Electronic health records (EHRs) are part of most medical practices, but many physicians remain unhappy with them. This course describes EHR trends, including perceived impacts on quality of care and administrative burden, interoperability, and the potential of innovative solutions like Blockchain and Fast Healthcare Interoperability Resources (FHIR) to alleviate pain points related to EHR usage. This course is part of the Health Care Trends series.

Questions or comments? Contact us here.

Instructions: Click Start above or navigate to a section below to begin
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Knowledge Check

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Additional Resources
Learning Objectives

After completing this course, you will be able to:

1. Identify current trends on electronic health records (EHR)

2. Examine promises offered by Blockchain and Fast Healthcare Interoperability Resources (FHIR) to address friction points

3. Discover predicted impacts of EHR trends for patients, physicians and payers
What are electronic health records?

An **electronic health record (EHR)**, sometimes referred to as an **electronic medical record (EMR)**, is an electronic version of patient medical history, maintained over time, containing key administrative and clinical information.

"Electronic health records now are a part of most medical practices, yet doctors remain unhappy with them."

Are there statistics around EHR usage by physicians?

Medical Economics polled more than 3,200 physicians, a majority (55%) of which were in independent practice, to learn how EHRs function for today's practicing physicians:

87% of surveyed physicians used an ambulatory EHR system

43% of surveyed physicians used three or more different systems

74% of surveyed physicians had been using EHRs for 1–9 years


What is the perceived impact of EHR usage on care?

Physicians and practice staff remain uncertain on the overall effect of EHR use.

Instructions: Flip each card to review findings from Medical Economics' 2017 EHR Report Card
When asked "What effect has your EHR had on the quality of care your practice provides?," physicians responded:

- 14% mostly harmed quality of care

When asked "What effect has your EHR had on the quality of care your practice provides?," staff responded:

- 17% mostly negative quality of care

Below are the reported impacts on administrative burdens associated with EHR use.

**Instructions:** Click each plus sign below to learn more about reported impacts

<table>
<thead>
<tr>
<th>Positives</th>
<th>Negatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 69%: Practice receives lab results faster</td>
<td>• 84%: Increased time spent documenting patient care</td>
</tr>
<tr>
<td>• 62%: Overall practice functions more efficiently</td>
<td>• 72%: Increased time spent ordering medical services</td>
</tr>
<tr>
<td>• 44%: Saves time overall</td>
<td>• 70%: Increased time spent reviewing patient information</td>
</tr>
</tbody>
</table>

A study of ambulatory physicians published by the AMA in 2016 found that for every hour spent interacting directly with patients, nearly two hours were spent on EHR/desk work. The participants cited poor EHR usability as a major source of dissatisfaction. The ambulatory physicians in the study spent, on average, one to two hours of personal time each night on additional computer and clerical work.

While interacting with patients, 52.9% of time was spent on direct clinical face time, while 37.0% of time consisted of EHR and desk work.


How do physicians view or impact EHRs?

Physicians who have more experience with EHRs tend to view EHRs more positively

Physicians with at least four years of experience working with EHRs are far more likely to view EHRs positively than those with less experience.

Physicians who worked with EHRs for at least four years were 21.4% more likely to answer that EHRs allow them to deliver better patient care, 20.0% more likely to say that EHRs produce a financial benefit in
their practice, and 19.2% more likely to say that their practice runs more efficiently with an EHR.

Conversely, physicians with less than four years of experience were 12.0% more likely to say that EHRs disrupt the way they interact with patients and 8.3% more likely to say that using EHRs results in incomplete billing for their services.


**Physicians who optimize EHRs for their practices lead to better results**

EHR optimization refers to the process of refining EHR software to serve a particular practice's needs. Optimization efforts often focus on clinical productivity and efficiency. EHR optimization may include a variety of efforts, including the following:

- Process refinements
- Workflow redesign
- Practice-specific modifications
- Installation and placement of workstations
- Identifying appropriate clinical decision support needs
- Coordination of work across a team
Physicians who reported having optimized their use of EHRs were far more likely to report overall practice efficiency, and that EHRs saved them time and allowed them to deliver better patient care. They were also significantly less likely to report that their EHRs were disruptive to patient interaction.

While physicians who self-reported optimizing EHR use were more likely to agree with positive statements about their EHR systems, the process of optimizing those systems is often time consuming and costly. Additionally, more than 70% of physicians report that EHR use increases time spent on administrative tasks, with or without optimization.


Interoperability Status

As of 2016, according to the Office of the National Coordinator for Health IT's most recently available data, 85% of hospitals could send patient summary of care records, 65% could receive those records and 38% could integrate those records into their own EHRs without manual entry. 52% of hospitals were able to electronically find patient health information. Just 26% of hospitals could perform all four of these functions, considered key elements of interoperability.
Integration

The domain of interoperability dealing with integration, in which clinical information received electronically is entered into EHRs without manual entry, has been slow to progress, particularly among all but the largest hospitals. This lack of integration is a primary barrier preventing physicians from using outside clinical information.

Results of a study found that 35.3% of primarily small-to-medium sized hospitals reported outside clinical information was available and they used it “often” or “sometimes” in the delivery of care.

Among the 43% of hospitals that had electronic access to outside clinical information, 37.2% reported they used it “rarely” or “never” in the delivery of care. The most cited reasons for not using outside information in care delivery were that information was not viewable in EHRs as part of clinical workflow (48.6%), it was difficult to integrate such information into EHRs (38.1%), information was not always available when needed (32.6%), and information was not presented in a useful format (23.9%).

Developing a standardized way of identifying patients

Enforcing HIT interoperability standards across care settings and facilities

Enforcing industry-wide interoperability measurement standards

Coordinating stakeholders across the industry

Ending information blocking and data sharing impediments


Usability

“Usability represents an important yet often overlooked factor impacting the adoption and meaningful use of EHR systems. Without usable systems, doctors, medical technicians, nurses, administrative staff, consumers, and other users cannot gain the potential benefits of features and functions of EHR systems.”

What is Blockchain?

"The technology most likely to change the next decade of business is not the social web, big data, the cloud, robotics, or even artificial intelligence. It’s the blockchain, the technology behind digital currencies like Bitcoin."

Blockchain is a digital, decentralized ledger or database, open to anyone, running on devices around the world.

Each time a transaction occurs, an ordered record (or “block”) is added to the ledger (or “chain”). The database is distributed, meaning that not all storage devices connect to a common processor. Private, cryptographically produced keys are necessary to edit a particular part of the chain.

In medicine, a patient would possess the private key for the part of the Blockchain containing their personal health information. The patient could then share this key with their physicians, hospitals, and other providers, allowing them to access the patient’s health information on the ledger, or make additions to it. Information could range from administrative and clinical data typically found within EHRs, to images (such as X-rays or MRIs). Additionally, a key could be issued to remote medical devices, collecting patient-generated health and automatically added to the Blockchain.


How Health Care Executives View Blockchain
A survey of 200 health care executives around the world found that 16% expected to commercialize blockchains at scale in 2017. This figure was similar to banks (15%) and financial market enterprises (14%). In North America, the number was lower, at only 8%.

Health care providers identified the following friction points that blockchain may be able to address:

- **Inaccessible information**
- Information **risks**, such as breaches and tampering
- **Transaction costs**
- **Inaccessible marketplaces**, i.e. assets that are underutilized, unmonetizable, and that do not contribute to revenue growth

The survey found that more than 70% of industry leaders saw the biggest potential benefits in managing clinical trial records, regulatory compliance and health records.


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**Barriers to Implementation and Use**
Blockchain technology is not yet totally mature, or a cure-all ready to be immediately implemented. While enthusiasm for its potential is increasing, there remain substantial barriers to use. This module will introduce a number of ways blockchain technology may be able to address friction points currently associated with EHRs, but widespread implementation is far from certain.

**Instructions:** Click each plus sign to learn more about potential barriers to Blockchain use

### Cost and Scalability

The costs involved with operating a blockchain system in health care are **not yet known**. Health systems and practices already spend substantial amounts of financial and human resources on the setup, maintenance and operation of HIT systems. A blockchain requires a great deal of computing power to process transactions, and the **amount is dependent both on the volume and size of the transactions**, among other factors. Though various aspects of blockchain technology, particularly its open-source technology and distributed nature, suggest that it **could lower costs in the long run, further investigation is necessary** to understand the potential costs.

### Regulation

Blockchain technology, as currently constructed, likely **does not conform** to privacy and security rules under **HIPAA** and the **HITECH Act**; it is unclear whether data stored on a blockchain can be considered protected health information (PHI) and therefore be regulated. Additionally, the decentralized nature of blockchains means that they may **exist across regions** with different regulations and laws regarding data protection, making it unclear how the regulation of blockchain could be accomplished in practice.

### Security and Privacy
A report by Deloitte differentiated between permissionless and permissioned blockchains. In the former anyone may join, while in the latter users must be added by an administrator. While permissioned systems may improve security of a particular blockchain to some degree, both types introduce new types of security risks that have not previously been encountered.

Since it is doubtful that any technology can be completely secure from tampering, serious consideration must be given to certain issues including:

- What patient information should be stored on the blockchain
- What should be stored off of it
- What methods of encryption should be used to best secure patient information

Since blockchain technology is so new, it is difficult to predict if and when the answers to these questions will be known.


A blockchain, while anonymous, is **public**, thus allowing for the possibility that a patient’s identity could be discovered despite being hidden cryptographically.

Linking patient information relies on a unique identifier; if a patient's data are added to the blockchain using different identifiers, **duplicate or redundant information** will exist.

The volume of clinical data generated far **exceeds current storage** capabilities of the blockchain.


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**Exploring How Blockchain Can Be Used in Medicine**

**ONC Blockchain Challenge**

In 2016, the Office of the National Coordinator for Health Information Technology (ONC) offered a challenge on the “Use of Blockchain in Health IT and Health-related Research Challenge.”

The ONC received more than 70 submissions from individuals, organizations and companies addressing ways that Blockchain technology might be used in health and health IT to **protect, manage and exchange** electronic health information.


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**IBM/FDA Research Initiative**
In early 2017, IBM Watson Health signed a research initiative with the Food and Drug Administration (FDA) with the goal of defining a secure, efficient and scalable exchange of health data using blockchain technology.

IBM and the FDA will explore the exchange of data from several sources including EHRs, clinical trials, genomic data, and health data from mobile devices, wearables and the “Internet of Things,” with an initial focus on data relating to oncology.


**Potential Positive Impacts of Blockchain**

*Instructions: Click each tab to learn more about potential positive impacts of Blockchain*

<table>
<thead>
<tr>
<th>INTEGRITY</th>
<th>PERMISSION</th>
<th>DECENTRALIZATION</th>
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- Requires patients to **verify information** is correct
- Can trace successful or attempted hacks and falsified records to an exact user to **mitigate data breaches and insurance fraud**
- Maintains a **permanent ledger**, making it more difficult for records to be lost
• Allows patients to grant permissions and control sharing of their data. Patients provide access to physicians when they need it, and simultaneously protect data from unauthorized users.

• Permits sharing of data from personal health and remote patient monitoring devices

• Fosters data sharing, audit trails and clinical safety analyses by distributing patient consent or trial results

• Stores data across decentralized databases and devices, allowing patients immediate access and ability to share the data they need, when they need it

• Makes ransomware attacks—in which access to the victims’ computer systems or files are blocked or limited until a ransom is paid—more difficult. Since data are distributed rather than located in an isolated system, hackers would have a harder time locking health systems out of their own data.

• Allows for a shared stream of anonymous patient information, which could more easily identify pandemics


Instructions: Navigate through the scenario below by using the right and left arrows found on either side of the images.

Jane Smith interacts with three physicians: her general practitioner, an emergency physician after rupturing her Achilles tendon, and an orthopedic surgeon for Achilles repair surgery. Jane shared information about her health with each physician.
Jane grants access to her blockchain to each physician, who automatically pulls records from each of Jane’s previous physician interactions, obtaining a complete picture of Jane’s health.
Each physician enters data about Jane’s health into EHR systems, including Jane’s X-rays and prescriptions for pain management. Jane, her physician and pharmacist verify that the information entered is correct.
Those data create time-stamped entries in Jane’s blockchain, becoming part of her permanent health record. When Jane goes off her pain medication, this record is added to the blockchain, ensuring an up-to-date picture of Jane’s health status.


Predicted Impacts
What are fast healthcare interoperability resources?

In 2014, Health Level Seven International (HL7), a not-for-profit, American National Standards Institute (ANSI) accredited standards developing organization, developed Fast Healthcare Interoperability Resources (FHIR, pronounced “fire”) as a draft standard for trial use, meant to allow developers in HIT to more quickly and easily build applications for EHRs and to improve data exchange.
In February 2017, FHIR became a full standard for trial use. Since its inception, large EHR vendors including Epic and Cerner have instituted initiatives aimed at allowing physician offices, hospitals and outside developers to develop applications that connect to their EHRs.

FHIR has become one of the most popular protocols for interoperability among distinct systems. FHIR enables an app-based approach, in which developers can build standardized applications that can access data regardless of which EHR a health system is using.

Conceptually, FHIR moves beyond the idea of interoperability as the exchange and use of electronic documents, and into the exchange and use of data itself, which could facilitate care coordination, clinical decision making and data analytics.


What could FHIR mean for physicians and patients?
FHIR-based applications have the opportunity to present physicians the data they need in a useful way and to integrate those data into their workflow.

This could include patient data generated by devices like fitness trackers and portable blood glucose monitors, allowing physicians to access relevant aspects of such data in a timely and efficient manner, providing potential benefits in the areas of chronic disease management and population health.

Additionally, patients may no longer have to access different portals for each physician they see, and instead access a single health record that conglomerates the information from the various EHRs into which their health data may be entered.


In 2018, Apple announced that it would begin allowing patients to view medical records from participating health care providers on their iPhones.

The health records will be retrieved directly from the EHR using the FHIR standard, and patients will be able to view information including allergies, vitals, medical conditions, immunizations, lab results, medications and procedures. The data will be stored on the iPhone itself, and Apple will be unable to view information without user permission. Patients will then be able to share the combined information with their physician. The use of the FHIR standard will allow the application to pull data from any EHR supported by the FHIR standard and EHR vendor.

In April 2016 the ONC announced the start of a three-part initiative meant to incentivize developers to build user-friendly applications leveraging FHIR and capable of pulling electronic health information from varying sources.

The three goals of the initiative are:

1. **Helping** consumers retrieve and make use of their health information
2. **Improving** utility and user experience for providers
3. **Coordinating** open information about EHR app solutions

Prizes were awarded to an array of innovative solutions.

*Instructions:* Click each plus sign to learn more about these innovative solutions

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**MyLinks**

A **cloud-based** application that facilitates the **gathering, management and sharing** of patient data. Data can be shared using FHIR and other secure methods of sharing via the internet. The application also allows users to **participate in research and monitor data from mobile devices**.
Green Circle Health

An application that imports patient data using FHIR to create a comprehensive family health dashboard. The dashboard contains personal data and data from medical devices, and is capable of remote monitoring and providing reminders.

Herald Health

A solution by Herald Health that allows physicians and other providers to customize push notifications for both individuals and groups to help manage the flow of alerts.

University of Utah Health Care

A clinical decision support tool by University of Utah Health Care, Intermountain Health Care and Duke Health System that can provide recommendations for treating babies with jaundice detected at birth based on the levels of liver waste products in the blood.

Medyear

A mobile application by Medyear uses FHIR to merge health records from multiple sources into a social-media like newsfeed that provides real-time updates to EHRs and allows patients to call and message their providers.


Predicted Impacts

 AMA_Trends 2018-19 Health IT MM1 FHIR.pdf

187.9 KB

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