Title:
The Impact of Implementation of a Clinically-Integrated Problem-Based Neonatal Electronic Medical Record- Documentation Metrics, Provider Satisfaction and Hospital Reimbursement. A Quality Improvement Project

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Introduction:

Wide-scale adoption of electronic medical records (EMR) became a national policy mandate in 2009, with allocation of significant healthcare dollars dependent upon meaningful use implementation [1]. This has been justified by projected improvements in patient safety and health care quality [2].

The evidence for the benefits of EMR-based physician documentation is evolving. One challenge to implementation remains physician resistance, related to a myriad of operational and human factor barriers to creating the traditional physician medical note, including a perceived decrease in efficiency and an increased time expenditure [3,4].

The importance of physician documentation and the concept of problem-based documentation was originally championed by Lawrence Weed who recognized the importance of a systematic and comprehensive approach towards documenting the care of the complex intensive care patient with multi-system disease [5]. The translation of this complex process was accomplished primarily by hand-written or transcribed notes until the advent of the electronic medical record (EMR). The EMR should efficiently collect, store and display patient information in a way that will facilitate medical decision-making and allow the provider to integrate this information, as reflected in his documentation [6].

All Patient Refined Diagnosis Related Groups (APR-DRGs) is the standard measure of provider medical documentation. Similar to the Centers for Medicare and Medicaid (CMS) Medicare Severity Diagnosis Related Group (MS-DRG) inpatient prospective payment system (IPPS), the APR-DRG provides a quantitative tool to measure accuracy and quality of physician documentation [7].

Our primary project goal was to fully redesign and standardize the provider documentation process, seeking improvement in documentation based upon ongoing APR-DRG-based coding records, while maintaining non-inferiority comparing provider satisfaction to our existing documentation process. We report the fiscal impact of improved documentation based upon changes in expected APR-DRG based hospital payments.

Methods:

Background:

In 2014-15, all physician documentation was transitioning from a dictation-based system to a fully electronic medical records platform using EPIC software (Epic Systems Corporation, Verona, WI). The EPIC platform was already integrated into obstetrical and neonatal nursing, respiratory therapy, case management, pharmacy, laboratory and imaging data entry, and the physician/provider component was a mandatory next step. Dictation-based documentation was the documentation method of choice. Between September 2015-September 2016 the neonatal group transitioned to a combination of analog dictation with hospital-contracted transcriptionist documentation, and a non-standardized, individualized “out-of-box” Epic-based electronic documentation.

We began to redesign the provider documentation system in October 2015. We actively utilized EPIC documentation capabilities as a “learning lab” for continuous improvement and refinement to achieve a final documentation system within EPIC. From October 2015 to October of 2016, the providers utilized a shared electronic entry template, and some dictation continued as well. The shared template continued to use a clinical systems-based format for
progress notes, and the entry was not problem-based. An ongoing feedback structure allowed providers to review benefits and drawbacks to note entry templates, smart phrases, general structure and work flow. Real-time refinements based upon this feedback allowed for a continuously evolving and improving documentation process.

In November 2016, the newly designed neonatal documentation system went live, and has continued through the study period of May 2017. We chose not to include any further data in our analysis, as the hospital NICU moved to a new facility in mid-May 2017.

Aims and goals:
The aims and improvement goals of this project:
- Improve provider awareness of appropriate documentation through a provider education hand-out and follow-up group discussion. We provided this education in August-September 2015, and an additional education with revision to ICD-10 in January-February 2016.
- Fully redesign and standardize the provider documentation process building from the native Epic-based software.
- Create a comprehensive neonatal provider documentation system including the History and Physical, Progress Note and Discharge Summary that utilizes sharing and collaborative maternal and neonatal data entry by clinicians/staff in the obstetrical and neonatal work environments.
- Improve provider care documentation as reflected by hospital 3M Severity of illness (SOI), risk of mortality (ROM) and case mix index (CMI) scores. We did not have any target goals to increase diagnosis documentation, but rather sought to improve accuracy of documentation.
- Achieve these goals without a negative perception of the new documentation process by the provider. This would be measured by time-based study by one provider and group survey after completion of the study.

Methodology:
We utilized a problem-based entry capability built into the hospital-wide vendor software to create a physician data entry structure that sought to efficiently manage the large data streams that occur in the NICU, enhance consistent and comprehensive identification of ICD-10 based diagnoses, streamline the use of an ongoing clinical summary form that can benefit all care providers with reduced redundancy of data entry, generation of a facile discharge summary, and provide a problem-based daily progress note that would encourage entry similar to the traditional physician problem-based SOAP note.

This project is a collaborative effort of the medical director of the NICU (WFL), all the neonatal providers and a key hospital information system programmer (TW) and the Coding Improvement staff. PRE-intervention period was October 2015-October 2016. Problem-based entry was a key component of the platform being created, and could not be implemented until the full configuration was in place. POST-intervention: November 2016 to May 2017.

Intervention 1: Provider Education in documentation:
1. In August-September 2015 the provider staff were given an orientation in optimal documentation (NICU Physician Documentation Guidelines) and encouraged to provide optimal and accurate documentation of patient clinical diagnoses.

2. In Oct-Nov 2015, the hospital converted to ICD-10 and a revised version of this guidelines was provided to the providers in Jan-Feb 2016.

Intervention 2: We designed the Neonatal EMR during the PRE-intervention period: October 2015-October 2016; “Go live” November 14, 2016

Changes to the neonatal documentation process.

• Over a one year period, through an ongoing clinician and information technology department collaboration, a more efficient and integrated Neonatal EMR was constructed. Objectives for creating the tools focused on the following:
  ▪ Efficient and effortless data entry
  ▪ Eliminate redundancies in documentation
  ▪ Quality of note readability facilitates communication of patient medical status
  ▪ Creation of the discharge summary incrementally during the hospital course

• Ongoing PDCA cycles built the documentation structure incrementally, with monthly physician/ IT design sessions.
  o The neonatal provider team simultaneously constructed a facsimile of the History and Physical Exam (H&P), Progress Note and Discharge Summary templates, using these for real-time documentation, as well as reviewing and improving upon variations on documentation strategies.
  o Epic Sandbox simulations were conducted as the project matured to allow for more realistic assessments of effectiveness, as well as identification of limitations and needed revisions.
  o Some examples of the PDCA process:
    ▪ Improved efficiencies in data collection and sharing:
      • Initial identification of discrete data fields and implementation-e.g. perinatal factors. Early identification of missing data fields or incomplete data entry in the obstetrical admission process. Discussion with obstetricians and nursing staff, revision of data entry structure in EPIC, and new workflow to capture necessary data. This allowed for more efficient and consistent data entry for all maternal/ antenatal/ intrapartum/ delivery room factors while the mother was being evaluated, and subsequent facile and efficient electronic transfer of data into the neonatal medical record. This would subsequently allow for transfer to the new neonatal H&P.
      • Redundant data collection was common to work flow with nursing and provider collection of health maintenance information (infant metabolic screening tests, critical congenital heart disease pulse oximetry screening results, hearing test, car
seat test, immunizations, physician follow-up appointments). As these needs became recognized in ongoing re-evaluations/ study of implementation, IT added common entry fields that would be accessible and editable selectively by nursing and provider.

- Constructing the discharge summary from birth:
  - Discharge summary template was pre-conceived and a facsimile was utilized in the ongoing EPIC documentation.
  - All elements were pre-configured to eventually build the discharge summary form as the infant approached his/her discharge date.

- Problem-Oriented charting:
  - The transitional workflow encouraged providers to shift from system oriented documentation, to a habit of listing all relevant ICD-10 diagnoses.
  - Efficient and consistent coding of diagnoses: The universe of ICD-10 diagnoses are available, but all common neonatal diagnoses were included in a subset menu of common diagnoses.
  - Progress note template created to allow for problem-based, and system-bundled format for the progress note, maintaining the “SOAP” template familiar to providers: subjective/ objective; assessment and plan.
  - The interim documentation did not utilize the problem-based Epic functionality until the actual program was rolled out in November 2016. This moved compliance from a primarily human vigilance paradigm to a structure and process that facilitated easier documentation compliance.
  - Prior to our “Go Live” date, IT, using the hospital computer lab, coordinated several in-service sessions for all providers on the final documentation system.
Figure 1. Development overview of components of H&P, Progress Note and Discharge Summary Navigators

Measures and Analysis:

- **Hospital clinical documentation improvement (CDI) team** utilize 3M APR-DRG Software, and a hospital employed staff member reviews each NICU admission, including all provider-generated neonatal patient documents (H&P, progress note, discharge summary and consults) in the EMR from admission to discharge. This review is also inclusive of nursing notes, all flow sheets, lab values, and mother’s electronic medical records. The 3M 360 software has an embedded natural language processor that helps the reviewer to identify potential diagnoses and sequence in order of severity. These diagnoses are manually verified by CDI staff. This encoding process is updated and re-sequenced until discharge. Utilizing the APR-DRG codes, the CDIS clinical logic algorithm generates a prioritized list of codes and calculates the Severity of Illness (SOI), Risk of Mortality (ROM) and Case Mix Index (CMI). These results are reviewed by a CDI team staff member.

- When comparing the PRE- and POST-intervention study periods, we used independent metrics to evaluate for any confounding variables in clinical acuity that might impact upon the coding scores. These included monthly average length of stay, NICU total patient days, monthly admissions by birthweight category and average daily census.

- **Average Expected Payment**: the calculated APR-DRG, SOI, ROM and CMI provide the basis for hospital payment calculations. The hospital has a customized payer mix filter with predetermined payment estimations, that factor in third party and government payer mix with
contracted payments, and calculates an Average Expected Payment for each patient. These algorithms remained consistent during the entire study period.

- **Time Study**: One provider (WFL) tracked his total time to complete clinical documentation, parsed into the time-period prior to initiation of the new documentation system, and after: defined as PRE- and POST-intervention. The PRE-intervention period reflects time duration for completion of clinical documentation utilizing the traditional voice-dictated note, transcribed by a hospital contracted transcriptionist. The POST-intervention period is composed of a random collection of electronic medical record documentations using the new documentation process.

- **Provider perception**: There are 13 providers (6 Neonatologists and 7 Neonatal Nurse Practitioners) who provided continuous documentation during the PRE-intervention and through the POST-intervention periods; one NNP began employment during the study and was excluded from the survey. In June-July 2017, a Survey Monkey based survey was conducted for the 12 eligible providers. The survey is comprised of questions addressing subjective assessments of the H&P, progress note and discharge summary processes, as well as an overall assessment of the change.

Statistics:
Data sources: Trendstar program accessing EPIC as well as NICU-based data analyst. Trended data, using Minitab, was presented using statistical process control (SPC) charting to visually present the impact of described interventions. SPC uses entered data to describe common causes of variability, generating control limits, and identifying special causes of variation, or statistically significant variance. Basic descriptive statistics were used, with T-test for test of variance for continuous data using Microsoft Excel software or Minitab, with statistically significant variance defined as p <0.05.

Results:
I. Documentation Metrics: Comparing October 2015-October 2016 to November 2016-May 2017
   - CDI scores:
     - Monthly average SOI scores increased by 11.1% (p = 0.008) (figure 2)
     - Monthly average ROM scores increased by 13.5% ((p = 0.007) (figure 3)
     - Monthly average CMI scores increased by 7.7% (p=0.009) (figure 4)
   - Potential Confounders- no evidence of measurable change in clinical acuity comparing PRE- and POST-intervention periods (table 1):
     - Average Length of Stay: slight increase in POST group, but not statistically significant (p = 0.117)
     - Total patient days: no difference in 3 of 4 weight categories
       - Significantly more Total Patient Days for babies <=1000 grams in the PRE-group (351,282, p=0.024).
     - Admissions: No difference in 4 of 5 weight categories
       - Significantly more admissions in <1000 gm in the PRE-group (14.9,11; p=0.025).
- Average Daily Census: No difference in total, level 3 or level 2 admissions.

Figures 2-4. Trended SOI, ROM and CMI
Table 1. Comparison of PRE- and POST-intervention groups with potential confounders

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>SOI</td>
<td>2.25</td>
<td>2.50</td>
<td>0.008</td>
</tr>
<tr>
<td>ROM</td>
<td>1.26</td>
<td>1.43</td>
<td>0.007</td>
</tr>
<tr>
<td>CMI</td>
<td>3.23</td>
<td>3.48</td>
<td>0.009</td>
</tr>
</tbody>
</table>

**Acuity Indicators**

- **Average Length of Stay**: 19.2 vs. 21.1, *p* = 0.117
- **Total Patient Days**
  - <=1000 gm: 351 vs. 282.3, *p* = 0.024
  - 1001-1500 gm: 189.6 vs. 237, *p* = 0.118
  - 1501-2500 gm: 442.4 vs. 431.7, *p* = 0.829
  - >2500 gm: 346.8 vs. 377.1, *p* = 0.38
- **Admissions-Total**: 73.4 vs. 68.4, *p* = 0.224
- **<1000 gm**: 2.9 vs. 3.0, *p* = 0.938
- **1000-1499 gm**: 3.4 vs. 4.4, *p* = 0.340
- **1500-1999 gm**: 9.1 vs. 10.0, *p* = 0.508
- **2000-2499 gm**: 14.9 vs. 11.0, *p* = 0.025
- **>=2500 gm**: 43.2 vs. 40.0, *p* = 0.251
- **ADC (L2/L3 combined)**: 44.1 vs. 44.9, *p* = 0.884
- **Level 3**: 19.2 vs. 18.6, *p* = 0.748
- **Level 2**: 25 vs. 25.3, *p* = 0.787
- **CCH-SCN**: 5.7 vs. 4.7, *p* = 0.185

II. **Impact on Providers**:

A. **Time Study**: One provider tracked his own time expenditure during the course of the project (figure 5; table 2).
   a. H&P: time allocation increased by 47% (*p* = 0.053)
   b. Progress Note time allocation significantly increased by 91% (*p* < 0.001)
   c. Discharge summary time allocation significantly decreased by 41% (*p* = 0.032)

*Figure 5. Time Study: PRE- and POST-intervention time periods comparing time spent to complete H&P, Progress Notes and Discharge Summary:*
Table 2. NICU Documentation: PRE-intervention (primarily dictation method) compared to POST-intervention

<table>
<thead>
<tr>
<th></th>
<th>PRE- (N)</th>
<th>POST- (N)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>H&amp;P</td>
<td>7:20 (12)</td>
<td>10:45 (10)</td>
<td>0.053</td>
</tr>
<tr>
<td>Progress Note</td>
<td>2:15 (31)</td>
<td>4:18 (24)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Disc Summary</td>
<td>10:12 (15)</td>
<td>7:14 (31)</td>
<td>0.032</td>
</tr>
</tbody>
</table>

B. Provider Survey Results:
Survey Monkey was used to poll all neonatal providers. Of 12 eligible providers, there was a 100% response to the survey. Survey obtained in July, 2017. Questions asked if the new process, as compared to the old process was... (based upon a Likert scale: 1 = much worse; 2 = somewhat worse; 3 = about the same; 4 = better; 5 = much better). Table 3 summarizes the results and are reported as (% answering “somewhat worse”/ % answering “better” or “much better”). No respondents answered, “much worse” for any of the questions.

Table 3. Survey of Providers-Summary

<table>
<thead>
<tr>
<th>Responses: % worse/ % better or much better</th>
<th>H&amp;P</th>
<th>Progress Note</th>
<th>Discharge Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to be comprehensive in my documentation</td>
<td>0% 92%</td>
<td>0% 93%</td>
<td>8% 93%</td>
</tr>
<tr>
<td>Ability to customize my documentation</td>
<td>0% 92%</td>
<td>0% 92%</td>
<td>0% 93%</td>
</tr>
<tr>
<td>Time allotted to accomplish this documentation</td>
<td>25% 67%</td>
<td>29% 42%</td>
<td>17% 67%</td>
</tr>
<tr>
<td>Overall Impression</td>
<td>The overall Documentation experience is...</td>
<td>0% 92%</td>
<td></td>
</tr>
<tr>
<td>My overall efficiency with documentation is...</td>
<td>13% 38%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My documentation accuracy (note reflects the true event) and validity (notes states what I intended) is...</td>
<td>0% 93%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Documentation system has made staff efficiency to collect information from multiple sources...</td>
<td>8% 83%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Documentation system had made the safety of patient care in the NICU...</td>
<td>0% 92%</td>
<td></td>
<td></td>
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</table>

III. Hospital reimbursement:
Comparing the PRE- and POST-intervention study periods, there was a $14,020/month/patient increase in Average Expected Payment for hospital charges ($p < 0.001$)(figure 6, table 3).

There was no difference in payer mix during this time-period (table 3).

**Figure 6. Trended Average Expected Payment**

![Figure 6. Trended Average Expected Payment](image)

**Table 3. Payor mix comparison: PRE- and POST-intervention periods**

<table>
<thead>
<tr>
<th>Differential Payment Estimations</th>
<th>AVG EXP PYMNT</th>
<th>$25,346</th>
<th>$39,366</th>
<th>&lt;0.001</th>
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<tr>
<td>Payer Mix</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>71.6%</td>
<td>72.2%</td>
<td>0.936</td>
<td></td>
</tr>
<tr>
<td>Third party</td>
<td>26.4%</td>
<td>26.3%</td>
<td>0.989</td>
<td></td>
</tr>
<tr>
<td>Self-Pay</td>
<td>0.8%</td>
<td>0.4%</td>
<td>0.791</td>
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</table>

**Discussion:**

A problem-based NICU documentation EMR effectively improves documentation while avoiding dissatisfaction by the participating providers, and improves hospital estimations of APR-DRG-based revenue.

**Addressing Challenges to NICU documentation**

The provider in the neonatal intensive care setting is challenged with a need to rapidly consolidate and integrate data that is being accumulated from several sources. The challenges to this in the NICU setting have been well described [8,9].

The NICU hospital course reflects a continuum of care with clinically relevant data collection beginning with a body of historical information that resides in the maternal
(obstetrical) history: the woman’s pre-existing medical conditions, her ongoing antepartum care and the acute management of the delivering mother during the intrapartum care, which overlaps her admission and subsequent delivery. With the delivery of the newborn, the EMR should be populated with accessible information reflecting the newborn’s delivery room management, and then his subsequent care in the NICU. This clinical course is composed of ICD-10 and text-based diagnoses, assessments and management interventions from not only the neonatal provider and specialist consultants, but also data entry by the NICU nurses, respiratory therapists, pharmacists, occupational therapists, dieticians, social workers and case managers working with the patient’s family as well as a plethora of laboratory testing and imaging study results. The provider routinely assesses, consolidates, and integrates this information into a diagnosis and care plan.

We maintained an awareness of the original goals in a physician note. In 1968, Dr. Weed had identified the importance of the problem-based note, and the importance of organizing clinical data. He outlined the characteristics of effective physician documentation, and the need for annotation of active and resolved problem lists [5]. The need to adhere to these principles is especially relevant when dealing with the intensive care patient with multi-system disease.

In October 2015, transcription services were still being used, as well as early participation in electronic entry of notes. The dictation system was a familiar tool that allowed the provider to generate a progress note rapidly, but the information was not digitally accessible. Our early electronic note entry remained essentially a word document without any structured identification of discrete data items. In both cases, the note structure, content and identification of diagnoses were recorded inconsistently, with a high variation in structure among providers, and did not allow for data tracking, or a linkage to a clinical data warehouse. There also was an inefficient collection and sharing of perinatal risk factors and clinical information with other NICU staff members due to the silo-based nature of documentation, with redundant work flows to acquire necessary information. A patient’s hospital course information was not easily accessible, and organization and completion of a discharge summary consequently was an inefficient and time-consuming task.

During the study period, we addressed these concerns with the following deliverables: (1) Utilize problem oriented charting for documentation. Epic’s suite of documentation tools can be customized to meet complex patient workflows while also facilitating discrete data capture; (2) Provide standard documentation templates for major neonatal diagnoses; (3) Provide standard documentation templates for H&P, daily progress note, and discharge; (4) Create a suite of neonatal documentation smart links that encourage problem oriented charting and optimizes physician workflow efficiency; (4) Front load the problem list at admission with gestational age based problem recommendations giving the physician a quick and easy way to add multiple problem selections; (5) Create a problem preference list inclusive of the most common neonatal diagnoses; (6) Implement a neonatal handoff to facilitate to-do list management and ease of provider handoffs of patient information; and (7) Create a structured course of care to manage pertinent historical data and to facilitate the expedited production of the discharge summary.

Documentation metrics
Illness classification systems function as a predictive model for federal resource allocation and to help track clinical outcomes. All patient refined diagnosis related groups (APR-DRG’s) were developed in 1990 by 3M Health Information Systems jointly with the National Association of Children’s Hospitals and Related Institutions (NACHRI) as the most comprehensive pediatric logic of any severity illness classification system, and was most recently updated to ICD-10-CM. By design, the APR-DRG system reflects completeness, accuracy and specificity of documentation [7]. EMR has been used to improve physician progress note documentation with documented improvement in ICD-9 codes [10], and a provider-targeted educational intervention has been demonstrated to improve documentation as reflected in DRG-based coding metrics [11]. While we were unable to see any improvement in our patient SOI, ROM or CMI scores with our educational intervention, converting to a problem-based software platform within our hospital EMR resulted in significant improvement in documentation, without any demonstrable change in clinical acuity between the study periods. The increase in total patient days and a larger number of <1000 gram newborn admissions in the Pre-Intervention period would only skew towards less difference between the groups, suggesting a conservative appraisal of our improved documentation. Our findings suggest that strategies that are dependent upon human diligence are much less effective than EMR-based process efficiencies.

Provider time expenditure/ provider satisfaction

Physicians generally perceive that EMR improves documentation, although many concerns are expressed [12]. Prior to initiation of this project, there was pre-existing provider bias based upon prior EMR experiences. These included a concern that there would be excessive time utilized for data entry, and note production and decreased productivity. An important goal was to decrease the time burden in generating a discharge summary (the NICU discharge summary often involves a 1-3 month length of stay requiring an extensive investment in time to review the hospital course, collect appropriate information and then transcribe the summary). Our PDCA approach utilized continuous feedback from the end-user, allowing us to refine our templates and note design to better address these concerns.

In estimation of time expenditure, we recognized that many confounders existed in a time study involving more than one provider. After implementation of the EMR, each provider had their own unique approach towards document preparation and note entry. This degree of provider-specific variation did not lend itself well to comparisons among different providers. A single provider case study allowed for consistent measurement, adequate sampling, and provided qualitative insight into changes in time expenditure before and after implementation. These results cannot be taken as anything more than the impact on one individual provider. It did appear that in this one sample, the time required for producing the H&P and progress notes was increased, whereas the time for generating a comprehensive discharge summary was significantly decreased. We obtained overall insight by surveying the entire provider group. Survey methodology is limited by design, however in the context of our project, allowed for a systematic way to understand the provider experience. Our results are highly valid, reflecting the entire provider population that experienced the documentation process. In the context of a survey design, we were looking only for non-inferiority or a perceptual equivalence which is a more cautious approach to interpretation of our results. Complementing our case
study of time allotment, the survey did not demonstrate a provider perception of increased
time allotment for documentation. In fact, there were no Likert scale “much worse” selections,
and generally a favorable response on all questions, including the overall documentation
process, documentation efficiency, accuracy and validity, ability for staff to obtain and report
clinical data, and overall perception of improved NICU safety. Our provider group adopted and
adapted well to the new documentation process, without any evidence that the new process
was worse, suggesting a better process than the one it replaced. We believe that early and
ongoing provider engagement in the development process played a large role in ensuring
greater provider satisfaction.

Reimbursement

Projected EMR costs have remained an ongoing barrier to implementation, despite the
emerging body of evidence that implementation of EMRs may lead to improved health
outcomes with decreased medical errors and improved disease management [13, 14].

There has been some evidence that there is a positive return on investment in adopting
EMR in an ambulatory setting [15]. A challenge to this is that while adoption of EMR may
digitalize and standardize many of the clinical processes, they also impact on revenue-cycle
functions. Poor awareness of this may have a negative impact upon an organizations cash flow.
Accurate and comprehensive capture of the clinical encounter is an important feature of an
effective EMR, and reflects an effective merging of clinical and revenue-cycle operations with
information technology [16].

Our documentation process focused not only on accurate and facile documentation of
appropriate ICD-10 diagnosis codes linked to concurrent supporting clinical elements, but on
development, design and entry interfaces based upon a tight collaboration between the
information systems programmer and the clinicians.

Clinical quality has become a major driver since the 2001 Institute of Medicine’s
landmark publication: Crossing the Quality Chasm: A New Health System for the 21st Century
[17]. Concurrently, healthcare financing continues to move from traditional fee-for-service
models to a more pay-for-performance, outcomes-based reimbursement. Along these lines,
hospital-based EMR’s must provide the ability to effectively and efficiently document and track
defined clinical interventions and outcomes on an individual and aggregated basis.

There is no doubt that the emergence of the electronic medical record is transforming
the way healthcare is delivered. The implementation of this change is taking place in the face of
perceived provider dissatisfaction, decreased productivity, and uncertainty at the corporate
level on the return on investment. The next step in healthcare reform involves improving value
(as a function of outcomes/ cost), especially as we are driven to improve clinical outcomes in
the face of increasing fiscal accountability [18].

Of interest, is that this project was primarily focused on physician efficiency and
documentation quality. The financials were never a primary goal. Our findings suggest that with
a focus on high quality care delivery, appropriate reimbursement gains will follow.

Conclusions
Our project has demonstrated the clinical and fiscal effectiveness of a collaborative effort to create a more effective documentation system. There is clear non-inferiority to our prior documentation process with respect to overall efficiency, and a suggestion of an improved overall experience, as well as improved patient safety based upon provider perception. We demonstrated that improved clinical documentation may also lead to improved hospital revenues, and clearly extends the dialogue on the role of providers in addressing value-based care.

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Conflicts of Interest:
None to declare

References

Abbreviations: Electronic medical record (EMR); Neonatal Intensive Care Unit (NICU); History and Physical Exam (H&P)