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Computerized clinical documentation in the pediatric intensive care unit : quality of notes and factors that affect the quality

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COMPUTERIZED CLINICAL DOCUMENTATION IN THE PEDIATRIC INTENSIVE CARE UNIT: QUALITY OF NOTES AND FACTORS THAT AFFECT THE QUALITY

By

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TABLE OF CONTENTS

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Computerized Clinical Documentation in the Pediatric Intensive Care Unit: Quality of Notes and Factors that affect the Quality

Abstract

Introduction: Clinical documentation is an essential aspect of the patient-clinician encounter and serves many purposes. With the increasing use of the electronic health record, computerized clinical documentation will soon become ubiquitous. It is one of the means of communication between healthcare providers. Ensuring good quality documentation is crucial to good patient care. The intensive care unit is a complex, dynamic environment and large amounts of data are generated daily for each patient. Good documentation becomes challenging in this situation. The quality of documentation in the intensive care unit has not been studied.

Objective: The overall quality of computerized clinical documentation in a pediatric intensive care unit was evaluated; documents were also rated on the basis of individual components of quality. Certain factors that may affect the quality of the notes were also studied.

Methods: A retrospective chart review was performed and 100 history and physical and progress notes were rated using the PDQI-9 tool. Data regarding the author of the notes, time of starting and completing the note in relation to the time of service, length of hospital and intensive care unit stay prior to the day of service, number of notes written in the intensive care unit that day, the day of the week that the service was provided, and severity of illness of the patient were collected.

Results: The overall quality of the notes was good with a mean total PDQI-9 score of 39 (maximum score possible is 45). Almost all notes were rated highly (score of 4 or 5 out of a maximum of 5) on succinct (99%) and a large majority of them were rated highly on comprehensible (93%), up-to-date (92%), accurate (92%), internally consistent (92%), synthesized (81%) and organized (80%). About two-third of the notes were rated highly on useful and 37% on thorough. There was a statistically significant correlation between the quality of the notes and the severity of illness and number of notes written on that day. As the number of notes increased, the quality of the notes deteriorated if they were written by residents or fellows, but not if they were written by nurse practitioners or attending physicians.

Conclusions: Despite the complexities of the intensive care unit and the limitations of a commercial EHR, clinicians could capture information about the patient, synthesize it and generate good quality notes. The quality of notes declined with an increase in the number of patients or severity of illness.

Introduction

Clinical documentation is an essential aspect of the encounter between a patient and the clinician. Clinical notes are used to document the clinician's collection of information, assessment of the problem and management of the patient. They reflect the care that has been provided and the rationale for the care. Clinical documentation is one of the means of communication between healthcare providers, and facilitates multidisciplinary team-based care, coordination and delivery. It is utilized for reimbursement, reporting and quality improvement. Computerized clinical documentation (CCD) refers to documentation of patient care using computers.

Although the clinical note is used for reimbursement and legal purposes, its primary role should be to document patient care.[1] The main purpose of documentation should be to support patient care and improve outcomes.[2] In order to serve this purpose, documentation must be accurate, complete, concise, consistent and easily understood by users. Poor documentation can result in errors and adverse incidents.[3] A standardized format is often used to ensure consistency and completeness. Use of headings improves organization and readability. Use of structured data such as vital signs as discrete data pulled in on command from the monitor versus free text entry has been recommended to improve accuracy. The use of standardized templates incorporating a standardized format, headings, use of discrete data as well as free text has been recommended.[3]

In order to improve the clinical efficiency without compromising quality, CCD should be based on the clinician's work flow and cognitive needs.[4] The intensive care unit (ICU) is

a dynamic environment with a unique workflow characterized by multiple disciplines involved in the care of a single patient, intense networking, multiple channels of communication, unstable and fluctuating clinical status of patients, frequent interruptions to clinicians, multitasking by clinicians, high cognitive burden, multiple medications and interventions and large amounts of physiological, laboratory, imaging and other data.[5-8] Computerized clinical documentation becomes complex. Completion of a clinical note in a single sitting is challenging. When the note is compiled at different times and includes the use of inserted objects such as vital signs and laboratory results, it may not always make sense when completed. Trying to include all the information collected makes it difficult for the reader to recognize relevant and abnormal values, as well as makes the note lengthy, and difficult to read. Incorporating the frequently changing clinical status and interventions, and the recommendations of numerous consultants and other members of the multidisciplinary team (nursing, respiratory therapy, clinical pharmacy, dietician, physical and occupational and speech therapy) may make it difficult to synthesize the note in a clear and comprehensible manner. The user may not be able to discern, within this complex summary, the rationale for medical decision-making.

Clinical documentation by critical care clinicians presents comprehensive and up-to-date snapshot of the patient and is used as a method of communication and coordination of care. Although, CCD in the ICU is important in patient care and the need to measure the quality of electronic notes has been highlighted, there have been no published studies that evaluate the quality of CCD in the ICU.[1] The objective of this paper is to study the

quality of CCD in a Pediatric ICU (PICU), and to determine the factors that are associated with the quality of documentation.

Review of literature

Clinical Documentation

Clinical documentation or notes are used by healthcare providers to record encounters with the patient. Historically, they have been narratives describing the patient's history and observations about the patient and have served as a medical record designed to resemble a lab notebook. They allowed providers to recall the past and to record the care provided. As clinicians recorded medical decisions, they not only documented what they saw and what they did and why, but also what they planned to do. Over the years, their role has evolved to serve many different purposes. Clinical notes can serve as cognitive aids that allow clinicians to reflect on their thoughts about the patient and enhance reasoning and decision-making.[9] Clinical notes allow clinicians to express their perspectives, are a means of communication, and allow the clinical team to develop a shared understanding and coordinate care. They are used to justify medical services provided to the patients for claiming reimbursement. They are sometimes felt to reflect the quality of care provided and are a demonstration of physician accountability. They fulfill regulatory requirements. Elements in clinical notes have been included to document use of safe practices. They serve as legal documents that can be used as evidence of the patient's condition and the care provided. They have been used for research.

Computerized Clinical Documentation (CCD)

As the adoption of electronic health records (EHR) increases, CCD is expected to become the principal method of clinical documentation. As compared to paper records, CCD allows multiple users to quickly access the records from multiple locations. In addition to these benefits, CCD has several other advantages over paper-based records. With the advent of CCD, there was no longer the problem of illegibility. CCD creation can be enhanced by content import technology including the use of templates, macros and automated data importing designed to improve the completeness and accuracy of the note. The use of CCD is expected to improve communication between clinicians, decrease medical and diagnostic errors, and improve efficiency of documentation.[10] CCD has been described as the principal source of patient information, and although it is inadequate, it serves a tool for communication and care coordination.[11]

Traditionally, clinicians create clinical notes soon after the patient encounter. Prior to the patient encounter, clinicians often refer to previous notes. It is not unusual for clinicians to begin documentation while reviewing the medical record and continuing the documentation after or even during the patient visit. Note creation, especially in the inpatient setting, can be a fragmented process with many interruptions.[12] Three temporal patterns of documentation were noted in an inpatient setting: progress notes were completed immediately after visiting the patients and prior to rounds; notes were written at the end of a shift after discussing and following up on the plans, and notes were started in the morning, interrupted frequently and written periodically throughout the day, when the opportunity presented itself. While writing a note on a general medical unit,

physicians transitioned on an average 10 times.[12] The reasons for the disruptions included transitioning away to look elsewhere in the EHR, to refer to paper notes, to reach out to colleagues over the phone or in person, or to close the note.

Clinical documentation in the intensive care unit (ICU)

The ICU is a dynamic environment characterized by multiple disciplines involved in the care of a patient, intense networking, multiple channels of communication, unstable and fluctuating clinical status of patients, frequent interruptions to clinicians, multitasking by clinicians, large numbers of physiological, laboratory, imaging and other data, high cognitive burden, and multiple medications and interventions.

To claim reimbursement for critical care services provided, the physician must document critical illness or injury, assessments of patient condition, "impairment of organ systems" based on relevant data, rationale, and timing of interventions and the patient's response to treatment.[13] In some ICUs, critical care physicians can be compared to the quarterback of a team, responsible for directing and coordinating multidisciplinary care. Thus, the critical care note should tie together relevant and important information from different sources, provide the critical care physician's perspective while incorporating or overriding the recommendation of other clinicians and providing a rationale, and paint an overall coherent picture of the patient's condition and plan of care.

Information overload is a challenge for clinicians in the ICU. Large amounts of information is generated by healthcare providers, bedside monitors, laboratory tests,

medication orders and other patient care related events and distributed across multiple sources including paper and electronic records and healthcare providers.[14] In one study, greater than 1300 data points were generated per patient per day of ICU stay.[15] In another study, the median number of new data points per patient was 1008.[5] This can overwhelm the cognitive capacity of the clinician and presents problems for extracting relevant information and analyzing it and presenting it in the CCD in an accurate, concise and organized manner. This can result in patient harm especially at times of transition of care.[8,16,17]

Electronic data organization support through structured text helped novice psychiatric residents reduce cognitive load of sifting through large amounts of narrative data and guiding them to focus on relevant data. A novel health care user interface was that extracted relevant data and presented it in systems based packages was developed and its effect on provider task load, error, and time required to complete the task was compared to a standard comprehensive electronic medical record interface.[5] The novel user interface that was designed based on the information needs of the ICU provider contained fewer data points as compared to the standard electronic medical record interface. It was associated with a significantly reduce task load, time to task completion and number of errors of cognition associated with the identification and subsequent use of relevant patient data.

In the inpatient setting, ineffective communication has been associated with increased length of stay, increased patient harm and increased resource utilization.[18-21] In one ICU,

verbal communication was found to be the preferred method of communication.[22] Residents and nurses asked each other for information, discussed orders placed in the electronic health record and updated each other verbally. Although CCD enhanced certain aspects of clinical workflow, clinicians found it difficult to update information and keep it accurate. This resulted in the perception of the electronic health record being "a shift behind". The reliance of clinicians on verbal communication may be a result of this perceived lack of updated documentation.

Although templates are frequently used creating clinical notes, physicians in two ICUs felt that predefined forms and templates restricted and impeded the ability of the physicians to express themselves. A flexible, free-form document editor with domain-informed patient data assistance for inserting relevant patient information into the note was preferred.[23]

A medical note creation prototype for ICU physicians was developed with the engagement of the ICU physicians.[23] The prototype was designed to provide intelligent, interactive data assistance with integrated, user-controllable data retrieval, updates, and alerts. There were several challenges to the design and testing of the prototype that included taking into account the different scales of patient information with varied patient data profiles.

Quality of Computerized Clinical Documentation

Although clinical notes have been written for over a century, and used as a reflection of care provided, there have been few reports about the quality of notes until recently.

Clinical notes are viewed by several users for different purposes: clinicians use it for planning patient care; case managers and social workers for making arrangements for patient care following discharge from the hospital; insurance companies, billers and coders for issues with payment; researchers for research. The quality of notes may be defined in various ways and characterized differently with varying elements based on the perspective of the user. It is crucial to define and measure these attributes if one is to determine the quality of clinical documentation.

Unfortunately, there are no universally accepted criteria to define or benchmark the quality of inpatient clinical documentation. In one study, the authors evaluated the quality of outpatient clinical documentation from perspectives of different stakeholder groups.[24] Three organizing themes emerged: characteristics of quality in clinical notes, desired elements within the clinical notes, and system supports to improve the quality of clinical notes. Characteristics of a high quality clinical note were conciseness, presence of sufficient information, including explanations of the clinician's thought process and plan of care. It should be clear and comprehensible to all who might read the note. It should contain information that is current, accurate and prioritized for action. The font should be appropriate, the handwriting legible, the spelling correct, abbreviations few or absent, and the syntax understandable. The note should be organized and tell a continuous story about

the patient. The content of the note included details of the elements that the stakeholders expected in a quality clinical note. These elements changed with different stakeholder groups who accentuated the details of the note that were useful to their role.

Another study that interviewed healthcare providers discovered that the efficiency of the document system with respect to time, and the availability, expressivity, structure, and quality were the most important factors that influenced satisfaction with clinical documentation systems.[25] Providers defined note quality by legibility, accuracy, thoroughness, and compliance with administrative documentation standards.

In another study, four factors were identified to be associated with perception of quality; well-formed, comprehensive, accurate and compact.[26] Another study recommended that clinical data capture and documentation should be clinically pertinent, patient-centric, accurate, relevant, reliable, valid, and complete, and must facilitate multidisciplinary, team-based care, coordination and deliver.[4] Completeness, content and accuracy have been attributes used to defined quality but have been difficult to define.[24,27,28]

With the introduction of CCD, certain elements that diminish quality such as illegibility and absence of data have been abolished.[29] Some researchers have found that CCD resulted in more complete documentation and more accurate documentation as compared to paper-based records.[30,31] Others have noted no impact on quality or lower quality documentation and increased risk of inaccuracies.[11,32,33]

However, there have been unintended consequences of CCD that have given rise to new concerns about the quality of the note.[32,34-39] There have been several reports of repetition of content that has been copied and pasted, and information that is not current and incorrect.[40-42] These primarily affect the readability, accuracy and conciseness of the note and are usually the result of content import technology. Copy and paste features are commonly used. In one study, the authors found that 9% of progress notes that were studied contained copied or duplicated text.[33] Most were of little consequence, but some introduced misleading errors into the record and some seemed to be unethical or possibly unsafe. When copy and paste features are used, notes tend to be longer with less internal cohesion.[43] The use of inserted objects may result in fragments of information that are collected at different times and when this information is presented as a whole, it is not necessarily salient. In addition, thoughtless insertion of large portions of information such as copying a large number of laboratory results makes it difficult to discern which results are important or relevant. Pre-compiled templates make it easy to enter in information, but harder to extract higher level reasoning. There have been other reports of problems such as information overload, understanding the author's intent and difficulty in communication.[29,40,44] The use of templates, although designed partly to enhance completeness, can result in large amounts of blank spaces.[32] Templates have been perceived to limit clinician expressivity, efficiency and autonomy.[11] Input errors made by physicians are not uncommon with CCD. In one study, 60% of patients whose charts were reviewed for input-errors had one or more errors with an average of 7.8 errors per patient.[32] The study also found that 20% of notes had an element of copying and the average error per copied note was 1.01.

CCD is used to share patient information, convey clinical thinking and enhance are coordination, and is expected to be current and correct. However, when documentation is found to be inconsistent, copied, incoherent or delayed, clinicians and administrators experienced a loss of trust.[11] They wished for system improvements and better organization of CCD.

Tools to Assess the Quality of a Clinical Note

Although there have been several reports on the quality of clinical documentation, there has been no uniform or consistent method to do so.[45] Most of the studies have assessed the accuracy or completeness of documentation. There are few valid and reliable instruments that have been developed to assess the quality of clinical documentation.

QNOTE is an instrument that rates a clinical note using certain criteria (or components) to rate various sections (or elements) of the note.[46] The 12 elements in the clinical note are chief complaint, history of present illness, problem list, past medical history, medications, adverse drug reactions, social and family history, review of systems, physical findings, assessment, plan of care, and follow-up information. One or more of 7 components were used to evaluate each of these elements. The 7 components are clear, complete, concise, current, organized, prioritized, and sufficient information. The QNOTE has been validated for outpatient clinical notes and was the instrument used to determine whether electronic health records improve the quality of clinical notes.[46,47]

A 22-item instrument, the Physician Documentation Quality Instrument (PDQI) was developed from a review of literature and opinion of experts to measure inpatient note

quality.[26] There was preliminary evidence for the construct validity and internal consistency reliability of this instrument. The scope was limited to the use of physician notes that are used to support clinical communication with other healthcare providers involved in the care of the patient. The Institute of Medicine recommends that data in medical records be legible, accurate, complete and have meaning.[48] The data quality attributes in PDQI are well-formed, comprehensible, accurate, and compact. Each of these attributes have components. The components for well-formed consist of clear, uncluttered, organized, structure, nonredundant, and synthesized. Comprehensible includes legible, coherent, useful, correct, comprehensible, and consistent. Accurate comprises of up-to-date, complete, accurate, thorough, current, and relevant. Compact is made up of brief, concise, succinct, and focused.

The PDQI was further refined to reduce the number of items and resulted in a 9-item PDQI (Appendix).[49] The nine items are up-to-date, accurate, thorough, useful, organized, comprehensible, succinct, synthesized, and consistent. Each item is rated on a five-point Likert-like scale, with the highest value of the scale being equivalent to a note that fits the description of ideal characteristics. The scores on each of the 9 items are added to get a total score that can range from 9 to 45. The PDQI instruments focus on descriptive characteristics of the note and were not intended to assess the presence or absence of specific elements in the note (e.g. “reason for admission” in an admission note). Unlike QNOTE, PDQI-9 evaluates the entire note as a global entity rather than assessing different sections of the note individually. The tool was developed to be applied to three notes of interest; admission (or history and physical), progress, and discharge notes.

PDQI-9 has been used to assess the method of documentation (templates, free-form or dictation) and quality of notes for primary care providers and specialists, and to determine factors that contribute to higher quality notes for chronic disease.[50] It has also been used to examine the relationship between note quality and quality of care.[51]

An instrument was developed to measure the quality of CCD based and used to study practitioners (including physicians), nurses and administrators perceptions of document quality.[52] They noted that the perception of quality differed depending on the role. The instrument was developed from interviews with physicians, nurse practitioners, physician assistants, and administrative staff such as billers, coders, medical information specialists and quality assurance staff. There were 10 items in the instrument and were based on the themes identified from the interviews.

Quality of Clinical Documentation in the ICU

The ICU is a data-rich environment. As compared to other units in the hospital, patients in the ICU are more likely to have invasive monitoring and be supported with mechanical ventilation, renal replacement therapy and extracorporeal membrane oxygenation or ventricular assist devices. They have vital signs documented more frequently and have a greater number of laboratory, imaging and other diagnostic studies performed. Patients in the ICU have complex medical problems, may be unstable and have a fluctuating course. Each patient is likely to be seen by a greater number of healthcare providers. This brings additional challenges to clinical documentation. One study discussed whether clinical documentation should be a composition of information versus a synthesis of information

and this is especially applicable to the ICU.[12] Replication of information in the clinical note, which can be easily obtained in the electronic health record, can result in information overload. On the other hand, integrating large amounts of information, interpreting it and creating a CCD that provides a comprehensive view of the clinical course, and the rationale for the decision-making and plan of care can result in cognitive overload. The final result can be redundancy, poor document readability, and use of unapproved abbreviation.

Content importing technology (CIT) such as templates, macros, automated data points and copy forward are techniques that enable clinicians to efficiently document and avoid errors.[53] However, the information must be meticulously reviewed and updated. Use of CIT is highly prevalent.[54] CITs also has potential risks to patient care.[54] Copying and pasting- health status of the patient on the date and time of the encounter may not be accurately and succinctly described. Macros or template physical examinations with prepopulated findings raise questions surrounding the accuracy of reported examination findings, as well as whether the recorded examination was actually performed. The use of CIT when used in the assessment and plan sections of a patient encounter can have more serious concerns. For example, patients with multiple, complex problems may have complex care plans that are internally inconsistent, inaccurate and/ or outdated. The indiscriminate use of CIT in a patient's note can result in unnecessary lengthy provider documentation that contains redundant or extraneous information. Copying information that is not pertinent to the patient's condition at the time of the encounter can lead readers to misinterpret the chronology of a patient's illness. Excessively long documentation can

lead to “reader fatigue” increasing the risk that the reader will overlook critical new information. The EHR has the ability to bring salient information from different sources to the user: physiological data is imported from the bedside monitor, and laboratory, imaging and results of other diagnostic testing from separate information systems or modules, clinical documentation from various healthcare providers of different disciplines and multiple sites. Results of other diagnostic tests and documentation by other healthcare providers can also be viewed. However, in order to review this data in order to synthesize a note, the clinician has to switch between different areas of the EHR to gather relevant information. The inevitable cost is overload of working memory and loss of content, conditions that result in the increased possibility of information loss and error. To compensate, the clinician may revert to noting the jotting the findings on paper before entering it into the note; this has the potential to introduce inaccuracies. Macros or the copy and paste features may be utilized; this may result in a lengthy, often unreadable note that duplicates data available elsewhere in the system.

Understanding the clinical course is paramount to situational awareness and planning care. There has been discussion as whether clinical notes should be problem-based or systems-based. The Centers for Medicaid and Medicare (CMS) has included the use of problem lists in Stage 1 of Meaningful Use.[55] Problem lists have now been incorporated in clinical notes and their use is being encouraged by hospital administrators. However, it has been shown that clinicians tend to think using a systems-based approach.[56] This can be confusing while creating CCD and can potentially result in inconsistencies, overly long notes and poor readability.

Clinical documentation is one of the means of communication between healthcare providers. In the dynamic environment of the ICU there is frequent communication between different healthcare providers throughout the day and night. In one ICU, verbal communication was the preferred method of information exchange.[22] Although CCD may not be the preferred means of communication in the ICU, it is still vital to document the discussion so that other healthcare providers understand what was done and why. Interdisciplinary rounds are an integral part of a day in many ICUs where the discussion includes generating the goals of care and plan for the day. It was found that one-quarter of goals stated on ICU interdisciplinary rounds were not documented in the EHR.[22] The EHR is often perceived to be a shift behind and only includes care that has already been provided to the patient.[23]

The complexity of medical illness, the co-morbidities, the complications and the severity of illness make completeness of the clinical note an elusive concept. It is difficult to conceptualize a definition that can be applied even to a single ICU.

To summarize, clinical documentation in an ICU is an important task. It brings together the myriad of information that is scattered across various sources, and information that is communicated verbally. The information is organized to create a comprehensive current status of the patient. The clinical note includes assessment of the patient, the goals and plan of care, rationale for the care, as well as communication with the patient or family and their understanding and wishes. This clinical note serves as a source of information

for other healthcare providers. For good quality patient care, it is crucial that the documentation be of excellent quality.

There is no instrument that has been specifically designed to evaluate the quality of clinical notes in the ICU. To the best of my knowledge, there are no studies that have been published that assess the quality of clinical documentation in the ICU.

Research questions

In this paper, I report the results of a retrospective review of the quality of CCD in the PICU, specifically the history and physical (H&P) and progress notes written by critical care providers, using the PDQI-9. I also examine the effect of certain factors on the quality of the notes.

The specific questions that I address are:

1. What is the overall quality of the notes?
2. How good are the notes with respect to specific attributes such as "up-to-date", "accuracy", "thorough", "useful", "organized", "comprehensible", "succinct", "synthesized" and "internally consistent"?
3. When were the notes started in reference to the time of service?
4. Did the time of starting the notes affect the quality of the notes?
5. Did it matter whether the notes were written by a nurse practitioner, resident, fellow, or attending physician?

6. Did the length of hospital or PICU stay prior to the date of service affect the quality of the note?
7. Did the number of patients seen by the clinician on that day affect the quality?
8. Did the day of the week influence the quality of the note?
9. Did the severity of illness of the patient affect the quality of the note?

Methods

Setting

The study was conducted at a tertiary care academic institution. Approval was obtained from the institutional review board (IRB) at this institution as well as the IRB at Oregon Health and Science University (OHSU).

The subjects for the study were admitted to the PICU of the Children's Hospital from January 1, 2014 to March 30th 2014. The PICU is a 25-bed unit and had 1350 admissions in 2013. The median length of stay is 1.2 days; 9.5% of patients have a length of stay over 7 days. The Pediatric Index of Mortality 2 (PIM 2) and Pediatric Risk of Mortality Score 3 (PRISM 3) are commonly used measures of severity of illness.[57, 58] These measures use physiological and laboratory data obtained within the first 24 hours of admission to the PICU to calculate the severity of illness and risk of mortality. The mean and median PIM 2 risk of mortality in this PICU is 2.19% and 0.8%. The mean and median PRISM 3 risk of mortality is 1.29% and 0.3%. The PICU is a mixed medical-surgical and cardiac ICU and cares for patients with a wide variety of conditions including patients on extracorporeal membrane oxygenation, ventricular assist devices,

renal replacement therapy, patients who have complications following of bone marrow transplantation, and patients who are awaiting or who are recipients of solid organ transplants including heart, kidney, liver, small bowel and multivisceral transplants.

The hospital has deployed a commercial EHR system (EpicCare Inpatient EMR, Epic, Verona, Wisconsin). The PICU utilizes the EHR for clinical documentation, computerized provider order entry, nursing flow sheets, laboratory results, radiologic imaging and reports, and results of other diagnostic studies. The PICU has been using the computerized clinical documentation module with semi-structured templates for H&P and daily progress notes, and these templates have not been modified since they were originally built over three years ago. The templates contain pre-defined headings and subheadings, automated data imports, data entry fields including drop down menus and free text entry. They also include the use of macros. The CIT such as automated data imports and macros are not updated each time the note is opened. Clinicians in the PICU enter the notes directly into the EHR via keyboard and mouse. The institution has guidelines for inpatient documentation, which were approved approximately a month prior to the start date of the study, that define best practices in clinical documentation. The guidelines specify that the content of documents in the medical record should support accurate representation of quality of care. It includes information about requirements that are designed to meet this need.

Notes are written by Pediatric residents and nurse practitioners and occasionally by Pediatric Cardiology fellows who rotate through the PICU. Pediatric residents rotate

through the PICU for four weeks during their second and third years of residency. Pediatric Cardiology fellows rotate through the PICU for four weeks a year; occasionally, they write notes on patients with primarily cardiac problems. The PICU has dedicated nurse practitioners. During the study period, there were six nurse practitioners with an average experience of 5.6 years (in their role as a nurse practitioner in the PICU). Attending physicians rarely write notes; however, they review all notes written by residents, nurse practitioners and fellows. They may revise the note and include an addendum to provide clarification or supplement or update information.

On a typical day (which includes weekends), residents and nurse practitioners arrive at about 6 am and received sign out report from the overnight resident and/ or nurse practitioner. They review information in various sections of the EHR and evaluate the patient at the bedside. They may obtain further information from the bedside nurse, other healthcare providers or the patient's family. The information is analyzed to formulate a plan of care. Most residents and nurse practitioners write the information in a structured format on paper. The information that is gathered is presented on multidisciplinary, family-centered rounds that begin at approximately 8 am. During rounds, the plan of care is formalized. After rounds, residents and nurse practitioners complete tasks including communication with other healthcare providers, following up on pending test results, bedside procedures, admitting new patients and transferring or discharging patients. Daily progress notes are expected to be completed by the residents and nurse practitioners before evening sign out that occurs at 4 pm every day. Residents and nurse practitioners are also expected to complete an electronic sign out note (manually entered) by 4 pm.

About one half of all to the PICU admissions are scheduled; this includes patients who undergo elective surgery. These patients have been seen previously by healthcare providers and information about the encounters is available in the EHR. Most other admissions are from the hospital's emergency department or other floors, or from other hospitals. Identifying information is available to the Pediatric Critical Care service prior to their arrival. If they have been seen at the hospital or other hospitals with the enterprise, information of the encounter can be accessed in the EHR. All patients admitted to the PICU have an H&P note entered by the Pediatric Critical Care service. H&Ps are expected to be completed soon after admission to the PICU but are often delayed due to rounds, sign out rounds or if the severity of illness necessitates urgent interventions.

Study Design

This is a cross-sectional study where randomly selected documents were subjected to a retrospective, manual review.

Subjects

Inclusion Criteria

Inpatient clinical notes of patients admitted to the Pediatric Intensive Care Unit (PICU) between January 1, 2014 and March 30th, 2014.

Exclusion Criteria

Inpatient clinical notes written by physicians or nurse practitioners for the Pediatric Critical Care service that were neither H&P nor daily progress notes were excluded. These included procedure notes, and progress notes that were updates to the daily progress note.

Inpatient clinical notes that were not written by the Pediatric Critical Care service were also excluded from the study.

Procedures

Study data were collected and managed using REDCap electronic data capture tools hosted at the Cleveland Clinic. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing an intuitive interface for validated data entry, audit trails for tracking data manipulation and export procedures, automated export procedures for seamless data downloads to common statistical packages, and procedures for importing data from external sources.[59]

A list of patients admitted to the PICU on each day between January 1, 2014 and March 30, 2014 was obtained. Randomization was performed and a new list was generated with the patient's medical record number and date. The author examined the CCD that corresponded to the medical record number and date and identified 100 documents that met the inclusion criteria and not the exclusion criteria.

Variables

Metadata

The following information was obtained about each document from the EHR:

1. Note writer (nurse practitioner, resident, fellow, attending physician): This refers to the clinician who was responsible for generating the note.
2. Date and time of service: This refers to the date and time that the note writer evaluated the patient. The date is automatically generated by the EHR when the note is started and is identical to the date on which the note was started. The time is manually entered by the note writer.
3. Date and time of day that the note was started: This is generated by the EHR and reflects the date and time when the note was initially started.
4. Date and time of day of filing: This information is generated by the EHR when the note is signed and closed by the attending physician. It reflects the last time that a change was made to the note by the attending physician.
5. Date of admission to the hospital: This refers to the date that the patient was admitted to the hospital.
6. Date of admission to the PICU: The date of admission alludes to the date of admission to the PICU.

While entering the date and time of service into the database, the corresponding day of the week was noted on the calendar displayed by the database.

Measures of severity of illness, PRISM III and PIM 2 were obtained from VPS, Virtual PICU Systems, LLC, Los Angeles, CA.

Rating the Quality

The author reviewed the notes and used the document quality assessment instrument, PDQI-9, to rate the quality of each note. The author is trained and board-certified in Pediatric Critical Care Medicine. Although each component of PDQI-9 has been loosely defined by the developers of the instrument, the author defined criteria and relative weights for the criteria, a priori, that would further clarify each component and determine the rating. However, on applying these criteria to a set of test documents, the author found that it was not feasible to rigidly define the components so that they could be suitably applied to the variety of patients typically seen in the PICU. Additionally, the omission of a certain criterion for a particular note may be more important than its exclusion in another note. These criteria defined a priori were therefore merely used as a guide, and not strictly adhered to, for rating the quality of the CCD. The author had access to the EHR for additional information such as vital signs and physiological data, test results, prior notes, and documentation by other healthcare providers.

Analysis

Descriptive statistics have been used to report variables of the study including quality of the documents and the factors that may affect the quality. The factors that may affect quality include the note writer, the time of starting the note in relation to the time of service (calculated as the difference in minutes from the time of the note to the time of

service), the time of filing the note in relation to the time of service (calculated as the difference in minutes from the time of filing to the time of service), the day of the week, the number of notes written by the Pediatric Critical Care clinicians on the day of service and the PRISM III and PIM 2 scores. The quality of the documents is reported as the total PDQI-9 score as well as the individual components of the instrument. Spearman correlation and Wilcoxon tests were used to determine whether or not there was a correlation between document quality (total score and individual scores) and the other variables.

Results

Characteristics of CCD

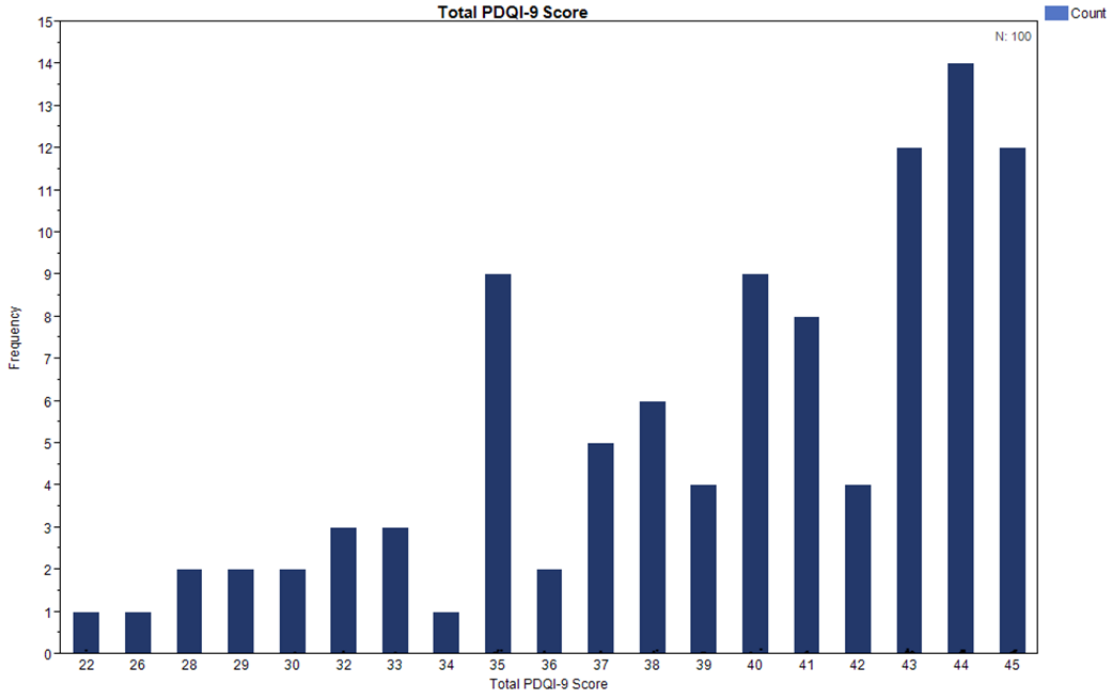
A hundred documents were reviewed. Seventy nine percent were progress notes and the remaining 21% were H&Ps. Thirty one percent were written by nurse practitioners, 63% by residents, 4% by fellows and 2% by attending physicians. The median number of notes written each day was 18 (range 9-32). Between 10 (on Sundays) and 21(on Fridays) notes were written on each day of the week. The median number of notes written on weekdays (Monday through Friday) was 20 (range 9-32), and on weekends (Saturday and Sunday) was 15 (range 12-25). The notes were started 9.65 $\pm$ 169.63 minutes (mean $\pm$ SD) after the time of service. Forty eight percent (39/81) of the notes were started before the time of service, 12 % (10/81) were started at the time of service, and 40% (32/81) after the time of service. The time that it took for the attending physician to review and complete the note was 7 hours and 13 minutes (median) from the time of service (range of 14 minutes to 29 days 39 minutes). Eighty three percent (67/81) notes were filed

within 12 hours from the time of service. Nineteen notes did not have the time of service documented. The median number of days that the patient had spent in the hospital prior to the day that the note was written was 4 days (range of 0-67days). The median number of days spent in the PICU prior to the day that the note was written was 2 days (range of 0 - 62 days). Sixteen of the 100 notes reflected the first inpatient encounter for the patient's hospital admission, and 22 were documentations of the patient's first day in the PICU (excluding prior PICU encounters during the same hospital stay after which the patient had been transferred out of the PICU). Thus, 84% of CCD had a prior inpatient note and 78 % had a prior PICU note (for the same problem). The median risk of mortality as determined by PRISM III was 0.51% (range 0.07 - 11.2 %) and by PIM 2 was 1.13 % (range 0.02 - 41.92 %).

Quality of CCD

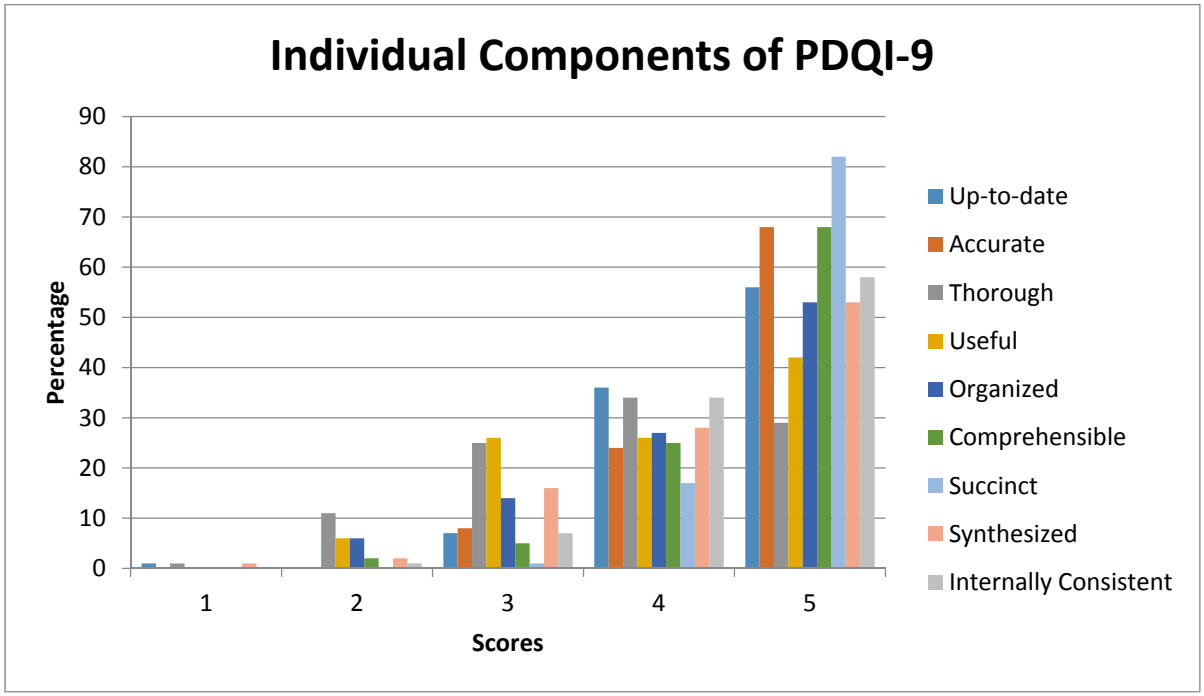
The total PDQI-9 score was 39 $\pm$ 5 (mean $\pm$ SD) (median and range, 40.5, 22-45). The total PDQI-9 score can vary from a minimum of 9 and to a maximum of 45. Figure 1 shows the distribution of the total scores.

Figure 1. Total PDQI-9 Score



The scores for the individual items are shown in Figure 2. The median score for seven of the nine individual items was 5 (maximum possible score); the score was 4 for the other 2 individual items ("thorough" and "useful").

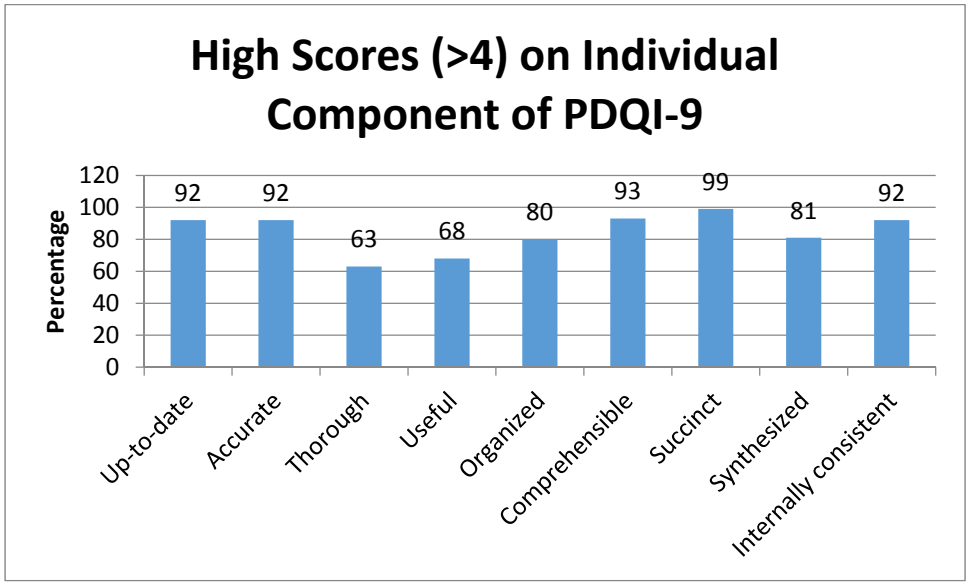
Figure 2. Individual PDQI-9 Scores



When the individual qualities of the documents were examined, 29 -82% of the documents reviewed received a score of 5, the maximum individual score, on any one of the individual components. "Thorough" had the least number of documents (29%) that received the maximum score; "succinct" had the most documents that were rated 5 (82%). A single document received the minimum rating of 1 on 3 individual components (“up-to-date”, “thorough” and “synthesized”). No other document received the minimal rating on any individual component.

The number (same as percentage) of documents that received a score of greater than 3 ranged from 63-99. Figure 3 shows the percentage of documents that received scores of > 3 on the individual components.

Figure 3. High Individual PDQI-9 Scores



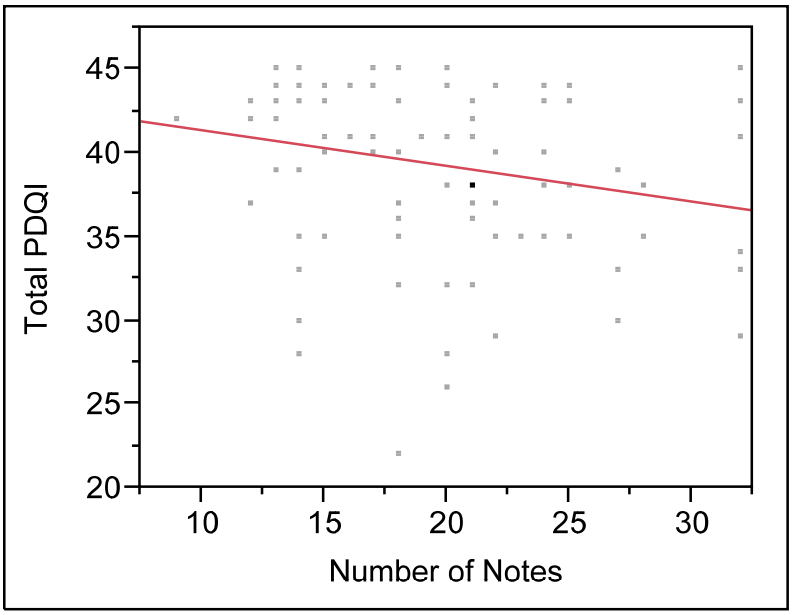
All individual components showed a statistically significant correlation ($p < 0.05$) with the total score. The component succinct showed no statistically significant correlation with any of the other components; internally consistent showed no statistically significant correlation with up-to-date, thorough, useful, comprehensible and succinct.

Factors that affect the quality of CCD

There was no correlation between the total PDQI-9 score and the type of document (H&P or progress note), author, or day of the week.

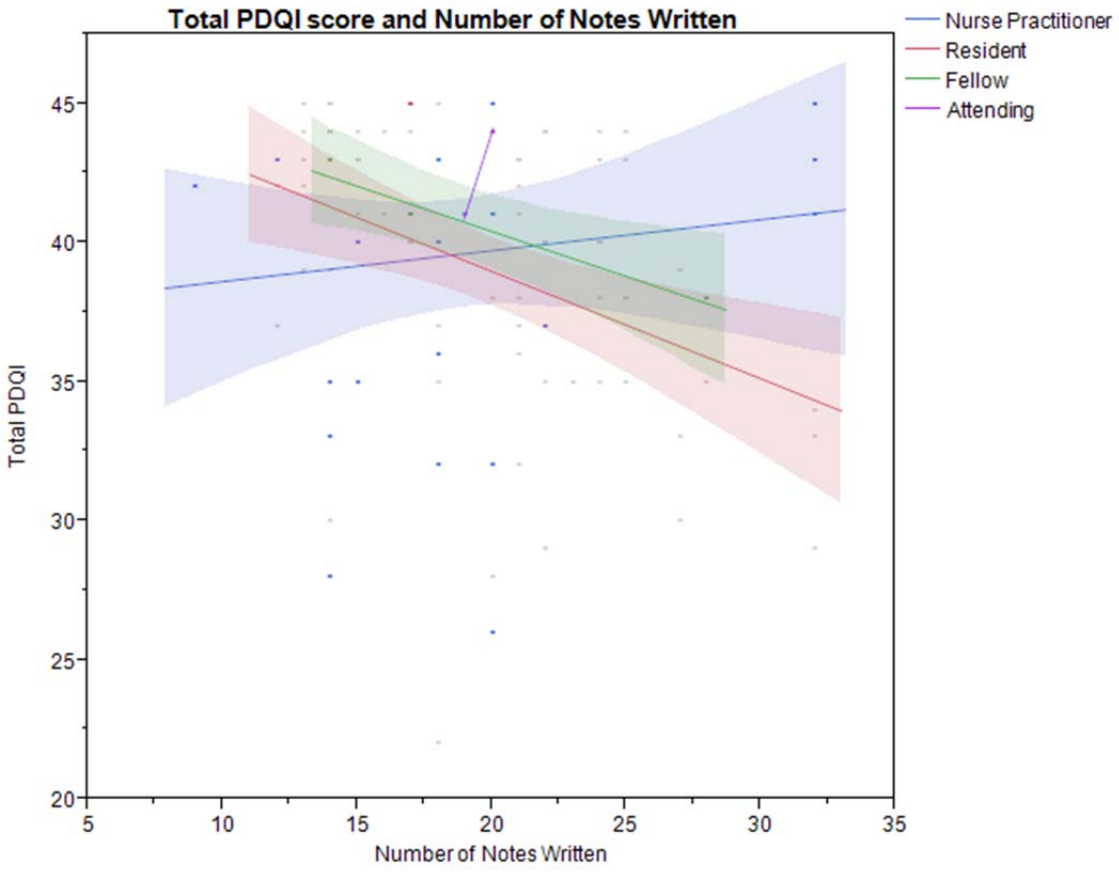
There was a statistically significant negative correlation between the total PDQI-9 score and number of notes written (p = 0.007, Spearman's test) (Figure 4).

Figure 4. Correlation between Total PDQI-9 Score and Number of Notes Written



When the relationship between total score and number of notes written was analyzed for author, a positive correlation was seen when the notes were written by nurse practitioners and attending physicians and a negative correlation was seen when they were written by residents or fellows (Figure 5).

Figure 5. Total PDQI-9 Score and Number of Notes Written by Note writer



There was no correlation between total PDQI-9 score and time of starting the note. Although there was a negative correlation between the total PDQI-9 score and time of filing the note (duration from the time of service to the time the note was completed by the attending physician), when time of filing was divided into two groups, filed within 12 hours of assessment or not, there was no significant difference between the total PDQI-9 scores of the two groups.

The total PDQI-9 score showed no correlation with the number of days of hospital admission or PICU admission prior to the day of service.

The total PDQI-9 score showed a correlation with the risk of mortality as determined by PRISM III ($p = 0.025$) and PIM 2 ($p < 0.01$).

Individual PDQI-9 scores showed no correlation with document type, note writer, or day of week. Some of the individual PDQI scores showed a statistically significant correlation the number of notes written. As the number of notes increased, the scores for up-to-date ($p = 0.02$), thorough ($p = 0.02$), and useful ($p < 0.01$) decreased.

There was no correlation between the individual scores and the number of days since hospital or ICU admission. There was a trend toward a decrease in the score on the "useful" component ($p = 0.05$) as the time from assessment to start time for the note increased. There was no correlation with the time that the note was completed. PRISM III scores correlated with the components "thorough" ($p = 0.03$) and "organized" ($p = 0.04$). PIM 2 scores correlated with the components "thorough" ($p < 0.01$), "useful" ($p < 0.01$), "organized" ($p < 0.01$), and "synthesized" ($p < 0.01$). As the PRISM III and PIM 2 scores increased, the individual scores mentioned above decreased.

Discussion

Key Findings

This is the first study, to my knowledge, that has evaluated the quality of CCD in the PICU. The key findings from this study were that (1) despite the inherently complex

nature of the PICU, the overall quality of CCD in the PICU, written within the constraints of a commercially available EHR, was good; (2) although the quality of the notes varied widely, most of them were of fairly good overall quality; (3) almost all the notes were concise, to the point, with little redundancy; (4) most notes were comprehensible, up- to-date, accurate, internally consistent, organized and synthesized; (5) about two thirds of third of notes were thorough or useful; (6) the quality of documentation declined as the number of notes written in a given day increased; (7) the quality of notes also deteriorated with increasing severity of illness of the patient; and (8) the quality of notes was not affected by the writer (nurse practitioner, resident, fellow, or attending physician), the day of the week, the time of writing the note in relation to the time of service and whether there was previous inpatient documentation available for reference for the episode of care.

In the following section, I discuss the role of the EHR and characteristics of the PICU including the workflow that affected CCD in this study, and their implications.

Role of the EHR

In this study, note writers used a semi-structured template, within a commercial EHR, to generate the CCD. The EHR is an integrated EHR with access to information about patients encountered in the main hospital as well as in outpatient centers, emergency departments, urgent care centers and inpatient settings in other hospitals within the enterprise system.

Patients who have been admitted to the hospital for at least a day prior to the day of service have clinical documentation readily available for the clinician to review. This documentation (H&P or Progress note) provides relevant information and includes the problem list, overall impression, and plan of care and can serve as a guide for subsequent clinical notes. In this study, most of the patients had CCD on the day prior to admission to the PICU. This may have contributed to the higher quality of documentation by reducing the cognitive and information overload relating to gathering information from disparate sources and analyzing it. However, if the prior note was inaccurate or poorly written and was used as a foundation for the note reviewed in this study, the note reviewed would be likely to carry forward the errors and problems of the initial note. Unfortunately, the accuracy of the data in prior notes was not confirmed by the author and this may act as a confounding factor in interpretation of the results.

Almost all notes were concise. The criterion that the notes scored least well was thorough. This may reflect the note writer's preference for clarity and brevity over completeness. It is possible that the notes were reviewed and redundancies deleted, either by the primary note writer or the attending physician, resulting in succinct notes. This study did not allow comments to be added by the reviewer; this would have given an insight into the components that the reviewer considered important for inclusion but were overlooked in the note making it incomplete. It would allow redesigning of the template with headings, subheadings, menu items or reminders to include the information that is frequently omitted from the note.

The notes were not as useful as one would like them to be; they were not very relevant and did not provide enough valuable information or analysis. It is likely that the notes were not thorough, missing valuable information, and were therefore found to be less useful. On the other hand, the information provided could have been adequate, but the rationale for the plan could not be deciphered. This is possible if the note writers preferred to keep the documentation brief and assume that the information is sufficient for and the reader has the knowledge to infer the rationale from the information provided. Use of a structured template with preference for discrete data discourages entry of free text narratives. A semi-structured template was used in this study; note writers had to switch between typing free text and using the mouse or the function keys. In order to finish the note quickly, note writers may include discrete data and minimum information required in the sections of the structured portion of the CCD.

Although not specifically examined in this study, from the author's personal experience, copy and paste functionality is frequently used by residents and nurse practitioners in this PICU. Studies have shown that CIT has improved accuracy of information in documentation.[53,54] In this study, this feature likely contributed to the accuracy of the information by pulling in some information directly from other parts of the EHR and thus avoiding manual entry. Problems with difficulties comprehending the writer's intent, discerning relevant information, lengthy notes and inconsistencies within the note have been reported with the use of CIT.[54] In this study, there were no concerns about redundancies, lengthy notes, understanding the author's viewpoint about the patient's status and ability to develop a plan of care, or inconsistencies within the note. Similar

problems with lack of organization, comprehensibility and internal consistency have been reported due to frequent interruptions. This study did not specifically measure the frequency of interruptions but given the nature of the PICU, they are to be expected. It is surprising that these problems were not seen. It is possible that the note writer's preference for brevity and efficiency, and editing by the attending physician contributed to the absence of the previously reported problems in this study.

The overwhelming majority of notes were up-to-date. It has been reported that information within the ICU note is considered "a shift behind".[22] This is in contrast to the findings in this study. This could be due to differences in study methodology, EHR capabilities, or note writer behavior. In this study, the time of service was taken as the reference point and the information was considered up-to-date if it accurately reflected the status at that point in time. Considering that some notes are written prior to the time of service and CIT is not updated each time that a note is edited, this result, that the notes were up-to-date, is unexpected. A possible explanation is the observation that the attending physicians updated information in the form of an addendum or revisions when they reviewed the notes. The inability to update information obtained by CIT in the note every time that it was edited probably contributed to the observation that the notes were synthesized and comprehensible. Had the information been updated and if it reflected a significant change in the patient's condition, the note writer would have to change the plan of care. If the note writer failed to review the updated information, update the plan or care and review the note in its entirety, the likelihood of the note being internally consistent, synthesized, and comprehensible would be greatly diminished.

Characteristics of the PICU

Residents and nurse practitioners write most of the notes in the PICU. This is consistent with the practice in most PICUs which support Pediatric residency programs or have dedicated nurse practitioners. In this study, the residents were second and third year Pediatric residents who were familiar with the EHR. The residents are less familiar, as compared to nurse practitioners, with some documents that are commonly used in the PICU, and not on other inpatient units, such as ventilator and nursing flow sheets. They have less experience in the PICU setting; with its unique workflow, practices, and patient population. In this study, there was no difference in the quality of notes written by residents and nurse practitioners. However, it should be noted that the study did not examine the quality of the notes prior to review by the attending physicians; attending physicians reviewed all notes and were permitted to make changes. By studying the quality of the notes written by residents or nurse practitioners and comparing them to the final note after it had been amended by the attending physician, the author would have been able to evaluate the importance of experience and expertise on note writing and would have been able to gauge the task load on the attending physician to revise the note. The average time from the time of service to completion of the note by the attending physician was 7 hours. It is unclear from this study as to the extent to which workflow contributed, and the amount of time that editing unsatisfactory notes contributed to this long duration. In order to improve efficiency, improvements in documentation should be targeted at enhancing the support system for residents and nurse practitioners who not

only have less expertise than attending physicians but are also responsible for writing notes in a large number of PICUs in the country.

Although one expects that inpatient notes are written at the time of service, this is not always true. It is not unusual for inpatient notes to be started before the time of service and for them to be completed after the patient is discussed on rounds. In the typical scenario, a template (if available) is selected and information that does not change is entered. Information gathered from sources within the EHR is imported or manually entered. The rest of the information is entered after assessing the patient. The note is often updated after the patient is discussed on rounds and the plan of care is formulated and after verbal communication with other healthcare providers. Starting the note prior to the time of service allows the writer to gather some of the information, process it and then document it. When the note is to be completed, the writer has less information to collect and analyze, resulting in potentially less cognitive and task load. On the other hand, when the note is written in stages, there is potential for poor organization and inaccuracies. It can be an arduous task to keep documentation of a patient admitted to the PICU up-to-date. As the patient's condition changes, new diagnostic information becomes available, or as new recommendations from the other healthcare providers is communicated, the writer may try to update the daily progress note. This results in the note being completed much later than the time of service. Although the purpose of the writer is to include up-to-information and be thorough, the end result could be a note that is confusing and internally inconsistent (the plans based on information available at any earlier time may no longer be relevant). Thus the time of starting the note and completing

the note may affect its quality. In this study, we did not observe any difference in the quality of CCD written before or after or at the time of service.

When a patient is admitted to the PICU and there is no pre-existing information in the EHR, the writer has to obtain information from the patient, family, other providers and paper-records and manually enter it. If the patient has a prior encounter with a provider who uses the same EHR as the writer, some of the information about the patient can be imported into the clinical note. The information becomes more relevant when the patient has an encounter for the same problem and there is a recent clinical note. For patients already in the PICU, the task for the writer is lessened further. As the length of stay in the PICU increases, the writer becomes more familiar with the patient (assuming that the same writer is assigned to the patient). This may decrease the task load on the writer but may increase the risk of carrying forward inaccuracies (if the initial documentation was incorrect) and the risks associated with copy and paste functionality. In this study, there was no effect of length of stay in the hospital or PICU prior to the day of service on the quality of documentation. There was no attempt made to check the accuracy of the initial documentation in this study.

Usually there are less scheduled admissions (such as elective surgeries) to the PICU on weekends as compared to weekdays. Staffing by clinicians may also be reduced on weekends. The workflow may be different. These factors may affect the quality of documentation on weekends. In this study there was no difference in the quality of notes written on weekdays as compared to the quality of documentation on weekdays. This

may be due to characteristics of this particular PICU where there is a similar workflow on all days of the week. Alternately, the lesser number of notes written on weekends may have posed a lower task load on the reduced staffing on weekends.

In a cognitive model of ICU workflow based on ethnographic observation and interview data, it was noted that the clinician may be performing a number of tasks within a short period of time: gathering knowledge and documenting, doing procedures, carrying out transfers or communicating with the nurse.[60] Increased patient load may affect performance including omission of important information or entry of incorrect assessments during documentation due to interruption in the flow of thoughts or limitation of short term memory. Seeking, filtering and processing information requires switching between resources as well as expertise and experience.[14] Residents and Pediatric Cardiology fellows lack familiarity with certain documents within the EHR that are primarily utilized in the PICU and have less experience and expertise in the PICU as compared to nurse practitioners and attending physicians. Nurse practitioners and attending physicians are expected to have a higher level of proficiency in gathering information from various sources and dealing with disruptions and the cognitive and overall work load because of their familiarity, experience and expertise. Based on this premise, one would expect that the quality of CCD by residents and Pediatric Cardiology fellows would be lower than that documented by nurse practitioners. However, in this study, there was no difference in the quality of the notes written by these providers. This may not be an accurate conclusion as all notes were reviewed (and revisions permitted) by attending staff. When the number of notes written on a given day increased, the

quality of the notes that were written by nurse practitioners increased whereas those written by residents and Pediatric Cardiology fellows deteriorated. Perhaps, given sufficient time, clinicians with less experience or expertise were able to write good quality notes but as the number of patients to be taken care of increased, the less seasoned clinicians became overwhelmed and wrote notes of a lower quality. With the increased activity in the PICU, the task load on the attending physician also increased resulting in less time available to review and revise the note.

The cognitive and task load on the clinician can be expected to increase as the severity of illness of the patient increases. There are more interventions done, a greater number of laboratory and other tests performed, a larger number of healthcare providers involved in the patient's care, more verbal communication and greater amount of time spent at the bedside. This may result in less time for documentation, more information overload, more cognitive burden, frequent interruptions and disruptions and poor quality documentation. This study confirmed that quality of documentation declined with an increase in severity of illness and an increase in the number of patients.

Limitations

This paper has several limitations. It was conducted in one setting, the PICU of a teaching hospital with a single reviewer. This limits the concept of quality to the view held by a single type of stakeholder. Clinical notes are read by clinicians (physicians, nurses, other healthcare providers) and administrators (billers, coders, quality assurance, and others). Quality is judged by the reviewer based on his or her expectations, needs and

values. The quality of a note includes content, which has been viewed differently by different stakeholders.[24] Other stakeholders, and even physicians of another specialty, may have judged the quality of CCD differently. In one study, practitioners judged notes more harshly than nurses or administrators on quality dimensions related to the informative content, reading ease, understandability and trust in information.[52] The reviewer is a pediatric intensivist who had contributed to CCD. There was no blinding. This introduces an element of bias. The templates used for the notes were developed locally and are unique to this setting. However, they were supported by a widely used commercial EHR. There is considerable subjectivity in rating the quality of the documentation. This limitation is difficult to overcome as there is no consensus as to what an ideal note should be. As mentioned before the quality of a note differs with its intended use. Even when restricted to patient care, clinicians do not agree on the nature and amount of information that they believe is needed. Because of the variety of patients with differing severities of illness, it will be nearly impossible to define some of the attributes such as completeness. The tool used to ascertain quality, PDQI-9 has not been specifically validated in the ICU environment.

Implications for Future Studies

Despite the limitations, this study shows that the quality of documentation by critical care providers is good despite the inherently complex nature of the PICU. It identifies factors that affect the quality of documentation and the challenges faced when evaluating quality of notes in the ICU. Other studies that look at quality of notes in the ICU should include review by several stakeholders. Further studies are needed to assess the role of the design

of the EHR in presenting information to the clinician. Innovations are needed to the currently available system to support creation of CCD. Finally, future studies should look at the impact of quality of documentation on patient outcomes; whether improvement in documentation improves care coordination, decreases length of stay and decreases morbidity and mortality.

Conclusions

Despite the complexities of the PICU, clinicians can capture accurate and up-to-date information about the patient and produce a comprehensible, succinct but not thorough CCD with good overall quality. However, as the PICU gets busier, reflected in the number of patients cared for in a day or the severity of illness of the patient, the quality of clinical documentation deteriorates. Notes were less thorough, useful and synthesized when a greater number of notes were written and the severity of illness increased. They were less organized when a greater number of notes were written, and less up-to-date when the severity of illness was greater. Despite its limitations, this study provides a snapshot of the quality of CCD in an ICU from a physician's perspective and gives an insight into some of the factors that influence it. Considering the fundamental importance and value of CCD in patient care, it is important that further studies are carried out to evaluate the quality of CCD in other ICUs and to determine the factors that influence quality and to find effective approaches to improve CCD.

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Appendix

Physician Document Quality Instrument (PDQI-9)

Attribute	Score	Description of Ideal Note
Up-to-date	Not at all 1 2 3 4 5 Extremely	The note contains the most recent test results and recommendations.
Accurate	Not at all 1 2 3 4 5 Extremely	The note is true. It is free of incorrect information.
Thorough	Not at all 1 2 3 4 5 Extremely	The note is complete and documents all of the issues of importance to the patient.
Useful	Not at all 1 2 3 4 5 Extremely	The note is extremely relevant, providing valuable information and/or analysis.
Organized	Not at all 1 2 3 4 5 Extremely	The note is well-formed and structured in a way that helps the reader understand the patient's clinical course.
Comprehensible	Not at all 1 2 3 4 5 Extremely	The note is clear, without ambiguity or sections that are difficult to understand.

Succinct	Not at all Extremely 1 2 3 4 5	The note is brief, to the point, and without redundancy.
Synthesized	Not at all Extremely 1 2 3 4 5	The note reflects the author's understanding of the patient's status and ability to develop a plan of care.
Internally consistent	Not at all Extremely 1 2 3 4 5	No part of the note ignores or contradicts any other part.
Total score		