



Electronic Documentation in Pediatrics: The Rationale and Functionality Requirements

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Clinical documentation has dramatically changed since the implementation and use of electronic health records and electronic provider documentation. The purpose of this report is to review these changes and promote the development of standards and best practices for electronic documentation for pediatric patients. In this report, we evaluate the unique aspects of clinical documentation for pediatric care, including specialized information needs and stakeholders specific to the care of children. Additionally, we explore new models of documentation, such as shared documentation, in which patients may be both authors and consumers, and among care teams while still maintaining the ability to clearly define care and services provided to patients in a given day or encounter. Finally, we describe alternative documentation techniques and newer technologies that could improve provider efficiency and the reuse of clinical data.

Clinical documentation is defined as the capturing and recording of clinical information, often in real time while the patient is present (eg, during consultation, assessment, imaging, and treatment).¹ However, clinical documentation has grown to encompass more than just provider notes at the time of a patient visit. Patient care activities often take place outside in-person encounters and include events involving care coordination and communication with patients and caregivers. The records of such events also represent clinical documentation. In addition, newer technologies, including patient portals, connected home monitoring devices, and patient-controlled mobile devices, potentially enable patients and families to act as authors of clinical documentation, a title previously assigned only to health care providers.²

Clinical documentation is primarily intended to facilitate the synthesis of patient information, develop medical care and wellness plans, and communicate patient information. Initially, documentation was intended for sharing information among various health care providers but has since

abstract

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expanded to include communication with patients and their caregivers as integral members of the care team. In pediatrics, clinical care teams also include adolescents who may have the right to manage their own reproductive health, substance use, and mental health issues and the school systems that serve as important caregivers for pediatric patients. Clinical documentation also serves other important roles, including the record of patient care and services provided for billing purposes, a means to protect the legal interest of providers and patients, a resource for research data for quality monitoring and improvement, and an educational tool for health care provider trainees.³

The transition of clinical documentation from paper to electronic health records (EHRs) has provided many positive opportunities in clinical care and documentation but has also introduced new challenges. Most importantly, electronic clinical documentation is more accessible and legible than paper records, may include more structured data elements contained elsewhere in the medical record, and is available remotely to health care providers, patients, and other stakeholders.

One downside with electronic documentation is that providers may be overwhelmed with large amounts of textual and tabular data. In addition, nonclinical stakeholders may have a more direct influence on the design and content of clinical documentation. For example, electronic documentation tools can remind or even require (required fields, forced fields, or hard stops) an author to include specific items in his or her documentation. Interventions on paper were much less invasive (education or reminders that could be avoided) and likely less effective at changing documentation behavior. This additional input can lead to increasing documentation burden,

especially when some of these requirements are redundant or not relevant to the clinical narrative, and can have the effect of blurring the understanding of the purpose of a note. There is increasing recognition that documentation burden can lead to clinician burnout, and new federal legislation is aimed at developing strategies to reduce documentation burden.⁴

Electronic clinical documentation may also be more onerous than using paper. Efficient typing and navigation of the electronic record may not be skills possessed by all providers. Documentation tools such as copying functions, templates and scripts (allowing for clicking rather than typing), or the importation of data from other areas in the medical record can alleviate some of the burden. However, these tools may introduce new unintended consequences of their own, including increased length and decreased effectiveness of notes (“note bloat”) and inaccurate documentation.⁵⁻⁷

The American Academy of Pediatrics (AAP) has addressed several topics related to EHRs, including electronic prescribing systems,⁸ health information technology and the medical home,⁹ standards for health information technology to ensure adolescent privacy,¹⁰ pediatric aspects of inpatient health information technology systems,¹¹ and electronic communication of the health record and information with pediatric patients and their guardians.¹² Although these areas cover aspects of electronic documentation, there is a lack of a single unified AAP policy statement or technical report that provides an overall view of clinical documentation of pediatric care. In this technical report, we aim to review electronic clinical documentation in pediatrics and provide background information for the recommendations in the accompanying policy statement¹³ to maximize the benefits of such

technology to improve the care of children as well as to mitigate the potential negative aspects.

CONTENT AND STRUCTURE REQUIREMENTS FOR RECORDING CLINICAL INFORMATION

Similar to what has been emphasized in AAP policy statements and technical reports,⁹⁻¹⁴ an Agency for Healthcare Research and Quality technical brief,¹⁵ and the Children’s EHR Format,^{16,17} pediatric care providers need certain core functionalities in EHRs, including the ability to document in a manner that supports and facilitates the care of pediatric patients. Templates or similar tools designed to guide providers through the task of documentation should facilitate longitudinal, preventive, team-based, and age- and condition-specific care central to the core of pediatric medicine (Table 1).¹⁸ In addition, pediatric care providers have long been on the forefront of family-centered care,¹⁹ but many EHRs lack the ability to support the hallmarks of this aspect of care, such as team-based documentation and documentation of familial connections.⁹ For example, familial linkages in the EHR and the ability to share certain parts of documentation, such as family and social histories, across family members could increase the robustness of this information and strengthen the delivery of family-centered care (Table 1). This feature could also serve as a method to reduce redundant documentation tasks.

Discrete Data

Similar to other medical specialties, the documentation needs of pediatric providers include both discrete (conforming to a predefined or conventional syntactic organization) and nondiscrete documentation needs as well as the need for some flexibility between the two.²⁰ The value of discrete data includes

TABLE 1 Clinical Documentation Framework Based on Core Components of Pediatric Care

Core Component of Pediatric Care	Examples of Supporting EHR Documentation
Longitudinal	Support documentation over the life course of the patient: attainment of developmental milestones (even outside typical norms); physical growth (growth charts); and serial immunizations (eg, DTaP vaccine No. 2).
Preventive	Support the attainment, documentation, and review of measures designed to maintain health: immunization schedules and screening tools and testing.
Age based	Document and review data based on patient age: screenings, testing, and measurements and anticipatory guidance.
Pediatric condition specific	Document and review data based on patient conditions: dedicated growth charts for patients with conditions affecting growth parameters (eg, Down syndrome, prematurity) and documentation templates that guide assessment of patients with specific conditions (eg, evaluation of asthma severity or control for patients with asthma).
Patient and family centered	Documentation supports the family unit and includes patient and family input: shared or linked mother-infant records to support perinatal care and documentation, shared family and social history documentation across family members, integrated patient- and family-generated data and/or information, supporting adolescent confidentiality, making information such as immunization records available to patients, families, and their providers regardless of the site of receipt.
Team based	Shared documentation tasks across health care provider types, primary care and specialty physicians, and health care settings (ambulatory, acute care, and long-term care).

DTaP, diphtheria, tetanus, and acellular pertussis.

relatively easy use and reuse for clinical decision support, quality measurement, research, or reporting to regulatory agencies.² For example, discrete data can be used to support clinical decision aids that are valuable to pediatric care providers, including health maintenance schedules that address vaccinations and screening on the basis of AAP preventive care guidelines.²¹ However, free-text or narrative documentation provides its own benefits because it allows for nuanced documentation for individual patients, which is critical for patient-centered care.

The need or desire for discrete data entry can have negative impacts on the relevance and clarity of clinical documentation and may increase documentation burden for health care providers.²⁰ Furthermore, the required components for some structured data entry for clinical information can result in an inability to record data that do not fit neatly into the structured syntactic organization or that are partially incomplete or unknown. For instance, some EHRs may limit the recording of immunization receipt or current medications if the exact immunization date is unknown or the patient or caregiver does not remember the name of a medication. This information, although incomplete,

still may be clinically relevant, and the flexibility should be present to allow for inclusion of these data alongside other discrete data in that category, so important information is not missed.

Examples of discrete data of importance to pediatric care providers include vital signs, growth parameters, immunizations, screening tests (eg, hearing tests, visual acuity testing, and developmental and mental health questionnaires) and validated scoring and screening tools (eg, Apgar score, Pediatric Early Warning Score, Pediatric Quality of Life Inventory).^{11,14,17} The discrete nature of the documentation of some of these items also makes them suitable for device integration and for machine-readable technology that streamline documentation and data entry. For example, the use of barcoding for vaccine administration eliminates the need to manually document the lot number and expiration date for every vaccine. Alternative technologies such as these can both serve to reduce documentation burden and reduce documentation errors.²²

Data Display and Standards

Documentation should only have to be entered once for these key metrics,

but retrieval and display of this information also requires careful consideration and build. Data display should be sensitive to both pediatric providers' needs and patients' conditions. As examples, immunizations should be displayed by vaccine components rather than by brand names or combinations, and vital signs should be displayed with their corresponding age-, sex-, height-, and/or weight-based percentiles.

Data elements should also be displayed on the basis of patient-specific conditions, such as growth charts for prematurity and Down syndrome. Other examples include immunization displays, the ability to document new vaccines for patients who have not responded to the original vaccine series, and patients who have received a stem cell transplant. In addition, there is a need for these displays to rapidly evolve with evidence-based updates, such as the recommendation to use the World Health Organization growth charts for children 0 to 2 years of age rather than those of the Centers for Disease Control and Prevention²³ and new guidelines for the management of hypertension.²⁴ Delays in updates may lead to the persistence of suboptimal or out-of-date care. However, even if optimal and current care is provided, any out-of-date

information populated in the documentation could be misinterpreted. For example, the provider made a clinical decision using the new hypertension management guidelines and blood pressure percentiles, but the old percentiles and/or guideline information still populate into the note.

Importantly, the value of discrete data is enhanced if the data can be used across health care institutions and organizations. For example, if patients' immunization records were shared seamlessly across EHRs and vaccine registries, the data at every location could be more robust and accurate. In addition, the task of documenting immunization histories into separate systems would be eliminated. For this reason, the AAP and other volunteer organizations should continue to support the creation and alignment of clinical data standards.^{25,26} The integration of these standards within various EHRs would increase the likelihood that individual organizations would adopt these standards and would promote technical interoperability.

Note Structure

Given the evolution of electronic charting and regulatory requirements of documentation, note structure and the elements that should be included in various clinical note types (eg, ambulatory visit note, inpatient progress note, and operative report) need to be constantly reviewed. The increasing length and limited use of notes argue for a more streamlined structure in which the most important clinical information is more readily found.²⁷ A solution framework to address this pervasive issue is a modified subjective, objective, assessment, plan (SOAP) note (Fig 1), which retains the original SOAP note structure from the paper-based era²⁸ but mitigates known concerns of electronic note systems (M.J Curren, MD, and V.K.

Reddy, MD, personal communication, 2017).

Managing Information Overload

The rapidly expanding volume of clinical documentation and its accessibility potentially across a patient's lifetime regardless of the location of care has important clinical benefits, but it has also introduced a new problem in clinical care: information overload. The concern is that the large volume of clinical information can lead to the inability of a clinical care provider to quickly retrieve appropriate diagnostic and therapeutic information when needed and may lead to a clinical care provider overlooking important clinical information. Technological solutions are likely necessary to mitigate this problem and maintain clinical care efficiency and value, including integrating graphs, tabular data, knowledge management tools, smart search engines, links to Web-based resources, and customized menus.²⁹ Functionalities that promote a more hierarchical display of data and promote the value of the synthesis of these data into information are needed to achieve this goal and mitigate information overload. For example, as the number of notes per patient continues to increase, standard naming convention, filtering, and semantic searching functions may help providers access necessary information in a timely manner.

Whenever possible, usability and information design should be an essential part of the EHR certification process. There should be a focus on graphical visualization of numerical data. Custom development of patient summaries for various provider types and care settings requires effort but can be valuable.

DOCUMENTATION FOR ADDITIONAL STAKEHOLDERS

Electronic clinical documentation also serves important functions for other

stakeholders and plays important roles in supporting regulatory requirements, legal protections, medical research, quality improvement, and medical education. Although important, the needs of these additional stakeholders often add to the complexity and amount of information captured and contained within EHR systems.

Regulatory Requirements

Developing and implementing clinical templates, customized electronic forms, and computer-assisted coding for patient encounters may result in more complete evaluation and management (E&M) coding. There is evidence that the use of EHRs may have contributed to increased use of higher-level *Current Procedural Terminology* (CPT) codes, particularly in the emergency department setting.³⁰ Although it is important for EHR documentation tools to guide and facilitate providers in documenting pertinent information, the EHR should not promote the inclusion of extraneous or irrelevant information that then can be used to select a more complex CPT code.

The Office of the Inspector General holds individual physicians responsible for all professional coding in their name regardless of the EHR tools used or other coding support used to select the CPT code. For this reason, it may be useful for pediatric care providers to familiarize themselves with common CPT codes rather than relying solely on EHR tools for CPT selection guidance.³¹ The Centers for Medicare and Medicaid Services (CMS) has begun the process of revising the E&M requirements in this new electronic era.³²

In addition to E&M coding requirements, processes must be in place to ensure that the documentation for the health information used in care, research, and health management is accurate, complete, and timely because clinical

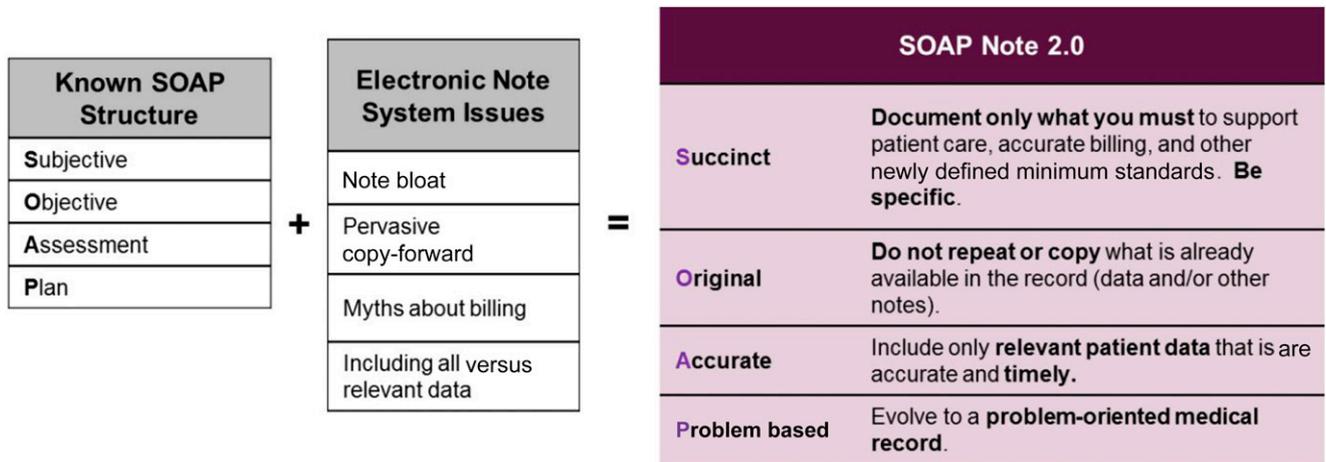


FIGURE 1
Evolution of SOAP Note 2.0 from known SOAP structure.

documentation serves as a key record to provide legal protection for providers and patients. Documentation standards should include recommendations regarding the use of electronic documentation functionalities, such as copy and paste, copy and forward, and automated insertion of data documented elsewhere in the EHR. Misuse of these functionalities can result in inaccurate, outdated, or irrelevant information, which may lead to significant quality of care and medical liability issues as well as the upcoding concerns noted previously. However, it is important to recognize that with proper use, these functionalities can save time and enhance documentation. After reviewing the literature on safety risks related to copying and pasting, the Partnership for Health IT Patient Safety made 4 recommendations that could improve the safety of its use: making copied and pasted text readily identifiable, referencing the text's origin, providing education on its safe use, and having practices in place to monitor its use.⁷

Clinical documentation is also an integral data source for reporting, quality improvement, and research. For example, electronic clinical quality measures are a set of quality

objectives that have been developed for both ambulatory and inpatient hospital quality reporting programs and must be reported to the CMS.³³ A robust electronic documentation system also creates the platform for patient care-based research and quality improvement projects that are crucial for pediatric care providers to provide safer, higher-quality care.³⁴ The data used for these purposes often require more structured or specific data entry. Effective reporting, quality measurement, and medical research depend on accurate clinical documentation. In the development of new quality or research measures existing data should be used whenever possible and primary data entry should not be required explicitly for that measure, thereby avoiding additional documentation burden by providers. When making decisions about additional data elements required or requested from clinicians, we should take this fact into consideration and be judicious in implementation.

As electronic clinical documentation and documentation tools continue to evolve, it is key that clinicians, clinical informaticists, health information management professionals, and quality, regulatory reporting, research, and billing specialists work

together on electronic documentation design, implementation, and improvement as well as the policies and procedures surrounding documentation and EHR use. The goal should be complying with billing, coding, and payer guidelines and providing data for quality reporting programs but also following best practices for electronic documentation.³⁵ In addition, it is crucial that the documentation burden placed on providers is not too high, and as much as possible, data solely necessary for other stakeholders should not disrupt the clinical narrative.

Documentation as a Vehicle for Medical Education

The steady shift of health care documentation from paper to electronic over the past 2 decades has had an impact on the learning process of medical students and pediatric residents and fellows. The EHR is an essential part of the daily work of medical students as they care for children and can also serve as an interactive learning tool by providing clinical decision support and ready access to the medical literature. Medical interns are estimated to spend 40% of their time dealing with EHR systems,³⁶ and in academic

medical centers, residents are a key source of clinical documentation.

Clinical documentation, itself, is an important learning objective of medical training, and close attention should be paid to trainees' understanding of the purpose of medical documentation and proper documentation technique in the electronic environment. In teaching institutions, trainees may be the primary documenters of clinical care because the CMS allows attending providers to verify both resident physician and medical student notes rather than redocumenting the work.³⁷ Trainees are often recipients of heavy workloads and may be more susceptible to some of the pitfalls of electronic documentation.⁵ Medical school and residency programs should prioritize informatics resources to aid and assist in designing curriculums and providing instruction on the best practices for clinical documentation. Mentoring physicians should continue to provide feedback to their trainees regarding their documentation and proper mastery of the use of the EHR system.

In the 2013 Accreditation Council for Graduate Medical Education common program requirements, use of information technology is listed as one of the competencies under practice-based learning and improvement.³⁸ There are specific suggestions for EHR-related enhancements to core competencies, such as maintaining accurate problem and medication lists within the EHR to facilitate multispecialty care, which exemplifies the core competency of systems-based practice.³⁹

Trainees are also in a unique position to advance health information technology. Trainees who are technically savvy and perhaps the heaviest users of the EHRs can provide important feedback on specific areas in which the EHR functionality can be improved. EHR and electronic documentation

improvement efforts in teaching hospitals should include input of trainees.

UNIQUE STAKEHOLDERS FOR PEDIATRICS

Schools

Pediatricians have a unique relationship with school systems because children spend much of their time at the school and teachers and school nurses serve as important caregivers for children. Federal law, specifically the Individuals with Disabilities Act⁴⁰ and section 504 of the Rehabilitation Act of 1973,⁴¹ ensures that all children, regardless of disability, have a right to free and public education that meets their needs. Schools are responsible for the care of any child's medical needs at school and are also important partners with pediatric care providers in ensuring that children with learning disabilities or developmental delays receive evaluations and appropriate education and therapies.

There is a vital need for school systems and child health providers to communicate and share relevant information in a bidirectional manner. Currently, much of the communication between schools and medical providers takes place via parents, who communicate between the 2 parties either with verbal information or by transporting paper school forms completed by educators and child health providers back and forth. This method leads to excessive work for parents and providers and presents multiple opportunities for error. In addition, the variability and constant changing of school forms required by private and public schools and child care centers causes great difficulty for health care providers and for the potential use of EHRs to aid form completion.

Communication between schools and health care providers could be facilitated by the streamlining and

standardization of documentation essential for this process for schools and child care centers across the country. In addition, efforts should be made to enable sharing of this information electronically with parents and the school system and direct communication between health care and education providers. Privacy, consent, and security specifications would need to be defined for this information exchange.

Adolescents

Pediatric care providers need to document information regarding adolescent mental health, substance use, and reproductive health so that it can be used for their care and communicated with other providers. However, as discussed in an AAP policy statement,¹⁰ this information is protected by federal and state laws. Although the adolescent is a minor, in some states, certain information cannot be shared with parents or guardians without the adolescent's permission unless there is a risk of harm.¹⁰ Many EHR systems lack the technology to segment or filter confidential clinical data to prevent inadvertent disclosure to unauthorized parties, including the sharing of this protected information with parents in written form or electronically through a portal.^{10,12} Unless a nationwide consensus on adolescent confidentiality issues is reached, there would also need to be flexibility in EHR settings regarding adolescents to account for state variations in laws.

NEW SHARED DOCUMENTATION PARADIGM

Shared Documentation With Patients and Families

Historically, the patient medical record, including clinical documentation, has been owned and held by medical providers and facilities, with access granted by request to patients as per regulations

in the Health Insurance Portability and Accountability Act.⁴² Until more recently, most patient requests for medical records were handled in person and/or through a process of written request.

This paradigm is changing rapidly with improvements in patient portal technology and with the requirement to share information electronically with patients as part of the Promoting Interoperability Program requirements⁴³ and the 21st Century Cures Act.⁴⁴ In general, there is growing support that although the medical care establishment remains the steward of the data, patients should have more control over their clinical records. Although current meaningful use criteria do not explicitly require the sharing of specific clinical documentation, such as office visit notes, daily progress notes, or discharge summaries,⁴⁵ a few institutions have begun doing so and have found this sharing to be well received by patients. A study at 2 institutions in 3 geographic areas (OpenNotes) revealed improvements in patient-reported medication adherence, engagement, and satisfaction after the institutions began sharing provider notes electronically.⁴⁶

The ease with which patients can now access their health records and information electronically could lead to a more shared model of EHRs and clinical documentation. Although concerns have been raised about the possibility of patient misunderstanding or worry regarding the information contained within the record,⁴⁷ the rates of this occurring, as reported by patients with access to clinical notes, were low.^{46,48} Even so, providers should be educated on ways to document without using needless medical jargon, abbreviations, and judgmental language.⁴⁹ Guidelines on creating patient-centric notes without losing the documentation's role as a communication tool among

providers and to substantiate billing are needed. In addition, because a significant portion of parents in America have basic or below-basic levels of health literacy,⁵⁰ their ability to make use of these notes to improve their child's care should be investigated.

It is also important to recognize that the sharing of clinical documentation between providers and patients could also reduce documentation burden for clinical providers. The plan section of notes and written patient instructions given to the patient (eg, after-visit summary and discharge instructions) often contain similar content but may be crafted separately. If one document could serve both purposes, it could eliminate redundancy and ensure that providers and patients communicate the medical plan effectively.

Patient-Generated Health Data

There is an opportunity in pediatrics to capitalize on patient-generated health data (PGHD), defined as "health-related data—including health history, symptoms, biometric data, treatment history, lifestyle choices, and other information—created, recorded, gathered, or inferred by or from patients or their designees (ie, care partners or those who assist them) to help address a health concern."^{51,52} There is growing evidence that PGHD have value to both patients and providers.⁵² The application of PGHD in pediatrics should continue to be explored and evaluated.

The value of PGHD includes the possibility of improving efficiency by the sharing of documentation tasks that would otherwise fall on providers and support staff or the time taken during the visits for patients and families to complete paper forms or questionnaires.¹⁷ This value may only truly be reaped, however, if the data are safely and seamlessly integrated within clinical

workflows and EHRs in a manner acceptable for patients and providers.

Another potential value of PGHD is the capture of important information that may otherwise be missed during a short visit and the empowerment of patients to have a significant voice in their own health care. Early-use cases in pediatrics include previsit surveys to tailor a clinical visit and questionnaires to assess and track development, quality of life, and indicators for various chronic medical conditions.⁵³

Shared Provider Documentation

Communication among providers is an important function of clinical documentation. For example, to enable successful communication between a referring primary care provider and a medical subspecialist or surgical specialist, the reason for consultation and urgency should be clear and readily available. This information can then be reviewed by specialty providers and their support staff as the appointment is being scheduled and at the time of the visit. Similarly, the specialty assessment and plan should clearly delineate the plan, including which provider is responsible, and needs to be clearly communicated to the referring provider and the patient.⁵⁴

Although primary care providers, medical subspecialists, surgical specialists, emergency physicians, and hospitalists may all provide care for the same medical problem for a given patient in the same EHR system, their documentation, including the assessment and plan, is usually housed in separate notes. Although distinct notes for each encounter are necessary for clearly documenting occurrences at a given visit or on a given day, models for shared documentation should be explored as a potential way to improve communication among providers.

Problem-Oriented Charting

Shared patient medical problem lists and problem-oriented charting could allow providers to view plans by all providers related to a particular medical problem. However, the use of problem-oriented charting has challenges, including problem list incompleteness and inaccuracies. An institution's use of problem-oriented charting or linkages between billing data and problem lists was associated with higher rates of problem list completeness.⁵⁵

In addition, the success of maintaining accurate problem lists for patients, as well as problem-oriented documentation, is associated with a culture in which primary care physicians and medical subspecialists and surgical specialists share responsibility for the problem list.⁵⁶ However, actual completion of the problem list is difficult to both support and enforce, and that culture may not exist at every practice or institution. There is some evidence that primary care providers are responsible for the clear majority of problem list documentation, and although primary care providers believe medical subspecialists should contribute to the problem list, medical subspecialists believe it may be an incursion on the primary care provider's territory.^{57,58} In addition, some medical subspecialists are likely to prefer documenting in a more systems-based format (eg, intensivists who care for more children with active multisystem issues). Providers may have differing needs for the information granularity level of any one given problem. Guidance and policies regarding how to effectively share problem lists and other shared documentation are necessary to support this new paradigm.

Although linking billing with problem lists is associated with more complete problems lists, basing a patient's problems on billable diagnosis codes

(eg, the *International Statistical Classification of Diseases and Related Health Problems, 10th Revision*) can introduce additional issues. Diagnosis codes may be insufficient to reflect the clinical picture. For example, there are limited codes available for working diagnoses and for problems related to social determinants of health. In addition, multiple diagnosis codes or problems are often used for interrelated conditions, raising the concern that problem-oriented documentation does not help manage the patient as a whole individual.⁵⁹

Medication Documentation and Management

Another example of shared documentation is medication lists. The idea behind shared medication documentation is to build on existing medication lists that multiple provider types across clinical settings contribute to rather than maintain separate lists, thereby reducing the harm caused by medication discrepancies during patient transitions.⁶⁰ However, similar to shared problem lists, not all providers believe they have ownership over the entire medication list. There is an inherent issue of medical subspecialists preferring to reconcile medications that are only relevant to their scope of care. Despite this, studies have revealed that a structured, systemwide intervention can be successful in achieving medication reconciliation compliance.⁵⁹

One medication list may not be able to serve all purposes of medication documentation, however. For instance, there is a difference between prescribed medications and medications taken by the patient, and both are important information to maintain. In addition, many medication lists require structured entry of the medication name, concentration, dose, route, frequency, and dispense amount to prescribe medications and refills. There is also

another layer of complexity when documenting medications in children, in that there may be multiple concentrations of the same liquid medication. However, even in the absence of knowing every detail, providers should be able to record partial medication information alongside all other active medications. Successful electronic medication documentation and management requires appropriate context, properly designed tools, and attention to implementation.^{61,62}

EVOLVING CLINICAL DOCUMENTATION METHODS

The technologies and methodologies associated with electronic documentation continue to mature. New tools should be evaluated for their ability both to improve clinical care and to alleviate provider documentation burden. For instance, the scope of clinical documentation has expanded beyond textual rendition. Images (rashes and wound care), audio files (abnormal heart and breath sounds), and video files (seizures and endoscope findings) may be useful adjuncts in the EHR. These alternative media could prove more valuable to clinical care than text description of the findings and could reduce some documentation load. However, more information is needed about how clinicians can include these media in EHRs using existing or future technology in a way that complies with the Health Insurance Portability and Accountability Act. Another example is using alternative EHR data sources, such as activity logs, to justify payment for services and eliminate the need for redundant documentation. The use of different types of media and EHR data sources as clinical documentation needs to be incorporated into E&M guidelines.

Speech Recognition

Speech (voice) recognition software is a growing technology that has the

potential to improve the efficiency of clinical documentation. As speech recognition software continues to improve, it may offer advantages over standard dictation and documentation by using a keyboard and mouse. However, further investigation is needed to assess its impact on documentation time and error rates.^{63–65} The maturity and increasing use of artificial intelligence computing techniques has greatly improved speech recognition capabilities.

Scribes

In addition to technological solutions, the use of physician extenders or scribes has been considered as a possible solution to alleviate physicians' documentation burden. A scribe's core responsibility is to capture accurate and detailed documentation of the encounter in a timely manner. The general duties of a scribe may include assisting the provider in navigating the EHR, responding to various messages as directed by the provider, locating information for review, and entering information into the EHR. It is imperative that all entries regarding a patient's health information be completed in the presence of and at the direction of the provider. It is also important that authentication of each entry be completed in a timely manner as defined by a practice's policies and regulatory requirements.⁶⁶ Research in this area is limited and has shown discrepancies in whether scribes have led to improvements in provider efficiency and satisfaction.^{67,68}

Technology to Enhance Data Reuse

New technologies could reduce documentation tasks by eliminating the need to document discrete information by enabling the reuse of text for research, quality metrics, and clinical decision support. Effective use of natural language-understanding tools, in which unstructured narrative information is converted into a structured form, could increase the amount of data usable for other purposes without increasing documentation burden on providers or favoring heavily structured notes over clinical narratives.⁶⁹ For example, natural language-understanding tools can enable the use of free-text information to drive clinical decision support.⁷⁰

CONCLUSIONS

Electronic documentation is now the norm for the care of children in most industrialized countries. However, there are still struggles to fulfill the many roles of electronic documentation. Strategies to meet these multiple, often competing needs have shifted from replicating paper documentation to exploring different models that may better suit these requirements and achieve maximum value for pediatric providers and for the care of children. Examples include shared documentation and medication management. Documentation improvement is a multidisciplinary venture that should include input from clinical, research, regulatory, and education stakeholders.

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ABBREVIATIONS

AAP: American Academy of Pediatrics
CMS: Centers for Medicare and Medicaid Services
CPT: *Current Procedural Terminology*
E&M: evaluation and management
EHR: electronic health record
PGHD: patient-generated health data
SOAP: subjective, objective, assessment, plan

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