From: Zenooz, Ashwini
Sent: 6 Mar 2018 08:45:38 -0600
To: Windom, John H.;Blackburn, Scott R.;Short, John (VACO)
Subject: RE: [EXTERNAL] Fwd: EMR

On physician and patient centric EHR: creating workflows with front line providers in-mind and engaged is the core part of change management strategy. Business and Clinical Requirements for Phase 1 of the acquisition were provided by Integrated Teams comprised of 200+ front line clinicians. Phase 2: in-depth workflow development for Cerner to implement at each site with follow a similar model. We are NOT adopting run-of-the-mill Cerner workflows. They will be configured based on requirements set forth by VA Clinical teams and Clinical Practice Guidelines.

Patient Perspective: We have engaged with VA patient centered design teams since day 1 of the project and our baseline discussions with Cerner started with the Veteran journey. Additionally, VSOs have been very engaged and have been/will be part of the design input and review as we implement patient portal, mobile scheduling etc.

Patient Centric EHR: Our focus is on providing high quality, value-based care and that was the basis of the "Choose VA" campaign. The goal of this implementation is to enable reliable metrics and data returns, measure outcomes so that patients have faster, access to quality care.

Please let me know if there are questions.

I'll be at the Venetian all day. (b) (6) or (b) (6)

Ash

Sent with Good (www.good.com)

From: Windom, John H.
Sent: Tuesday, March 06, 2018 6:16:13 AM
To: Blackburn, Scott R.; Zenooz, Ashwini; Short, John (VACO)
Subject: RE: [EXTERNAL] Fwd: EMR

Ash and John S.,
Please provide a one short paragraph technical and functional response for Mr. Blackburn to these elements that we have covered as part of our efforts. I can tell that our journey is coming to a close in the good Doctor's mind. Please do not create any ambiguity or open up any cans of worms in your responses. "Clear and concise." Thank you. Break Mr. Blackburn/I provided you the Apple comparison matrix awhile back but will send you again. My e-mail highlighted that

the Apple solution that was announced is effectively portable electronic file cabinet not an EHR/EMR.
V/r,
John

John H. Windom, Senior Executive Service (SES)
Program Executive for Electronic Health Record Modernization (PEO EHRM)
Special Advisor to the Under Secretary for Health
811 Vermont Avenue NW (b) (6)
Washington, DC 20420
(b) (6) @va.gov
Office (b) (6)
Mobile: (b) (6)
Executive Assistant: (b) (6) - Appointments and Scheduling
(b) (6) @va.gov Office: (b) (6)

From: Blackburn, Scott R.
Sent: Tuesday, March 06, 2018 8:42 AM
To: Windom, John H.; Zenooz, Ashwini; Short, John (VACO)
Subject: FW: [EXTERNAL] Fwd: EMR

See email below. Any thoughts on how to respond?

Sent with Good (www.good.com)

From: David Shulkin
Sent: Tuesday, March 06, 2018 7:09:43 AM
To: Blackburn, Scott R.
Subject: [EXTERNAL] Fwd: EMR

Can we begin to address and then ill respond back?

Sent from my iPhone

Begin forwarded message:

From: Bruce Moskowitz <(b) (6) @mac.com>
Date: March 5, 2018 at 6:49:58 AM EST
To: (b) (6) @gmail.com, (b) (6) @reagan.com
Cc: (b) (6) @gmail.com, IP (b) @frenchangel59.com>, (b) (6) @gmail.com
Subject: EMR

I would like to underscore the importance of getting the “Cloud”correctly and the other four issues with the new CIO’s. Also the composition of the physician input has to change immediately so that the EMR is patient centric and usable from the physician perspective.
Second this is going to take years to implement and especially in mental health we need a portable EMR solution that works with the DOD, the VA and the private sector. No one at the VA got back to me on what the Apple project can and can not do in terms of solving this problem.

Sent from my iPad
Bruce Moskowitz M.D.

From: Short, John (VACO)
Sent: 28 Feb 2018 12:19:37 -0800
To: Blackburn, Scott R.
Cc: Windom, John H.;Zenooz, Ashwini
Subject: RE: Open API - it is CLOUD + languge + (b) (6) Update All 4 Answers
Importance: High

1. Voice Recognition?
   The EHRM platform includes Enterprise Dragon Nuance. VHA already deployed the enterprise version which maintains people voice print and the Clinical Staff say it works very well. Cerner will port over the voice prints so the clinicians that use it today will be able to use it tomorrow in Cerner without any rework. The Clinician can use the dictation and other features with voice recognition.

2. How will all entered lab data, from any source, be available on a graph?
   Graphs are generally available in 2 spots. 1. Workflow MPage lab Component and 2. Results review flowsheet. When outside labs are mapped we would use the same names as internal and then they would appear on the same line. Even if they are not exactly named the same the results review flowsheet allows for 2 different lab values to be graphed together.

2. Can Cerner's system catching test duplication, over utilization and medication duplication/errors at time of ordering instead of after the fact?
   Yes. All tests are configured to have a time where and alert is issued based on parameters we configure and can flex by venue. Over utilization is generally avoided with real time alerting but we would have to use some mechanism to monitor, via report, usually. The med duplication is configured similarly to test and parameters determine how the system acts. Tall man lettering reduces errors in look alike, sound alike meds, and finally in instances we identify unique instances of errors we can configure rules to catch those. For meds all allergy checking, dupes, dose range checks, and interactions are checked at time of ordering.
   **Also, at DoD Cerner has already prevented over 15,000 duplicate test at the three sites.

3. Does Cerner have streamlined SOAP notes?
   Yes. These are provided and will be further configured under VA direction to meet VA clinician needs.

From: Blackburn, Scott R.
Sent: Wednesday, February 28, 2018 2:33 PM
To: Windom, John H.; Short, John (VACO); Zenooz, Ashwini
Subject: FW: [EXTERNAL] Re: Open API - it is CLOUD + languge + Rasu

Where did we land on the 4 topics below? I want to make sure they understand that you guys did a hell of a job so we have a warm and fuzzy that we are getting the best deal for Veterans.

From: Bruce Moskowitz [mailto(b) (6) @mac.com]
Sent: Wednesday, February 28, 2018 1:13 PM

To: Blackburn, Scott R.
Cc: DJS; Marc Sherman; O'Rourke, Peter M.; IP; (b) (6) @gmail.com
Subject: Re: [EXTERNAL] Re: Open API - it is CLOUD + languge + Rasu

Thank you my five CIO's had looked forward to tar and feathering me if the cloud is not done correctly!
The other issues are:

Voice Recognition

All entering lab data on a graph from any source

Catching test duplication, over utilization and medication duplication/errors at time of ordering not after the fact

Streamlined SOAP notes

Sent from my iPad
Bruce Moskowitz M.D.

On Feb 28, 2018, at 12:52 PM, Blackburn, Scott R. (b) (6) @va.gov> wrote:

> Bruce – this is incredibly helpful. Thank you very much. I had my team dig into this this more this morning. What you have stated below is clearly the intent (we need everything to be OPEN and absolutely do not want to inadvertently create vendor lock); we've also gone back this mornign to confirm with Cerner that this is their intent. We are going to alter the language to make this more clear. We don't anticipate any pushback. A few things I learned this morning…
>
> - The contract does NOT lock us in to Amazon Web Services (AWS). Rather any cloud provider or applications that meet security and privacy requirements to protect Veteran data can interface with Open APIs or push data to the VA/Cerner system.
> - Currently 3 cloud providers meet the Government security requirements – AWS, Azure/Microsoft and CSRA. There are several others that we expect to come on board soon including Google and VirtuStream/Dell. At VA, we use both AWS and Azure right now. Again, the goal here is to create open environment as long as the provider meets certain standards (these standards are dictated by GSA, not VA).
> - (b) (4) [redacted]

- DoD is excited to follow our lead on all of this. I spent the morning at the Pentagon with the DoD CIO/team. This will help not just Veterans, but servicemembers still in uniform.

Thanks again for the feedback and support. We are going to make sure this is crystal clear.

Scott

From: Bruce Moskowitz [mailto:(b) (6) @mac.com]
Sent: Tuesday, February 27, 2018 9:29 PM
To: Blackburn, Scott R.
Cc: DJS; Marc Sherman; O'Rourke, Peter M.; IP; (b) (6) @gmail.com
Subject: [EXTERNAL] Re: Open API - it is CLOUD + languge + (b)

Apologize for the wording instead of their commercial cloud a cloud based system open
To all entities and instead of Amazon it should be all platforms working to accelerate health care iniatives

Sent from my iPad
Bruce Moskowitz M.D.

On Feb 27, 2018, at 9:20 PM, Bruce Moskowitz <(b) (6) @mac.com> wrote:

> To clarify further it states their commercial cloud instead a commercial cloud
> Open to all entities and of equal importance an open platform to all not just amazon but to all

Working on

Sent from my iPad
Bruce Moskowitz M.D.

On Feb 27, 2018, at 8:20 PM, Bruce Moskowitz <(b) (6) @mac.com> wrote:

> This is a problem it should say open cloud to all entities not commercial cloud

Second it should be open platform and not just Amazon to all entries working on health care platforms.

Sent from my iPhone

On Feb 27, 2018, at 6:09 PM, Blackburn, Scott R. <(b) (6) @va.gov> wrote:

> David/Bruce/Marc – here are a few updates:
>
> #1) (b) (6) **s all** in as far as starting to help right away. I just got off the phone with him. He has UPMC commitments rest of this week and is Chairman of HiMSS Innovation committee (so we will all be at HiMSS together next week). However if he needs to come to Washington this week for something, he will find a way to do it (and we will use invitation travel to pay for it). He is willing to start engaging right away to help us. He said he doesn't have to wait for

the IPA paperwork to come through for him to help. I've attached (b) (6) CV in case you need it.

#2) **The APIs are cloud based.** Here is the response from our Technical lead...

- The Open APIs that VA has access to from Cerner reside in their Commercial Cloud environment. This environment is designed to scale to accommodate Cerner's entire

remote hosted customer base.

- In a recent press release Cerner and Amazon announced that they would be working together in cooperation to accelerate Health Care Innovations.

#3) Below is the <u>IP language</u> that we negotiated**.** This is what caused [redacted] (one of the experts on our MITRE panel) to jump out of his chair

last week. He claims this is the holy grail that no other healthcare system has been able to get from either Cerner or Epic. (b) (6) claims that as a result of what we've negotiated below, that other healthcare systems will be willing to join us in the attached pledge (shall we decide to go forward with it) and we could do this next week at HiMSS. When I spoke to (b) he told me (b) (6) had already called him about this and that UPMC would be willing to sign this pledge.

Of import ance: Third[MJT1] party API develop ers shall retain

their IP rights when their API is used to connect to the Cerner interface, and there will be no derivative Contractor IP ownership when third parties consume Cerner terminology through open APIs.

Regarding the question on sharing development with others, see PWS Section 5.5.4 opening

paragraph: To accelerate better and more responsive service to the Veteran, VA is making a deliberate shift towards becoming a standards[MJT2]-based API driven digital enterprise. A cornerstone of this effort is the setup of a strategic Open API Program, The Digital Veteran Platform API Gateway, that

is adopting an outside-in, value-to-business driven approach to create API's that are managed as products to be consumed by developers within and outside of VA.

Finally, Cerner's response and the final negotiation language on sharing their data model as a result of the Interoperability Panel

finding s is as follows , Cerner agreed to sugges ted additio n of PWS paragr aph 5.8(h) as highlig hted at no additio nal cost:

From: Sandoval, Camilo J.
Sent: 6 Feb 2018 22:24:13 +0000
To: Sandoval, Camilo J.;Blackburn, Scott R.;Windom, John H.;Zenooz, Ashwini;Short, John (VACO)
Cc: (b) (6) (b) (6)
Subject: RE: EHR Meeting
Attachments: EHR Discussion - (8-Feb-2018).docx, WhatThisComputerNeeds.pdf

Marc and Bruce requested that we read attachments prior to our call

Agenda

1. **Marc Sherman** – 5 minutes to layout areas of interest
2. **Bruce Moskowitz** – 5 minutes to layout areas of interest
3. Group discussion around attachments
4. **John Window** – 5 minutes closing comments

Thank you
Camilo

Camilo Sandoval
Senior Advisor to Under Secretary
Veterans Health Administration
U.S. Department of Veterans Affairs
Washington, D.C.
M: (b) (6)
O: (b) (6)

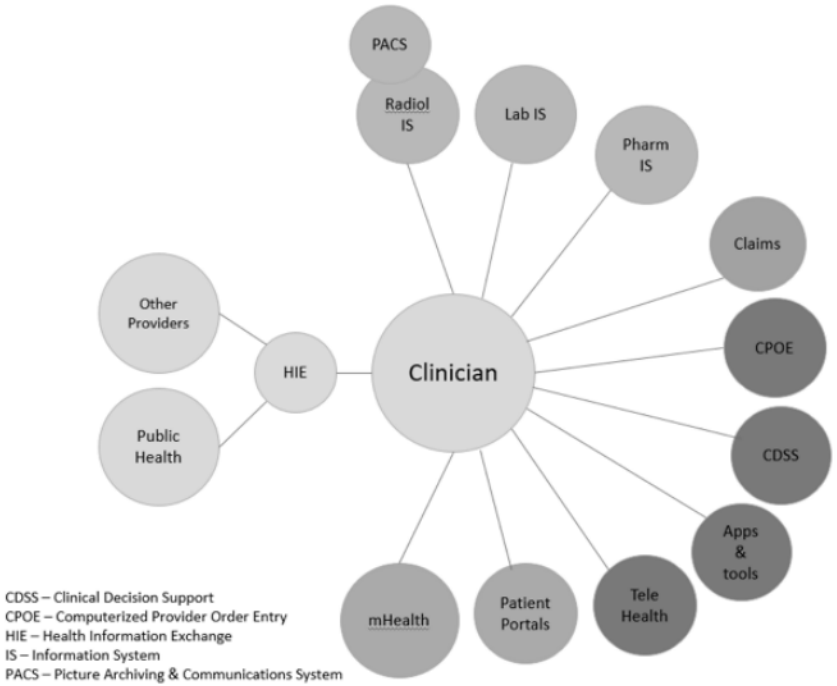
1	Topic Area	**Humanism and Artificial Intelligence** (Attachment – What this Computer Needs.pdf)	
	Summary	**Clinical Documentation and Electronic Systems: burnout & redundancy** • Dissatisfaction with design & cumbersome processes of electronic documentation • Loss of social rituals b/w physicians & nurses, healthcare workers etc. • Redundancy of notes & order entry; Mundane clinical documentation requirements • Overall mix of clinical vs. nonclinical activities • Concerns with AI/ML driven automation	**Additional Thoughts (Big Picture)** • Policy & Predictive Policing (Rule Engine) • How could AI help fix some of the problems created by technology & other potential advantages • Streamlining administrative burden and patient support • Data mining possibilities (from therapy to payer landscape) • Clinical Decision Support Systems • System and workflow design • Training around using models developed by Machine Learning • Other unanticipated consequences

2	Topic Area	**EHR OPTIMIZATION: Relationship between clinical documentation, the electronic systems that support documentation, and clinician burnout (Below)**
	Summary	• A range of factors drives clinician burnout, including workload, time pressure, clerical burden, and professional isolation . Clerical burden, especially documentation of care and order entry, is a major driver of clinician burnout. Recent studies have shown that physicians spend as much as 50 percent of their time completing clinical documentation . Nurses similarly spend up to half their time fulfilling clinical documentation requirements and data entry for other demands such as quality reporting and meeting accreditation standards. In the outpatient setting, patients will often describe clinical team members going through mundane questioning and computer documentation, often duplicative, and spending little time making eye contact and talking to them, or performing physical examination. With the exception of improving medication safety, nurses and other clinicians report **dissatisfaction with the design and cumbersome processes of electronic documentation**. Many clinicians feel they are compelled to first satisfy the demands of documentation in the clinical record. After caring for patients, many clinicians devote significant amounts of time to nonclinical activities, which often carry on into afterhours. This paper explores the relationship between clinical documentation, the electronic systems that support documentation, and clinician burnout, and provides recommendations for addressing these issues.

3	Topic Area	**Clinical Documentation and Coding Requirements**
	Background	• Clinician well-being and fulfillment in work is critical for patient safety and health system function. Fulfillment in work has been ascribed to **three factors**: (**1**) mastery: competency and proficiency in the work to be done, (**2**) autonomy: having some element of influence over the way work is performed, and (**3**) purpose: a connection to filling a societal need in an environment where one's profession is honored and valued. The current epidemic of clinician burnout is related to these factors. Clinicians increasingly feel burdened by administrative tasks that seem to not add value to patient care and are unrelated to the reasons they chose their professions. The disconnect between one's calling and one's daily work contributes to distress, and can lead to alienation, isolation, depersonalization, cynicism, emotional exhaustion, and burnout. • Clinical documentation began when physicians recorded case reports of a patient's course of care. These case reports evolved into records used in teaching others the practice of medicine. Although the original impetus for clinical documentation was to tell a patient's story and describe that person's treatment and progress, recent history has seen an increasing shift toward tailoring documentation to fulfill billing requirements. **Several major forces led to changes in clinical documentation**. **First**, as a component of **public funding** (Medicare and Medicaid), documentation of services became a requirement for payment, because federal payers needed to ensure that taxpayer funds were appropriately spent and beneficiaries received medically necessary services. Additionally, payers had to guard against fraud. However, payers are requiring increasingly detailed documentation to provide reimbursement. Similarly, **private payers** have increased administrative oversight in the form of administrative preapproval processes and **very specific documentation criteria to reimburse** for drugs and procedures. These requests encourage the generation of boilerplate text, templates, check boxes, and other documentation tools that fulfill billing purposes but can produce documentation of limited clinical value and also add time to the documentation process. **Movement away from detailed documentation of each care process to a focus on rewarding patient outcome is potentially beneficial**. **However, the management of the transition and the specified documentation approaches for outcome measurement will directly affect the potential benefit**. • The **second factor** influencing the change in clinical documentation was computerization of the patient medical/health record. Early systems fulfilled the need to collect data from different sources (pharmacy, laboratory, transcription). These electronic health records (EHRs) were often used to support billing and collections, and not necessarily clinical needs and workflow. Next, computerized provider order entry systems (CPOE) were introduced that use described guidelines for care and checklists in the form of electronic order sets. CPOE offers advantages over traditional paper-based order-writing systems, such as improved accuracy in ordering services and the avoidance of problems associated with handwriting legibility. However, **CPOE interrupts the traditional workflow of order entry. The way electronic order sets conceptualize workflow often does not align with actual practice**. For example, ICU physicians are often alerted to emergent needs for medication orders by the bedside nurse, who monitors the patient closely. Nurses were previously able to write verbal orders from the physician, with physician signature later, sometimes after administration of the medication. In contrast, CPOE workflow requires the physician to enter the order as well as sign it. **Further attention to the design and implementation of CPOE is necessary to realize its full potential benefits**.

4	Topic Area	**(Conti…) Clinical Documentation and Coding Requirements**
	Background	• The **third factor** that changed workflow was the introduction of patient confidentiality rules and regulations within the Health Insurance Portability and Accountability Act (HIPAA). Although HIPAA introduced important privacy protections for patients, the law also led health systems to limit the use of tools such as the problem-oriented checklist, names of patients written on the rooms or central locations, and many other basic forms of communication. • **A continued shortcoming of modern systems is adherence to tedious detailed documentation requirements to satisfy payers and regulations**. We have yet to design systems to support the premise that clinical documentation exists to support the care clinicians deliver to patients, and other functions should be a secondary goal. By creating a specific task out of every element of information, even with the use of checklists and reporting by exception, clinicians' time is adversely affected. **In part, this is perpetuated by the myth that "if it isn't documented, it wasn't done ."** Much of this has been driven by linking documentation to payment. This demand has perpetuated the perception by clinicians that payers do not fully trust them. The perceived over documentation of process fuels resentment that payers are supplanting the clinician's professional judgment regarding the care that needs to be provided. • Centers for Medicare and Medicaid Services' Evaluation and Management (E/M) coding guidelines offer a good example of the challenges in completion of document requirements. E/M codes require attestation of various elements of the patient's history, including review of 14 systems (e.g., respiratory) and physical examination to support the level of payment requested. There are five levels of payment, which are determined by a tabular interplay of four levels of medical history, four levels of physical examination, and four levels of medical decision making . This **results in abundantly detailed documentation, which is necessary for billing purposes, and, with the exception of medical decision making, is often clinically irrelevant**. The EHR compounds this problem by facilitating the collection of many redundant or irrelevant details. Another challenge is that some institutions over interpret E/M coding guidelines and require that only physicians can directly enter elements of the History of Present Illness (HPI). In addition, limitations are sometimes placed on clinically trained staff (medical assistants or nurses) such that they must sign in and out of roles between clerical and clinical tasks, and that the HPI drafted by an MA or nurse during rooming does not count for billing.

5	Topic Area	**Clinical Information Systems**
	Background	• EHRs provide a nexus for information input and retrieval among complex health care systems and environments. However, there are challenges in the use of EHRs that affect clinician burnout. **The Health Information Technology for Economic and Clinical Health** (HITECH) Act of 2009 provided the financial support and incentives to accelerate the adoption of computerized patient records. Through the **Meaningful Use** (MU) Program of HITECH, eligible providers and organizations could garner significant funding to offset the costs of implementing EHRs with the intention of optimally using the data to improve the patient experience, as well as quality and cost of care. The rapid pace of implementing systems that were available on the market at the time discouraged many clinicians and organizations from taking the time to redesign workflows, or insist on design changes in EHR systems that would better support clinical care. **What was not envisioned was that the electronic systems would exact more benefits for those other than patients and clinicians—e.g., automated claims for third-party payers**. • **Currently, most sites of clinical care use EHRs, which include electronic prescribing (pharmacy information systems) and CPOE. These systems often connect to clinical decision support systems** (CDSS), laboratory, radiology, telehealth, mobile health, patient portals, and health information exchange systems. CDSS are designed to aid clinical decision making by providing patient-specific assessments or recommendations**. When MU incentives rapidly advanced the implementation of EHR systems, it brought along the breadth of features listed above**. **Also for health care providers, MU brought enhanced use of structured data elements, and significant changes in workflow**. Although some positive process and outcomes improvements have been reported with the use of CPOE and CDSS systems, the overall results are mixed. **There is evidence for enhanced quality and safety, but there is also risk that distractions caused by associated clerical burden can contribute to safety issues**. Physicians who do use CPOE experience 30 percent higher rates of burnout than those who do not. Several studies document that physicians and residents spend 50 percent or more of their time using EHR systems for documentation, ordering tests, reviewing results, and communicating with patients or team members. Furthermore, nurses also spend up to 50 percent of their time on documentation. • From the early inception of electronic documentation, appropriate mechanisms to encourage direct clinician input have proved to be a challenge. CDSS often provide alerts (such as drug interactions and reminders) to health care providers as they use the EHR. Efforts of health systems to improve quality and performance along with MU requirements have led to widespread use of CDSS and alerts. **However, a high percentage of alerts are routinely bypassed** . **Another feature of EHR systems, inbox notifications, also consumes clinician time—a recent study estimated that physicians spend an average of 67 minutes per day processing these notifications**. **As a result, the utility of such notifications should be optimized and warrants further investigation**. • Personal health records that store health data input by the consumer or from other data sources have been implemented through a variety of models. They are most frequently available as tethered patient portals in EHRs, but freestanding products are also offered. However, adoption of patient health records has been slow, and there are recognized barriers to their use. Increasingly, mobile health data are available through personal mobile health devices and phones that can measure heart rate, steps, oxygen saturation, and other data. **Integration and use of this data can be important to patient management, and plays a growing role in the clinical record**.

6	Topic Area	(Conti…) **Clinical Information Systems**
	Background	• Patients and clinicians benefit when essential relevant health information is available at the point of care. For this to occur, health information must be shared across systems. **Health information exchange (HIE) efforts are focused on the problem of sharing data between EHR systems**. Although progress is being made, barriers remain with interoperability between EHRs and other health information tools and systems. Also, **there are concerns that HIE is impeded by EHR products because information sharing between systems can be challenging**. A principal challenge in HIE is the **limited standardized formatting of data and a lack of common framework**. Although it is common in other industries such as banking and travel, this lack of easy exchange of medical data constrains the overarching promise of EHRs. • The digital environment in health care has irrevocably changed how clinicians deliver and document care. The promise of technology to deliver on improving care and outcomes, as well as enabling workflow and reducing clinician workload, has yet to be fully realized. **The National Academy of Medicine (NAM) recognized the impending challenges more than two decades ago when it formed the Committee on Improving the Patient Record in Response to Increasing Functional Requirements and Technological Advances**. In their report, the committee acknowledged both the benefits and the challenges of the rapid expansion of information technology in health care. As health care continues to become increasingly complex and the pace of technological change accelerates, the need to revisit the digital environment in health care has never been more pressing. Figure 1 | Clinician EHR Systems/Tools | Source: Ommaya et al., "Care-Centered Clinical Documentation in the Digital Environment: Solutions to Alleviate Burnout," National Academy of Medicine.  000121

7	Topic Area	**System Challenges in the Current Environment**
	Background	• **Clinicians must spend increasing portions of their work time on nonclinical activities**. This leads to a lack of control over their workday, a loss of collegiality while working in isolation, and interference with the patient-physician/clinician relationship as a computer screen creates a physical and psychological barrier between them. EHRs have spawned a new MD exercise known colloquially as "**Pajama Time**," with mandated documentation carrying on into afterhours because of the volume of required computer tasks and the ability to complete these tasks remotely. • Because of the aforementioned payment guidelines and the ease with which digital documentation allows "copying and pasting" or just adding to prior entries, the **EHR has become a bloated repository of repetitive and redundant information**. Recent studies indicate that, in a variety of settings, clinicians routinely use copy and paste or copy-forward and that most clinical notes are the result of copied or imported text. The patient's story is further lost in the fog of self-populated content that adds pages but little purpose to the notes. • Another feature that an EHR has that a paper chart lacks is the ability to use templates and menus. Depending on the use, these features can either speed up or slow down use but **may not necessarily improve content**. Forced characterization by selecting choices from a "pull-down" list or prewritten text prevents telling the story in the patient's own words in as much detail as possible. Some health organizations require documentation through templates (e.g., drop-down boxes) to facilitate billing and auditing. Optimization of template design may help alleviate some of these issues.

8	Topic Area	**The Challenge of Multiple Stakeholder Requirements Driving Clinical Documentation**
	Background	• The espoused advantages of electronic health records are to help provide higher-quality and safer care along with greater efficiency to meet business goals. **Some of the potential advantages are widely accepted**: timely access to patient records, legible documentation, more reliable prescribing, reduction of some error-prone processes, enhanced privacy and security of data, and the potential to share information electronically with patients and other care providers. **The advantages of other capabilities are less certain and have yet to be realized by the majority of patients and clinicians**. **These advantages include better-coordinated and efficient care, enhanced clinician and team communication, complete documentation for streamlined coding and billing, improved productivity and efficiency leading to better work-life balance for clinicians, and reduced costs with less "paperwork" as well as elimination of duplicate diagnostics**. • **Given the investment and desire to optimize the use of EHR systems, practices and organizations rely on the broadest possible application of its use to service a diverse array of stakeholders, including but not limited to patients, clinicians, institutions, payers (public and private), vendors, research bodies, registries, regulatory bodies and regulatory counsel, and policy makers**. These stakeholders have great expectations that may also create competing interests. For example, documentation methods that capture data in a structured format can help facilitate billing or data analysis for quality improvement. However, clinicians may prefer free-form methods that provide greater flexibility and may be faster than structured templates in certain instances (though the use of structured formats and free-form methods for clinical documentation are not mutually exclusive). That being said, all stakeholders rely on data for critical decision making as well as advancing business decisions. • The fundamental functions driving clinical-documentation demands include traditional recording of care, automated transactions, and approaches to enable greater quality, efficiency, and informed decision making as summarized in Table 1. • Source: Ommaya et al., "Care-Centered Clinical Documentation in the Digital Environment: Solutions to Alleviate Burnout," National Academy of Medicine. | Note: [a] Principal elements that should be captured by the clinician during the patient encounter and recorded in clinical documentation.

9	Topic Area	**Leveraging Digital Health to Support Rational Clinical Documentation**
	Background	• Up to 80 percent of information about an individual in a medical record is textual. Use of free text in clinical notes is an important part of medical documentation. It allows the clinician to go beyond structured data entry to record a more holistic view of an individual. In addition, under the Assessment and Plan sections of a progress note, clinicians describe their current assessment, along with their rationale, and plans for next steps in diagnosis or treatment. • **Reimagining the future of digital health information technology to support clinicians, patients, and person-centered care relies on reevaluating the current data elements collected and entries recorded in EHRs**. Simplifying the breadth and depth of documentation for all clinicians should be predicated on evidence that the documentation is justified.
10	Topic Area	**Providing Automated Review of Previous Clinical Information**
	Background	• With the introduction of EHRs, and their text-productivity tools (e.g., templates, macros, and copy-paste functionality), clinical notes have become bloated and difficult to read. This forces the next clinician to go through a process of foraging to uncover important elements of past notes. By applying specially designed natural language processing algorithms, computers are now poised to read clinical text and glean important insights from it. Natural language processing (NLP) tools have been shown to reliably extract data from clinical notes with high levels of precision in research settings for specific tasks. Current use of NLP also allows clinicians to dictate a clinical experience and can provide structured data without the use of a template. In a study published in the Journal of Medical Internet Research, use of dictation plus NLP reduced documentation time while maintaining documentation quality. Future tools that facilitate the presentation of summary insights from the past in a succinct fashion would save clinicians time and prevent important information from falling through the cracks.
11	Topic Area	**Addressing Copy-Paste Documentation**
	Background	• Tools to help recognize the original source of text passages would help the clinician reader assess the credibility and veracity of the text, as well as know which findings are new or changed. Microsoft's Track Changes is an example of a common editing tool that helps the reader understand the provenance of a text passage. Administrative changes, such as documentation assistance and empowered teamwork that direct data entry tasks away from clinicians, will reduce the pressure to copy and paste or copy-forward. Copy and paste can be helpful and time saving, but it must be used judiciously. Organizations have identified practices to promote safe use of copy and paste [41]. In addition, regulatory changes that relieve clinicians of the need to document low-value text—e.g., each element of a normal physical exam, a complete review of systems, test results that are already present elsewhere in the record, and so on—will reduce the need for copy and paste.

12	Topic Area	**Transitioning to Payment Reform**
	Background	• One of the drivers leading to excessive and duplicative text that is so prevalent in today's clinical documentation is the need to comply with billing rules. Payment-driven documentation criteria are artifacts of the fee-for-service environment that has dominated American medicine for decades. As the United States moves from fee-for-transactions to value-based purchasing, policy makers should reexamine the need for documentation that serves billing needs and replace it with documentation that serves care. Ultimately, returning to the origins of clinical documentation—to communicate and facilitate care—would simplify documentation, reduce the effort dedicated to producing it, and encourage documentation of only those features that are most salient and necessary to continuing care.
13	Topic Area	**Applying User-Centered Design Principles**
	Background	• As health care practitioners transition from handwritten documents in paper medical records to electronically captured structured and unstructured documentation, the health care enterprise should take the opportunity to fundamentally reexamine the methods used to enter and retrieve essential care information. Instead of computerizing the paper-based methods of entering and retrieving information, design-thinking methods should be employed to elucidate an efficient method for capturing information and an efficient and effective way of retrieving the information needed to support effective decision making. • The transition from paper-based record keeping to computer-based information management presents a great opportunity to fundamentally relook at the most effective way of capturing and using rich information about an individual to make the best possible decisions about health. A goal of this effort should be to improve targeting of alerts and reduce disruption in clinician workflow. In addition, the inclusion of social and behavioral data that helps drive patient-focused treatment recommendations and the incorporation of patient goals would be beneficial. Standards for automated data integration from medical monitoring devices and other IT systems will also decrease clinician burden of manual data entry [42]. A truly advanced EHR system should provide patient-specific outcome and experience comparisons based on the treated population within the practice [43]. Machine-learning approaches could add to existing CDSS and generate accurate differential diagnoses and determine high-value evaluation approaches [44]. Machine-learning tools will likely assist in error detection and could improve diagnostic accuracy. Importantly, efforts to improve health IT systems must address usability or the "effectiveness, efficiency and satisfaction with which specific users can achieve a specific set of tasks in a particular environment [45]." A schema of the future state is presented in Figure 2. • Figure 2 | The Future State of a Lean, Streamlined, User-Designed System | *Source: Ommaya et al., "Care-Centered Clinical Documentation in the Digital Environment: Solutions to Alleviate Burnout," National Academy of Medicine.*

14	Topic Area	Recommendations
		• To say the evolution of clinical documentation in the digital environment has become merely a source of dissatisfaction for clinicians grossly underestimates its effect on burnout. Clinicians are calling for significant redesign of clinical documentation to restore autonomy and purpose to this aspect of work, eliminate the perceived large number of actions that do not add value, and return time to clinicians for essential care activities. **We recognize that the primary drivers for current capabilities in EHRs include regulatory requirements, and documentation to support coding and billing**. As noted in this paper, however, **the needs of clinicians and patients should be emphasized more directly and better incorporated as the primary drivers**. Clinicians spend much of their time focused on documentation and related coding issues. This use of highly specialized clinical knowledge seems to be a misapplication of resources. Meanwhile, the patients have been left in their exam rooms or hospital beds wondering if all the activity going on is helping to address their needs. • **It is essential that clinical documentation be adequately detailed so that patients' diagnoses and care can be understood by clinical colleagues and contribute constructively to team-based care**. With the current system, we have created records that are dense, where the relevant information is challenging to find, and gaps in the consistency of what is documented are apparent. Clinicians have learned to simply jump through the hoops of adequate documentation for reimbursement. Physicians are copying and pasting previous notes, changing a few details, and potentially contributing to the increasing volume of unnecessary and irrelevant data. • **Recognizing that time is a limited resource for all clinicians, only essential primary data entry should be required of clinicians to support the care of a patien**t. The care team needs to control what documentation demands their attention with optimal capability to capture information at the point of care. Secondary uses, such as billing, should be satisfied through machine-captured data, which might be addressed in EHR certification criteria. The technology also needs to be enhanced to address the tension between structured versus unstructured documentation. • Given the time that clinicians spend with inbox management, **organizations should ensure that messages indicate clear action targeted to specific audiences**. Having medical assistants or other support personnel support documentation (e.g., inbox management and entering patient data into the EHR) improves clinician satisfaction and reduces burnout. However, **the potential for unintended consequences in data accuracy should be considered and further evaluated**. Additionally, providing time in workflows during the workday to complete EHR documentation tasks enhances clinician satisfaction. Although not addressing the underlying documentation challenges, scribes or team-support mechanisms for documentation enhance physician satisfaction, increase time with patients, and advance charting efficiency [47]. • **As the country transitions from pay-for-transactions to pay-for-value, the focus of documentation should return to that which supports high-quality care delivery and team communication**. The original 1995 and 1997 guidelines were developed to ensure that fee-for-service reimbursement was justified. It would also be beneficial for CMS to deemphasize documentation requirements as a condition of payment for health care services. Deemphasizing (and phasing out over time) the granular

documentation requirements would not only decrease the administrative work that burdens clinicians, but also improve the quality and

- meaningfulness of the clinical documents. CMS should clarify that elements of the HPI drafted by an assistant (MA or nurse) during rooming, and subsequently confirmed with the patient by the provider, as indicated by the provider in the medical record, should count for reimbursement.

- Focus on further development of health informatics capability that allows clinicians to view and understand the previous medical, health, and social history of the patient, including detail regarding diagnostic, surgical, procedure, and care plan information, will improve current EHR workflow. Ideally, richer imaging, video, and other sources of information will be included. In this system, medical history will be informed and built on the input of various treating and consulting clinicians with input and review by the patient.

- As a best practice, clinicians should be engaged in development, testing, optimization, and evaluation of new EHR features such as clinical decision support, order sets, and templates. EHR training is often provided in a limited number of sessions as an onboarding component. However, advanced longitudinal training and support of clinical staff improves self-assessment of competency [48,49].

- The authors recommend that an authoritative body, such as the National Academy of Medicine, initiative a study focused on redesigning clinical documentation suited to the modern digital age with a primary focus on informing clinical management and improving patient outcomes and health. The study should focus on the needs of clinicians and patients in support of succinct documentation and use of informatics tools, which can facilitate and streamline workflow. See Box 1

Conclusion

As a result of new and emerging technology and changing consumer expectations, health care will inevitably transition to a more person- and family-centric health system requiring the interoperability of a broad array of health solutions from traditional resources, including clinicians and hospitals, to the internet of things. As we enter an era of telehealth and digital applications, we are just beginning to understand the effect of new technologies, such as machine learning and blockchain solutions, on extending the value of health care and better aligning it with the social, genetic, environmental, and behavioral determinants of health [50]. Simultaneously, payment reform efforts are underway to support this change with new models of value-based payment that reward improved personalized health outcomes. As we study opportunities to address the existing challenges of clinical documentation, we must do so with the understanding that health care is at an inflection point and will undergo unprecedented change in the way care is delivered and paid for in the coming years. Florence Nightingale was prophetic in her 1863 critique of hospital documentation that described her difficulty in seeking information on patient care and hospital conditions, claiming, “I have applied everywhere for information, but in scarcely an instance have I been able to find hospital records fit for any purpose of comparison [51].” Physicians 100 years ago brought forth the idea of adequate documentation to establish their professional responsibilities to their patients and to themselves. In the present environment, clinicians have lost control of this responsibility, and it is having deleterious effects on the authenticity of their work, their sense of autonomy, patient outcomes, and the functions of the clinical environment. It is time to rethink the patient record

		and how it can best be used to improve person-centered care.

VIEWPOINT

What This Computer Needs Is a Physician
Humanism and Artificial Intelligence

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The nationwide implementation of electronic medical records (EMRs) resulted in many unanticipated consequences, even as these systems enabled most of a patient's data to be gathered in one place and made those data readily accessible to clinicians caring for that patient. The redundancy of the notes, the burden of alerts, and the overflowing inbox has led to the "4000 keystroke a day" problem[1] and has contributed to, and perhaps even accelerated, physician reports of symptoms of burnout. Even though the EMR may serve as an efficient administrative business and billing tool, and even as a powerful research warehouse for clinical data, most EMRs serve their frontline users quite poorly. The unanticipated consequences include the loss of important social rituals (between physicians and between physicians and nurses and other health care workers) around the chart rack and in the radiology suite, where all specialties converged to discuss patients.

The lessons learned with the EMR should serve as a guide as artificial intelligence and machine learning are developed to help process and creatively use the vast amounts of data being generated in the health care system. Outside of medicine, the use of artificial intelligence in predictive policing, bail decisions, and credit scoring has shown that artificial intelligence can actually exaggerate racial and other bias. For example, a program used for risk assessment by US courts mistakenly flagged black prisoners as likely to offend at twice the rate it mistakenly flagged white prisoners.[2]

> The 2 cultures—computer and the physician—must work together.

Similar concerns around artificial intelligence predictive models in health care have been discussed: clearly, in the 3-step process of selecting a dataset, creating an appropriate predictive model, and evaluating and refining the model, there is nothing more critical than the data. Bad data (such as from the EMR) can be amplified into worse models. For example, a model might classify patients with a history of asthma who present with pneumonia as having a lower risk of mortality than those with pneumonia alone,[3] not registering the context that this is an artifact of clinicians admitting and treating such patients earlier and more aggressively. Since machine learning presents no human interface and cannot be interrogated, even if its predictions are extraordinarily accurate, some clinicians are likely to view the "black box" with suspicion.

The missing piece in the dialectic around artificial intelligence and machine learning in health care is understanding the key step of separating prediction from action and recommendation. Such separation of prediction from action and recommendation requires a change in how clinicians think about using models developed using machine learning. In 2001, the statistician Breiman[4] suggested the need to move away from the culture of assuming that models that are not causal and cannot explain the underlying process are useless. Instead, clinicians should seek a partnership in which the machine predicts (at a demonstrably higher accuracy), and the human explains and decides on action. The same sentiment was expressed by Califf and Rosati as early as 1981 in an editorial on predictive risk factors emerging from a computer database on exercise testing for coronary artery disease: "Proper interpretation and use of computerized data will depend as much on wise doctors as any other source of data in the past."[5]

The 2 cultures—computer and the physician—must work together. For example, clinicians are biased toward optimistic prediction, often overestimating life expectancy by a factor of 5, while predictive models trained from vast amounts of data do better; using these well-calibrated probability estimates of an outcome, clinicians can then can act appropriately for patients at the highest risk.[6] The lead time a predictive model can offer to allow for an alternative action matters a great deal. Well-calibrated levels of risk for each outcome, and the timely execution of an alternative action, are needed for a model to be useful. In short, a black-box model can lead physicians to good decisions but only if they keep human intelligence in the loop, bringing in the societal, clinical, and personal context. Additionally, the unique human brain and clinical training can generate new ideas, see new applications and uses of artificial intelligence and machine learning, and connect these technologies to the humanities and the social sciences in ways that current computers do not.

The ability of artificial intelligence to automate and help in the clerical functions (such as servicing the EMR) that now take up so much of a clinician's time would also be welcome. Although not currently accurate enough, automated charting using speech recognition during a patient visit would be valuable and could free clinicians to return to facing the patient rather than spending almost twice as much time on the "iPatient"—the patient file in the EMR.[7] More time for human-to-patient interaction might both improve care and allow physicians to record, and accurately register, more phenotypes[8] and more nuance. Better diagnosis, and diagnostic algorithms providing more

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accurate differential diagnoses, might reshape the traditional CPC (clinical problem solving) exercise, just as the development of imaging modalities and sophisticated laboratory testing made the autopsy less relevant.

As with the EMR, there are legitimate concerns that artificial intelligence applications might jeopardize critical social interactions between colleagues and with the patient, affecting the lived experiences of both groups. But concerns about physician "unemployment" and "de-skilling" are overblown.[9] In the same manner that automated blood pressure measurement and automated blood cell counts freed clinicians from some tasks, artificial intelligence could bring back meaning and purpose in the practice of medicine while providing new levels of efficiency and accuracy. Physicians must proactively guide, oversee, and monitor the adoption of artificial intelligence as a partner in patient care.

In the care of the sick, there is a key function played by physicians, referred to by Tinsley Harrison as the "priestly function of the physician." Human intelligence working with artificial intelligence—a well-informed, empathetic clinician armed with good predictive tools and unburdened from clerical drudgery—can bring physicians closer to fulfilling Peabody's maxim that the secret of care is in "caring for the patient."

ARTICLE INFORMATION

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