MPN-531

Direct and Indirect Costs for Patients With Myeloproliferative Neoplasms

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Introduction

- Myeloproliferative neoplasms (MPNs), clonal blood diseases characterized by an overproduction of blood cells, include myelofibrosis (MF), polycythemia vera (PV), and essential thrombocythemia (ET)[1]
- Over the course of illness, these disorders can impart substantial direct and indirect healthcare costs due to lost work productivity and medical leave[2-5]
  - Prior survey-based research reported that 24.8% of employed patients with MPNs took some form of medical disability leave (MF, 37.9%; PV, 22.2%; ET,15.3%)[5]
  - Annual healthcare costs have been reported to range from 1.9× higher (for PV) to >5× higher (for MF) compared with age- and sex-matched controls[2]

Objective

- To measure work loss (short-term and long-term disability [STD/LTD]) and direct and indirect costs for employed patients with MPNs in the United States

Methods

Study Design and Patients

- This was a retrospective cohort study using the MarketScan Commercial Database and MarketScan Health and Productivity Database
- Employed patients (aged 18–64 years) with ≥1 diagnosis of an MPN (cohorts for MF, PV, and ET identified separately) from January 1, 2009, to December 31, 2019, were identified
- The latest date meeting all eligibility criteria in the selection window was set as the index
- Patients were required to have continuous database enrollment (with medical, pharmacy, and work loss data available) for 6 months before (pre-index period) and 12 months after (follow-up period) the index date
- Patients with evidence of pregnancy during follow-up, a diagnosis of acute myeloid leukemia (AML; all cohorts), or a diagnosis of MF or myelodysplastic syndrome (MDS; PV and ET cohorts only) at any point during the study were excluded
- A control cohort of patients without evidence of MPN, AML, or MDS during the entire study period and meeting the same enrollment criteria as the MPN cohorts was also selected (index date randomly assigned according to distribution of index dates observed in the MPN cohorts)
- A subgroup analysis was conducted comparing cohorts of patients with MF/PV/ET who had a thrombotic event (TE) during follow-up with matched TE controls (without MPN and with TE)

Statistical Analyses

- Direct matching on age and sex followed by propensity score matching (1:3 ratio [control:MPN disease cohort]) methods were used to adjust for differences in patient demographics and comorbidities between patients with MF, PV, and ET and their corresponding controls
  - The subgroup analysis of patients with a TE used a 1:1 ratio of control:MPN disease cohort
- Chi-square tests were used to evaluate statistical significance for differences in categorical variables; *t* tests were used to analyze continuous variables

Results

Patients

- Overall, 173 patients with MF, 4,477 with PV, and 6,061 with ET (and their matched controls) were included in the analysis (**Table 1**)
  - After matching, patients with an MPN were well balanced with controls (defined as standard mean difference of <0.1) on all demographic and clinical characteristics (**Table 1**)
- 19 patients with MF, 288 with PV, and 382 with ET (and their matched controls) experienced a TE during follow-up, with demographic and clinical characteristics well balanced (data not shown)

Table 1. Patient Demographics and Characteristics at Index

	Myelofibrosis		Polycythemia Vera		Essential Thrombocythemia	
Variable	MF (n=173)	Control (n=519)	PV (n=4,477)	Control (n=13,431)	ET (n=6,061)	Control (n=18,183)
Age, median (IQR), y	54.0 (47.0–58.0)	54.0 (47.0–58.0)	51.0 (43.0–57.0)	51.0 (43.0–57.0)	48.0 (40.0–55.0)	48.0 (40.0–55.0)
Male, n (%)	101 (58.4)	303 (58.4)	3,690 (82.4)	11,070 (82.4)	2,184 (36.0)	6,552 (36.0)
Index year, n (%)						
2009–2014	58 (33.5)	174 (33.5)	2,210 (49.4)	6,603 (49.2)	1,766 (29.1)	5,261 (28.9)
2015–2019	115 (66.5)	345 (66.5)	2,267 (50.6)	6,828 (50.8)	4,295 (70.9)	12,922 (71.1)
Prevalence/incidence status, n (%)*						
Incident	83 (48.0)	NA	2,667 (59.6)	NA	3,954 (65.2)	NA
Prevalent (incident diagnosis date known)	55 (31.8)	NA	1,096 (24.5)	NA	1,306 (21.5)	NA
Prevalent (incident diagnosis date unknown)	24 (13.9)	NA	489 (10.9)	NA	439 (7.2)	NA
Unknown	11 (6.4)	NA	225 (5.0)	NA	362 (6.0)	NA
Geographic region, n (%)†						
Northeast	32 (18.5)	93 (17.9)	569 (12.7)	1,696 (12.6)	945 (15.6)	2,713 (14.9)
North Central	41 (23.7)	132 (25.4)	1,030 (23.0)	3,170 (23.6)	1,182 (19.5)	3,533 (19.4)
South	57 (32.9)	169 (32.6)	2,001 (44.7)	5,949 (44.3)	2,717 (44.8)	8,389 (46.1)
West	43 (24.9)	125 (24.1)	872 (19.5)	2,585 (19.2)	1,208 (19.9)	3,514 (19.3)
Employment status, n (%)						
Full-time	166 (96.0)	494 (95.2)	4,375 (97.7)	13,148 (97.9)	5,785 (95.4)	17,389 (95.6)
Part-time	2 (1.2)	6 (1.2)	38 (0.8)	113 (0.8)	86 (1.4)	239 (1.3)
Other	5 (2.9)	19 (3.7)	64 (1.4)	170 (1.3)	190 (3.1)	555 (3.1)

ET, essential thrombocythemia; IQR, interquartile range; MF, myelofibrosis; MPN, myeloproliferative neoplasm; NA, not assessed; PV, polycythemia vera.
* Only for MPN cases; the incident diagnosis date is the true first diagnosis date (which may be known or unknown), determined based on earliest enrollment date and earliest diagnosis date, using full database history. If earliest enrollment date is <12 months before earliest diagnosis date then the earliest diagnosis date was assumed to be the incident diagnosis date; if not, incident diagnosis date was unknown.
† Geographic region unknown for 5 patients with PV and 31 matching controls, and 9 patients with ET and 34 matching controls.

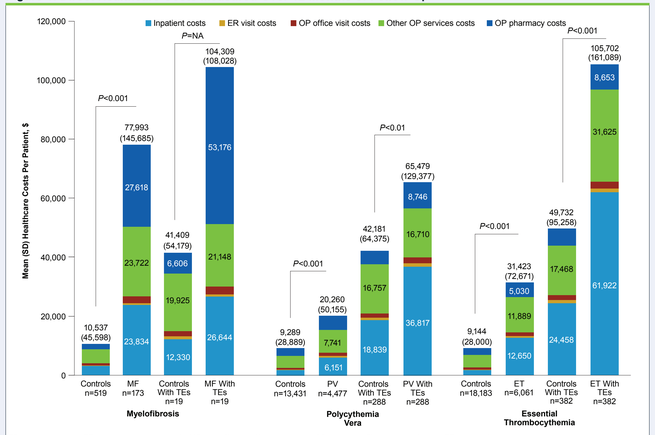
Work Loss and Healthcare Costs

- Total direct healthcare costs and those of each cost component (ie, inpatient, outpatient, and pharmacy) were significantly higher among all 3 MPN cohorts compared with controls (mean cost difference: MF, $67,456; ET, $22,279; PV, $10,970; **Figure 1**)
- Patients with MPNs were more likely than matched controls to take disability leave during the 12-month follow-up period (**Figure 2**)
- Patients with MPNs took significantly more days of disability leave than controls (**Figure 3**)
- Patients with MPNs incurred significantly higher STD- and LTD-related costs than controls (**Table 2**)

Work Loss and Healthcare Costs – Thrombotic Events During Follow-up

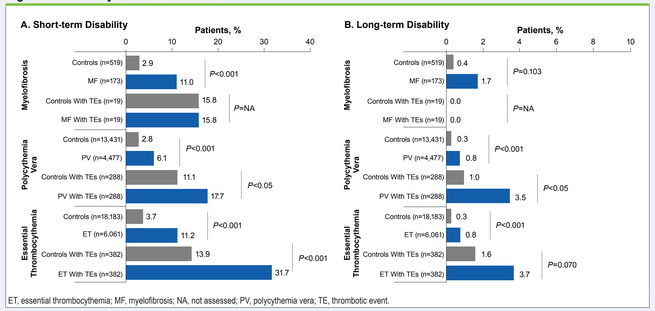
- In patients with MPNs who experienced TEs during follow-up, mean total direct healthcare costs were substantially higher than in the full cohorts of each disease (**Figure 1**)
  - Compared with matched TE controls, subgroups of patients with PV or ET who experienced TEs during follow-up had significantly higher mean total direct healthcare costs (statistical significance not assessed in the subgroup of patients with MF and TEs because the sample size was too small)
- Patients with MPNs who experienced TEs were more likely to take disability leave during the 12-month follow-up period (**Figure 2**) and took more days of STD leave on average than the overall MPN cohorts (**Figure 3**)
  - Compared with matched TE controls, subgroups of patients with PV and ET who experienced TEs during follow-up took significantly more days of STD, and the subgroup of patients with PV with TEs also took significantly more days of LTD
- Patients with MPNs who experienced TEs had higher indirect costs than the overall MPN cohorts (**Table 2**)
  - Subgroups of patients with PV or ET who experienced TEs during follow-up had significantly higher STD-related costs than matched TE controls, and the subgroup of patients with PV with TEs also had significantly higher LTD-related costs

Figure 1. Direct Healthcare Costs Measured Over 12 Months of Follow-Up*



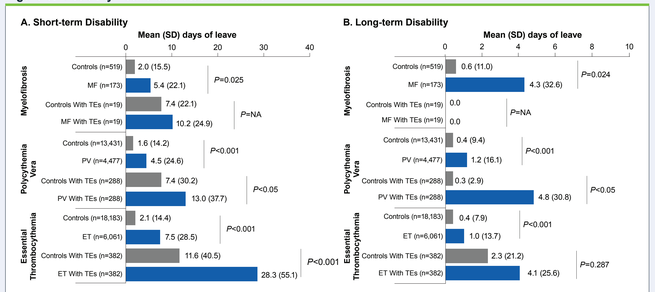
ER, emergency room; ET, essential thrombocythemia; MF, myelofibrosis; NA, not assessed; OP, outpatient; PV, polycythemia vera; TE, thrombotic event.
* For individual cost components, the differences between case and control groups were all statistically significant at *P*<0.01 in both the overall cohorts and in subgroups with TE, except for the subgroup of patients with TE in the MF cohort, for which the sample size was too small to assess statistical significance.

Figure 2. Disability Leave Prevalence



ET, essential thrombocythemia; MF, myelofibrosis; NA, not assessed; PV, polycythemia vera; TE, thrombotic event.

Figure 3. Disability Leave Cumulative Duration



ET, essential thrombocythemia; LTD, long-term disability; MF, myelofibrosis; NA, not assessed; PV, polycythemia vera; STD, short-term disability; TE, thrombotic event.
The number of days of STD or LTD leave represents the mean number of days lost to STD or LTD leave in the 12-month follow-up period, not the mean number of days of an STD or LTD claim overall (disability claims can overlap with the start or end of the 12-month follow-up period). The number of days lost to STD or LTD leave only accounts for workdays (5 per week), so the maximum number of days of STD or LTD leave during the 12-month follow-up period was 261.

Table 2. Indirect Costs Due to Disability Leave Over 12 Months of Follow-Up

	Myelofibrosis				Polycythemia Vera				Essential Thrombocythemia			
Mean (SD) indirect costs per patient, $	Control (n=519)	MF (n=173)	Controls with TEs (n=19)	MF with TEs (n=19)	Control (n=13,431)	PV (n=4,477)	Controls with TEs (n=288)	PV with TEs (n=288)	Control (n=18,183)	ET (n=6,061)	Controls with TEs (n=382)	ET with TEs (n=382)
Short-term disability	257 (1,995)	697 (2,841)*	953 (2,843)	1,304 (3,198)	210 (1,826)	573 (3,159)†	946 (3,871)	1,663 (4,838)*	263 (1,849)	962 (3,661)†	1,491 (5,196)	3,629 (7,076)†
Long-term disability	73 (1,415)	553 (4,185)*	NA	NA	56 (1,205)	153 (2,062)†	37 (369)	621 (3,950)*	47 (1,008)	133 (1,758)†	293 (2,716)	526 (3,289)

ET, essential thrombocythemia; MF, myelofibrosis; NA, not assessed; PV, polycythemia vera; TE, thrombotic event.
Costs associated with absenteeism and disability leave used a wage constant ($183.40 per day) equivalent to the median hourly wage for employed full-time wage and salary workers from the US Bureau of Labor Statistics (2019). Benefits typically pay 70% of wages; therefore, we reported 70% of the wage rate per day as the indirect costs incurred due to disability leave.
* *P*<0.05 versus controls.
† *P*<0.001 versus controls.

Conclusions

- **This real-world analysis found high economic burden among employed patients with MPNs**
- **Patients with MF, PV, and ET were significantly more likely to take disability leave and had significantly higher direct and indirect costs compared with matched controls**
- **The presence of TEs more than tripled direct costs and nearly tripled use of disability leave for patients with PV or ET compared with the full PV or ET cohorts**
- **Healthcare costs and disability leave for patients with PV or ET with TEs were generally significantly higher compared with matched controls with TEs**

Disclosures

JY and EB are employees and shareholders of Incyte Corporation. MJ, and NP are employees of Merative, which was contracted by Incyte to perform this study. JN and TM were employees of Merative at the time the study was conducted.

Acknowledgments

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References

1. Arber DA, et al. *Blood*. 2016;127(20):2391-2405. **2.** Mehta J, et al. *Leuk Lymphoma*. 2014;55(10):2368-2374. **3.** Mesa R, et al. *BMC Cancer*. 2016;16:167. **4.** Yu J, et al. *Ann Hematol*. 2019;98(5):1119-1125. **5.** Yu J, et al. *BMC Cancer*. 2018;18(1):420.

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