Patterns of Care in Community-Based Oncology Practices for Anemia Associated With Myelosuppressive Chemotherapy

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Abstract

Purpose: Adherence to anemia guidelines may improve patient outcomes. The objectives of this retrospective analysis were to examine baseline guideline adherence and patient characteristics associated with receiving treatment for chemotherapy-induced anemia (CIA) in community-based oncology practices.

Methods: National guidelines at time of data collection, including those from ASCO, National Comprehensive Cancer Network, and McKesson Corporation (San Francisco, CA), were used to measure adherence. Guidelines recommended treatment with erythropoiesis-stimulating agents (ESAs) or transfusions when hemoglobin (Hb) levels were less than 11 g/dL or from 11 to 12 g/dL with presence of anemia symptoms or risk factors for development of symptomatic anemia. Medical records of patients age 18 years or older receiving myelosuppressive chemotherapy between June 2005 and August 2006 for multiple solid tumors, Hodgkin's lymphoma, or non-Hodgkin's lymphoma at 47 oncology practices were abstracted.

Results: There were 2,874 patients receiving chemotherapy (mean age, 62 years; 66% female). The most common malignancies were breast cancer (36.5%), non-small-cell lung cancer (19%), and colorectal cancer (18%). Treatment patterns in 2,175 (75.7%) of 2,874 patients followed guideline recommendations. In 310 patients (10.8%), treatment was not initiated when guidelines recommended it, and in 389 patients (13.5%), treatment initiated was inconsistent with guideline recommendations. Among patients for whom treatment was recommended, prior chemotherapy and lower Hb levels were associated with higher likelihood of receiving treatment. Patients with colorectal, breast, and head and neck cancer and non-Hodgkin's lymphoma were less likely than patients with other cancers to receive CIA treatment.

Conclusion: The majority of patients received treatment consistent with guidelines. Cancer type, prior chemotherapy, and lower Hb levels were associated with receiving CIA treatment among patients for whom treatment was recommended.

Introduction

It is well known that myelosuppressive chemotherapy can cause anemia, which is associated with a reduction in hemoglobin (Hb) levels.¹ A review of 38 studies evaluating chemotherapy-induced anemia (CIA) found prevalence rates of 5% (prostate cancer) to 90% (multiple myeloma), with the most common prevalence rates ranging from 60% to 90%.^{2,3} Fatigue is one of the most commonly reported symptoms of CIA and has been widely studied in this patient population.²⁻⁴ Fatigue is particularly prevalent in patients receiving multimodality or dose-intense chemotherapy regimens and radiotherapy in combination with chemotherapy and in those with metastatic disease.⁴⁻⁶

Erythropoiesis-stimulating agents (ESAs) such as epoetin alfa (Procrit; Ortho Biotech Products, Horsham, PA) and darbepoetin alfa (Aranesp; Amgen, Thousand Oaks, CA) are indicated for treatment of anemia caused by myelosuppressive chemotherapy and have been shown to increase Hb levels and reduce need for transfusions in this patient population.⁷⁻⁹ Systematic reviews and meta-analyses on the effects of ESAs have shown that treatment with ESAs is associated with reduced transfusion rates, increased Hb response, and improvements in patient-reported fatigue.^{8,10-12}

Clinical Treatment Guidelines

Clinical treatment guidelines are developed to address variations in clinical practice and to assist clinicians in integrating

rapidly changing scientific evidence into clinical practice.¹³ In 2002, national evidence-based guidelines regarding use of epoetin alfa in clinical practice were released.¹⁴ These guidelines were recently updated to include recommendations regarding use of darbepoetin alfa and thromboembolic risk associated with use of ESAs.¹⁵⁻¹⁷

Management of CIA has recently been the subject of important policy decisions in the United States; few data exist on treatment patterns and guideline adherence among patients with CIA. An assessment of current treatment patterns and guideline adherence using retrospective medical records could provide valuable information on real-world management of CIA. The objectives of this analysis were to examine baseline guideline adherence and patient characteristics associated with receiving CIA treatment in community-based oncology practices before educational intervention to improve anemia guideline adherence.

Methods

Study Design

The EDUCATE (Educating Clinicians to Achieve Treatment Guideline Effectiveness) study was aimed at examining—using a cluster-randomized design—effect of an educational intervention program on adherence to anemia and neutropenia treatment guidelines. This article addresses baseline data for

patients with anemia. Sites were eligible if they had patient volume sufficient to provide medical records for data analysis, if they were willing to make all practice clinicians available for educational intervention, and if they lacked practice-wide systems for ESA or colony-stimulating factor (CSF) use at time of study initiation.

Sites were recruited from six US regions. A total of 4,198 health care providers (HCPs) from 1,568 sites in six US regions were approached for participation, with 197 HCPs (122 sites) responding. Of these, 83 HCPs from 47 sites were enrolled. Predominant reasons for nonparticipation were ineligibility because systems for managing ESA or CSF use were already present (49 HCPs; 25%), inability to fulfill medical record data abstraction or educational intervention activities (21 HCPs; 11%), and inadequate medical record volume (13 HCPs; 7%).

The study incorporated a 52-week educational intervention offered to all clinicians practicing at intervention sites. Treatment guidelines used for the study took into consideration ASCO, National Comprehensive Cancer Network, and McKesson Corporation guideline recommendations; at the time of this study (2005 to 2006), guidelines recommended CIA treatment (ESAs or RBC transfusion) for patients with Hb levels less than 11 g/dL.^{16,17} For symptomatic patients with Hb levels from 11 to 12 g/dL, guidelines strongly recommended CIA treatment.¹⁵⁻¹⁷ Anemia symptoms included chest pain, peripheral edema, sustained tachycardia, severe fatigue, and dizziness.

In asymptomatic patients with Hb levels from 11 to 12 g/dL who had risk factors (RFs) for development of symptomatic anemia, guidelines suggested that CIA treatment may or may not be appropriate. RFs for development of symptomatic anemia included RBC transfusion in the last 6 months, history of radiation therapy to more than 20% of skeleton, history of prior myelosuppressive therapy, significant myelosuppressive potential of current chemotherapy regimen, chronic pulmonary disease, cerebrovascular disease, age older than 65 years with cardiovascular or respiratory compromise, and cardiac history or decompensation.

Data Abstraction and Analysis

Medical records were identified from 47 participating sites. Trained abstractors collected data following standard protocol from a sequential sample of adult patients with cancer age 18 years or older who began receiving myelosuppressive chemotherapy during the year before site randomization. Data abstraction occurred between June and November 2006. Medical records from patients with bladder, breast, colorectal, head and neck, lung, ovarian, and testicular cancer, lymphoma, and multiple myeloma were eligible for abstraction. Data elements abstracted included demographics, chemotherapy (intent, planned and actual doses, dose reductions, and delays), complete blood count, CSF and ESA use, RBC transfusions, RFs for development of neutropenia and/or symptomatic anemia, neutropenia events, and anemia symptoms.

This analysis focused only on baseline patient data abstracted before educational intervention. The patient was the unit of analysis. Treatment for CIA was defined according to national guidelines as treatment with ESAs or RBC transfusion. Eligibility for CIA treatment was defined as Hb levels less than 11 g/dL, Hb levels from 11 to 12 g/dL with symptoms (chest pain, peripheral edema, sustained tachycardia, severe fatigue, dizziness), or Hb levels from 11 to 12 g/dL with RFs for development of symptomatic anemia (RBC transfusion in last 6 months, history of radiation therapy to more than 20% of skeleton, history of prior myelosuppressive therapy, significant myelosuppressive potential of current chemotherapy regimen, chronic pulmonary disease, cerebrovascular disease, age > 65 years with cardiovascular or respiratory compromise, cardiac history or decompensation).¹⁵⁻¹⁷

To determine treatment according to guideline recommendations, the first Hb value during chemotherapy of 12 g/dL or less was identified as the index Hb value and categorized as either less than 11 g/dL or from 11 to 12 g/dL. Patients whose Hb levels did not fall below 12 g/dL during chemotherapy were categorized as having no index Hb value. Symptoms and RFs for development of symptomatic anemia in conjunction with index Hb value were recorded. Index Hb value, symptoms, and RFs were combined into six patient categories that defined patient eligibility for CIA treatment by guideline criteria (Table 1). Patients were excluded from analysis if there was evidence of prior iron-deficiency anemia or if no Hb values were recorded during chemotherapy. Assessment of ESA or transfusion use was not conducted for these patients. Iron-deficiency anemia was assessed in review of each medical record and was defined as mean corpuscular volume less than 80 fL, iron levels less than 11 ng/mL, serum ferritin levels less than 15 mcg/L, transferrin saturation less than 16%, or notation of iron-deficiency anemia in patient medical record (within 6 months before start of chemotherapy).

Treatment patterns that occurred within the guideline treatment period (Table 1) were categorized as no treatment, ESAs only, RBC transfusion only, and both ESAs and RBC transfusion. Treatment initiated or not initiated in keeping with guideline recommendations was described as “consistent with guidelines.” Treatment initiation that occurred outside of the guideline treatment period and treatment initiated when guidelines did not recommend it were described as “initiation inconsistent with guidelines.” This category included patients whose Hb levels remained greater than 12 g/dL throughout chemotherapy (ie, no index Hb value; Table 1).

With respect to timing of treatment initiation in the context of the guideline treatment period (Table 1), treatment initiated before index Hb value was reached was considered too early, and treatment administered more than 14 days (if index Hb value was < 11 g/dL) or 21 days (if index Hb value was from 11 to 12 g/dL) after the index Hb value was reached was considered too late. When guidelines indicated that treatment was optional

Table 1. Categories Defining Patient Eligibility for CIA Treatment by Guideline Criteria

Index Hb Value (g/dL)	Guideline-Adherent Recommendation
< 11	Initiate CIA treatment or repeat Hb testing within 14 days of index Hb value —If repeat Hb > 12 g/dL, administer no CIA treatment —If repeat Hb ≤ 12 g/dL, initiate CIA treatment within 14 days
11-12, plus symptoms and RFs	Initiate CIA treatment or repeat Hb testing within 21 days —If repeat Hb > 12 g/dL, administer no CIA treatment —If repeat Hb ≤ 12 g/dL, initiate CIA treatment within 21 days
11-12, plus symptoms but no RFs	Initiate CIA treatment or repeat Hb testing within 21 days —If repeat Hb > 12 g/dL, administer no CIA treatment —If repeat Hb ≤ 12 g/dL, initiate CIA treatment within 21 days
11-12, plus RFs but no symptoms	Either initiate CIA treatment or repeat Hb testing within 21 days, or do neither —If repeat Hb > 12 g/dL, administer no CIA treatment —If repeat Hb ≤ 12 g/dL, initiate CIA treatment within 21 days
11-12, no symptoms or RFs	Do not initiate CIA treatment
All > 12 during chemotherapy (no index Hb value)	Do not initiate CIA treatment

Abbreviations: CIA, chemotherapy-induced anemia; Hb, hemoglobin; RF, risk factor.

(ie, treatment initiation was left to HCP discretion), CIA treatment initiation within the treatment period and no treatment were both considered to be consistent with guidelines (Table 1).

To determine patient characteristics associated with CIA treatment, bivariate comparisons of demographic and clinical characteristics were conducted using χ^2 tests for categorical variables and *t* tests for continuous variables. Characteristics included age, sex, cancer type and duration, prior RBC transfusion, radiation therapy or chemotherapy, history of chronic obstructive pulmonary disease, cerebrovascular or cardiac disease, anemia symptoms at time index Hb value was reached, and index Hb value. Multivariate logistic regression models included variables associated with CIA treatment at $P < .2$ in bivariate analyses. Results are presented as odds ratios (ORs) and 95% CIs, adjusted for all other variables in the model. Statistical analyses were performed using SAS Version 9.1 or later (SAS Institute, Cary, NC).

Results

Of 3,313 patients who met study inclusion criteria, 2,926 had no evidence of prior iron-deficiency anemia (387 were excluded because of iron-deficiency anemia); 52 were excluded from analysis because no index Hb values had been recorded, yielding a study sample of 2,874. The majority of patients had a diagnosis of breast cancer (36.5%), were female (66%), had a mean age of 62 years, and had an index Hb value from 11 to 12 g/dL (Table 2). Before or at the time index Hb value was reached, 22.7% of patients had reported symptoms of anemia. The majority of patients (71.1%) had one or more RFs (Table 2). For six study patients, sex was classified as unknown, the result of coding omissions that occurred during medical record abstraction. Because all patient information became part of a

de-identified data set, it was not possible to return to patient medical records when these omissions were recognized.

Tables 3 to 6 provide data on baseline guideline adherence, including a detailed breakdown by guideline category recommendations and index Hb values. As indicated in Table 3, treatment patterns in 2,175 patients (75.7%) followed guideline recommendations. In 633 of these patients, CIA treatment was initiated when recommended by guidelines (or when guidelines stated treatment was optional). The remaining 1,542 patients did not receive CIA treatment and did not have characteristics (index Hb values, RFs) associated with eligibility for treatment.

A total of 389 patients (13.5%) received CIA treatment inconsistent with guideline recommendations. In this subgroup, treatment was initiated later than recommended in 156 patients (40.1%) and earlier than recommended in 89 patients (22.9%). In addition, in 144 patients (37.0%), treatment was initiated when guideline criteria did not recommend treatment at all.

Finally, for a total of 310 patients (10.8%), treatment was not initiated when guidelines recommended it. Of the subset of 953 patients for whom guidelines explicitly recommended treatment, 310 patients (32.5%) did not receive CIA treatment, 429 (45%) received treatment as recommended, and in 214 patients (22.5%), treatment was initiated either too early or too late as described in Data Abstraction and Analysis.

Table 4 provides a summary of baseline guideline adherence. Table 5 presents information on guideline adherence by guideline Hb categories. In the event that guidelines stated CIA treat-

Table 2. Patient Demographics and Clinical Characteristics

Characteristic	Patients (N = 2,874)	
	No.	%
Age, years		
Mean		61.7
SD		13.2
Sex		
Female	1,885	65.6
Male	983	34.2
Unknown	6	0.2
Type of cancer		
Breast	1,048	36.5
Non–small-cell lung	545	19.0
Colorectal	524	18.2
Non-Hodgkin's lymphoma	225	7.8
Small-cell lung	160	5.6
Ovarian	123	4.3
Head and neck	105	3.7
Bladder	64	2.2
Hodgkin's lymphoma	48	1.7
Multiple myeloma	19	0.7
Testicular	13	0.5
Months since cancer diagnosis		
Mean		13.8
SD		32.0
Median		1.9
Index Hb value, g/dL		
11–12	1,590	55.3
None ≤ 12	680	23.7
< 11	604	21.0
Symptoms (reported at or before index Hb value)		
Fatigue	557	19.4
Dizziness	73	2.5
Peripheral edema	70	2.4
Chest pain	52	1.8
Tachycardia	48	1.7
Any of the above	651	22.7
Risk factors		
Age ≥ 65 years	1,229	42.8
Prior chemotherapy	888	30.9
Cardiac disease history	765	26.6
Chronic obstructive pulmonary disease history	481	16.7
Cerebrovascular disease history	226	7.9
Prior radiation	191	6.7
Prior RBC transfusion	36	1.3
Any of the above	2,044	71.1

Abbreviations: SD, standard deviation; Hb, hemoglobin.

Table 3. Baseline Guideline Adherence and CIA Treatment Initiation

Treatment	Patients According to Treatment (N = 2,874)							
	Guidelines Recommend (n = 953)		Optional in Guidelines (n = 759)		Guidelines Do Not Recommend (n = 1,162)		Total	
	No.	%	No.	%	No.	%	No.	%
Consistent with guidelines								
Initiated as recommended	429	45.0	204	26.9	0	0.0	633	22.0
Not initiated as recommended	0	0.0	524	69.0	1,018	87.6	1,542	53.7
Inconsistent with guidelines								
Not initiated when recommended	310	32.5	0	0.0	0	0.0	310	10.8
Initiation inconsistent with recommendation	214*	22.5	31*	4.1	144	12.4	389	13.5

Abbreviation: CIA, chemotherapy-induced anemia.

* Treatment initiated too early or too late (patient eligible for CIA treatment, but treatment was not initiated according to guidelines, as detailed in Table 1).

ment was optional, both treatment initiation and lack of initiation were considered appropriate. Therefore, of the 759 patients for whom treatment was optional (Table 3), 204 patients received treatment in accordance with guidelines, and 524 did not receive treatment, which was also in accordance with guidelines (Table 5). There were an additional 31 patients for whom treatment was initiated. However, in these patients, treatment was inconsistent with recommendations, because it was initiated either too early or too late.

Of the 578 patients with Hb levels less than 11 g/dL, 309 patients (53.5%) received CIA treatment consistent with guideline recommendations (Table 5). Guideline adherence occurred less frequently among those with Hb levels from 11 to 12 g/dL who had symptoms, either with or without RFs. Of the 266 patients with both symptoms and RFs, fewer than half were not treated, even though treatment was recommended by guidelines; a little more than one third received treatment consistent with guidelines, and approximately one fifth received treatment inconsistent with recommendations. Of the 109 patients with symptoms and no RFs, 60 (55.1%) were not treated even though guidelines recommended treatment, 23 (21.1%) received treatment in keeping with recommendations, and 26 (23.9%) received treatment in a manner inconsistent with recommendations.

Table 6 lists type of treatment received for the 953 patients eligible to receive CIA treatment per guidelines. Treatments received at any time during chemotherapy were ESAs only (n = 551), RBC transfusion only (n = 16), or both ESAs and RBC transfusion (n = 76; Table 5). In 1,162 patients for whom CIA treatment was not recommended, treatment was initiated for 247 (21.3%) as follows: ESAs only (n = 235), RBC transfusion only (n = 1), or both ESAs and transfusion (n = 11).

Characteristics associated with any CIA treatment were identified on the basis of the 953 patients for whom guidelines recommended treatment (Table 7; online only). Characteristics associated with an increased likelihood of receiving treatment were prior chemotherapy (OR, 1.56; $P = .01$) and lower Hb levels ($P < .001$). Colorectal, breast, and head and neck cancer and non-Hodgkin's lymphoma were associated with decreased likelihood of receiving CIA treatment ($P < .05$) compared with other cancers. Among patients for whom guidelines did not recommend treatment, no differences in patient or clinical characteristics were observed between those who did and did not receive treatment.

Discussion

The EDUCATE study was designed to examine the effect of an educational intervention program on adherence to anemia and

Table 4. Summary Results of Baseline Guideline Adherence: Consistent Versus Inconsistent

Treatment	Patients (N = 2,874)					
	Treatment Initiated (n = 1,022)		Treatment Not Initiated (n = 1,852)		Total	
	No.	%	No.	%	No.	%
Consistent with guidelines	633	61.9	1,542	83.3	2,175	75.7
Inconsistent with guidelines	389		310		699	

Table 5. Baseline Guideline Adherence of CIA Treatment by Index Hb Values

Guideline Hb Values (g/dL)	Patients According to Treatment (N = 2,874)								Total
	Initiated As Recommended		Not Initiated As Recommended		Not Initiated Although Recommended		Initiated Inconsistent With Guidelines		
	No.	%	No.	%	No.	%	No.	%	
< 11	309	53.5	0	0.0	135	23.4	134*	23.2	578
11-12, plus symptoms and RFs	97	36.5	0	0.0	115	43.2	54*	20.3	266
11-12, plus symptoms but no RFs	23	21.1	0	0.0	60	55.1	26*	23.9	109
11-12, plus RFs but no symptoms	204	26.9	524	69.0	0	0.0	31*	4.1	759
11-12, no symptoms or RFs	0	0.0	238	71.5	0	0.0	95	28.5	333
None < 12	0	0.0	645	94.9	0	0.0	35	5.2	680
> 12 on retest (after initial Hb value < 12 with symptoms and/or RFs)	0	0.0	135	90.6	0	0.0	14	9.4	149
Total	633	22.0	1,542	53.7	310	10.8	389	13.5	2,874

Abbreviations: CIA, chemotherapy-induced anemia; Hb, hemoglobin; RF, risk factor.

* Treatment initiated too early or too late (patient eligible for CIA treatment, but treatment was not initiated according to guidelines).

neutropenia guidelines. As part of the study, baseline data were obtained from medical records of eligible patients with cancer abstracted for the 1-year period before start of educational intervention (2006). The baseline data reported here provided an opportunity to evaluate adherence of community oncologists to existing guidelines for use of ESAs in treatment of CIA before recent guideline revisions (ie, before 2007). Table 8 (online only) provides a comparison between ESA initiation parameters for guidelines used in the EDUCATE study and those in the current versions of national guidelines.

The results reported here indicate that the majority of medical records abstracted (75.7%) reflected treatment patterns that followed the 2006 version of CIA guideline recommendations. In clinical situations in which guidelines stated that treatment was optional (759 patients), the majority of patients (69.0%) did not receive treatment. Among remaining patients for whom

data were abstracted, 466 patients (16.2%) received treatment that was initiated later than recommended or not at all, even though guidelines recommended treatment (5.4% and 10.8%, respectively). For another 233 patients (8.1%), treatment was initiated earlier than recommended or initiated even though guidelines did not recommend treatment (3.1% and 5.0%, respectively). However, overall, the majority of patients were treated according to existing guidelines.

The results observed here are consistent with findings reported in guideline assessment studies conducted in other disease states. However, limited availability of data on guideline adherence in CIA makes it difficult to compare the findings of this study with published literature in the same patient population. In a study on darbepoetin alfa use conducted on the basis of electronic medical records of patients with Hb levels of 12 g/dL or greater, 6.9% of darbepoetin alfa administrations occurred in

Table 6. Guideline Categories by Type of CIA Treatment

Type of Treatment	Patients According to Treatment (N = 2,874)							
	Guidelines Recommend (n = 953)		Optional in Guidelines (n = 759)		Guidelines Do Not Recommend (n = 1,162)		Total	
	No.	%	No.	%	No.	%	No.	%
No CIA Treatment	310	32.5	366	48.2	915	78.7	1,591	55.4
ESAs only	551	57.8	361	47.6	235	20.2	1,147	39.9
RBC transfusion only	16	1.7	4	0.5	1	0.1	21	0.7
Both ESAs and RBC transfusion	76	8.0	28	3.7	11	1.0	115	4.0

NOTE. Data reflect type of CIA treatment at any time during chemotherapy regardless of timing of initiation (either consistent or inconsistent with guidelines).

Abbreviations: CIA, chemotherapy-induced anemia; ESA, erythropoiesis-stimulating agent.

patients with Hb levels of 12 g/dL or greater.¹⁸ This is consistent with our finding that 9.6% of patients with index Hb values of 12 g/dL or greater received treatment.

Our study has several limitations. Practice sites with standardized systems for ESA or CSF use were excluded from participation, which may have introduced bias. In addition, the data presented here were abstracted from medical records and may reflect documentation in medical records rather than adherence. Data were also abstracted by multiple abstractors trained to use standard abstracting protocol. Furthermore, in situations in which guidelines were not definitive in terms of whether treatment should be initiated, we categorized any decision as consistent with guidelines, which may have resulted in overestimation of the level of adherence.

One limitation is related to the absence of anemia guideline adherence data in the literature, which precluded our ability to compare the findings of this study with published estimates of guideline adherence in the United States. Furthermore, patterns of treatment observed in this study may not be generalizable to all US health care providers. With that said, a global, longitudinal observational study has recently been completed examining practice patterns and patient-related outcomes for treatment of cancer-related anemia (including CIA) during the time period between 2006 and 2007.¹⁹ The analysis, not yet published, will include assessment of adherence to best practice guidelines and describe changes in anemia management over the past 5 to 6 years, thus providing an opportunity to compare findings with the EDUCATE study. Aside from this, the characteristics of patients included in the EDUCATE study were similar to other surveys of patients receiving chemotherapy.

Finally, regional reimbursement for ESAs at time of treatment may have influenced therapeutic options that were not noted in medical records. It is important to note that this study did not evaluate the impact of recent product-label revisions mandated by the US Food and Drug Administration, which resulted in black-box warnings addressing off-label usage and ESA dosing, or the impact of changes made by the Centers for Medicare and Medicaid Services with regard to coverage for ESAs for non-renal disease indications.²⁰ Rather, this study provides data on CIA treatment patterns before these changes in patients receiving chemotherapy from 2005 to 2006. Future research examining the impact of policy and subsequent guideline changes on CIA treatment patterns is needed.

Summary

In this study, we observed that management of CIA in the majority of patients in community practice was consistent with

national treatment guidelines that were in existence from 2005 to 2006. In addition, we observed that some patients did not receive treatment consistent with guidelines. Approximately 16% of patients did not receive any CIA treatment even though guidelines recommended it, or they received treatment later than recommended. Another 8.1% of patients either received CIA treatment when guidelines did not recommend it or received treatment earlier than recommended. In clinical situations in which guidelines stated that treatment was optional, the majority of patients did not receive treatment. Most patients for whom guidelines did not recommend treatment did not receive it. Prior chemotherapy, type of cancer, and index Hb value were predictors of treatment among those for whom guidelines recommended treatment. As expected, Hb levels showed a strong association with treatment initiation.

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Commentary: Do Guidelines Influence Physician Practice Behavior? The Experience With Erythropoiesis-Stimulating Agents

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Most oncologists have grown tired of the issue of erythropoiesis-stimulating agents (ESAs). The contentious debate over appropriate use of these agents in chemotherapy-induced anemia, the national coverage decision (NCD) of the Centers for Medicare and Medicaid Services, and finally the US Food and Drug Administration (FDA) label changes have led to dramatic changes in how these agents are used in clinical practice. This journey has not been a pleasant one. Was it necessary? Could adherence to evidence-based guidelines have provided the necessary discipline to ensure appropriate prescribing to optimize outcomes? In this issue of *Journal of Oncology Practice*, Naeim et al¹ report on community physician adherence to published guidelines with respect to ESA use and conclude that 75% of patients were treated according to these guidelines, which antedated the NCD, the revised American Society of Hematology/ASCO guidelines,² and certainly the new FDA label. Although this conclusion seems encouraging, a more rigorous look at the study design and data suggests that community physicians actually did not perform that well.

Naeim et al¹ performed a retrospective review of clinical practices (83 health care providers in 47 sites throughout the United States) willing to undergo an educational intervention program to enhance adherence to anemia and neutropenia

treatment guidelines (the EDUCATE [Educating Clinicians to Achieve Treatment Guideline Effectiveness] program). The report focuses on baseline prescribing characteristics before intervention. The groups selected had to have sufficient patient volume and could not have in place a practice-wide system regulating ESA or colony-stimulating factor use. More than 4,000 providers were initially approached; thus, this was a highly selected group of providers. From these practices, 2,874 patients were deemed eligible for analysis. Baseline clinical features of these patients were representative of patients receiving chemotherapy in the community, with almost 75% having breast, colon, or lung cancer.

Appropriate use of ESAs was adjudicated on the basis of adherence to EDUCATE guidelines, which recommend treatment with ESAs when hemoglobin (Hb) levels are less than 11 g/dL or when Hb levels are from 11 to 12 g/dL but symptoms of anemia or risk factors for symptomatic anemia are present. The study also required a proximate Hb measurement (Hb measured within 14 to 21 days of—but not before—administration of ESA dose). Unfortunately, within the group in which treatment was recommended by guidelines, fewer than half of patients (only 45%) were treated correctly. Among patients treated incorrectly, almost half the time the error was initiation without a proximate