Computerized Provider Documentation: findings and implications of a multi-site study of clinicians and administrators

Embi, Weir, Efthimiadis, Thielke, Hedeen, Hammond. JAMIA. January 2013

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Clinical Documentation

- Varied purpose and quality throughout history
  - Hippocrates to Weed

- Clinical Record - the repository of patient information

- Physician/Provider documentation serves as the core
Clinical Documentation: History

- Early 1900s quality was poor
  - Few hospital/physician records reliable or detailed
  - “The record as it is kept today is practically valueless”
    - Editor *The Modern Hospital*, 1917

- Attempts at reforms:
  - 1910 - Flexner Report on medical education - formal statement on function and content
  - 1940s - accuracy and organization requirements for hospital accreditation

- Despite efforts quality remained poor
Clinical Documentation: History

 Lawrence L. Weed:

- *Medical Records that Guide and Teach* NEJM 1968
- “Creation and review of clinical documentation is integral not only to the practice of medicine, but also to the teaching and learning of it”
- Problem-oriented organization proposed
  - SOAP format proposed
- Predicted: *Computers will help manage information*

- Came to pass, but other issues have influenced documentation since Weed’s time...
Purpose of Clinical Record Today

- Today a “Comprehensive” Purpose
  - Communicate with ourselves and others
  - To justify interventions/reimbursement
  - To satisfy legal requirements/protect from lawsuits
  - To teach/educate students
  - To improve efficiency
  - To enable quality assessment and increase safety
  - To develop database for “learning”

- How well does traditional paper record meet these purposes?
Limitations of Paper-based Record

- Limited accessibility
- Variable Legibility
- Single format for data entry/retrieval
- Minimally structured

Drivers of EHR adoption

EHR-based Clinical Documentation

- Inclusion in EHRs even early on via:
  - Transcribed dictation
    - Expensive
    - Delays in document availability
  - Document Imaging (Scanning)

- Direct entry of documentation by physicians via computer keyboard and mouse:
  - Computerized Provider Documentation (CPD)
EHR-based CPD

- Multiple EHR systems
- Most share integrated features/components in common to help “get work done”
  - Typing can be cumbersome, so tools to help:
    - Templates
    - Copy-and-paste
    - Automated data insertion
EHR-based CPD

- Potential Benefits
  - Better accessibility to record
  - Better legibility
  - Depending on system:
    - Better integration of/access to data
      - Lab, Meds, Notes, Reports, etc.
    - If structured data - better retrieval

- Some aspects of paper are lost in many EHRs
  - Color, shape, texture, and other visual cues…
Paper-based Record Examples

**INTERDISCIPLINARY PROGRESS RECORD**

<table>
<thead>
<tr>
<th>DATE/TIME</th>
<th>DISCIPLINE</th>
<th>NARRATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>E. TS4, RN</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mrs. reports feeling pretty good this morning. Is worried about not eating before her thallium scan. No CP, has not had any pain for 24 hrs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VS: BP 104-150/55-100, HR 62-73, RR 16-20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I/O: 2160/1525, Net +35, Weight 63.8 &lt; 64.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extremities: Trace edema LE's (8)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Labs: T/L 18.5; D/L &lt; 55; ESR &lt; 20; PTT 13.7; PT 68.2; CT 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Instructs: None</td>
</tr>
</tbody>
</table>

**ECG:** NSR, A/S NS, Diffuse ST T I, II, III, AVF V4-5

**Int:** Middle aged & & S's of unstable angina. Likely to be 5-6 wks ago. Lots of angina. Now nearly incapacitated. Have rec angina possibly PCI. Risks/Benefits discussed.

1. cont. HFO. 
2. cath pass PCI in AM.
3. likely will need CABG.

**Blood Pressure:** 90/60

**Weight:** 131/30

**REC CABG**

**Order:** Con var. overnight.
CPD issues to be aware of...

- Change to the way we document have impacts
  - Software can limit data representation/organization
  - Human-computer interface itself may slow review of data
  - "Pattern-dead" data representations can worsen interpretability
  - Visual cues important when clinicians review clinical data

- Technologies can have unintended consequences
  - On culture, education, practice (CPOE, BCMA)
  - Same appears true for CPD
Some early studies showed mixed results
- EMR documentation more “complete” & “understandable”
- May enhance completion of information intensive tasks at expense of patient communication

- Does more data = better note?
- Does “complete” = better communication?
- Other impacts of CPD?
  - Studies of transitions from paper to CPD reveal more…

Studying CPD

- Perceptions after transition to CPD:

- Emergent themes:
  1. Changed Availability of Documentation
  2. Changes to Work Processes and Communication
  3. Alterations in Document Structure and Content
  4. Mistakes, Concerns, and Decreased Confidence in Documents

- Other research has shed even more light

- Increasingly, these impacts of CPD affect not just practice, but other “uses”

Embi PJ et al. JAMIA 2004
CPD and quality improvement/research

- Increasingly, clinical data seen as valuable resource
- Rich source of data from which to drive care, improve quality, and enable research
- These drivers important “secondary use” or “re-use” of data
  - Particularly as lines between research-care blur
  - Multiple ongoing efforts, agenda toward this
Purpose of this study

- Despite becoming quite common, many reports of issues/challenges and not much research in this area
  - For instance, much more on CPOE
- Previous studies like this one have focused
  - on particular stakeholder groups (e.g. physicians)
  - Particular sites
  - Paricular issues (e.g. copy-and-paste)
  - All useful to understanding, but often limited in scope
- We sought to study multiple stakeholders across multiple sites in US to gain broader understanding of impacts of CPD
  - Particularly, understanding of clinical and administrative perceptions of CPD
Methods:

- Three focus group sessions at each site*
  - One each with nurses, practitioners and administrators

- Sites:
  - Seattle Division of VA Puget Sound (Washington),
  - VA Medical Centers in Walla Walla (Washington),
  - Salt Lake City (Utah)
  - Cincinnati (Ohio).
  - *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
# Methods: Study Subjects

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Descriptive statistics of study subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Practitioners (MD, NP/PA)</td>
</tr>
<tr>
<td>Total no of participants</td>
<td>54 (45, 9)</td>
</tr>
<tr>
<td>% Female</td>
<td>46.3%</td>
</tr>
<tr>
<td>By facility:</td>
<td></td>
</tr>
<tr>
<td>Puget Sound VAHCS, American Lake (Tacoma, Washington, USA)</td>
<td>8 (5, 3)</td>
</tr>
<tr>
<td>Puget Sound VAHCS, Seattle (Seattle, Washington, USA)</td>
<td>15 (12, 3)</td>
</tr>
<tr>
<td>Walla Walla VAMC (Walla Walla, Washington, USA)</td>
<td>11 (9, 2)</td>
</tr>
<tr>
<td>Salt Lake City VAMC (Salt Lake City, Utah, USA)</td>
<td>7 (7, 0)</td>
</tr>
<tr>
<td>Cincinnati VAMC (Cincinnati, Ohio, USA)</td>
<td>13 (12, 1)</td>
</tr>
</tbody>
</table>

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.
Methods:

Data collection:

- 1 hour focus groups at each site
- Led by 2 researchers experienced with focus groups
  - 1 author at each, with 1 other site-specific author at each (total of 2)
- Brief guided discussion to start and focus on CPD
- Then, semi-structured script followed
- Open-ended followed by closed-ended questions as needed
- Recorded and transcribed

Analyses:

- Six investigators participated in multiple rounds of review
- Pre-coding by at least two-reviewers for each transcript
- Codes derived from utterances where possible
- Then iteratively reviewed and refined all as a group of six
- Final review to reconcile discrepancies, derive codes
- Summary interpretations drawn from categorizations, grouped into themes
Results:

- 14 focus group sessions were conducted
- Total of 129 subjects
- Seventy-five distinct codes were identified, and grouped into 17 higher-order categories (next page).
- Some phrases were assigned unique codes, and others, representing multiple concepts, were cross-coded
Results: Emergent Categories

- Control (i.e., issues of institutional and provider control over document content)
- Functions forced on note authors by the system
- Negotiation and transfer of responsibility via documentation
- Concerns over expressivity—(story telling versus recitation of facts)
- Copy and paste functionality (pros and cons of copied and pasted content)
- Lack of confidence and trust in note contents
- Availability issues (accessibility, legibility, finding and comprehensibility of document content)
- Comparisons of paper-based and computerized documentation (e.g., changes to workflow, flexibility, documentation burden, chart ‘landmarks’, efficiency, quality)
- Communication and computerized provider documentation usage (e.g., collaboration, care coordination, inappropriate usage, inadequate tools for effective communication)
- Process integration (e.g., integration of ordering with note-writing, easing document review with data review, etc.)
- Clutter, irrelevance, redundant, useless information
- Knowledge of system, skillfulness with system
- Work-arounds
- Safety issues, errors
- Desire for improvements/missing features
- Personal work and information management
- Poor/uninhibited authoring behavior facilitated by system
Results: Themes

- Communication and coordination
- Control and limitations of expressivity
- Information availability and reasoning support
- Workflow alteration and disruption
- Trust and confidence concerns
Results: Theme: Communication & Coordination

- Participants: CPD was their principal source of patient information and primary means of understanding a patient's clinical history.
- Even so, multiple communication channels beyond CPD were necessary for successful care coordination.
- Major benefits of improved access to documentation facilitated by CPD.
- Also, CPD often inadequate for the degree of communication and care coordination that they desired.
Results: Theme: Communication & Coordination

- Face-to-face communication was more frequent before CPD due to the central location of paper charts.
- CPD has altered work patterns in ways that reduce direct communication among providers.
- Developed work-around tactics to improvise communication, for example:
  - Co-signature feature to flag documents for others
  - Addendums that included comments and responses to original text
  - Administrators objected to finding such ‘discussions’ in the chart.
  - Many clinicians not comfortable with this
Results: Theme: Communication & Coordination

- Clinicians also wanted better functionality to support the coordination of care.
- Clinical tasks often hard to track from one note to another, hard to reconstruct events and details across multiple problems and encounters.
- Significant time and effort required to review available documents, discern major issues, goals
- Other difficulties
  - Identifying who was actually responsible for the current stage of a patient's care,
  - Determining which plans were being followed
  - Summarizing information for a care transfer or patient ‘hand-off’.
Results: Theme: Control & Limitations of Expressivity

- CPD can restrict expression, ‘force’ prescribed actions.
- Required templates force administratively required information at the expense of relevant clinical information, compromising clinician autonomy, expression, efficiency.
  - Often forcing documentation of info found elsewhere
  - Template-constrained language perceived as bland to facilitate regulatory and reimbursement compliance at the expense of clinically useful information.
  - Long documents, relevance not easily determined.
  - Though, templates can remind about important information, and speeded data entry
- Generally, 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.
Results: Theme: Information Availability & Reasoning Support

- CPD improves and worsens information availability
- We use ‘availability’ to mean accessibility as well as ease of cognitively processing content and meaning
  - Better: location-independent, quick access to documents and the ability for multiple users to access concurrently
  - However, challenges in finding desired information
    - Longer than paper, cluttered inserted, non-relevant text
    - Tools for searching across documents slow and awkward, coped by relying on own earlier notes, worried about overlooking information.
    - Hard to read by boilerplate, inserted data and copied text
- Desire for better integration of documentation with other EHR activities such as writing orders, reviewing practice guidelines and responding to clinical reminders.
Results: Theme: Information Availability & Reasoning Support

- Copying data and narrative text from other notes one approach to overcome the lack of integration, but also seen 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 templates-driven documents and desires for ‘completeness’ interfered communicating the flow of care.

- Administrators also liked succinctness, but they needed to focus more on details than on summarization and integration
  - So, they prized the ‘completeness’ that many clinicians lamented
Results: Theme: Workflow Alteration & Disruption

- Main “positive” was ease of work at multiple sites
- Several negative perceptions about this theme
  - Keyboard entry time consuming, interfering with patient contact and face-to-face communication.
  - Interruption due to poor integration of CPOE and CPD
  - Ready availability of historical information made their work more efficient overall.
- Nurses concerned about mismatch of CPD with their mobile, team-based work processes.
  - Some had to record information as many as three times when caring for patients: in pocket notes, at the bedside and finally at a computer terminal.
  - Need to summarize in shift notes clashed with their need to collect data continuously.
- Inpatient carry paper notes to manage information
  - Poor fit with mobile, fast-paced teamwork.
Results: Theme: Trust and Confidence Concerns

- Practitioners and nurses affirmed primary purpose of documentation was to convey clinical thinking, share information and coordinate the care team
  - Aspects of CPD (e.g., availability) facilitate these goals.
  - Administrators felt CPD eased monitoring of safety practices
- Many felt CPD lead to less reliable and less trustworthy documentation than the paper notes
- All expressed concerns about the risks of careless copying and pasting, stating that they were less likely to trust notes containing obviously copied text.
- CPD facilitated ‘uninhibited’ authoring behavior, via templates that inserted excessive data or copied text.
- Pressure to ‘document’ care for reimbursement purposes often led to information that is not current, sometimes
- Many inconsistencies, incoherence, delays were minor, but collectively, they diminished trust in documents.
Results:
Overarching findings

- Despite the negative comments, CPD was superior to paper-based documentation in many ways
  - None wished to revert to a paper-based system
- All desired system improvements and better organization of the record, examples include:
  - Voice-to-text capability
  - Ability to hyperlink, cross-reference documents and external data
  - Automatic highlighting of copied text
  - Need for more training to improve skills, CPD ‘etiquette’, effective work strategies
- Felt that uninhibited documentation behavior due to training failure and poor design.
Results: Perspectives differed by role

- Consistency within each of the stakeholder types across the facilities, with practitioners agreeing with practitioners, nurses with nurses, and administrators with administrators.

- However, perceptions of CPD usage often varied between types of users, based on work roles.

- Generally speaking:
  - Nurses emphasized communication and coordination.
  - Practitioners emphasized finding information to support decisions.
  - 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.
  - 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: Main points

- As EHR adoption expands, so will CPD use
- This is the first study to look at perceptions across a range of users and range of facilities across the US
  - Provides unique insights, expands our understanding of CPD
- Key insights:
  - CPD’s value as a communications tool, and its unrealized promise
    - Organization of notes and “chart” makes it hard to use
    - Some mis-use of features like co-signature, etc. Some have addressed this with messaging capability, but full support for communication needs still not common in systems (e.g. for care coordination, transitions in care, etc.)
  - Widely accessible charts is improvement
    - But, over-use of features like copy-paste, templates can lead to more difficulty processing the information
  - Use in different locations also impacts workflow in new ways
  - CPD notes don’t do a good job of imparting “flow” of care for a patient
    - Ability to find information limited; search and indexing needed as are different ways of viewing record depending on role
  - Time and effort burden for creating CPD notes remains high
    - Desire for more features to ease this burden (e.g. voice-to-text as some are introducing)
  - Need to address these issues also to improve data collection and use for advancing science
Discussion: Main points

- CPD appears to not only be affecting, but transforming the way medicine is practiced.

- These findings also indicate that the design, implementation, and use of CPD systems must evolve to incorporate lessons learned after a decade of use.

- 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.
  - There is a need for CPD systems that both respond to user needs and adapt over time, preserving and improving document quality while supporting workflows.
Discussion: Limitations

- Only at VA facilities
  - Some unique features, but many similarities to other systems, too.
- Sites where CPD was long in use,
- Interviews 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
  - 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, most generally positive about the system even as they agree that some CPD usage patterns are problematical and require attention and improvement.
- Care must be taken in the design, implementation, and use of CPD to avoid or minimize potential harmful impacts.
- Current CPD system design and usage is not optimally meeting the needs of users and appears to be based on an outdated paradigm.
  - The degree of angst and dissatisfaction with CPD 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 inform training strategies and the development of best practice standards for users
- These findings add to the relatively limited literature on CPD, but more research in this area is sorely needed
Questions?

- Thank you!

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