Implementing Outpatient Order Entry to Support Medical Necessity using the Patient's Electronic Past Medical History

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Abstract
Physician order entry is difficult to implement, both in inpatient and outpatient settings. Such systems must integrate conveniently into clinical workflows, and provide sufficient benefit to offset the burden of system use. For outpatient order entry, significant advantages can accrue when systems incorporate medical necessity guidelines – improved billing and adherence to governmental policies. The authors developed and implemented an outpatient order entry system that utilizes an electronically accessible history of patient, provider, and clinic-related diagnoses in assisting providers (when possible and appropriate) to select compliant justifications for tests and procedures. The pilot implementation site, active for more than six months, has been the Vanderbilt University Page Campbell Cardiology Clinic, with 34 providers.

Introduction
Prior to the design of the "Out Patient Orders with Compliance" (OPOC) System at Vanderbilt, providers in outpatient clinics used a tedious manual process based on paper forms to both order tests and to comply with Local Medical Review Policy (LMRP) guidelines. Improving compliance over arbitrary manual methods is becoming critical in an environment where penalties of up to $10,000 per service event plus treble damages may be assessed.

The Centers for Medicare and Medicaid Services (CMS) formerly the Health Care Financing Administration (HCFA), in fiscal year 2000 had a $630 million budget to monitor improper payment of a $200 billion budget overall[2]. This antifraud program, which received its initial major funding from the Health Insurance Portability and Accountability Act in 1996, is estimated to have recovered $16 for every dollar spent in preventing and prosecuting fraud and abuse[1]. Part of the antifraud program is assuring that Medicare only pays for services that are "medically necessary." Providers bear the responsibility for providing correct medical necessity not only for large claims (e.g., inpatient stays), but also for common "small ticket" services (e.g., individual outpatient laboratory tests). Specifically, all procedures and test orders (coded in Healthcare Common Procedure Coding System [HCPCS] or Common Procedural Terminology [CPT]) must be medically justified at the time they are ordered for Medicare and Medicaid patients, using International Classification of Diseases 9th Revision Clinical Modifications (ICD-9-CM) diagnosis or symptom code(s). Although LMRPs may contain many types of business rules, such as requiring that less invasive procedures be completed before the beneficiary would be covered for an invasive procedure, the majority of policies are rules limiting coverage for a given procedure to a specific set of ICD-9-CM diagnosis/symptom codes. There are hundreds of thousands of these "code pair" procedure/diagnosis rules. It is not reasonable to expect that a provider will know or check all of these rules when writing orders during the typical 10-15 minute outpatient visit.

If a provider orders a service that does not meet LMRP guidelines for payment, s/he must notify the beneficiary and the beneficiary must be given the option to agree to pay or decline the service. The American Clinical Laboratory Association estimates this "Advance Beneficiary Notice" (ABN) process occurs more than 1.5 million times per year just for laboratory services[2]. However, failure to check LMRP guidelines is probably equally common, preventing the service provider from collecting compensation. Statistics are not available for such "write-offs". Few organizations have systems in place to present the coverage requirements and provide feedback to the provider when an ABN must be requested of the patient. In lieu of such a system, a large medical center with on the order of 300,000 to 400,000 visits a year could experience losses upwards of $2 million a year.

Authors JB, RM, and ES designed and wrote the OPOC system code to help providers in complying with LMRP guidelines through electronically replacing the manual process of reviewing the patient's entire medical history in search of potentially compliant, truthfully accurate conditions. Author JD wrote the database code to review patient data and provide it in a useful form for OPOC. Authors FF and WK provided informational background and knowledge of clinical workflows at the target site to help design, and ultimately implement the system. OPOC was designed to use diagnostic history of the patient being seen, of all patients seen by the current practitioner, and of all

patients seen in the current clinic as potential sources of suggestions to present in real time to the practitioner during the patient encounter, so that he or she could select a truthful and accurate justification (or enter one by typing, if none of the system suggestions were appropriate).

Diagnosis Utilization History

This paper describes components of the OPOC system used to capture the subset of diagnoses likely to help practitioners establish medical necessity for outpatient procedures. The database for diagnosis history had been previously set up as part of a larger application for capturing outpatient orders and charges.

Capturing Patient, Provider, and Location History

The best history data that could be used to present probable diagnoses would be from an "orders" database that contained justifications rather than a "charge" database. However, because OPOC was the first electronic ordering system introduced into Vanderbilt outpatient clinics, no such database existed for the clinics (although part of the design is to use OPOC orders as new source). Initially, charge databases were used as a proxy. Additionally, physicians in the same specialty operate in the same location and, since we have charge data by location (e.g. clinic) we used location as a proxy for specialty. The pre-existing database captured historical patient information including procedures, diagnoses, and additional patient-specific information. The sources for capturing the history of medical necessity were medical records abstracting (facility or hospital), professional (group practice), and ancillary (technical/facility) services charges. Database files were reviewed to ensure double counting did not occur. For example, minimal items in the Laboratory (only anatomic pathology) have a professional component, and, as a result, the technical/facility billing source file for Laboratory procedure diagnosis history was used. On the other hand, Radiology virtually always has both a technical and professional component, so the professional charge capture system was used as the source of medical necessity history for Radiology procedures. Finally, diagnoses that are retrieved from medical record abstracting are not associated with any single procedure, but instead take into account the major Diagnosis Related Group level operative codes. However, they are associated with a patient. At Vanderbilt, not only inpatients, but also day surgery, and observation patients are abstracted. Diagnoses from all these medical record abstractions were included in our history. But, in terms of order entry data, the most useful history data was that which paired the CPT (order) with an ICD-9-CM (medical necessity).

Professional Charges

Early on, it became clear we would need to stage patient history data to tables indexed and suitable to real-time queries from the order entry application. In our institution, as is the case in most hospitals, the response time to launch real-time queries to the original database files would be unacceptable; therefore, the history data for those patients who have known appointments is staged in batch overnight. That is, the evening before the appointment, for the previous N years for each patient (with N varying from 1 to 5 based on data source), all professional charges (medical record number, procedure code, up to four diagnosis codes, attending physician, location, and service date) are obtained. This includes all physician charges for both the inpatient and outpatient setting.

Medical Record Abstracting

Diagnosis codes from medical record abstracting are retrieved for a five-year history. Since as few as 7 to 20% of covered beneficiaries may have an inpatient encounter per year, whereas as many as 85% of beneficiaries have an outpatient encounter in a year, we decided to capture a 5 year history for inpatient and other abstracted encounters and a 1 year history of outpatient clinic encounters[3,4]. In addition, we selected the longer period for hospital based encounters because the diagnosis codes have been abstracted by professionally trained coders and are more likely to be based on diagnoses rather than symptoms, and, are more likely to represent chronic or persistent diagnoses. On the other hand, ICD-9-CM codes used to justify tests or outpatient visits are often symptoms (e.g. Shortness of Breath [786.05] might be used to justify Spirometry [94010]) or acute conditions that resolve (e.g. Upper Respiratory Infection [465.9]). The drawback of data from medical records abstracting is that diagnosis codes are associated with the encounter as a total. These history tables only include the medical record number and the diagnosis codes, (not associated with any CPT code).

Ancillary/Facility Charges

Ancillary and facility charges are retrieved for a one year history. For example, a serum cholesterol charge is purely technical and is captured and billed in our technical/facility charge system. For ancillary and facility charges not associated with professional services, we limited the retrieval to procedures associated with an injection. This subset excludes charges in many departments because they are not yet targeted by this application (e.g. Pulmonary, Respiratory, Rehabilitation therapies, and Pharmacy).

In total, six new tables were created to hold the diagnosis and CPT combination history needed to present probable medical necessity diagnoses/symptoms. In addition, even though these tables were created for the explicit purpose of servicing the application, real-time inquiry performance still required additional indexing specific to the type of query required to improve response time. For example, the following index combinations have been created:

- Diagnosis used by a specific physician
- Diagnosis in a specific location
- Diagnosis used by a specific physician in a specific location
- Diagnosis used for a specific CPT
- Diagnosis used by a specific physician for a specific CPT
- Diagnosis used by a specific physician in a specific location for a specific CPT
- Diagnosis used for a specific patient
- Diagnosis used for a specific patient, by a specific physician
- Diagnosis used for a specific patient, by a specific physician, and for a specific CPT

These index combinations are summarized so that they represent combination types, CPT code, and count when diagnoses appear more than once. Again, for order entry, the most useful indices were those that paired CPT codes with ICD-9-CM codes.

Presenting Likely Diagnoses for Patient Visit

Although our original commission from the medical center had been only to provide medical necessity for orders, the scope was expanded when it became obvious that eliciting all the diagnoses that were reasons for the patient encounter would be very helpful when presenting probable diagnoses for orders. In addition, we believed that automating the processes for capturing physician charges would improve physician acceptance. The OPOC system, as now implemented, collects possible diagnoses for both scenarios: likely diagnoses that may be the reason for the visit (Figure 1) and likely diagnoses that may justify medical necessity for orders (Figure 2).

The presentation of diagnoses likely to be the reason for the patient's visit assigns weights to potential diagnoses via a combination of whether or not the diagnoses occurred in the patient, the provider, or the clinic location in the past. Specifically, weights are assigned based on multiple factors (listed below). The provider is presented with the top fifty weighted diagnoses to select the actual reasons for the patient encounter. Additionally, the provider may search the complete ICD-9-CM file when the actual reason for visit does not appear in the top fifty.

Figure 1:

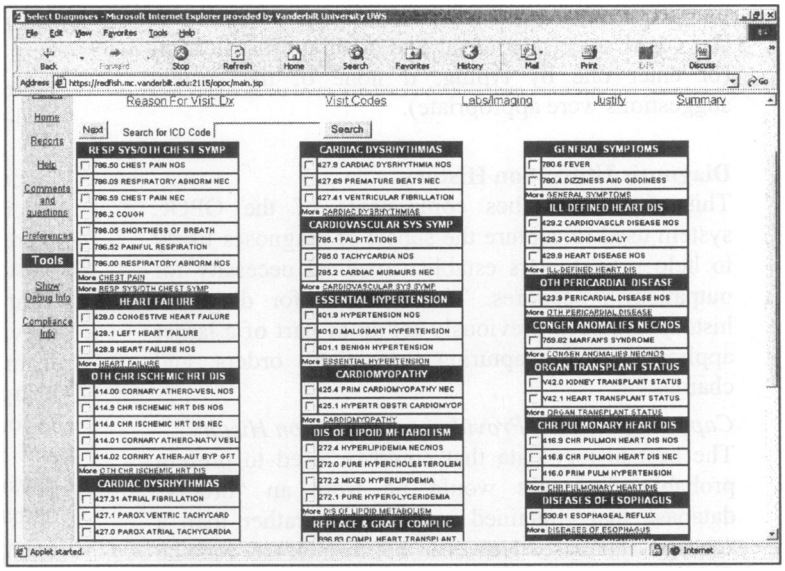
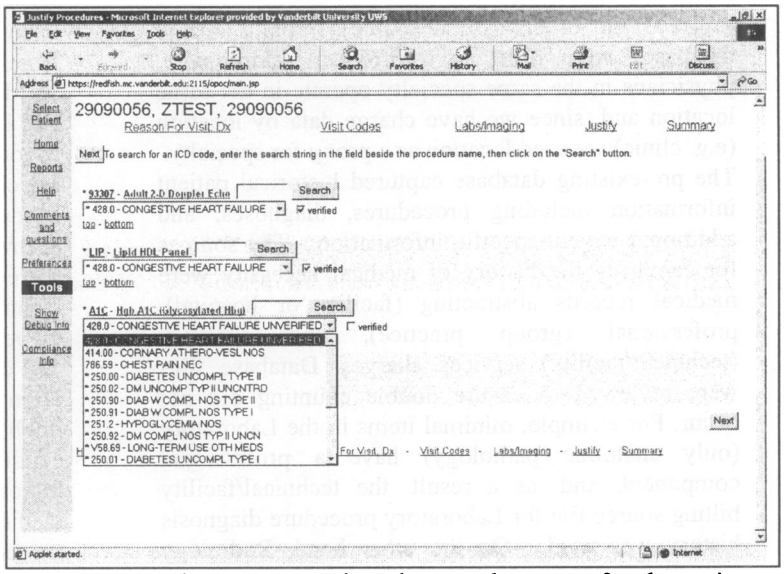


Figure 2:



we weighted in descending importance whether it occurred:

- In this patient
- By this physician
- In this location
- Or anywhere

We added additional weight according to how recent the last instance of the ICD/CPT combination occurred. We also added additional weight if this combination had been selected in the automated (non-historically based) order entry system previously.

Presenting Diagnoses by Procedure

The presentation of probable diagnoses to justify medical necessity by order or procedure weighs diagnoses for the prioritized drop down list (refer to Figure 2). Weight is given to whether or not the diagnosis was previously used for this patient, for this order/procedure, by this provider, in this location and/or in the orders system. This drop down list flags compliant diagnoses with an asterisk.

Results

Outpatient orders and clinic charges for professional services were analyzed for 6,197 cardiology clinic encounters from the period of June 29, 2001 to February 26, 2002 for a total of 11,322 orders entered through the orders system. Of these orders, 4,302 were for Medicare patients (potentially requiring ABNs) and 6969 were for non-Medicare patients. During this period, 34 providers entered orders in the OPOC system, prompting a total of 94 ABNs, accounting for 2.2% of the Medicare patient procedures entered. Based on our early analysis, Hemoglobin A_1C (Hgb A_1C) accounted for 29 or 30.9% of the ABN prompting. Common reasons associated with the ordering of this procedure that resulted in prompting for an ABN included Chronic Ischemic Heart Disease (414.9 and 414.8), Coronary Atherosclerosis (414.00), Hypertension NOS (401.9), Mixed Hyperlipidemia (272.2 and 272.4), and Congestive and Heart Failure (428.0). These diagnoses accounted for a total of 18 occurrences or 62% of the non-compliant reasons chosen for ordering Hgb A_1C. We hypothesize that the majority of the incidences in which an ABN was prompted was due to the fact that the provider chose the reason for visit as the reason for performing the procedure even when the reason for visit did not justify medical necessity for the order/procedure. Other common orders/procedures that prompted an ABN included Thyroid Stimulating Hormone, Carotid Duplex, and Adult 2-D Doppler Echo, for a total of 25 incidences or 26.6% of the ABN prompting. We noticed that a single provider accounted for a disproportionate share of the total ABNs. In addition, of the 21 ABNs prompted for this provider, 15 of the procedures ordered were for Hgb A_1C. These orders requiring ABNs comprised 15.6% of total ABN messages.

Our aim in using diagnosis history files to present probable codes likely to meet medical necessity or justify the reason for visit was to speed the ordering process and reduce the number of times the provider had to search the complete ICD-9-CM master file for the appropriate diagnosis code. Even so, there were 2,047 occasions when a provider searched the complete ICD-9-CM master out of 18,123 distinct diagnosis codes selected across sessions. If each of these searches represent one diagnosis code per session that was not available in the history (and the outcome of the search and the number of searches for a given diagnosis code is not known) then the percent of distinct diagnosis codes that was not represented in diagnosis utilization history would be 11.3%. Searches were necessary presumably because the desired diagnosis code did not appear in the prioritized lists due to one or more of the weighting factors mentioned previously. Fortunately, the system design gives significant weight to codes entered through the OPOC system on subsequent return visits.

Charges for non-compliant orders had a three-fold decrease going from 0.74% to 0.25% for a difference of 0.49% as a percent of total Medicare charges. We compared the non-compliant order charges before and after system implementation for 4 physicians live on OPOC in October 2001 (post-system) to May 2001 (pre-system). Included were only the technical charges for clinic patients where one of the 4 physicians was listed as ordering physician and there was at least one Cardiology, Radiology, or Laboratory charge. Medicare revenue from clinic patients with only an office visit, tests that had to be scheduled for a subsequent visit were excluded.

Discussion

This paper describes the components of a system, OPOC, that was created for capturing a subset of diagnoses likely to be useful in establishing medical necessity for outpatient orders/procedures and the weighting factors used to present these diagnoses to the ordering physician. There has been a slight increase in compliant ordering since the implementation of the orders system due to the notification to the providers of ABN requirements during the ordering process. Previously, providers manually assigned a diagnosis to a specific procedure, but were not cognizant as to whether the test would meet medical necessity. With the orders system, professional and ancillary procedures are being ordered using weights from patient history for presenting diagnoses likely to be the reason for the patient's visit and the reason for orders. In this way,

providers are reminded of diagnoses from the patient's, provider's, or clinic's history and alerted prior to ending their ordering session if the diagnosis meets LMRP guidelines for the orders/procedures selected.

In the initial site, a Cardiology clinic, the system is in active use by attending physicians. Use by physicians is critical for at least three reasons. First, the Medicare regulations hold the provider (not the billing or ancillary staff) responsible for determining medical necessity. When a service is not covered for a given diagnosis code, it may still be covered for that patient with an alternative diagnosis or symptom of which the provider would be aware (ancillary and billing staff would not know alternative applicable diagnosis codes). Second, it is important that the provider know if a patient, having been presented with an ABN, has refused the order/procedure. It may be necessary to discuss and agree to an alternative plan of care with the patient. Third, although medical necessity for payment is a decidedly administrative function, order entry also is the best place to present non-administrative medical decision support that may be contemplated in the future (e.g. drug interaction alerts). Once provider acceptance is achieved, it is feasible to add such decision support; enhancing patient safety as has been recommended by the National Institute of Medicine (IOM).

Our initial group of physicians favored the presentation of prior diagnoses for the patient during the ordering process, but disliked the variability this engendered in the presentation of diagnoses on the the screen. The prior encounter sheet had a preprinted list of "most common" diagnoses with an inherent consistency in layout—"Chest Pain NOS (786.50)" could be consistently expected to be in the first row of the third column of diagnoses, etc. The patient specific presentation in the orders system required providers to read the screen more closely since the layout differed depending on the weighting. Providers have requested that prior patient diagnoses be separated from other possible diagnoses (those commonly used by the provider or the specialty). Searching for a diagnosis from the ICD-9-CM master file when the desired diagnosis is not on the probable diagnosis page has proven to be a daunting task for our providers. In the manual system providers would have simply written a diagnosis in free form text and nursing or billing staff would have looked up the code. Neither the implementation team nor the physicians are trained coders, so the complexities of selecting among diagnosis codes has generated questions that sometimes have to be referred to staff with formal training in coding. Vanderbilt plans to enhance our ICD-9-CM code finder to better index codes to common synonyms. However, at its best, few would call the ICD-9-CM vocabulary provider friendly even with the best of tools. Nevertheless, reimbursement requires its use and developers must look for tools to improve provider accuracy in their use of ICD-9-CM codes.

Ultimately, a portion of the success of this system will be measured in revenue, both in the avoidance of direct penalties (like lost revenue and express fines) and indirect penalties (like corrective action programs and corporate integrity agreements). Vanderbilt plans to improve its measure of return on investment based on the improved revenue flow by clinic. Providers in Cardiology have been more motivated to assure the justification of Cardiology procedures like Electrocardiograms and Cardiac Catherizations where they see a direct revenue benefit to their own department than other ancillary services where the medical center (versus the department) receives the benefit but have cooperated nonetheless. We have found that providers are interested in individualized feedback, and the organization is working to provide this information.

Although it is theoretically possible to use ICD-9-CM as the standard for patient problem lists, the approach has not been successful in practice. Problem lists may be as difficult for the provider to generate as the medical necessity for orders. Although providers are cognizant of the reason for a patient's visit, there is value in being reminded of other chronic and persistent conditions in the patient's history.

Providers in this pilot were interested in knowing the diagnoses used for the patient for past orders/claims when selecting medical necessity justification codes, and may be equally interested in their use for developing problem lists. Future research might study how often the diagnosis selected to validate a plan of care was actually in the patient's history.

References

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