Computerized provider documentation: findings and implications of a multisite study of clinicians and administrators

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ABSTRACT

Objective Clinical documentation is central to the medical record and so to a range of healthcare and business processes. As electronic health record adoption expands, computerized provider documentation (CPD) is increasingly the primary means of capturing clinical documentation. Previous CPD studies have focused on particular stakeholder groups and sites, often limiting their scope and conclusions. To address this, we studied multiple stakeholder groups from multiple sites across the USA.

Methods We conducted 14 focus groups at five Department of Veterans Affairs facilities with 129 participants (54 physicians or practitioners, 34 nurses, and 37 administrators). Investigators qualitatively analyzed resultant transcripts, developed categories linked to the data, and identified emergent themes.

Results Five major themes related to CPD emerged: communication and coordination; control and limitations in expressivity; information availability and reasoning support; workflow alteration and disruption; and trust and confidence concerns. The results highlight that documentation intertwines tightly with clinical and administrative workflow. Perceptions differed between the three stakeholder groups but remained consistent within groups across facilities.

Conclusions CPD has dramatically changed documentation processes, impacting clinical understanding, decision-making, and communication across multiple groups. The need for easy and rapid, yet structured and constrained, documentation often conflicts with the need for highly reliable and retrievable information to support clinical reasoning and workflows. Current CPD systems, while better than paper overall, often do not meet the needs of users, partly because they are based on an outdated 'paper-chart' paradigm. These findings should inform those implementing CPD systems now and future plans for more effective CPD systems.

BACKGROUND

Electronic health records (EHR) promise to improve the quality, safety and efficiency of healthcare, and EHR adoption continues to increase across the USA, spurred by legislative incentives.[1] [2] As EHR are implemented, direct computerized provider documentation (CPD) is expected increasingly to become the primary way clinical narrative documents are produced. Provider documentation records the patient's history, clinical situation and plan of care. All members of the clinical team look to documentation to support a shared view of the patient, while administrative departments use narratives as a basis for claiming reimbursement and demonstrating regulatory compliance. CPD shapes how health services are described and justified, how medical decisions are recorded, and how clinicians communicate with each other.[3] [4]

Previous studies have demonstrated that transitioning from paper-based to electronic clinical information systems brings both positive and negative consequences to practice, organizational culture and medical education.[5–10] The introduction of new technology effects reciprocal and complementary changes in both the users and the technology. New technology disrupts complex healthcare environments[11] and induces unanticipated changes in work patterns and demands for information. In turn, these changes expose shortcomings in the technology that spurs ongoing development.[12]

In contrast to computerized provider order entry and despite its relative importance, the impacts of CPD have been less extensively studied.[8] [13–17] Furthermore, the results of investigations on CPD to date have been mixed. Some researchers have found that CPD resulted in more complete,[18] more accessible and more accurate documentation compared to paper-based records.[19] [20] In contrast, others have noted that CPD either had no impact on quality,[21] or promoted lower quality documentation and increased the risk of inaccuracy that could lead to adverse events.[22–24]

Users have identified significant problems that go beyond issues of accuracy and accessibility. In several qualitative studies, clinicians using CPD reported problems with information overload, confusion regarding the writer's intent and communication difficulties.[10] [11] [13] In studies that examine what clinicians perceive as high quality computerized documentation, issues such as expressivity, being able to understand the big picture, and brevity emerge.[13] [25–27] Several authors have identified the tension between the need for structured data capture and the desire for narrative expression, a problem possibly unique to CPD.[26] [28]

Such earlier studies of CPD have mostly focused on single work roles (eg, physicians) or specific problems (eg, copying behavior) and have been limited to single settings. Given the fundamental and growing importance of CPD as EHR are adopted, we studied the impact of CPD on multiple stakeholders in various settings, aiming to capture viewpoints of both clinicians and administrators and identify higher-order themes related to working with CPD.

METHODS

We applied qualitative methodology to identify a broad range of issues and insights related to CPD across multiple sites and user types.

Design

With approval of the appropriate institutional review boards, we undertook a cross-sectional study of practitioners, nurses, and administrators. The objective was to assess subjects' perceptions and usage of CPD at five distinct veterans affairs sites of varying size, complexity and geographical location across the USA.

Settings

The Department of Veterans Affairs Health Administration (VA) has one of the oldest and most widely implemented EHR in the USA, the computerized patient record system (CPRS). This EHR enables CPD and supports functionality characteristic of such systems, including document templates, automated data insertion, and copying text. Since 1998, VA facilities have mandated CPD for nearly all forms of clinical documentation, ensuring experience with the adoption and use of CPD in routine work across all employee roles. Furthermore, since 1990, the VA has had the authority to assess co-pays and bill third party insurance for healthcare, and documentation standards needed for third party reimbursement have been a central concern impacting such documentation as for many other health systems.[29] Therefore, while it and its EHR system are different from others in some important ways, the VA provides a good environment for studying impacts of CPD on the healthcare enterprise.

Three focus group sessions (one each with nurses, practitioners and administrators) at each site were conducted at the Seattle Division of VA Puget Sound (Washington), and at the VA Medical Centers in Walla Walla (Washington), Salt Lake City (Utah) and Cincinnati (Ohio). At the American Lake Division of VA Puget Sound (Washington), only nurses and practitioners were involved, for a total of two focus groups. All sites had used the CPRS system for over a decade.[30 31]

Subjects

Subjects represented the groups of interest at each site. All were VA employees with at least 2 years of experience using CPRS. Subjects were invited to participate via an e-mail sent to all eligible individuals in each group by the principal investigator (PI) at each facility. At each site, potential subjects from each of three work roles were contacted on this matter with the goal of recruiting approximately 12 available and willing subjects in each category, with follow-up messages sent if needed. Recruited practitioners were inpatient and outpatient primary care and subspecialty providers. Nurses were inpatient and outpatient registered nurses and licensed practical nurses and administrative staff were non-clinicians whose quality assurance, medical coding, or risk management work required accessing CPD (table 1).

Data collection

Two investigators conducted 1-h focus groups at each site. One author (ANH) assumed the role of leader of each group to ensure consistency and minimize variability between sites, while the second facilitator at each site was the co-author serving as PI at that site. To ensure that participants focused their comments on the topic at hand, a standard, semistructured 'interview guide' or script that was developed based on previous research[11 13] and refined by pilot testing to maximize group involvement and topic coverage was followed in each group discussion. Each focus group session started with in a brief guided discussion of what participants saw as typical CPD tasks, followed by questioning according to the semistructured script. The goal of each focus group session was to elicit respondents' views and perceptions about using CPD in everyday work, exploring with open-ended questions and clarifying with follow-up and closed-ended questions only when necessary. The focus group format was efficient in obtaining input from many users and allowed exploration of issues that arose spontaneously. To encourage unfettered discourse about perceptions of how CPD was used and to minimize conformity pressures, focus groups consisting of practitioners, nurses or administrators were conducted separately. All focus group sessions were recorded, transcribed and anonymized for analysis.

Data analysis

Six investigators participated in multiple rounds of review and analysis of content and each reviewed the focus group transcripts from all of the sites at least once. In a pre-coding round, each transcript was independently reviewed by at least two coders and coded at the sentence or phrase level as a unit of analysis.[32] Code descriptors were based on participants' utterances. Next, the reviewers met by telephone and in person and iteratively organized pre-codes into discrete categories and relationships. Two investigators (PJE, CW) consolidated and finalized the codes, consulting with the others. In a second round, the six reviewers independently re-coded transcripts they had not seen initially, using the refined code set and applying the refined codes to each data element. Units of analysis that could not be represented by refined codes prompted new codes. A final review reconciled discrepancies and yielded the codes, sub-codes, and relationships reported here. Summary interpretations were drawn from the categorizations, and these were organized into common themes.

RESULTS

Fourteen focus group sessions were conducted with a total of 129 subjects representing three healthcare professional categories from five distinct VA facilities across the USA (table 1).

Table 1 Descriptive statistics of study subjects

	Practitioners (MD, NP/PA)	Nurses (RN, LPN)	Administrators
Total no of participants	54 (45, 9)	38 (34, 4)	37
% Female	46.3%	92.1%	89.2%
By facility:			
Puget Sound VAHCS, American Lake (Tacoma, Washington, USA)	8 (5, 3)	8 (6, 2)	–
Puget Sound VAHCS, Seattle (Seattle, Washington, USA)	15 (12, 3)	9 (9, 0)	8
Walla Walla VAMC (Walla Walla, Washington, USA)	11 (9, 2)	5 (5, 0)	10
Salt Lake City VAMC (Salt Lake City, Utah, USA)	7 (7, 0)	7 (6, 1)	7
Cincinnati VAMC (Cincinnati, Ohio, USA)	13 (12, 1)	9 (8, 1)	12

LPN, licensed practical nurse; MD, doctor; NP/PA, nurse practitioner, physician assistant; RN, registered nurse; VAHCS, Veterans Affairs Healthcare System; VAMC, Veterans Affairs Medical Center.

Seventy-five distinct codes were identified, and grouped into 17 higher-order categories (box 1). Some phrases were assigned unique codes, and others, representing multiple concepts, were cross-coded. Both beneficial and detrimental features of CPD were identified and coded. Some concepts addressed technical issues (eg, copying) and intrinsic aspects of CPD use (eg, availability), while others referred to broader issues such as communication and work process integration. There was substantial overlap in findings between sites, and the phenomenon of saturation was reached by the third of five sites, with few if any novel codes being identified on analyses of the final two sites.

Five distinct themes emerged from these analyses: communication and coordination; control and limitations of expressivity; information availability and reasoning support; workflow alteration and disruption; trust and confidence concerns. Descriptions of these themes follow. Representative quotations organized by thematic area are presented in box 2.

Communication and coordination

The first theme, informed by several identified categories, involved the impact of CPD on clinical communication and care coordination. Participants emphasized that CPD was their principal source of patient information and primary means of understanding a patient's clinical history. Even so, participants acknowledged that multiple communication channels beyond the clinical documentation were necessary for successful care coordination. While respondents repeatedly noted the benefits of improved access to documentation facilitated by CPD, they also lamented that CPD was often inadequate for the degree of communication and care coordination that they desired. Several noted that face-to-face communication was more frequent before CPD due to the central location of paper charts. Since its introduction the valued ability to access CPD from anywhere has also altered work patterns in ways that reduce direct communication among providers. For instance, while acknowledging that CPD could not replace direct communication, clinicians described work-around tactics to improvise communication of important patient information. One such method exploited the system's document co-signature feature to flag documents for viewing by others (thereby highlighting relevancy and important clinical information). Another work-around was addendums to notes that included comments and responses to original text. Clinicians used these feature routinely, highlighting the generalizable importance of their functionality. However, some administrators objected to finding such 'discussions' in the chart. Even among clinicians who understood the reasons for using this capability as a communication work-around, many were not always comfortable, sharing discomfort that these methods of communicating individual responses to text suggested delegating responsibility for a case without appropriate negotiation.

Clinicians also wanted better functionality to support the coordination of care. Some stated that specific clinical tasks and problems were hard to track from one note to another, and this impeded their ability to reconstruct events and details across multiple problems and encounters. Significant time and effort was required to review available documents in order to discern major issues and goals of care. Other difficulties included identifying who was actually responsible for the current stage of a patient's care, determining which plans were being followed, and summarizing information for a care transfer or patient 'hand-off'.

Control and limitations of expressivity

The second emergent theme involved how CPD could be used to control expression and 'force' prescribed actions. Many clinicians perceived the CPD system's control over how and where information was inserted as excessive. Required templates were sometimes seen to force recording administratively required information at the expense of relevant clinical information, compromising clinician autonomy, expressiveness, and efficiency. More than once, nurses mentioned an admission assessment template process that not only blocked their ability to access information elsewhere in the chart, but also forced them to enter data already found elsewhere. Template-constrained language was often perceived to produce bland standardized documents that facilitated regulatory and reimbursement compliance at the expense of clinically useful information. Templated entry produced long documents in which relevance was not easily determined. On the other hand, templates were viewed as beneficial when they reminded authors not to forget important information and when they speeded data entry.

Tension between the perspectives of clinicians and administrators was especially evident in discussions of control functionality inherent in the CPD system. In general, the administrative group valued the completeness afforded by templates, while the practitioner and nurse groups complained that while templates could help facilitate documentation, restrictive templates generated less informative documentation than free text.

Information availability and reasoning support

Another emergent theme related to the 'availability' of information in support of reasoning and decision-making. Here, the term 'availability' is used to encompass not only the ease of

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Box 1   Top level categories that emerged from participant interviews

1. Control (ie, issues of institutional and provider control over document content)
2. Functions forced on note authors by the system
3. Negotiation and transfer of responsibility via documentation
4. Concerns over expressivity—(story telling versus recitation of facts)
5. Copy and paste functionality (pros and cons of copied and pasted content)
6. Lack of confidence and trust in note contents
7. Availability issues (accessibility, legibility, finding and comprehensibility of document content)
8. Comparisons of paper-based and computerized documentation (eg, changes to workflow, flexibility, documentation burden, chart 'landmarks', efficiency, quality)
9. Communication and computerized provider documentation usage (eg, collaboration, care coordination, inappropriate usage, inadequate tools for effective communication)
10. Process integration (eg, integration of ordering with note-writing, easing document review with data review, etc.)
11. Clutter, irrelevance, redundant, useless information
12. Knowledge of system, skillfulness with system
13. Work-arounds
14. Safety issues, errors
15. Desire for improvements/missing features
16. Personal work and information management
17. Poor/uninhibited authoring behavior facilitated by system

Box 2   Representative quotations

Representative quotations are presented, organized by theme. Within each thematic section, quotations are tagged according to which type of participant uttered the statement (practitioner, nurse or administrator), and whether it reflects a 'pro' or 'con' position regarding that theme.

Theme 1 – Communication and coordination

Pro: *Practitioner:* "I find it very helpful. If I get a, when I'm sent, I get a view alert and I address a patient issue, I can make a new note and send it to my nurse or send it to the pharmacy, so I send… that saves walking around or calling or doing those kinds of things. The phone's busy. So it does. It's the coordination of care."

Con: *Practitioner:* '… there's a relative anonymity to using the co-signature (feature) that can really promote bad behavior. And the one that you hear us complain about is the consult that comes back with the note from the consultant that says, 'Please order a CBC, a renal panel' and refer the patient back to me. And I can pretty much guarantee that if the consultant had to call me personally, no consultant would ever call me and say, 'Please order some lab tests that I wanted'.'

Con: *Administrator:* '… you see things in an electronic record you never would have seen in a paper record… 'So and so called today. Please call 'em back'. I mean, they use 'em, they use it as a telephone message pad… They use it for any and all documentation between co-workers because it's available, it's fast, everybody can see it and read it'.'

Con: *Administrator:* 'In audits, unfortunately, when we're auditing we see that, sometimes, the progress notes are used as Outlook (e-mail), where they're discussing things amongst providers to each other. For instance, they will use the progress note and say, '<Name>, what do you think about this for Mr. <Name>'? And, then they send an alert to her to look at this. 'Well, I think, maybe, we ought to think about this', and you send it back…. saying, 'Would you call so-and-so, and remind them to get this lab work, change their pills?'…'

Interviewer: 'That's in the progress note?'

Administrator: 'In the progress note. Then, it goes back…And, she says, 'I did it'….It's a dialog.'

'And, what we're telling people is don't put that dialog in the patient record. Because, sometimes, it could be, 'Dr <Name> I'm the nurse. I called him, Mr <Name>, three times and he never responded, so I'm not going to do anything about this 'til he calls me back.' Well, that's not appropriate for a patient official record… That should happen on Outlook, or over the phone, but not in the official computerized patient record system (CPRS) record.'

Pro: *Nurse:* 'Well, it aids our communication in that if we see a patient, and we feel anesthesia needs to see them, anesthesia will come and recommend an echo, or something like that. Then, we identify as an additional signer the primary care provider and the resident that sent the patient over, and, before we sign the note, and then we know that they will get an alert on this patient that, you know, 'This is what anesthesia recommends, so the surgery could be delayed.' It also lets the primary care provider know what's going on with the patient, if there's been a change or not… Where I'll have—is we'll have patients who'll be in and a month ago they were in the clinic and they never got their labs done and they're ordering some strange, not your normal lab type things. I can send an alert to the provider in the clinic saying 'Hey, we got this guy <inaudible> do you want me to draw his labs and send<inaudible>' and most of the time I'll get a little thing back that says 'Please'.'

Pro: *Nurse:* 'I turn the chart around and show it to the patient a lot, too… you know. I show him how, well, you know, 'I know you were in audiology yesterday' and… all that kind of stuff, and they love it.'

Theme 2—Control and limitations of expressivity

Pro: *Administrator:* 'Because you can build that right into a template as an outline to kind of help gather the information that you need for that particular visit… So, the software allows us to, to build them that way. The software's greatly enhanced our ability to maintain compliance with regulatory standards. And, I—speaking from the joint commission side, say, something like seclusion and restraints through a tem-, a note template, we're able to tell to build in those mandatory fields of things that need to be in the documentation to show compliance: Is their order within a certain amount of time? Was the patient's family notified? Were other methods tried before you actually restrained the patient? Those are the key components that put us in compliance with the standard. And, so, this allows us to highlight what those are, and give the provider clinician a heads-up as to what they need to document to show compliance…'

Con: *Practitioner:* 'Well, yeah. A lot of the notes, so much of it is made from the templates. It's all the same and it's been the same for the last 2 years, if you look back. It's hard to—so, you have to look through the note to find out what is from that day and what is new, and not just boilerplate. So, I mean there's some value in templates, too, but so many of the VA notes are all template.'

Con: *Nurse:* 'You spent 30 min entering information and you think you have everything; you'll hit 'enter' and it'll pop up with a little text box that says 'you missed something'. But it doesn't identify *what* you missed and so then you'll spend another 15 min going over it again and then you still can't find it so then you have to get somebody *else* to come and look at it to see if they can spot the thing that you missed. || -and now the latest thing is not to, not that the document gets lost if you don't complete it within a certain amount of time, when you might get pulled off somewhere and you're stuck in this document and you're; you have to get back 5 min… ||-or else you have to start all over again.'

Con: *Physician:* 'Oh that's a huge problem. If you're trying to fill out a consult it doesn't allow to go out and look at other information…(huge murmur of agreement—'oh yeah!'—strongest in the whole session). …'If you want to enter a consult, so you pull up the consult plate, it freezes the background and so you cannot scroll around in your own note…' So these poor specialists (ironically) they're getting these lousy consults.'

Theme 3—Information availability and processing

Pro: *Nurse:* 'It helps because you've got everything in front of you, and if you've got questions you can just do a quick review, even before you actually see the patient. You can just do a quick review and find out a few things about him and anticipate his needs before he actually… gets to you. It's just a-it's a wonderful thing.'

Pro: *Practitioner:* 'I like them. I like the templates. And I use them in rheumatology. We've created rheumatology templates and I use it in primary care. And I find once you've gotten used to working with it. Uh, sometimes my exam is the same for five visits. You know but, its just, it's the idea that it has a familiarity so it's very quick to go through it. Now that I've gotten used to the templates so I like the idea that that is available.'

Con: *Administrator:* 'The other thing, it pulls in, I think, most of the notes pull in the problem list and that could be old and it may have no relevance, you know, that's listed there. So, you really have to look at it to figure out why the patient came in what's actually being treated.'

Con: *Nurse:* 'the patient safety issue is being able to retrieve the information. So you have a nursing progress note that's from a patient on the SICU and the patient is transferred to 3East Tele and then, 3E, just before they went home there was a problem discovered and then to do an information trail so you have all these nursing progress notes and you don't know which nursing progress note originated where…it really gets in the way. The vitals are all the same. The titles are all the same. The contents of the notes are all the same…everything is all the same.'

Con: *Practitioner:* Problem is finding… 'The opinion of that person that's writing the note. And that's often hard to find sometimes. It's at the beginning of the note, sometimes it's at the end and it's buried between medication lists. The physical exam is a little blurb saying… Just weeding that part out. Not to mention finding the note, but once you find the note—finding the important portion …'

Theme 4—Workflow alteration and disruption

Pro: *Administrator:* 'I don't have problems finding what I need to get if it's in, if it's in the computer. And maybe that's because I have to use it so often in so many different ways.'

Interviewer: 'Do you have some skills or tricks or approaches to that?'

Administrator: 'Well, well I know there are certain things that I'm looking for and that's admission date, what they (are) doing (on the) admissions date, when they get ready to home. And I follow that patient from the time they come in until the time they leave and go home. So, I pretty well know what's going on in the progress notes and in the consults, what the person's going to need when they get out and go home, the lab reports, those kinds of things. So, I know where to find that information and do have contact with the doctors and with the discharge planners. So, it's a little different.'

Con: *Nurse:* 'We have a piece of paper with all the questions because you don't have the computer in the room. So, you have to take that piece of paper, write it all down, and, then, go find a computer and put it in there. And, then, you get a call light or you have to go take care of a patient, it'll kick you out of there and you'll lose it…and, you've got to start all over again.'

Con: *Practitioner:* 'At least half the time. And—one of the things is that before CPRS, we would write a note with the orders at the end and a clerk would take those orders off and everything would happen. Now, we write a note with the orders at the end and then I print that note and then I sit there and clerically put all those orders in the computer' '… you know, so all of a sudden instead of being done when I'm done with a patient, I'm sitting there for the next 5 min or more, putting in all the—what I'm going to do…' '… and that takes time. It takes way too much time.'

Pro: *Nurse:* 'Sometimes, if we see outpatients in emergency room, like, maybe a refill or this fella's having sleep problems and his doctor doesn't happen to be there, we'll do the evaluation, we'll do whatever it is we did, and then I identify the outpatient doc as an additional signer (on the note). That way (due to the alert) he knows, 'Oh, this guy came in on Tuesday and they adjusted his sleep medication', or something like. It's, it—that's really great…'

Theme 5—Trust and confidence concerns

Pro: *Administrator:* 'I think it greatly enhances (safety) because, you know, the falls assessment, the wound assessment, all of these things that can be put on a template that highlight the areas you need to cover are all right there. So, the accuracy of covering all those points, you know, is, is there. I think it enhances it, greatly.'

Con: Physician: 'The perfect example is just today: A patient's wife called in, and he was nauseated and vomiting and hypotensive, and she called in and asked what to do. And, the TIP nurse took the question, put me and my care manager RN down as co-signers on the note. Didn't page me with this and, you know, luckily, the care manager that I work with got it before I did and called this woman up, and said, 'Call 911'. 'Cause he was falling. And, I think they just assumed we were just constantly in front of the computer, looking at these things. And we're not…'

Con: Physician: 'The thing that affects patient safety and credibility, because when you see things like a note in which the vitals are 3 days old, it immediately calls attention to the fact that the author didn't read the note. And we see a lot of that with copy and paste that they, the patient's on day 5 antibiotics 6 days in a row and it's really apparent that the author didn't read the note. And that's a credibility problem.'

Con: *Nurse:* 'From a safety perspective, I think that copy and paste has had some influence in care of patients. I can think of a mental health chart that I recently reviewed where the event that, the patient—we had a disruptive behavior patient, and that event has been carried in every note for 4 years. And, I think that what we failed to do is a new assessment of that patient to still see if he is disruptive. But, his history has just gone with him the whole time. And, I had to do the chart for a disruptive behavior committee, and, at that committee, we determine and recommend whether, whether or not a patient's record is flagged. And, it would be unfair to have flagged that patient, based on one event that happened 4 years ago that's repeated in every kind of historical event afterwards. It's like it—what, what happened with the patient is someone failed, then, to really assess him in his current …'

Pro: *Administrator:* 'It helps me in the way that I can instantly see information. Whereas before, I would have to wait or do a lot of phone calling to get it. But now I can respond quickly and that person then gets the consult or the document can respond to me. And so that really cuts down on time.'

accessing documents but also how readily the content and meaning of documents could be cognitively processed.[13] [33] CPD was noted both to improve and worsen information availability. Participants greatly valued location-independent, quick access to documents and the ability for multiple users to access charts concurrently. However, once documents were accessed, there was also widespread concern about the challenges in finding desired information within them as they were longer than paper notes and cluttered with inserted, non-relevant text. Users reported that tools for searching across documents were slow and awkward. Many practitioners reported coping with this by reading only their own earlier notes and a few others before patient encounters, and worried about overlooking information. Notes were often seen as particularly hard to read when boilerplate, inserted data and copied text obscured key points.

CPD information was often perceived as unorganized and hard to search. One practitioner described how difficult it was to determine why a particular drug had been discontinued. Others described difficulty determining symptom patterns and disease course. Repeatedly, subjects expressed the desire for better integration of documentation with other EHR activities such as writing orders, reviewing practice guidelines and responding to clinical reminders. Copying data and narrative text from other notes to synthesize information was described as one approach to overcome the lack of integration, but this solution was also seen by some respondents to worsen clutter and impose a burden on readers. In general, clinical users desired succinct, current summaries of the patient's status and goals of care, but felt that many documents guided by templates and desires for 'completeness' were confusing and interfered with reconstructing the flow of care. While administrators also liked succinctness, they needed to focus more on details than on summarization and integration and thus prized the 'completeness' that many clinicians lamented.

Workflow alteration and disruption

Integrating keyboard entry of documentation with workflow was described as time consuming and interfering with patient contact and face-to-face communication. Practitioners wished for better integration of computerized order entry and CPD. Ward nurses and practitioners reported that notes documenting decisions made during morning rounds were often unavailable for review until the afternoon. Likewise, transcribed emergency room notes were reported as not available until the next day, leaving staff uninformed about new admissions and transfers. In addition to this frustration by some over not having immediate documentation availability, clinicians also complained about the time burden of performing CPD. However, most agreed that the ready availability of historical information made their work more efficient overall.

Nurses expressed concern about the mismatch of CPD with their mobile, team-based work processes. Some reported recording information as many as three times when caring for patients: in pocket notes, at the bedside and finally at a computer terminal. They also commented that the requirement to summarize care in shift notes clashed with their need to collect data continuously. Inpatient practitioners also reported carrying paper notes to manage information about the patients under their care. In general, CPD was viewed as more challenging on inpatient wards and in emergency departments than in clinics, and a poorer fit with mobile, fast-paced teamwork. Nurses in particular noted that CPD could not replace direct verbal exchange when handing off care to colleagues.

Trust and confidence concerns

Practitioners and nurses affirmed that the primary purpose of documentation was to convey clinical thinking, share information and coordinate the care team, and they saw aspects of CPD (eg, availability) as facilitating these goals. Administrators echoed that CPD made safety practices easier to monitor. However, many expressed the view that CPD usage could lead to less reliable and less trustworthy documentation than the paper notes that preceded it. All subject groups expressed concerns about the risks of careless copying and pasting, stating that they were less likely to trust notes containing obviously copied text. Subjects also noted that CPD facilitated 'uninhibited' authoring behavior, via templates that inserted excessive data or copied text. Clinicians experienced pressure to 'document' care for reimbursement purposes, but the result was a relatively messy process of simply inserting labs, vitals, medication lists and problem lists that could be misleading. This information was deemed essential, but when data inserted were not current, or when inserted data blended current and older data as if they were contemporaneous, the results were seen as misleading and confounding. Providers described how the workflow of editing a note during a clinic visit could result in the insertion of medication and problem lists that had been current before, but not after the encounter. Individually, these inconsistencies might seem minor, but collectively, they diminished trust in documents. Even so, participants of all types gave examples of how well-written, well-integrated notes aided the entire care team. Some users expressed concern that while the rapid availability of CPD information promoted a general perception that recorded information was current, trust was shaken when documents were noted to be inconsistent, copied, incoherent or delayed.

Overarching findings

Some general findings spanned all themes and work roles. Despite the negative comments, subjects agreed that CPD was superior to paper-based documentation in many ways and did not wish to revert to a paper-based system. Universally, they expressed the desire for system improvements and better organization of the record. Other desired improvements included voice-to-text capability, the ability to insert hyperlinks to cross-reference documents and external data, and automatic highlighting of copied text. Participants also voiced their need for more training to improve skills, reporting that their formal training had consisted of basic instruction in technical capabilities rather than emphasizing best practices. Subtleties such as CPD 'etiquette' and effective work-around strategies were learned ad hoc from peers or not at all. Subjects tended to attribute uninhibited documentation behavior to training failure and poor design. During the sessions, users often expressed pleasant surprise when hearing that another user's work-around technique met their need.

Perspectives differed by role

Users' views were quite consistent within each of the stakeholder types across the facilities, with practitioners agreeing with practitioners, nurses with nurses, and administrators with administrators. Indeed, the thematic findings among types of users were remarkably consistent and contributed to the finding of saturation that was evident about midway through the study. However, as alluded to under each thematic area above, perceptions of CPD usage often varied between types of users, based on work roles, with different groups seeming to emphasize and

value certain aspects of CPD more than others. Generally speaking, nurses emphasized communication and coordination, practitioners emphasized finding information to support decisions, and administrators emphasized accuracy and valued the consistency that comes from adherence to standard documentation formats. These differences seemed to be determined at least in part by whether their principal CPD activity involved the creation or consumption of information. For instance, whereas practitioners and nurses emphasized data entry and interpretation (exemplified by the importance to them of CPD as a communications medium and information resource), administrative users considered documentation compliance with regulatory and billing requirements as most important.

DISCUSSION

Given the increasing EHR adoption rates across the USA, the transition from handwritten documentation to CPD will continue to grow as the predominant form of clinical documentation within healthcare practices and hospitals.[34] While previous studies have explored some of these CPD issues, this is the first study to explore those across multiple sites and multiple stakeholders. As such, these findings confirm and expand on those of earlier studies, adding to our understanding of the potentially beneficial and detrimental aspects of prevailing CPD systems.[11 13 23]

A key insight informed by these findings relates to the perceived value of CPD as a communications tool, and its unrealized promise. The ubiquitous availability of CPD clearly enables many improvements in productivity and efficiency. At the same time, it is clear that there are factors inherent to such systems that can degrade the value of shared information and communication if improperly used. Complaints about inappropriate copying as well as vast quantities of low-quality information automatically inserted into documentation are now widely reported and were confirmed in our study as a concern among multiple stakeholders.[23 35–37] In addition, by enabling location-independent documentation in non-traditional, often distant physical sites, CPD systems create a need for collaborators who are physically separated to communicate in new ways. As this study shows, work-around solutions for communication have thus emerged, even as the consequences of decreased face-to-face contact have not been fully mitigated. While some EHR systems have addressed this concern partly by integrating messaging functionality to augment CPD, full support for the communication needs of providers in order to enable collaborative care efficiently and effectively, including the important issues of care coordination, transitions and patient hand-offs, remains largely unmet across such systems.[38 39]

Even as CPD users strive to furnish a complete journal of care, our findings also suggest that current CPD systems may not be ideal for imparting that course of care to readers, much less facilitating clinical decision-making. Current implementations of CPD in prevailing EHR systems like the one studied lack the cognitive support tools needed to help clinical users acquire 'big-picture' views of the patient's specific situation, with clinicians and administrators alike lamenting the challenges of discerning details often buried in notes that are challenging to find or review.[40] More flexible and powerful indexing, search and filtering tools are needed to serve each type of user. Differing uses of documentation require balancing users' needs for efficient expression and clarity versus completeness and formal compliance. Indeed, other investigations of document quality and collaborative cognitive work in EHR environments have also observed that different users such as clinicians and administrators perceive document quality differently, thereby

supporting the notion that no single way of viewing records will suit every user or purpose.[27 39 41 42]

In addition to issues related to the consumption of CPD-generated notes, the time and effort burdens of creating electronic documentation also arise as major disruptors of workflow and important causes of uninhibited authoring behavior. It is evident that improvements in note generation, such as by improved voice-to-text dictation capabilities, would help greatly. Similarly, while systems like the one studied nominally support both outpatient and inpatient documentation activities by multiple providers in a unified record, they tend to be optimized for use in one setting over the other. Just as different documentation views may be needed for different users and purposes, so too are tools required to meet the documentation creation needs of different settings and users.

As CPD assumes its central position in the healthcare and business processes of both private and public health systems, tensions over administrative versus clinical goals in CPD use must be acknowledged and negotiated, lest opposing agendas blunt the potential of CPD for needed improvements in healthcare. Enforced use of templates to meet regulatory and billing requirements should be moderated by the input of clinicians using the system. Standardized documentation can certainly be useful, but excessive control over expression risks loss of information and trust in the written record. Emerging technical solutions such as better tools for administrators to extract information from natural language may help ease tensions even as CPD generation capabilities are improved.

Another important reason to address these concerns relates to the goal of leveraging the rich and varied data in CPD-generated notes for knowledge discovery and systematic learning through care processes. Indeed, creation of the so-called 'learning health system' depends in large part on an ability to capture reliable and complete clinical information and then reuse such EHR-derived data to inform quality improvement as well as clinical and translational research.[43–45] To reap such benefits, it is critical that the value and function of CPD be protected and improved even as it becomes more efficient in order to enable scientific advancement among the multiple purposes of clinical documentation.

The drastic changes to how clinical documentation is created and used in an EHR-equipped world require not just new system features, but also improvements in work processes and user education that promote optimal use. Each facet of CPD-related information management, ranging from personal information management and team-based care to institutional and regulatory considerations, should be part of an integrated training approach. In addition, given concerns over cognitive overload and diminished trust in and value of CPD, it is critical to revisit current expectations for and drivers of what should be included in clinical documentation, particularly when key information is now available a mouse-click away in current EHR systems. User instruction in optimal CPD techniques should then take that into account in order to help avoid the creation of cluttered notes with low information value.

Overall, and despite the limitations noted, users have adopted CPD enthusiastically and passionately, and they wanted to see it improved. It is clear that CPD use creates a valuable, shared clinical information and communication space, although the communal nature of this space brings challenges and conflicting opinions over how it should be used. As with many such systems, the VA's CPD system was modeled after an electronic version of a paper-based medical record. While understandable, the persistence of this paper-based paradigm as the basis for CPD capabilities and activities seems to have contributed to

numerous problems and unintended consequences such as those identified above. Indeed, it appears that the resultant CPD systems are not only reshaping but transforming the provision of care and clinical and administrative workflows, often to a greater extent than was anticipated and not always for the better.

Even as more study is needed, these findings indicate that the design, implementation, and use of CPD systems must evolve to incorporate lessons learned after a decade of use.[46–51] Fundamentally, a change is needed in the current metaphor on which current CPD systems are based. The 'electronic chart' paradigm may have been useful for establishing CPD, but as recent consensus statements call for and studies like this one confirm,[52] there is a need for CPD systems that both respond to user needs and adapt over time, preserving and improving document quality while supporting the information-intensive workflows that are essential to providing and improving care.

Limitations

Our study has limitations. Despite the range of facilities included and the fact that many EHR systems share common features, those interviewed all used the same VA CPD system, potentially introducing bias if some findings resulted from factors unique to the VA. Indeed, while the VA as a system has a long history of CPD use, certain features such as the problem of ambiguous co-signature usage may be specific to the VA system. Furthermore, the nature of the VA, including that it is a 'closed' healthcare system, primarily funded by a single payer in the form of the US government, and wherein all staff are employees, may contribute to perceptions, motivations, and usage behaviors that are less commonly seen in other settings in which payment pressures differ or users are more loosely affiliated with the institution hosting the EHR system. Beyond potential VA-specific limitations, there may be others. Although we studied sites where CPD had long been in stable use, the interviews were conducted at a single point in time, raising the possibility that some findings might change as systems evolved. More generally, qualitative studies like this one have limits: focus group contributions are subject to conformity pressures, may not truly reflect the work environment, and despite best efforts to be objective investigator biases can be introduced in the collection or analysis phases of this study. Despite these potential limitations, the consistency of findings across sites, and the use of multiple independent reviews followed by iterative group analysis should reduce this source of bias.

CONCLUSIONS

CPD use has large impacts on the clinical and administrative aspects of healthcare. While current users vary in their perceptions of how well CPD meets their needs, most are generally positive about the system even as they agree that some CPD usage patterns are problematical and require attention and improvement. As with any healthcare intervention, care must be taken in the design, implementation, and use of CPD to avoid or minimize potential harmful impacts. Our findings suggest that current CPD system design and usage is not optimally meeting the needs of users and appears to be based on an outdated paradigm. While there are clear benefits to CPD, the degree of angst and dissatisfaction with it speaks to a fundamental need for changes that probably reflect the need for a new paradigm governing how such systems should be built, implemented and used. Emergent features relating to communication, coordination, cognitive support, workflow and implementation policies need to be included in planning and refining CPD

systems. These findings should also be considered in training strategies and the development of best practice standards for EHR users. These findings add to the relatively limited literature on CPD given its fundamental importance to healthcare and EHR use, and more research is indicated to assess the extent of these findings and to determine effective approaches to improve CPD systems.

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