Administrative Health Data to Assess Performance in a Myelodysplastic Syndromes CME Initiative

Paul D. Walden, PhD, Betsy Dennison, MS, RN, FNP, Christopher Hane, PhD, Alexandr Yevzelman, Alan Baldwin, Victoria Moore, Carl N. Kraus, MD

ABSTRACT

Background: Using administrative health data for performance and quality improvement is appealing because such data are readily accessible, measurable, and scalable for a variety of continuing medical education (CME) programs.

Method: Here we provide a critical evaluation of how administrative health data can be used to evaluate a CME initiative designed to improve physician performance in the diagnosis of myelodysplastic syndromes (MDS). Steps involved in this process include identification of practice gaps; specification and validation of International Classification of Diseases, 9th Revision (ICD-9), and Current Procedural Terminology (CPT) codes that can be used as measures of performance, development, and implementation of effective CME [context-based, interactive learning with practical application]; and direct measurement of performance at baseline and post CME.

Results: Using practice gaps in the diagnosis of MDS as a case study, the performance measure used was time from initial diagnosis of anemia [nonspecific diagnosis] to first MDS diagnosis [specific diagnosis]. This coding specification was used to retrospectively evaluate performance among physician participants in our 2006 MDS CME activities. Compared with a control group of demographically similar physicians who did not attend our CME activities, physician participants in our 2006 CME activities diagnosed significantly more patients with MDS within 6 months of initial diagnosis of anemia and had a 29% lower median time to first diagnosis of MDS from the initial diagnosis of anemia.

Conclusion: Health insurance claims data can be used for performance evaluations of physicians participating in a CME activity who have adequate representation in an administrative healthcare database.

INTRODUCTION

The adult learning literature [1-4] identifies 4 key components of effective continuing medical education (CME): (i) a needs assessment with a focus on higher-level outcomes; (ii) planning and development of “context-based” content (ie, the context in which the learned principles will be applied); (iii) interactive learning (through case presentations); and (iv) integration of learned information into practice. A meta-analysis of the literature determined that CME activities such as case-based learning, live programs, and printed materials have positive short- and long-term effects on practice behavior [5]. Despite these positive attributes of CME, the inability of physicians to accurately self-assess and effectively self-direct their continuing professional development has been brought into question, raising concerns over quality and patient safety [6,7]. Performance Improvement (PI) CME was approved by the American Medical Association (AMA) to address limitations with continuing professional development. PI CME involves a cyclical approach to changing practice behavior comprising 3 distinct stages [8]: Stage A, identify actual performance patterns to assist physicians in understanding practice patterns; Stage B, use these data to plan/implement evidence-based changes in practice; and Stage C, assess the effectiveness of the intervention. Each stage is valued at 5 AMA PRA Category 1 Credits™, and participants who complete all 3 stages in sequence may claim an additional 5 credits for a total of up to 20 credits [8].

We hypothesized that health insurance administrative claims data can be used as a basis for assessing quality improvement/performance improvement in, as well as identifying barriers to, change in CME. Administrative claims data can be used in the different stages of PI CME: in Stage A, to identify practice gaps and, where they exist regionally, to design effective CME.
that addresses these practice gaps in consultation with physicians; in Stage B, to plan/implement the evidence-based CME; and in Stage C, to determine the efficacy of the educational intervention on professional performance measures and patient outcomes. Participation in this process not only benefits the CME content by providing outcome feedback but could also benefit physicians in the era of pay for performance, providing comparative data to them using treatment guidelines as a benchmark.

Using our ongoing CME initiative in myelodysplastic syndromes (MDS) as a case study, the objective of this report is to critically and systematically evaluate how administrative claims data could be effectively incorporated into a CME initiative designed to improve performance while at the same time maintaining full compliance with the Health Insurance Portability and Accountability Act (HIPAA) [9]. Though this was not initially designed as a PI CME initiative, PI measures using claims data were incorporated into the design retrospectively, and this example is provided to evaluate the steps involved in the process.

Myelodysplastic syndromes comprise a group of clonal hematopoietic stem cell disorders that frequently manifest as one or more peripheral cytopenias, often producing associated signs and symptoms such as anemia, bleeding, fatigue, pallor, infections, and bruising [10]. Although MDS has been associated with chemotherapy or radiation therapy used to treat other diseases, most cases are idiopathic [11]. A recent report indicated that the incidence of MDS in the Medicare population is 76,600/year [12], a figure 4 to 5 times higher than previous estimates from epidemiologic studies [13,14]. The median age at diagnosis is 76 years, which is significant given that most cases of MDS present as anemia and the high prevalence of anemia in the elderly population [15]. Therefore, it would not be surprising if many cases of MDS are overlooked. Diagnosis can be further complicated due to the existence of overlap conditions [16]. Definitive diagnosis of suspected MDS requires cytogenetic as well as morphologic evaluation of a bone marrow sample. Surprisingly, in the Medicare population only 57% of the diagnoses were based on a bone marrow evaluation (43% were based on clinical impression) [12]. The International Prognostic Scoring System (IPSS) for MDS uses specific disease characteristics to calculate a score to predict risk of progression to acute myeloid leukemia (AML) or death [17]. While not perfect, IPSS has stood the test of time and remains the gold standard upon which therapy decisions are made [18]. These challenges in the diagnosis of MDS form the basis for an ongoing CME initiative. Delayed or inappropriate diagnosis reduces or eliminates the therapeutic window of opportunity to positively impact the natural progression of MDS to AML or death [17].

Table 1. Professional Practice Gaps in Myelodysplastic Syndromes (MDS) Identified by a Multisource Needs Assessment

<table>
<thead>
<tr>
<th>Practice Gaps</th>
<th>Knowledge gap/Barriers to change</th>
<th>Desired Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay in the diagnosis of MDS</td>
<td>• Failure to recognize MDS among anemic patients</td>
<td>Improve time from initial diagnosis of anemia to definitive diagnosis of MDS</td>
</tr>
<tr>
<td>• Delay in the diagnostic process of suspected MDS, possibly resulting in adverse outcomes (acute myeloid leukemia (AML), death)</td>
<td>• Definitive diagnosis of MDS requires cytogenetic and/or morphologic evaluation of a bone marrow sample. These tests are complex. Information is evolving; a new World Health Organization (WHO) 2008 classification was recently introduced</td>
<td>• Improve collaboration among stakeholders involved in the care of patients with MDS through community outreach</td>
</tr>
<tr>
<td>• This is the “key” performance gap in MDS because it applies to other needs (therapy selection is dependent on accurate diagnosis and International Prognostic Scoring System (IPSS) risk stratification)</td>
<td>• Anemia is common in the elderly, MDS is a disease of the elderly, and most cases of MDS present as anemia; thus many cases of MDS may be overlooked</td>
<td>• Increase recognition of signs suspicious for MDS among anemic patients (primary care physicians)</td>
</tr>
<tr>
<td>Performance gap</td>
<td>• High-level synthesis required to incorporate information into clinical practice</td>
<td>• Recognize appropriate tests to order to make a definitive diagnosis of MDS and correctly interpret and document results for future use (hematologist/oncologists)</td>
</tr>
<tr>
<td>• Multiple stakeholders involved in the diagnostic process (primary care practitioners, hematologist/oncologists, and pathologists)</td>
<td>• Multiple stakeholders involved in the diagnostic process (primary care practitioners, hematologist/oncologists, and pathologists)</td>
<td>• Use diagnostic criteria for risk assessment (IPSS) and direct treatment decisions in the context of current guidelines (hematologist/oncologists)</td>
</tr>
<tr>
<td>• Appropriate tests are not always ordered, and results are not always collected and documented for future use</td>
<td>• Appropriate tests are not always ordered, and results are not always collected and documented for future use</td>
<td>• Recognize morphologic (and cytogenetic) features of MDS and how to accurately document them (pathologists)</td>
</tr>
<tr>
<td>• There is a low degree of concordance among pathologists, resulting in test reports that are often not interpretable</td>
<td>• There is a low degree of concordance among pathologists, resulting in test reports that are often not interpretable</td>
<td></td>
</tr>
</tbody>
</table>
MATERIALS AND METHODS

Identification of Practice Gaps
Each January after the American Society of Hematology annual meeting, we convene a focus group with community and academic hematologists/oncologists. This focus group evaluates emerging data that may influence current practice and identifies professional practice gaps among community providers. The group also reviews the content contained in our online Educational Resource Library (www.oncologylibrary.com), which serves as a central repository of clinical data slides that faculty can use for the development of CME-certified activities. Practice gaps identified by the focus group were validated in surveys of community-based hematologist/oncologists as well as discussions with the MDS Foundation.

Educational Activities in MDS
Our educational activities in MDS incorporate active adult learning concepts [1-4] and are designed for community practitioners. Activities are requested by the host institution or group practice to address their specific educational needs and include independent medical education forums (IMEFs), small-group workshops, and traditional grand rounds. Each IMEF is a 1-hour, interactive, case-based learning activity. Our IMEF format of several learning modules allows learners to request specific topics for discussion, enabling each activity to be tailored to the learners’ specific educational needs in their community practice; however, within this IMEF model there is a mandatory learning component on diagnosis. Small-group workshops feature a highly interactive, case-based discussion focused on practical challenges faced by that particular group practice. Grand rounds form part of a community outreach program designed to overcome practice barriers and to increase collaboration among community stakeholders for referrals and patient accrual into clinical trials. At the time the study was conducted, this was the largest MDS CME program for community physicians in the United States. Other sources of CME on MDS for community physicians would have been very limited, allowing direct assessment of the impact our educational activities.

Data Source and Data Analyses
The source of administrative claims data for this study was the Normative Health Informatics (NHI) database. NHI is owned and maintained by Ingenix as a research-oriented data mart containing more than 25 million current members with UnitedHealthcare insurance policies. NHI data extend back to 1994 and contain medical claims, membership, pharmacy, provider, and laboratory data. These data are protected by the HIPAA. In addition, the NHI database contains demographic information that permits analyses related to variables such as age, gender, and location.

The NHI database allows queries involving medical, pharmacy, laboratory, and provider elements. Specifically, each claim possesses the information necessary to link it to the patient, the provider, the setting (inpatient, outpatient, etc.), procedures, diagnoses, and dates of service. These data fields allow computation of summary statistics such as the total cost of all claims with a specific International Classification of Diseases, 9th Revision (ICD-9), code in a ZIP code for providers that match a certain specialty. The presence of lab values and pharmacy information extend the analytical capabilities even further. There remain, however, many statistics of interest that are not immediately evident from claims data. For our MDS case study, the performance measure that directly related to the practice gap was mean time to diagnosis (MTD) of MDS (specific diagnosis) from an initial diagnosis of anemia (nonspecific diagnosis).

![Figure 1. Map of mean time to diagnosis (MTD) by US region. Map shows the ratio of the average mean time from initial diagnosis of anemia (Dx 281; Dx 285) to first myelodysplastic syndrome (MDS) diagnosis (Dx 238.72 to 238.75) [MTD] for providers in a given ZIP code to the average MTD for all providers: blue indicates average MTD better than the average MTD for all providers [ratios less than 1], and red indicates local MTD worse than the MTD for all providers. The size of the circle represents the number of providers in that ZIP code. For this analysis we used a cut-off of 5 or more providers.](image-url)
The coding specifications for MTD were established by rounds of discussion with disease-state experts and our data analysts. It was then necessary to determine if MTD could be measured in a reliable way.

A claims code utilization analysis was conducted as an initial step to establish which codes were utilized for particular conditions. Once identified, codes were evaluated to ensure that they were in clinical use during the test period so that a confounder of non-use would not impact the outcome analysis: in essence, to assess the claims code “stability.” Since the ICD-9 diagnosis codes 238.72 to 238.75 were introduced in October 2006, we did not use these codes exclusively but also used codes previously shown to be sensitive for MDS diagnoses [19]. Case and control definition required an initial diagnosis of anemia (ICD-9 281) within the study period (January 2007 through June 2008) and an outcome diagnosis of one of the following 5 claim codes [19]: Dx 238.7x (MDS); Dx 284.9x (aplastic anemia not otherwise specified); Dx 285.0x (sideroblastic anemia); Dx 205.20 (subacute myeloid leukemia without remission); Dx 208.20 (subacute leukemia without remission).

Claims for both the initial diagnosis of anemia that defined a potential MDS case and the outcome measure of MDS needed to be submitted by the same provider in order to minimize potential referral bias. Claimants with an initial diagnosis of anemia but no subsequent diagnosis of MDS were not included in the MTD evaluation. In the current study, analysis was limited to CME participants in calendar year 2006. CME participants were matched to the NHI database based on (1) first name, (2) last name, (3) city, and (4) state to identify providers with sufficient data in the NHI database to permit evaluation under our criteria. Since providers participated in the CME activity at varying times during the 2006 calendar year, a sliding scale window was used so that claims submitted by the provider 6 months prior to participation in the CME activity was compared with the 6 months of

Figure 2. Demographics of matched continuing medical education (CME) activity participants. Of the 707 physicians who participated in our myelodysplastic syndrome (MDS) educational activities during calendar year 2006, 40% or 279 of all 2006 physician participants provided care to UnitedHealth Group (UHG) patients. Of these 279 providers, 75% were hematologists and oncologists (A) practicing in 33 states (B).
activity after CME participation. Data from matched participants were compared with data from a control group of demographically similar physicians who did not attend our CME activities.

RESULTS

Identification of Practice Gaps in MDS

A focus group of disease-state experts from academic and community centers was asked to identify professional practice gaps that represent barriers to the optimal care of patients with MDS. The most significant practice gap identified by this group, which was subsequently confirmed by surveys of community-based oncologists and discussions with the MDS Foundation, was failure to recognize MDS among anemic patients as well as a general delay in the diagnostic process once MDS was suspected (Table 1). Since accurate diagnosis is required for IPSS risk stratification and appropriate treatment [18], improving time to MDS diagnosis was the primary learning objective in our CME activities.

Development and Validation of Doding Specifications Based on the Practice Gap

Based on the practice gap, the performance measure was MTD: time from initial diagnosis of anemia (nonspecific diagnosis) to first MDS diagnosis (specific diagnosis). Coding specifications were therefore developed for MTD (see Methods). Once the coding specification is derived it must be retrospectively validated before it can be used prospectively for CME. Validation ensures that the coding specification represents an adequate measure of performance and that the identified practice gap does indeed exist in the dataset. The validated coding specification can be used to provide a detailed regional snapshot of practice performance. MTD can be used to identify specific regions in the US where performance is below the national average (Figure 1), allowing for effective placement of regional CME activities. Our educational activities in MDS incorporated validated methods for effective CME (see Methods), so we examined the impact of these activities on improving MTD retrospectively among providers who participated in our 2006 CME activities. During calendar year 2006, 707 physicians practicing in 38 states participated in our MDS educational activities and applied for CME credit. Of those, 279 participants (40%) provided care to UnitedHealth Group (UHG) patients in 33 states (Figure 2). Hematologists (n = 118) and oncologists (n = 92) accounted for 75% of the total UHG physician subset. MTD among these 279 participants was compared with MTD among a matched control group of 279 physicians who did not attend our CME activities, but who had similar demographics using matching variables of specialty, city, state, and patient panel size. At the time the study was conducted, other sources of CME on MDS for community physicians would have been very limited, allowing direct assessment of the impact on our educational activities. All 279 CME participants in this analysis attended a single CME event.

As shown in Table 2, there was a significant improvement in the number of patients with a first MDS diagnosis in the post-CME period seen by the CME physician participants compared with the matched non-CME (control) physicians (January-June 2007); 271 versus 201 respectively ($P$ [chi-squared] = .03). The diagnosis of MDS was associated with prior bone marrow biopsy or cytogenetic testing in only 23% and 19% of patients, respectively ($P$ [chi-squared] = .06). Baseline cytogenetic testing on bone marrow became part of Medicare’s Physician Quality Reporting Initiative (PQRI) in 2007 [20,21]. The higher rates of first MDS diagnosis among the 2006 CME participants translated to improvements in time from initial diagnosis of anemia (Dx 281; Dx 285) to first MDS diagnosis (Dx 238.72 to 238.75) in the post-CME period. Almost 7% more patients had an MDS diagnosis within 6 months of initial diagnosis of anemia in our 2006 CME participants group (Figure 3). This was associated with a 20% reduction in the MTD of MDS from the initial diagnosis of anemia among physicians who participated in our 2006 CME activities compared with the control group (Table 3).

DISCUSSION

Using an identified practice gap in the diagnosis of MDS, we have explored proof of principle in designing a CME initiative...
that incorporates de-identified claims data as a measure of performance improvement. This measure was validated retrospectively in a cohort of physicians that attended our CME activities. These principles are now being applied prospectively in our ongoing CME initiative in MDS along with elements of the retrospective analysis that require further evaluation (eg, bone marrow biopsy/cytogenetic testing).

Several issues need to be addressed in the design of CME using claims data as a performance measure. The most significant issue involves defining the coding specification from the practice gap to be used as a performance measure. Once this coding specification has been derived from a combination of ICD-9 and Current Procedural Terminology (CPT) quality codes it must be validated retrospectively and adjusted as necessary to provide an accurate actual (or surrogate) measure of performance. The validation process should assess stability of the coding specification over time.

Once the coding specification has been validated, assessment of learner performance can begin. The validated coding specification can be used to identify regional variations in practice performance, enabling the placement of CME activities for maximal impact (the impact of CME in these regions could then be measured prospectively). In conducting educational activities across such a large geographic area, regional differences in practice behavior need to be considered as a potential confounder. To control for this we convened a focus group of community and academic hematologists/oncologists (see Materials and Methods) from different regions of the United States. We identified no regional differences in practice behavior that would affect the differential diagnosis of MDS; we did identify potential regional (eg, environmental) differences in the causes of macrocytic anemia and in reimbursement for certain types of therapy, but no differences in the definitive diagnosis of suspected MDS that uniformly requires a bone marrow biopsy/cytogenetic testing [18,21]. Other considerations at this point depend upon the goals of the CME activity and include the decision whether to assess performance on the same group of physician participants before and after CME intervention or to assess performance after CME intervention among participants and a control group of demographically similar physicians that did not participate in the CME. For

### Table 3. Number of Days from Initial Diagnosis of Anemia to First Myelodysplastic Syndrome (MDS) Diagnosis among 2006 CME Physician Participants versus the Control Group

<table>
<thead>
<tr>
<th></th>
<th>Average, d</th>
<th>Median, d</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 CME physicians</td>
<td>492</td>
<td>217</td>
</tr>
<tr>
<td>Matched non-CME physicians</td>
<td>614</td>
<td>304</td>
</tr>
</tbody>
</table>

Figure 3. Proportion of patients with first diagnosis of myelodysplastic syndrome (MDS) within 6 months of initial diagnosis of anemia. Mean percentage of patients [±SD] seen by our 2006 continuing medical education (CME) participants and the control group who made a first diagnosis of MDS within the first 6 months of initial diagnosis of anemia.
PI CME, change in performance before and after CME intervention should be measured on the same physician participants, after obtaining their consent to access their claims data in NHI. For our retrospective MDS study we matched CME participants using first name, last name, city, and state. Though we were able to obtain a 40% match using this approach, a more efficient approach would be to match CME participants using their National Provider ID (NPI), if they would be willing to provide this. Figure 4 provides an overview of the process involved in the development of a CME initiative designed to impact performance measured using claims data.

Since MDS is a rare disease, assessing performance on the same group of providers before and after CME would have required a 6-month window before and after CME to allow a sufficient number of patients to be seen by the participants to ensure meaningful comparison. This extended time-frame for data collection potentiates the effects of confounders (in the case of our MDS study, introduction of new ICD-9 and the rapid evolution of clinical data were the major confounders complicating a longitudinal study). Measurement of performance improvement in other disease states with larger numbers of patients could therefore be conducted using a narrower pre- and post-CME time period. Assessing performance after CME intervention among participants and a control group of demographically similar physicians that did not participate in the CME offers the advantage of controlling for confounders and other external influences, but does not allow comparison of performance changes in the same group of physicians. Standard limitations regarding the use of claims data also apply to such use for CME outcomes analyses. Specifically, factors such as miscoding, upcoding, and coding lags could have resulted in biased assessments. Future prospective assessments with sample chart audits will assist in characterizing such error in future studies.

ACKNOWLEDGMENTS

The CME activities on which this study was based were funded by Celgene Corporation. The authors wish to thank Robin Snowden for the editorial support.

REFERENCES


