INTRODUCTION

Discordance between patient and physician perceptions of disease burden has been identified in various hematology and oncology disease settings and may affect patient outcomes. A recent systematic review of patient and physician perceptions in oncology settings revealed that physicians often underestimate symptom prevalence and severity, which may delay or hinder the alleviation of symptoms. When considering patients with prostate cancer, a study indicated that physicians underestimated pain severity, which could compromise the ability to achieve improvements in quality of life (QoL). Those investigators also reported that physician estimates regarding the effects of breast cancer on patient QoL, social functioning, and role functioning differed from patient perceptions. In a third study, physicians overestimated the burden of common treatment options for myelodysplastic syndrome compared with patient perceptions. Consequently,
physicians may have recommended treatment discontinuation because of inaccurate perceptions about treatment effectiveness in their patients.³

Patients with Philadelphia chromosome-negative myeloproliferative neoplasms (MPNs), including myelofibrosis (MF), polycythemia vera (PV), and essential thrombocythemia (ET), have increased mortality rates⁴ and experience notable symptoms that negatively affect QoL.⁵ However, limited data are available concerning patient and physician perceptions about MPN symptomatology and treatment goals. Attempts to better understand these perceptions may lead to optimized patient care and, ultimately, better patient outcomes.

The MPN Landmark survey was the first large observational study to evaluate patient and physician perceptions about MPNs among contemporary populations in the United States. The first report from the MPN Landmark survey summarized patient-reported effects of MPNs on overall health and productivity, but it did not evaluate physician or patient respondent data concerning treatment goals or satisfaction and did not make direct comparisons between physician and patient respondent perceptions.⁶ The objective of this second analysis of MPN Landmark survey data was to identify gaps between patient respondent perceptions about their disease management and physician respondent self-reported practices regarding MPN-related prognostic risk assessment, symptom burden, treatment goals and expectations, and treatment satisfaction.

MATERIALS AND METHODS

Study Population

Patients who were previously diagnosed with MF, PV, or ET in the United States were eligible to participate in the survey. Patient respondents were recruited through physician offices, advocacy groups, and the media, as previously described.⁶ The study received approval from an internal institutional review board at ICF International (Fairfax, Va), which assisted in conducting the MPN Landmark survey. All respondents provided informed consent.

A national sample of physicians in direct patient care who specialized in hematology or oncology was drawn as a national probability sample of these specialties from the American Medical Association and American Osteopathic Association databases and was contacted by mail, e-mail, and fax. Those who met practice eligibility requirements for the study were asked to participate in the MPN Landmark survey. Eligible physician respondents were those who actively practiced in hematology or oncology settings in the United States and had managed the care of ≥2 patients with MF, ≥5 patients with PV, or ≥5 patients with ET within the 12 months before the survey. Physician respondents received modest remuneration for their participation; patient respondents did not receive remuneration. The method of patient and physician respondent recruitment was not revealed to the investigators, and the survey did not collect the method of respondent recruitment.

Survey Instrument

Questionnaires specific to the MF, PV, and ET settings were created for patient and physician respondents (6 surveys total) and were conducted in English only. Some patient survey questions related to MPN symptoms and QoL were adapted from the MPN Symptom Assessment Form (MPN-SAF)⁷ and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30,⁸ which are validated survey instruments. However, the MPN Landmark survey instruments were not validated. The questionnaires, which respondents completed online, included 59 to 65 multiple-choice questions (respondent/disease dependent) and required 20 to 25 minutes to complete. The surveys included a core set of questions that required responses before submission. Partially completed interviews were excluded from all analyses. A summary of the physician survey is included in the online version of this article (see online supporting information), and a summary of the patient survey was described in a previous publication.⁶ The current report includes data from respondents about: 1) demographics, 2) MPN prognostic risk assessment, 3) MPN symptom burden, 4) MPN treatment goals and expectations, and 5) MPN treatment satisfaction. Descriptive statistics were used for all analyses.

RESULTS

Respondent Demographics

Patient respondents

Patient respondent demographics (MF, n = 207; PV, n = 380; ET, n = 226) from the MPN Landmark survey have been reported previously⁶ and are briefly summarized in Table 1[^6^] and Supporting Table 1 (see online supporting information).

Physician respondents

Overall, 457 physicians who practiced in a hematology and/or oncology specialty completed an MPN subtype-specific version of the survey (MF, n = 156; PV, n = 250; ET, n = 51) (Table 2). Physician respondents had graduated from medical school a mean of 20 or 21 years before the
survey, depending on which MPN subtype-specific survey they completed, and most reported treating patients in a single-specialty group or an academic hospital. On average, physicians reported treating between 11 and 20 patients with MF, PV, or ET at the time of the survey.

**Patient-Physician Comparisons: MPN Prognostic Risk Assessment**

Most physician respondents self-reported that they classified their patients according to prognostic risk categories (MF, 83%; PV, 59%; ET, 77%). In contrast, notably smaller proportions of patient respondents reported that their diagnosing physician had stratified their MPN with a prognostic risk score (MF, 54%; PV, 17%; ET, 31%).

**Patient-Physician Comparisons: MPN Symptom Burden**

Patient respondent perceptions of physician management differed from the management practices reported by physician respondents regarding symptom assessment and related communications (Table 3). Compared with patient respondents, larger proportions of physician respondents reported that their typical management practices included asking patients about their most important MPN-related symptoms during symptom assessment and referring to a full list of symptoms when discussing potential symptoms and disease progression. In contrast, patient recollections of physician visits suggest that physicians were less specific (eg, they were most likely to simply ask how patient respondents were feeling during symptom assessment). Approximately 5% to 15% of patient respondents in each MPN group reported that their physician was uninterested or did not ask about symptoms.

Approximately 5% to 15% of patient respondents in each MPN group reported that their physician was uninterested or did not ask about symptoms. Patient respondents who reported experiencing known MPN-related symptoms often did not recognize a connection between the symptom and their MPN (Fig. 1). Historically, difficulty sleeping is 1 of the most frequent symptoms experienced by patients with MPNs12; however, some patient respondents in the MPN Landmark survey who reported difficulty sleeping did not think that their difficulty sleeping was related to their MPN (MF, 49%; PV, 34%; ET, 25%).

### TABLE 1. Characteristics of Patient Respondents With Myeloproliferative Neoplasms

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>MF, n = 207</th>
<th>PV, n = 380</th>
<th>ET, n = 226</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>112 (54)</td>
<td>237 (62)</td>
<td>163 (72)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>203 (98)</td>
<td>371 (98)</td>
<td>221 (98)</td>
</tr>
<tr>
<td>Black</td>
<td>2 (1)</td>
<td>3 (1)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Asian</td>
<td>1 (&lt;1)</td>
<td>4 (1)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Unknown</td>
<td>1 (&lt;1)</td>
<td>2 (1)</td>
<td>1 (&lt;1)</td>
</tr>
<tr>
<td>Disease duration since diagnosis:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median [range], y</td>
<td>4 [0-36]</td>
<td>7 [0-61]</td>
<td>7 [0-36]</td>
</tr>
<tr>
<td>Calculated prognostic risk score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>13 (6)</td>
<td>49 (13)</td>
<td>76 (34)</td>
</tr>
<tr>
<td>Intermediate-1</td>
<td>47 (23)</td>
<td>119 (31)</td>
<td>126 (56)</td>
</tr>
<tr>
<td>Intermediate-2</td>
<td>84 (41)</td>
<td>57 (15)</td>
<td>NA</td>
</tr>
<tr>
<td>High</td>
<td>63 (30)</td>
<td>155 (41)</td>
<td>24 (11)</td>
</tr>
</tbody>
</table>

Abbreviations: ET, essential thrombocythemia; MF, myelofibrosis; NA, not applicable; PV, polycythemia vera.


* Patient respondents were allowed to give multiple answers regarding race; this table shows only the first answer given by each patient respondent.


* Patient respondents with ET could receive prognostic risk scores of low, intermediate, or high; intermediate scores were not divided into intermediate-1 and intermediate-2.
50% who treated patients with ET estimated that ≤50% had no symptoms (Fig. 2).

Although the majority of patient respondents reported reductions in their QoL because of MPN-related symptoms (Supporting Table 2; see online supporting information),6 many physician respondents (MF, 28%; PV, 46%; ET, 47%) were “somewhat” or “strongly” in agreement that patient QoL was not significantly affected unless splenomegaly was severe. However, most physician respondents believed that MPNs were associated with functional impairments, which is consistent with patient respondent perceptions (Supporting Table 2; see online supporting information). Physician respondents reported that most patients felt anxious about their MPN (MF, 31%)}
had difficulty focusing (MF, 97%; PV, 96%; ET, 90%), and avoided social interactions (MF, 92%; PV, 83%; ET, 84%) and that MPNs interfered with daily activities (MF, 99%; PV, 96%; ET, 92%), family/social life (MF, 99%; PV, 92%; ET, 88%), and sex life (MF, 98%; PV, 96%; ET, 90%).

**Patient-Physician Comparisons: MPN Treatment Goals and Expectations**

The perceptions of patient and physician respondents about treatment needs and goals were generally not well aligned. Among patient respondents, “slow/delay progression of condition” was the most important treatment goal in the MF and PV settings; in contrast, physician respondents reported “symptom improvement” and “prevention of vascular/thrombotic events” as the most important treatment goals for MF and PV, respectively (Fig. 3). Many patient and physician respondents agreed that “prevention of vascular/thrombotic events” was the most important treatment goal for ET (patient respondents, 35%; physician respondents, 57%); however, there remained notable discordance in the ET setting about other treatment goals.

In the MF and PV settings, patient respondents (MF, 47%; PV, 33%) and physician respondents (MF, 99%; PV, 100%; ET, 98%) had difficulty focusing (MF, 97%; PV, 96%; ET, 90%), and avoided social interactions (MF, 92%; PV, 83%; ET, 84%) and that MPNs interfered with daily activities (MF, 99%; PV, 96%; ET, 92%), family/social life (MF, 99%; PV, 92%; ET, 88%), and sex life (MF, 98%; PV, 96%; ET, 90%).
MF, PV, ET) identified fatigue as the single symptom that patients would most like to resolve. Fatigue was also chosen as the most important symptom or complication by patient respondents (33%) and by a notable proportion of physician respondents (22%) in the ET setting; however, the largest subgroup of physician respondents (29%) reported stroke as the single most important to resolve. Discordance between patient and physician respondents concerning treatment needs and plans could limit patient compliance with prescribed treatment and, in turn, clinical and QoL outcomes and patient satisfaction. More than 75% of physician respondents in each group reported that patients “sometimes” or “often” did not wish to comply with physicians’ primary treatment recommendation (MF, 77%; PV, 84%; ET, 78%). Reasons for lack of patient compliance are unclear. However, some patient respondents did not believe that their physician had a treatment plan (MF, 30%; PV, 27%; ET, 35%) or believed that their physician was not providing updates regarding new treatments (MF, 29%; PV, 37%; ET, 41%).

**Patient Respondent MPN Treatment Satisfaction**

Subgroups of patient respondents were dissatisfied with the care they received from their physician. More than one-third of patient respondents were not “very” satisfied with their physician’s overall management of their disease, and an additional subgroup was “somewhat” or “very” dissatisfied (MF, 8%; PV, 10%; ET, 12%) (Fig. 4A). Similarly, more than one-third of patient respondents were not “very” satisfied with their physician’s communication about their disease, and an additional subgroup was “somewhat” or “very” dissatisfied (MF, 9%; PV, 13%; ET, 16%) (Fig. 4B). Among patients who had researched their condition (MF, 97%; PV, 96%; ET, 97%), the majority of patient respondents included the Internet among the most helpful sources of information about their diagnosis (MF, 90%; PV, 87%; ET, 89%), with a minority including their physician’s office (MF, 26%; PV, 21%; ET, 20%). Approximately one-half of all patient respondents reported that they had changed their MPN physician (MF, 47%; PV, 46%; ET, 56%); the most frequently reported reason for the change was dissatisfaction with prior care received (MF, 40%; PV, 37%; ET, 33%).

**DISCUSSION**

Although several analyses in recent years have evaluated MPN-related symptoms and effects on QoL, to our knowledge, this is the first study in the MPN setting to evaluate discordance in communication and perceptions between patients and physicians. This analysis of MPN Landmark survey data identified several gaps between the perceptions of patient respondents with MPNs and the self-reported practices of physician respondents who treat patients with MPNs. Most physician respondents reported that their standard practices included classifying patients by prognostic risk, including patients with PV and ET, which are disease settings that do not have
widely accepted prognostic risk scoring instruments.\textsuperscript{10,11} This was discordant with patient respondents, most of whom did not recall receiving a prognostic risk score. In the PV and ET settings, physician respondents underreported the proportion of patients who experienced symptoms at diagnosis compared with patient respondents. Furthermore, most patient respondents reported that MPN-related symptoms negatively affected their QoL.
yet many physician respondents did not believe that patient QoL was reduced in the absence of splenomegaly. It is challenging to put these data into context, because splenomegaly rates were not captured by the MPN Landmark survey. However, the splenomegaly associated symptoms of abdominal discomfort and early satiety occurred in 53% and 37% of patients with MF, respectively; in 35% and 22% of those with PV, respectively; and in 31% and 21% of those with ET.6 Taken together, these gaps in perception suggest a need for greater physician appreciation for the importance of MPN-related symptoms from the perspective of patients. In addition, the median time since diagnosis (MF, 4 years; PV and ET, 7 years) was relatively recent for many patient respondents, suggesting that there may be a particular need for addressing this issue among patients in the early stage of their disease.

Research in non-MPN disease settings suggests that patient satisfaction may be improved with patient-centric communication styles, which have been associated with improvements in adherence, satisfaction, and overall health in the primary care setting.16 A meta-analysis that included patients and physicians from primary care and specialty practice settings reported a significant correlation between physician communication skill and patient adherence.17 However, further research is necessary to determine whether these findings are applicable to MPN settings.

This analysis of MPN Landmark survey data provides a basis for further strategies to close the gaps in perception between patients with MPNs and their managing physicians in an effort to optimize patient care and satisfaction. First, improved patient education may better prepare patients to communicate key aspects of their disease and manage treatment expectations. Many patient respondents in the MPN Landmark survey did not recognize a connection between common MPN symptoms and their MPN diagnosis. MPN-related symptoms have been associated with reduced QoL, suggesting that there is an opportunity to improve QoL in patients who may be living with symptoms they do not realize are related to MPN. In addition to educating patients on MPN symptoms, physicians should proactively assess symptoms with early and regular use of formal patient-reported outcome instruments (eg, MF Symptom Assessment Form, MPN-SAF, European Organization for Research and Treatment of Cancer Quality-of-Life Questionnaire-Core

Figure 4. Patient respondent satisfaction with (A) physician management and (B) physician communication is illustrated. ET indicates essential thrombocythemia; MF, myelofibrosis; PV, polycythemia vera.
increased effectiveness of new treatment options. Among patients with chronic lymphocytic leukemia, the observed discrepancies between patients and physicians. Improvements in QoL may also be a contributor to the treatment options that provide durable, clinically relevant improvements and enhance the alignment of patients and physicians with regard to MPN symptomatology and treatment goals.

Finally, limited availability and access to effective treatment options that provide durable, clinically relevant improvements in QoL may also be a contributor to the observed discrepancies between patients and physicians. Among patients with chronic lymphocytic leukemia, the increased effectiveness of new treatment options is expected to correspond with improvements in health-related QoL. It is likely that the use of more effective treatments in the MPN setting could yield similar improvements and enhance the alignment of patients and physicians with regard to MPN symptomatology and treatment goals.

Limitations of this analysis stem primarily from the nature of the study. First, because patient responses were based on their recollection and awareness of their MPN management details, some differences may be the result of patient error rather than a true disconnect with physicians. Second, responses were not matched between physicians and the specific patients under their care, which limits how these data can be compared and interpreted. Third, the low MPN prevalence rates in the general population required nonprobability sampling methods for patient respondents, which may have limited how representative the MPN Landmark survey patient respondent population was of all US patients with MPNs. For example, patient respondents were primarily white and female and had a high level of advanced education; however, it remains unclear whether these characteristics are representative. The physician respondent population was recruited based on a probability sample. However, there may have been a self-selection bias regarding which physicians chose to participate that may have influenced the sample sizes for each MPN. Although physician respondents primarily practiced in single-specialty groups or outpatient clinics in academic hospitals, with relatively few from community hospitals, multispecialty groups, health maintenance organizations, or individual practices, this distribution of practice settings may be representative.

Conclusions
This analysis of MPN Landmark survey data suggests that patient and physician respondents often view the assessment of MPN prognosis, disease burden, and treatment goals differently, with physician respondents overestimating the ability of patients to recognize symptoms as MPN-related. Taken together, these findings suggest that there is room for improved patient education in the MPN setting. In particular, improved patient-physician communication regarding treatment goals and enhanced patient access to effective treatment options may improve patient outcomes and overall treatment satisfaction.

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CONFLICT OF INTEREST DISCLOSURES
Ruben A. Mesa served as a consultant for Novartis and received research funding from Incyte Corporation, CTI BioPharma, Gilead, Genentech, Promedior, NS Pharma, and Pfizer. Carole B. Miller served on speakers bureaus and received honoraria and research funding from Incyte Corporation. Maureen Thyne served on speakers bureaus for Incyte Corporation. James Mangan received research funding from Novartis and served on an advisory committee for Incyte Corporation. Salman Fazal served on speakers bureaus, served as a consultant, and received research funding and honoraria from Incyte Corporation and Gilead. Xiaomei Ma served as a consultant for Incyte Corporation. Wendy Wilson received honoraria from Incyte Corporation and Gilead. John O. Mascarenhas received research funding paid to his institution from Incyte Corporation, Roche, Promedior, CTI BioPharma, Kalobios, and Novartis. Sara Goldberger has no competing interests to disclose.

AUTHOR CONTRIBUTIONS
Ruben A. Mesa, Carole B. Miller, Maureen Thyne, Sara Goldberger, Salman Fazal, John Boyle, and John O. Mascarenhas participated in designing and coordinating the study, drafting the article, and approved the final article for submission. James Mangan participated in analyzing data, reviewing and revising the article, and approved the final article for submission. Xiaomei Ma participated in designing and coordinating the study, reviewing and revising the
article, and approved the final article for submission. Wendy Wilson participated in designing the research plan, reviewing and revising the article, and approved the final article for submission. Dilan C. Paranagama, Ahmad Naim, and Shreekant Parasuraman participated in analyzing data from the study and reviewed and approved the final article for submission. David G. Dubinski participated in developing the study, analyzing data from the study, drafting the article, and approved the final article for submission.

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