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Improved Comorbidity Capture Using a Standardized 1-Step Quality Improvement Documentation Tool

Robert J. Morrison, MD[1,2], Kelly M. Malloy, MD[3],
and Rishi R. Bakshi, DO[4]

Abstract

Objective. To assess the impact of implementation of a "1-step" documentation query system on comorbidity capture and quality outcomes within the Department of Otolaryngology–Head and Neck Surgery.

Methods. Implementation of the 1-step documentation query system was instituted for all otolaryngology–head and neck surgery faculty at a single institution. Individual query responses and impact metrics were analyzed. Departmental case-mix index (CMI), risk of mortality (ROM), and severity of illness (SOI) were collated over a 14-month implementation period and compared to a 12-month preimplementation period.

Results. A total of 226 documentation queries occurred during the program pilot period, with an 86.7% response rate. Of queries with a response, 91.0% resulted in a significant impact for the hospitalization diagnoses-related group, ROM, or SOI. Departmental CMI increased from 2.73 to 2.91 over the implementation period, and observed/expected mortality ratio decreased from 0.50 to 0.42 pre- to postimplementation.

Discussion. With increasing emphasis on quality metrics outcomes within the United States health care system, there is a need for institutions to accurately capture the complexity and acuity of the patients they care for. There was a positive change in quality outcomes metrics, including ROM, SOI, and CMI over the first year of deployment of the 1-step documentation query process.

Implications for Practice. Clinical severity metrics are becoming increasingly important to otolaryngologists, as insurers move to severity-adjusted profiles. The 1-step documentation query process provides a reproducible and effective way for clinical documentation specialists and physicians to collaborate on improving departmental clinical severity metrics.

Keywords

PS/QI, diagnosis-related groups, value-based purchasing, outcomes, coding, case-mix index, comorbidities, documentation query, inpatient medicine, risk adjustment, electronic medical record

Accurate documentation of the nature of a patient's clinical course during hospitalization has been essential for patient care since the advent of the modern hospital. Documentation serves to aid the patients and their physicians both during the admission as well as when the patients transition into the outpatient world. With the proliferation of Diagnosis-Related Groups (DRGs) in the 1960s and subsequent tethering to Medicare in 1982, there has been an inevitable linking between documentation and medical resource allocation.[1] To date, DRGs remain the gold standard for health care systems-level risk-adjusted outcomes data and remain essential to health care purchasing negotiation and institutional prestige in metrics such as the US News & World Report Rankings (USNWRR).[2] With an ever-increasing emphasis on pay for performance and value-based purchasing within the US health care system, there is a pressing need for institutions to accurately capture both the complexity and acuity of the patients they care for.

US hospital adoption of "comprehensive" electronic medical record (EMR) systems, defined as an EMR capable of meeting all core meaningful use metrics, including evaluation and tracking of quality metrics, has been steadily

[1]Department of Otolaryngology–Head and Neck Surgery, Michigan Medicine, Ann Arbor, Michigan, USA
[2]Department of Otolaryngology–Head and Neck Surgery, Vanderbilt University Medical Center, Nashville, Tennessee, USA
[3]Division of Head and Neck Oncology and Microvascular Surgery, Department of Otolaryngology–Head and Neck Surgery, Michigan Medicine, Ann Arbor, Michigan, USA
[4]Department of Physical Medicine and Rehabilitation, University of Michigan, Ann Arbor, Michigan, USA

Corresponding Author:
Rishi R. Bakshi, DO, Department of Physical Medicine and Rehabilitation, University of Michigan, 325 E Eisenhower Parkway Suite 100, Ann Arbor, MI 48108, USA.
Email: rbakshi@med.umich.edu

increasing from 1.5% of all US hospitals in 2009 to 40.5% in 2015.[3,4] Many institutions have looked to EMR system transitions as an inflection point to expand clinical documentation improvement (CDI) efforts. Over the past several years, the University of Michigan's Michigan Medicine health system has endeavored to fully transition to a comprehensive, integrative EMR system across the inpatient and outpatient realms. One of the primary goals of this transition was to help study and improve outcomes, reduce readmissions, improve quality of care, and meet performance and quality targets, many of which are actively moving.

Clinical documentation improvement program expansion occurred with the EMR rollout to augment quality improvement (QI) efforts currently in process in the health care system. A major strategy of the CDI program was to address high-yield data elements that affect performance and quality targets, including increasing the capture of severity of illness (SOI) and risk of mortality (ROM) scores for hospital inpatients through accuracy of documentation of primary and secondary diagnoses.[5] Both SOI and ROM are defined as comorbidity-determined DRG modifiers tethered to a specific patient's primary disease process and are intended to reflect difficulty in treating a patient's primary diagnosis and risk for morbidity or mortality with treatment. Severity of illness is intended to reflect the degree of physiologic decompensation of the patients due to the interaction of their primary illness and medical comorbidities, while risk of mortality is intended to reflect patient risk of death. The Department of Otolaryngology–Head and Neck Surgery at Michigan Medicine was identified as a pilot department for the proposed CDI intervention.

Incorporating the principles described by Payne[6] at the University of Washington, we embarked on an information technology (IT)–centric approach to simplify and streamline documentation queries. Major considerations included how clinical documentation specialists (CDSs) interact with physicians surrounding documentation queries, how said queries are prioritized, how physicians interact and respond to documentation queries, and how to best simplify the workflow process for our physicians. Many of these considerations arose out of prior failed interventions, including physician education initiatives, and local interventions in CDI, which led to fragmentation in workflows. Our goal was to build a standardized mechanism within the EMR in which a CDS can directly interface with a physician regarding diagnoses clarifications while allowing the physician to readily respond with minimal disruption to the current workflow. We also sought to increase physician satisfaction with the CDI process by creating a workflow that was more intuitive and less burdensome. Herein we describe development and implementation of a 1-step documentation tool aimed at improving comorbidity capture and quality metrics for medically complex inpatients in the Department of Otolaryngology–Head and Neck Surgery.

Methods

Using the aforementioned principles, we developed a "1-step" documentation query process in which a physician is empowered to respond to a CDS query with only a few mouse clicks within the EMR system. Michigan Medicine uses the Epic EMR (Epic Systems Corp, Verona, Wisconsin) software system. For example, if on review of a patient's inpatient stay after a large head and neck cancer operation, a CDS notes the patient experienced an acute blood loss anemia but the diagnosis was absent from the provider's documentation, the CDS can send the physician a direct message for diagnosis clarification. The request is structured to read "Dear Dr. xxx, based on review of complete blood cell counts obtained postoperatively, please clarify the specific diagnosis/procedure in the Provider Only section below." The provider needs to only simply select from options given or reply via free text and click the button to sign (**Figure 1**). If the physician disagrees with a suggested change, he or she simply selects "Clinically Unable to Determine" or free texts "Disagree" and signs as before. Once a physician digitally signs the query, the diagnosis is added or clarified within the patient's medical record as a signed provider note with no additional follow-up required of the physician. This improved upon the previous process whereby an EMR in-basket message was sent to providers and they were then required to enter a patient's chart, select a note to addend, edit the note, sign the note, and then message the CDI specialist to notify him or her of their response. Eight to 9 mouse clicks on at least 3 different screens was reduced to 3 mouse clicks on a single screen with the 1-step workflow.

The development of this workflow used an existing functionality within the Epic EMR called the "shared note," which was repurposed and renamed as a "documentation query" note type. The documentation query is created by the CDS using a standardized template as a shared note within the patient's hospital encounter, which is then forwarded to the provider. The provider receives the query within the chart completions folder of the Epic in-basket, determines appropriate action within the in-basket, and signs the note. The query is then filed as a documentation query note as part of the permanent medical record within the patient's hospital encounter. As no new resources needed to be built or installed within the EMR, there was no specific financial cost to development of the 1-step documentation system beyond the time set aside by the EMR build team. Total development was accomplished in 18 work hours, which included 4 hours of design time, 10 hours to tailor the function to our institution's version of the Epic EMR, and 4 hours to update staff security templates to allow CDS personnel to enter the hospital encounter within a patient's record.

The Department of Otolaryngology–Head and Neck Surgery was identified as a candidate for a pilot of this new process, given an institutional push to more accurately capture expected mortality and increase CMI. The pilot was enacted in the third fiscal quarter of 2016 for the entire faculty in the Department of Otolaryngology–Head and Neck Surgery. Following University of Michigan institutional review board exemption, documentation queries and

Provider Receives a Documentation Query in Their In Basket HCC Folder and Takes Action
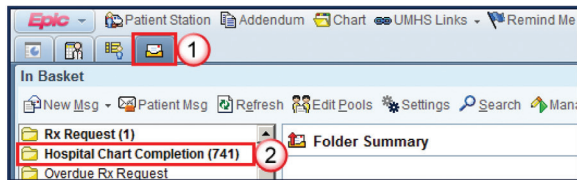
1. Click **In Basket**.
2. Click **Hospital Chart Completion** folder.

- Deficiency type is *Documentation Query* with a status of *Note Pending*.
- If Documentation Query note was initially sent to a **Resident** and completed by the **Resident**, the deficiency type will be *Documentation Query* with a status of *Cosign Needed*.

3. Select the **Documentation Query note** to address.
   - The *Documentation Query note* also appears on the *Incomplete* tab of *Notes* activity, and the *Notes* tab of *Chart Review*.
4. Click **Edit**.

5. Read the **query message**.
6. Press **F2** on your keyboard and replace the wildcards (***) with the specific diagnosis(es)/procedure for the patient.
7. Click **Sign**.

> ❗ All responses in the PROVIDER ONLY section become part of the permanent medical record.

Figure 1. The 1-step documentation query system within an Epic electronic medical record system.

documentation clarifications were tracked and collated prospectively over a 14-month period (January 1, 2016, through February 28, 2017) following institution of the new 1-step documentation query process. Historical preimplementation data were also aggregated for comparison from the 12-month period (January 1, 2015, through December 31, 2015) preceding initiation of the 1-step query process. A documentation clarification was defined as addition, removal, or modification of a current diagnosis within the patient's medical record. The primary outcome of this observational study was to assess the rate of clinical documentation queries that produce a significant impact during the pilot implementation period. A query was determined to have a significant impact if it resulted in a change to the patient's DRG, ROM, or SOI with the understanding that these are the primary determining factors for quality outcome metrics. We secondarily aimed to examine the response of departmental-level case-mix index (CMI) and observed/expected mortality ratio during the implementation period.

Inpatient discharges were assigned to their Medicare Severity–Diagnosis-Related Group (MS-DRG) based on the MS-DRG Grouper version appropriate to their discharge

date. However, to compare the CMI across several years, the federal fiscal year 2017 MS-DRG weights were used on all cases to eliminate CMI differences resulting simply from the annual adjustment of MS-DRG weights. The Vizient Morality Risk Adjustment Model (Version 2015; Vizient, Irving, Texas) was used to assign an expected mortality (0%-100%) to each case based on factors such as demographics, admission type, diagnoses, and procedures. For groups of cases, an overall ratio of observed mortality to expected mortality (O/E mortality ratio) can be derived and compared over time. If observed mortality exceeds expected mortality, the ratio is greater than 1. A downward trend in the O/E mortality ratio in the context of a CDI intervention may indicate improved documentation and coding of diagnoses and procedures leading to higher expected mortality assignment to cases.[7]

Results

A total of 226 documentation queries occurred during the program pilot period, with an overall response rate from clinicians of 86.7%. Of the 196 queries with a provider response, 91.0% resulted in a significant impact for the

Table 1. Documentation Queries and Impact During the Implementation Period.

	FY16Q3	FY16Q4	FY17Q1	FY17Q2	FY17Q3	Total
Documentation with impact	25	17	51	52	3	148
Documentation with no impact	1	1	1	8	1	12
Unanticipated response	0	0	3	3	0	6
Impact details						
Total query impacts	30	21	76	103	8	238
MS-DRG	0	1	27	37	0	65
Admit ROM	2	3	7	15	2	29
No impact	0	0	10	11	1	22
Admit SOI	5	2	3	6	0	16
APR-DRG	4	4	3	0	0	11
Discharge ROM	1	0	7	2	0	10
Discharge SOI	4	2	1	0	0	7

Abbreviations: APR-DRG, All Patients Refined-Diagnosis Related Groups; FY, fiscal year; MS-DRG, Medicare Severity–Diagnosis-Related Group; Q, quarter; ROM, risk of mortality; SOI, severity of illness.

hospitalization. The most common metric affected was MS-DRG (31.9%) followed by ROM (16.4%) and SOI (9.6%) (**Table 1**). The number of query responses in under 2 days increased from 43.6% preimplementation to 63.8% postimplementation. A total of 77.6% responses were received in under 5 days.

A total of 279 diagnoses were clarified during the implementation period (**Table 2**). The most common diagnosis category clarified was surgical pathology diagnosis (27.0%) followed by severe malnutrition (13.0%) and acute blood loss anemia (11.0%). Compared to the preimplementation period, there was an increase in number of secondary diagnoses captured that significantly affected SOI and ROM, including pathologic diagnosis, severe malnutrition, stage of chronic kidney disease and congestive heart failure, and respiratory diagnoses (**Table 2**).

A total of 675 cases were captured in the preimplementation period and 851 cases during the implementation period. The average department CMI increased from 2.73 to 2.91 over the implementation period (**Table 3**). Notably, expected mortality rate, which is based on expected mortality stratified first by ROM subclass within the base MS-DRG and then by transfer status, increased by 0.23% according to the Vizient risk model. The O/E mortality ratio correspondingly improved from 0.50 to 0.42 pre- to postimplementation. There was an overall observed improvement in percentage of discharges with documented major medical comorbidities (MMCs) and percentage of discharges with a high SOI index (**Figure 2**).

Discussion

Physicians are being asked to use greater specificity in clinical diagnoses, not only for billing and value-based purchasing purposes but also to adequately capture clinical severity of illness for outcomes measures that affect institutional rankings regionally and nationally. While clinical documentation represents only one small facet of the clinical care

administered in health care systems, EMR systems represent an ideal sector for intervention due to the standardized nature in which documentation is performed within an EMR workspace. We had previously sought to improve documentation quality metrics at our institution through educational initiatives targeting physicians to highlight the complex interaction between documentation, admission diagnoses, and outcomes measures such as SOI and ROM. These unpublished interventions included both formal and informal "grand rounds" physician educational didactics, resident targeted educational curricula, localized departmental CDI workflow interventions, and physician easy-access tip sheets and index card–sized "white coat cards." While many physicians expressed understanding and buy-in for improving clinical documentation following educational interventions, the gains seen through this approach were ultimately not sustainable. We suspect this was due to the need for physicians to abort standard workflows to "look up" documentation questions as well as confusion created by the variety of methods in which CDSs would approach physicians about documentation queries, including pages, emails, and EMR messages.

With this project, we sought to standardize documentation queries by creating a solution within existing physician workflows in a manner that was easy to use and readily understandable. The transition to a comprehensive EMR system was essential to this work by increasing physician familiarity and efficiency within the EMR system and enabling simplification and consistency of communication methodology. Our results show that there was an increase in capture of major medical comorbidities within documentation of our patients after using principles of standardization and simplification of documentation queries to create a 1-step query process. There have been corresponding increases in CMI and SOI/ROM indices for our patients that more accurately reflect the complexity of our patient population in a tertiary care medical center. Most important, the department's

Table 2. Summary of Diagnosis Clarified Pre- and Postimplementation of 1-Step Query Process.

Diagnosis Clarified	Queries			
	Preimplementation, No.	% of Total	Postimplementation, No.	% of Total
Pathological diagnosis/result	32	20	75	29
Malnutrition, severe	29	18	36	14
Anemia, acute blood loss	15	9	31	12
Neoplasm, secondary site	11	7	15	6
Renal failure, chronic and stages 1-5	3	2	9	4
Congestive heart failure, type and/or severity	3	2	8	3
Sepsis	7	4	7	3
Complication, postoperative	1	1	7	3
Neoplasm, primary site	16	10	6	2
Pressure ulcer, site and stages 1-4	2	1	5	2
Respiratory failure, acute	1	1	4	2
Hypotension		0	4	2
Renal failure, acute unspecified		0	4	2
Respiratory failure, acute and chronic		0	4	2
Malnutrition, moderate	3	2	3	1
Malnutrition, mild		0	3	1
Pneumonia, bacterial		0	3	1
Respiratory failure, postprocedural acute		0	3	1
Shock		0	3	1
Complication, intraoperative	4	2	2	1
Alkalosis	3	2	2	1
Pneumonia, aspiration	2	1	2	1
Urinary tract infection	1	1	2	1
Wound debridement		0	2	1
Malnutrition, protein calorie	9	6	1	0
Ulcer type and site	6	4	1	0
Anemia, other	1	1	1	0
Diabetes with manifestation	1	1	1	0
Deep venous thrombosis	1	1	1	0
Respiratory failure, chronic	1	1	1	0
Cerebral edema		0	1	0
Myocardial infarction		0	1	0
Pneumonia, viral		0	1	0
Respiratory distress syndrome, acute		0	1	0
Wound infection		0	1	0
Encephalopathy	4	2		0
Total queries for period	162		256	

Table 3. Department-Level Quality Metrics before and after Implementation of the 1-step Query Process.

Intervention	No. of Cases	Expected Mortality Rate, %	Actual Mortality Rate, %	Observed/Expected Mortality	MS-DRG CMI	% CDS Reviewed[a]
Before	675	1.18	0.59	0.50	2.73	42.4
After	851	1.41	0.59	0.42	2.91	55.6

Abbreviations: CDS, clinical documentation specialist; CMI, case-mix index; MS-DRG, Medicare Severity–Diagnosis-Related Group.
[a]Percentage of all hospitalization charts for the department in the study period reviewed by a clinical documentation specialist.
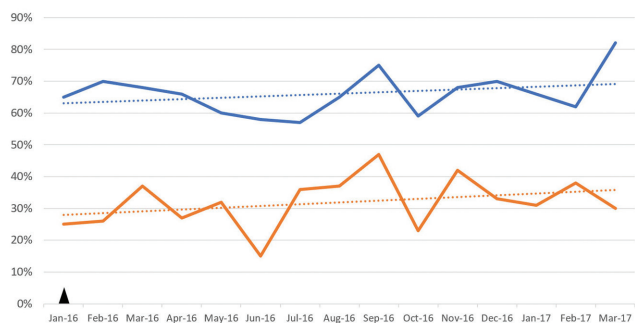
Figure 2. Graphical representation of departmental discharges with major medical comorbidities (blue line) or major or extreme severity of illness scores (orange line) following implementation of the 1-step documentation system (black arrow).

mortality index (O/E mortality ratio) improved during the implementation period, which is a key driver of quality rankings for national outcomes reporting services such as the USNWRR. In short, there has largely been resolution of a chronic, inadvertent underestimation of SOI that led to inaccurate reflection of department quality metrics following implementation of the 1-step query process.

It is important to note that the outcomes of this study are associative and observational in nature and do not demonstrate a true cause-and-effect relationship. The observed increase in CMI during the implementation period may be a result of annual variations in patient mix and would be better studied over a longer period of time. While the described intervention process is potentially applicable to multiple EMR systems, the 1-step process as described is specific to the Epic EMR, which limits external applicability of this study. Physician feedback within our department has been that the 1-step system is easy to use and provides adequate information to make a clinical decision about the appropriateness of the documentation query, reflected in the response rate and timeliness of response postimplementation of the system. The sustainability of the intervention, such that the diagnoses become a part of the patient's active medical record, ensures that comorbidities are appropriately addressed as the patient transitions from the inpatient to outpatient setting. It also ensures that information regarding the patient's inpatient experience is disseminated to the patient's care team through increased accuracy of the patient's discharge summary. Secondarily, areas for improvement in quality and patient safety can be more readily identified when looking globally at our department's patient population. The 1-step system also potentially allows physician "education by standardization" such that proper documentation diagnoses, such as staging and type of congestive heart failure, become more familiar with repeated exposure, although such inferences are beyond the scope of this study.

Implications for Practice

Clinical severity metrics, which are tethered to appropriate documentation of diagnoses affecting patients' care in the hospital, are becoming increasingly important to otolaryngologists as Medicare and other insurers move to severity-adjusted physician profiles and pay for performance. The 1-step documentation query process we describe provides a reproducible and effective way for CDSs and physicians to collaborate on improving departmental documentation quality and clinical severity metrics. This has important implications for not only departmental reimbursement but also regional and national outcomes rankings. More important, this helps ensure accurate documentation of the course and severity of our postsurgical patients as they transition from inpatient care to the outpatient environment and ensures appropriate follow-up of important medical issues in the otolaryngologic clinic and with the patient's primary care provider. We are further studying the impact of the 1-step tool globally within other departments following institution-wide rollout to assess the reproducibility of the benefits within other surgical and nonsurgical patient populations.

Author Contributions

Robert J. Morrison, conceptualized and designed the project, carried out the project methods and data analysis, drafted the initial manuscript, and approved the final manuscript as submitted; **Kelly M. Malloy**, conceptualized and designed the project, carried out the project methods and data analysis, revised the manuscript, and approved the final manuscript as submitted; **Rishi R. Bakshi**, conceptualized and designed the project, carried out the project methods, revised the manuscript, performed data analysis, and approved the final manuscript as submitted.

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