Z	Pr > |Z|
Year (Numeric)	1.114	1.022	(1.068 -	1.163)	4.960	<.0001
Existing PV Patients	1.381	1.115	(1.114 -	1.711)	2.950	0.0032
First Diagnosed PV Patients	Ref.					
Age						
30 Years And Younger	0.634	1.285	(0.388 -	1.036)	-1.820	0.0692
31 - 40	0.823	1.255	(0.527 -	1.285)	-0.860	0.3924
41 - 50	0.927	1.214	(0.634 -	1.356)	-0.390	0.6965
51 - 60	1.211	1.205	(0.841 -	1.745)	1.030	0.3038
61 - 70	0.883	1.199	(0.619 -	1.260)	-0.680	0.4934
71 - 80	Ref.					
Risk						
High	1.599	1.139	(1.240 -	2.063)	3.620	0.0003
Low	Ref.	1.000	(1.000 -	1.000)	.	.
Place Of Service						
On Campus-outpatient Hospital	1.450	1.092	(1.220 -	1.722)	4.220	<.0001
Other	1.122	1.130	(0.883 -	1.425)	0.940	0.3479
Office	Ref.					
Rendering Provider Specialty						
Hematology	1.364	1.096	(1.139 -	1.632)	3.380	0.0007
Medical Oncology	1.070	1.094	(0.897 -	1.277)	0.750	0.4513
Other / Unknown	0.880	1.086	(0.749 -	1.034)	-1.550	0.12
Family Practice / Internal	Ref.					

DISCUSSION

- The total annual mean cost was $17,746 (±SD=$43,982, median=$5,086, range: $0-$1,454,008).
- For patients newly diagnosed with PV (n=1,962), the annual mean cost over 5-years range was ($13,079-$18,501) and existing PV patients (n=1,971), the year-by-year mean cost over 5-years were significantly higher ($18,117-$23,423).
- The estimated year-by-year increase based on the GLM was 11.4% (95%CI = 6.8%–16.3%) percentage increase based on the gamma distribution model.
- High-risk patients were associated with a 59.9% (95%CI=24.0%–106.3%) higher cost when comparing to the low-risk patients.
- Limitations of this study are based on its retrospective observational design.
- Data in the Blues Health Intelligence were used as entered by healthcare professionals and providers for billing purposes and may be subject to miscoding or inaccurate/incomplete records.

CONCLUSION

These results underscore the substantial economic burden associated with PV and emphasize the need for optimized management strategies where early interventions may help to address rising costs and disease burden associated with PV.

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Presented at the ISPOR conference, May 13-16, Montreal, QC, Canada.