

Leading Public Health Practice Through Health Informatics and Technology



A GUIDEBOOK FOR STATE HEALTH OFFICIALS

Electronic Case Reporting (eCR)

New ways of automatically collecting, sharing, and using data in real-time for decision making.

What is eCR?

eCR is the automated generation and transmission of case reports from the electronic health record to public health agencies for review and action.

Adopting eCR has many benefits.

To realize the benefits of eCR and prepare for implementation, state and territorial health agencies can consider gaining buy-in from key stakeholders, including public health partners, healthcare organizations, and healthcare providers.

How do you gain buy-in?

Communicate the value of eCR and explain how the process can be integrated with other data systems to provide a more comprehensive view of population health.

Benefits of eCR:

- Builds a foundation for modernizing public health disease reporting.
- Provides more complete and accurate data in real-time.
- Improves outbreak detection, response, and recovery.
- Reduces burden on healthcare providers to meet legal reporting requirements to public health.

Are you ready to implement eCR in your state or territory?

Once your jurisdiction has assessed your technical and legal readiness for eCR, it is important to build consensus among your stakeholders on an implementation approach and communicate how it will meet public health surveillance and population health improvement goals.

CALL TO ACTION: BELOW ARE SOME STEPS STATE AND TERRITORIAL HEALTH OFFICIALS CAN TAKE TO IMPLEMENT eCR.

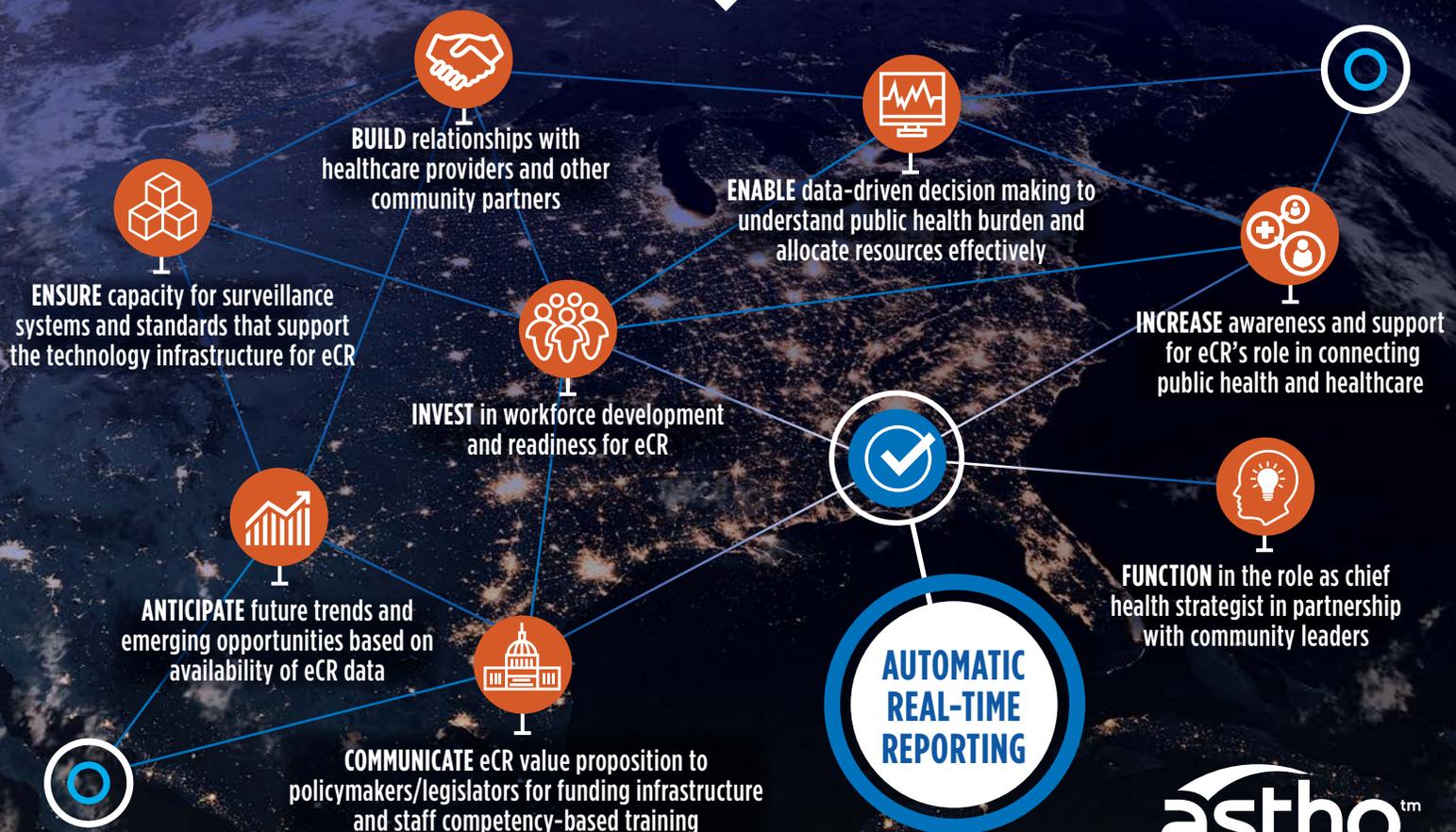


Table of Contents

EXECUTIVE SUMMARY	1
INTRODUCTION	2
SECTION ONE: THE BASICS	3
DEFINITION OF ELECTRONIC CASE REPORTING	5
Essential Stakeholders.....	6
Electronic Lab Reporting vs. Electronic Case Reporting	9
HISTORICAL PERSPECTIVE: CONNECTING PUBLIC HEALTH AND HEALTHCARE	9
SECTION TWO: SETTING THE STAGE FOR ADVANCEMENT THROUGH eCR	13
THE MOVEMENT TOWARD ELECTRONIC CASE REPORTING	14
Health Insurance Portability and Accountability Act	15
American Medical Informatics Association Spring Congress Meetings	15
BioSense	15
Public Health Information Network (PHIN).....	15
Pandemic and All-Hazards Preparedness Act.....	16
APHL Informatics Messaging Service	16
Integrating the Healthcare Enterprise Quality, Research, and Public Health	16
Health Information Health Informatics and Technology for Economic and Clinical Health	16
Clinical Document Architecture Public Health Pilot.....	16
Reportable Condition Knowledge Management System.....	16
Public Health Community Platform	17
Digital Bridge	17
ELECTRONIC CASE REPORTING LEGAL ISSUES.....	18
MEANINGFUL USE AND ELECTRONIC CASE REPORTING.....	18
USE CASE EXAMPLES OF ELECTRONIC DATA EXCHANGE IN PUBLIC HEALTH PRACTICE.....	20
Immunization Information Systems.....	20
Newborn Screening.....	20
Syndromic Surveillance.....	20
eCR ADOPTION AND IMPLEMENTATION CHALLENGES.....	21
Socio-Technical Barriers to eCR Implementation	21
Benefits to eCR Implementation	22
SECTION THREE: CALL TO ACTION	23
REFERENCES	26
APPENDIX A. DIGITAL BRIDGE PARTICIPATING ORGANIZATIONS	28

Executive Summary

State health officials, as leaders in their states, must familiarize themselves with the opportunities and challenges that the public health community faces, as well as the policies, practices, and tools that are available to them.

Trends with new and emerging infectious disease, as well as the ever-increasing prevalence of chronic disease, greatly increase the need for advanced knowledge combined with an expanded, more effective use of new technologies. Health Informatics and Technology provides new ways of collecting, sharing, and using data for analysis and visualization. Electronic reporting for surveillance purposes is one application of Health Informatics and Technology that can benefit both public health and healthcare.

High-level legal issues, funding, sustainability and maintenance, collaboration, and governance are just a few of the crucial considerations that a state health official must be aware of when embarking on, designing, or leading a Health Informatics and Technology project. This guidebook serves as a tool to assist state public health leaders as they embark on developing the data Health Informatics and Technology systems necessary to achieve excellence in population health outcomes. Using electronic case reporting as the primary example, the guidebook will help state health officials lead their state toward national public health data standards and solutions that not only serve public health’s mission and goals, but will be integrated and function along with healthcare and other data systems to provide a 360-degree view of population health.

In the United States, state and local laws and regulations mandate that healthcare providers report incidence of certain diseases and conditions to public health. These reportable conditions are then reported up to CDC. Complete, timely disease case reporting is important to conducting public health surveillance. Unfortunately, these reports are often slow or incomplete and place a substantial burden of work on healthcare providers and public health agencies. The future of surveillance is electronic case reporting. Electronic case reporting is the process of electronically reporting cases of public health importance from clinically-based electronic health records to public health agencies for integration into disease surveillance system.

Benefits of Electronic Case Reporting	Recommendations
Preparing public health for disease outbreaks	Build relationships with healthcare providers and other community partners
	SHO functioning in role as chief health strategist
Serving as the foundation of modernized public health disease reporting	Data-driven decision-making
Making the disease reporting process more efficient and providing information in less time	Effectively communicate with EHR vendors
	Communicate the eCR value proposition to policymakers and legislators
Automating the reporting process	Anticipate future trends and emerging needs for eCR
Allowing for standardized data capture	Increase awareness of and support for eCR’s role in public health
	Increase awareness of and support for eCR’s role in healthcare
Simplifying the reporting decision for providers	Invest in workforce development for eCR

Along with the benefits, there are barriers and legal issues that must be addressed. The barriers to eCR can be technical, organizational, and workforce-related. There are also legal and privacy implications in collecting protected health information for eCR. State health officials should include legal expertise and other important stakeholders in the early stages of eCR implementation planning.

ASTHO proposes to work with state public health agencies, other public health professional associations, Digital Bridge, electronic health records vendors, and healthcare providers to support the implementation of eCR in state health departments.

Introduction

The purpose of this document is to serve as a guidance tool to advance the role of state public health leaders as they embark on developing the data health informatics and technology systems necessary to achieve excellence in population health outcomes. This guidebook will assist state health officials (SHOs) in leading their states toward national public health data standards and solutions that not only serve public health’s mission and goals, but are integrated and function along with other data systems to provide a 360-degree view of population health.

Using electronic case reporting (eCR) as the example, this guidebook will help state public health leaders communicate effectively with healthcare, policymakers, and funders to advance eCR as a streamlined, standardized way to submit reportable disease reports. The future is now for eCR and bidirectional exchange with healthcare to create a more efficient, effective, and higher-quality exchange of information. The guide will first describe the essential purpose of eCR, how to plan for and establish high-level buy-in, and the components for building an eCR system that can be used as a model for future integration with healthcare systems and electronic health records (EHRs). This overview of eCR is intended to serve as a guide for SHOs as they plan, develop, and implement eCR.

The guidebook is divided into three sections. Section One covers the basics of eCR and the importance of the health informatics and technology leveraged for eCR practices. After introducing eCR, it will also cover other current surveillance systems tools that assist public health with one of its core function: to assess and monitor health through disease detection, notification, and mitigation. Section Two of the guidebook will describe the newer approaches to eCR in more detail and how developing a bidirectional exchange with healthcare providers sets the stage for other advancements in surveillance and ensuring population health. This section will also explore the potential challenges that state public health leaders may face when they begin to embark on or enhance their current systems and how to address them. Lastly, Section Three is a call-to-action checklist for SHOs on how to address sustainability through leadership.

Acknowledgements

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SECTION ONE

THE BASICS

DEFINITION OF ELECTRONIC CASE REPORTING

HISTORICAL PERSPECTIVE: CONNECTING PUBLIC HEALTH AND HEALTHCARE



SECTION ONE: THE BASICS

Electronic Case Reporting better prepares public health for disease outbreaks, serves as the foundation of modernized public health disease reporting, makes the disease reporting process more efficient and provides information in less time, automates the reporting process, allows for standardized data capture, and simplifies the reporting decision for providers.¹

Because eCR transfers patient data electronically from EHRs, this process allows for more comprehensive records and less follow up. Streamlining the data capture and transfer process minimizes mistakes and speeds the closure of cases, giving public health staff more time to analyze cases and interpret the data they are gathering. Additionally, systematized reporting provides a more accurate picture of diseases and more timely case report submissions, along with a more representative number of actual cases that will be reported to the state.

The public health community is facing new challenges with both communicable and chronic diseases.

Emerging infections such as Ebola and Zika, as well as an aging population, have increased the need for public health professionals to effectively exchange information with their healthcare and community partners.¹ The trends with emerging infections and increased chronic disease greatly increase the need for expanded and more effective use of new technologies. Health informatics and technology provides new ways of collecting, sharing, and using data for analysis and visualization. Electronic reporting for surveillance purposes is one application of health informatics and technology that benefits both public health and healthcare.

Electronic reporting for surveillance purposes is one application of technology that can benefit both public health and healthcare.

Healthcare providers and hospital facilities are increasingly adopting eCR due to their growing use of EHRs and incentives to use EHRs in a meaningful way.² EHRs contain much of the data that providers need to report cases of reportable conditions to public health agencies. Reporting of diseases occurs either through a paper process or unidirectional electronic sharing of data. The manual processes of faxing, emailing, or calling public health agencies is tedious, inefficient, and often slows down epidemiologists' case investigation. Improving the timeliness of and access to this data is important to improving population health. In addition to reportable disease reporting for infectious diseases, the increase in chronic diseases has prompted public health agencies to start collecting information on cancer, diabetes, heart disease, and other conditions.

Public health surveillance systems and EHRs must serve both the information needs of clinical encounters and the needs of the greater community. These two types of systems must communicate seamlessly to realize eCR's potential. To benefit both stakeholder groups, data exchange must be bidirectional, clinical care data from providers will flow to public health organizations and condition specific reporting information and summarized community health data will flow to back providers.

This guidebook includes background and a historical perspective of the progress made in case reporting and surveillance to date. Examples of bidirectional data sharing, as well as the barriers and benefits to eCR, are also included. Finally, there is a call to action for SHOs at the end of the document.

Definition of Electronic Case Reporting

Complete, timely disease case reporting is important to conducting public health surveillance. However, case reporting from healthcare providers typically is a paper-based system or electronic entry into a web-based portal to state health department systems.³⁻⁴ These reports are often slow, incomplete, and place a substantial burden on healthcare providers and public health agencies. eCR is the future of surveillance. eCR is the automated process of electronically reporting cases of public health importance from clinically-based EHRs to public health agencies for integration into disease surveillance systems.¹

Surveillance is a component of the 10 Essential Public Health Services and crucial to monitoring population health.⁵⁻⁷ Public health surveillance benefits from the connection between healthcare providers and public health agencies.⁸⁻⁹ In the United States, state and local laws and regulations mandate that healthcare providers report incidence of certain diseases and conditions to public health, which then reports the incidences to CDC.

Public health agencies rely on their healthcare partners to report these conditions and disease outbreaks in their patient population.¹

Exchanging electronic clinical data, both inpatient and outpatient, with public health programs has changed the way healthcare providers gather surveillance data.¹⁰ In a manual disease reporting process, healthcare providers record data on paper and send those reports to public health agencies for entry into surveillance systems.

Electronic data exchange can be unidirectional or bidirectional. Unidirectional exchange occurs when healthcare providers report directly to public health, including specialty registries. Bidirectional data exchange occurs through the use of common data content and transport standards in a real-time or near real-time basis. Bidirectional exchange allows public health and healthcare to build a more complete, up-to-date record in systems.

eCR is the process of electronically reporting cases of public health importance from clinically-based electronic health records to public health agencies for review and action.

SHOs as Chief Health Strategists

SHOs have a long-standing history of establishing partnerships with healthcare providers to develop community-wide needs assessments that help guide both public health and healthcare. The chief health strategist will not only partner with healthcare to establish shared goals, but will include other partners from social services, business, and other governmental agencies. When formal partnerships are made, each sector will be more effective in improving client health and well-being.

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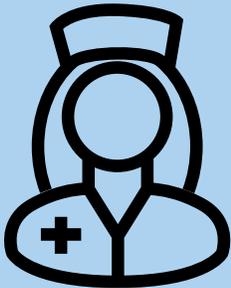
Essential Stakeholders

There are multiple stakeholder groups that play essential roles in the eCR process and benefit from it. The stakeholder groups include patients, providers, healthcare organizations, EHR vendors, public health agencies, and others. It is important for SHOs to understand the role each stakeholder group plays in the eCR process in order to facilitate implementation. Most critically, SHOs need productive working relationships with their local healthcare providers. Patient-related data is housed within providers' medical offices and associated facilities and is the core component of case reporting. As the chief health strategist, the SHO needs to be able to assemble and process input from the stakeholders who are impacted by data's timeliness, accuracy, and completeness. Because disease-related case information is more readily available, eCR can also enhance situational awareness to support executive decision-making. The typical stakeholder groups are identified and discussed below.



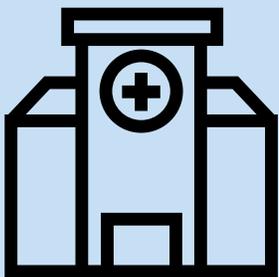
Patients

Patients provide essential individual case report data when they visit their healthcare provider while ill. This protected health information is the cornerstone of the case report. According to the Health Insurance Portability and Accountability (HIPAA) Act of 1996, patients have a right to protection of their confidential data and these safeguards must be built into the eCR process.



Healthcare Delivery

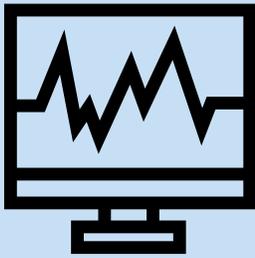
Healthcare providers capture case report data during patient encounters and record data into the EHR. Currently, providers report this data to public health agencies either in a paper format or stand-alone internet-based data system entry. Electronic case reporting seeks to automate and integrate this data systems entry process.



Healthcare Organizations

Healthcare organizations gather clinical data for patients who are treated or hospitalized within their network of facilities. This data is stored in EHRs, as well as clinical data warehouses or repositories that integrate data across multiple clinical domains (e.g., laboratory, pharmacy, claims, etc.). This data can be shared with public health in the form of case reports. Reporting this case data electronically will make the process more efficient.

Essential Stakeholders (continued)



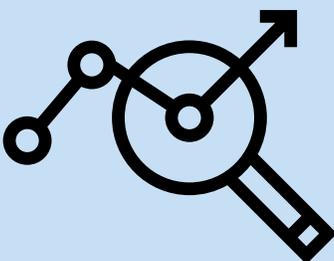
EHR Vendors

EHR vendor organizations develop the EHR systems that automatically send an initial electronic case report (eICR) to public health departments. The EHR system compares coded clinical information (i.e., diagnosis codes) with the Reportable Conditions Trigger Codes (RCTC), a pre-defined set of public health trigger codes. Upon detecting a match, the EHR builds the eICR and sends it to public health through a decision support intermediary. Customer and healthcare provider demands have driven EHR vendors to develop functionality for eCR. The public health community should work more closely with EHR vendors to ensure that EHR systems meet public health needs and public health systems share information back to clinical providers.



Decision Support Intermediaries

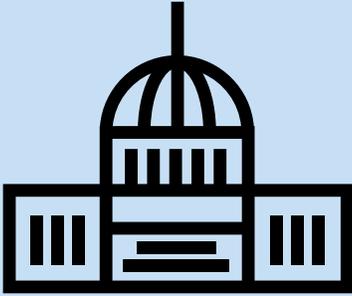
A decision support intermediary is a health informatics and technology-based solution that acts as a link between healthcare EHRs and public health surveillance systems. They receive, validate, process eICRs for Reportability, create a Reportability Response (RR) and route eICR and RR documents between healthcare providers and public health agencies. Currently for eCR, the Association of Public Health Laboratories (APHL) operates the APHL Informatics Messaging Services (AIMS) platform, which hosts the Reportable Condition Knowledge Management System (developed by the Council for State and Territorial Epidemiologists (CSTE) and together carry out the functions described above. These intermediaries use clinical decision support (CDS) tools to determine if the eICR meets specific criteria before routing the case to public health surveillance systems.



State, Territorial, Local, and Tribal (STLT) Public Health Departments

Public health departments receive and integrate eICR documents into their surveillance systems. Epidemiologists can then act on the information and determine if additional follow up and reporting is needed. However, epidemiologists and other public health professionals must have the knowledge and skillset to effectively use eCR. The public health workforce needs additional investment to ensure that the right people have the right information at the right time.

Essential Stakeholders (continued)



Federal Agencies

Agreements between states and the federal government facilitate voluntary case notification to CDC. Local health departments receive cases from providers and healthcare organizations. These cases are then compiled at the local level and sent to the state public health department. Cases are compiled at the state level and reported to CDC on a periodic basis.



Policy Makers

The information collected through eCR is critical for public health professionals to meet their stakeholders' needs and deliver on the promise of the essential services, such as monitoring the health of the community, diagnosing and investigating disease, and providing care. eCR data can also play a role in developing policy and informing changes in the way public health does its work.



Electronic Lab Reporting vs. Electronic Case Reporting

Electronic laboratory reporting (ELR) is the automated transmission of laboratory-related data from commercial, public health, hospital, and other labs to state and local public health departments from laboratory information management systems.¹³ ELR has many benefits, including improved timeliness, reduction of manual data entry errors, and reports that are more complete.¹⁴ ELR supports overall public health surveillance by helping improve the timeliness and accuracy of case reporting and confirmation to state and local health departments. Reporting also supports national public health surveillance by improving the timeliness and accuracy of notifiable disease data that states voluntarily share with CDC.

Data from EHRs, including laboratory results, provide more complete, timely case report data for decision makers

in public health agencies.¹⁵ The distinguishing difference is that other types of data can also be transmitted through eCR, including patient demographics, lab test orders, diagnoses, treatment information and other clinical observations.

Historical Perspective: Connecting Public Health and Healthcare

The history of connecting public health and healthcare dates back to the late 1800s, when Congress authorized the U.S. Marine Hospital Service to collect reports about local occurrences of diseases, such as cholera, smallpox, plague, and yellow fever.¹⁶ The modern-day collection of reportable diseases to state, territorial, local, and tribal health departments continues that collaboration. Public health practice utilizes case reporting from healthcare providers to create interventions that reduce the burden of disease on the population.

Information technology (IT) and the development of surveillance information systems have had a tremendous impact on the way public health surveillance is practiced.¹⁷ In 1951, ASTHO developed a list of nationally



Figure 1. 10 Essential Public Health Services

Data from EHRs, including laboratory results, provide more complete, timely case report data for decision makers in public health agencies.

notifiable diseases and starting in 1955, CSTE began regularly updating this list. Over the years, surveillance systems and public health data sources for both infectious and noninfectious diseases have emerged at all levels of public health practice.

Public health surveillance systems rely on clinical data from EHRs, laboratory reports, vital statistics, surveys, and other data sources. Table 1 gives examples of several national public health surveillance systems that eCR activities may impact

Information technology and the development of surveillance information systems have had a tremendous impact on the way public health surveillance is practiced.

Table 1. National Public Health Surveillance Systems

SURVEILLANCE SYSTEM	DESCRIPTION
National Electronic Telecommunications System for Surveillance (NETSS)	NETSS allowed health jurisdictions to collect and transmit weekly data regarding nationally notifiable diseases to CDC. NETSS is no longer in use. https://wwwn.cdc.gov/nndss/netss.html
National Notifiable Diseases Surveillance System (NNDSS)	Integrated surveillance information systems in public health departments are primary sources for reports to the NNDSS. These systems use the CDC National Electronic Disease Surveillance System (NEDSS) architectural standard. https://wwwn.cdc.gov/nndss/
The Epidemic Information Exchange (Epi-X)	Epi-X is a web-based communications solution that allows CDC officials, state and local health departments, poison control centers, and other public health professionals to securely access and share preliminary health surveillance information. https://www.cdc.gov/epix/
Epi Info	Epi Info is used for outbreak investigations by providing epidemiologists with an easy data entry form and database construction, customized data entry experience, and data analyses with epidemiologic statistics, maps, and graphs. https://www.cdc.gov/epiinfo/
National Syndromic Surveillance Program BioSense Platform	The BioSense platform is a cloud-based health information system that allows public health officials to collect, analyze, and exchange syndromic data in order to improve awareness of health threats over time and across regional boundaries. https://www.cdc.gov/nssp/biosense/

Over the decades, Health Informatics and Technology has improved modern surveillance systems and public health data sources. These data sources represent a wide-range of information gathered at the national, state, or local levels. Public health data sources are increasingly available on the Internet. These public-use databases may be packaged and ready for direct use or raw data sets that require additional user intervention. The National Center for Health Statistics (NCHS) provides researchers with a rich source of data to perform data analysis. Table 2 presents examples of several data sources available from NCHS.

NCHS uses a variety of data collection mechanisms to obtain information from multiple data sources.¹⁸ NCHS works with each vital registration area and the National Association for Public Health Statistics and Information Systems to collect vital registration data and improve timeliness and data quality. It is working to implement electronic exchange for birth and death registration systems. These electronic records will improve timeliness of data and allow for data sharing between the states and territories.

Table 2. NCHS Data Sources

DATA SOURCE	DESCRIPTION
National Health and Nutrition Examination Survey (NHANES)	NHANES is a program of studies designed to assess the health and nutritional status of adults and children in the United States. https://www.cdc.gov/nchs/nhanes/
National Health Care Surveys	These surveys are designed to answer key questions of interest to healthcare policymakers, public health professionals, and researchers. Some of these questions concern healthcare resources, quality, and disparities. https://www.cdc.gov/nchs/dhcs/
National Vital Statistics System (NVSS)	NVSS collects and disseminates the nation's official vital statistics, including births, deaths, marriages, divorces, and fetal deaths. https://www.cdc.gov/nchs/nvss/
National Survey of Family Growth (NSFG)	NSFG gathers information on family life, marriage and divorce, pregnancy, infertility, use of contraception, and general and reproductive health. https://www.cdc.gov/nchs/nsfg/
National Health Interview Survey (NHIS)	NHIS is the principal source of information on the health of the civilian non-institutionalized population. https://www.cdc.gov/nchs/nhis/
National Immunization Survey (NIS)	NIS is a group of phone surveys used to monitor vaccination coverage among children aged 19-35 months, teens 13-17 years, and flu vaccinations for children 6 months-17 years. https://www.cdc.gov/vaccines/imz-managers/nis/index.html

Longitudinal Studies of Aging (LSOA)

LSOA is a multi-cohort study of persons 70 years of age and older that is designed primarily to measure changes in the health, functional status, living arrangements, and health services utilization of two cohorts of Americans as they move into and through the oldest ages.

<https://www.cdc.gov/nchs/lsoa/>

State and Local Area Integrated Telephone Survey (SLAITS)

SLAITS supplements current national data collection strategies by providing in-depth state and local area data to meet various program and policy needs in an ever-changing healthcare system.

<https://www.cdc.gov/nchs/slaits/>

At its outset, eCR initiatives seek to collect EHRs to create state-based data sources for five notifiable diseases: Gonorrhea, chlamydia, salmonella, pertussis, and Zika. These case reports will be triggered by a set of standard codes (ICD-10, LOINC, SNOMED, etc.) and sent from EHRs to public health surveillance systems. APHL, CSTE, and CDC have vetted the codes for these conditions and intend to develop codes for all notifiable diseases.¹



SECTION TWO

SETTING THE STAGE FOR ADVANCEMENT THROUGH eCR

THE MOVEMENT TOWARD ELECTRONIC CASE REPORTING

ELECTRONIC CASE REPORTING LEGAL ISSUES

MEANINGFUL USE AND ELECTRONIC CASE REPORTING

USE CASE EXAMPLES OF ELECTRONIC DATA EXCHANGE IN PUBLIC HEALTH PRACTICE

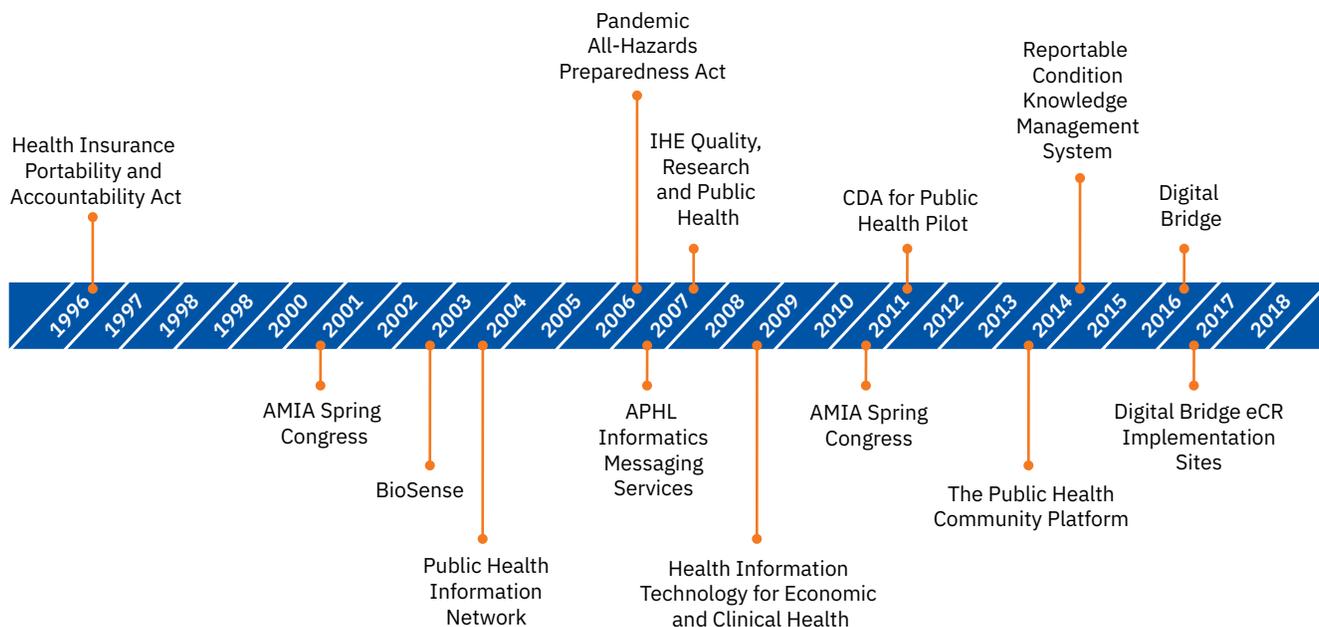


SECTION TWO: SETTING THE STAGE FOR ADVANCING ELECTRONIC CASE REPORTING

Relative to state and local governmental agencies, public health is typically an early IT adopter. However, public health has applied much of the Health Informatics and Technology in a categorical manner, developing systems mainly on narrowly-focused applications.² Disease outbreaks and other threats to the public's health require timely information that enable leaders to make effective decisions.¹⁹

There are many events, regulations, policies, and technologies that allow public health to implement eCR with its healthcare partners. Each of these events, regulations, and systems have played an integral role over time in connecting healthcare and public health. A timeline of selected events is presented in Figure 2 and those components are discussed below.

Historical Timeline: eCR Implementation



Health Insurance Portability and Accountability Act

The privacy standards issued as part of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) provide protection for the privacy of certain individually identifiable health data, known as protected health information.²⁰ To balance public health's need to protect communities, the privacy rule allows it to collect identifiable data without individual authorization for the purposes of preventing or controlling disease, injury, or disability. This balancing act allows epidemiologists to collect and use important public health data to create policy interventions to keep the population safe from existing and emerging threats

There are many events, regulations, policies, and technologies that allow public health to implement electronic case reporting with its healthcare partners.

American Medical Informatics Association Spring Congress Meetings

In 2001, the American Medical Informatics Association's (AMIA) Spring Congress brought together members of the public health and informatics communities to develop a national agenda for public health informatics.² The participants discussed funding and governance; architecture and infrastructure; standards and vocabulary; research, evaluation, and best practices; privacy, confidentiality, and security; and training and workforce. Key themes that emerged from this meeting include engagement in coordinated activities related to information architecture, standards, confidentiality, and research. The participants also noted that the public health workforce needed informatics training at all levels.

AMIA hosted another meeting in 2011 to revisit the 2001 agenda and assess the progress that had been made over a decade.²¹ The participants developed recommendations to further guide the public health informatics field based around three key themes: (1) Enhancing communication and information sharing within the community, (2) improving the consistency of informatics through common terminologies and evaluation methodologies, and (3) competency-based training and effective coordination and leadership to move the field forward.

BioSense

BioSense, now referred to as the National Syndromic Surveillance Program (NSSP), is a CDC initiative to collect syndromic surveillance data to support situational awareness and may provide early detection of disease outbreaks through timely acquisition of emergency department data.²² The BioSense platform accepts near real-time data from EHRs and promotes electronic data exchange between healthcare facilities and public health agencies.

Public Health Information Network (PHIN)

The Public Health Information Network (PHIN), developed by CDC, is an initiative to advance the development of fully capable and interoperable information systems in public health organizations. PHIN supports core public health functions, including outbreak detection, data analysis, and managing public health response. PHIN includes technical and data standards. CDC developed tools to help increase public health agencies' capacity to electronically exchange health information.²³

Pandemic and All-Hazards Preparedness Act

The 2006 Pandemic and All-Hazards Preparedness Act (PAHPA) recognized the need for efficiently sharing real-time information to help prevent potentially harmful consequences resulting from public health emergencies.¹⁹ The act required HHS to develop an overall strategic plan to improve capacity for a near real-time electronic network of systems. In 2013, PAHPA was reauthorized and extended to continue funding and improvements against public health threats.

APHL Informatics Messaging Service

The APHL Informatics Messaging Service (AIMS) is a secure, cloud-based platform that accelerates health messaging by providing shared services to aid in the transport, validation, translation, and routing of electronic data.²⁴ AIMS is a national resource for interoperability with connections to over 50 state and local Public Health Agencies, CDC, private laboratories, and healthcare facilities.

Integrating the Healthcare Enterprise Quality, Research, and Public Health

Integrating the Healthcare Enterprise (IHE) is a healthcare industry-led initiative to improve the way computer systems in healthcare share information. In 2007, it formed the IHE Quality, Research, and Public Health domain to address the information exchange and EHR content standards necessary to share information relevant to quality improvement in patient care, clinical research, and public health monitoring.²⁵

Health Information Technology for Economic and Clinical Health

The Health Information Technology for Economic and Clinical Health (HITECH) Act provides financial incentives to reimburse healthcare providers for their Meaningful Use of EHRs.²⁶ These incentives provide both opportunities and challenges for public health. To receive incentives, providers must exchange specified data types with their public health partners. eCR is one option for providers. HITECH can pose challenges for public health departments because these incentives are focused on healthcare providers and do not support public health agencies to address issues such as the lack of infrastructure, trained resources, and data exchange capabilities. Meaningful Use and additional barriers to eCR are discussed in later sections of this document.

HL7 Public Health Working Group and Standards for eCR

Data standards to support consistent implementation of eCR are being pursued in the HL7 Public Health Working Group. The Public Health Working Group is a voluntary, open committee that leads the HL7 consensus process for public health related standards activities. It has a membership that include public health, healthcare and vendors, that discusses needs, develops and reviews standards and publishes those standards for implementation. For eCR, common data elements for the eICR were identified by a task force of the Council of State and Territorial Epidemiologists (CSTE). The data for the eICR are drawn from those supported in certified EHRs and are considered critical for reporting or the initiation of a public health investigation. The HL7 Public Health Working Group, with support from CDC and other public health partners have developed implementation guides using clinical document architecture (CDA) standards for public health reporting from healthcare providers to state and local public health agencies.²⁷ CDA is a messaging standard used for data exchanges between clinical systems and was recommended by the Health Information Technology Advisory Committee (HITAC). To keep in step with technology changes in healthcare, additional work to support eCR is now being advanced using Fast Healthcare Interoperability Resources (FHIR).

Reportable Condition Knowledge Management System

The Reportable Condition Knowledge Management System (RCKMS) is an authoritative, real-time portal that aims to enhance disease surveillance by providing comprehensive information to reporters and public health about the “who, what, where, when, why, and how” of case reporting.²⁸ RCKMS is designed to handle the variation in reporting criteria that exists between jurisdictions. Currently for eCR, after a trigger is met and an eICR is sent to the APHL AIMS platform, RCKMS will determine whether the potential case is reportable, and if so, to which jurisdiction. This automated process removes some of the burden of reporting and handling complexity from data reporters and gives public health agencies more capabilities to manage and communicate their reporting criteria.

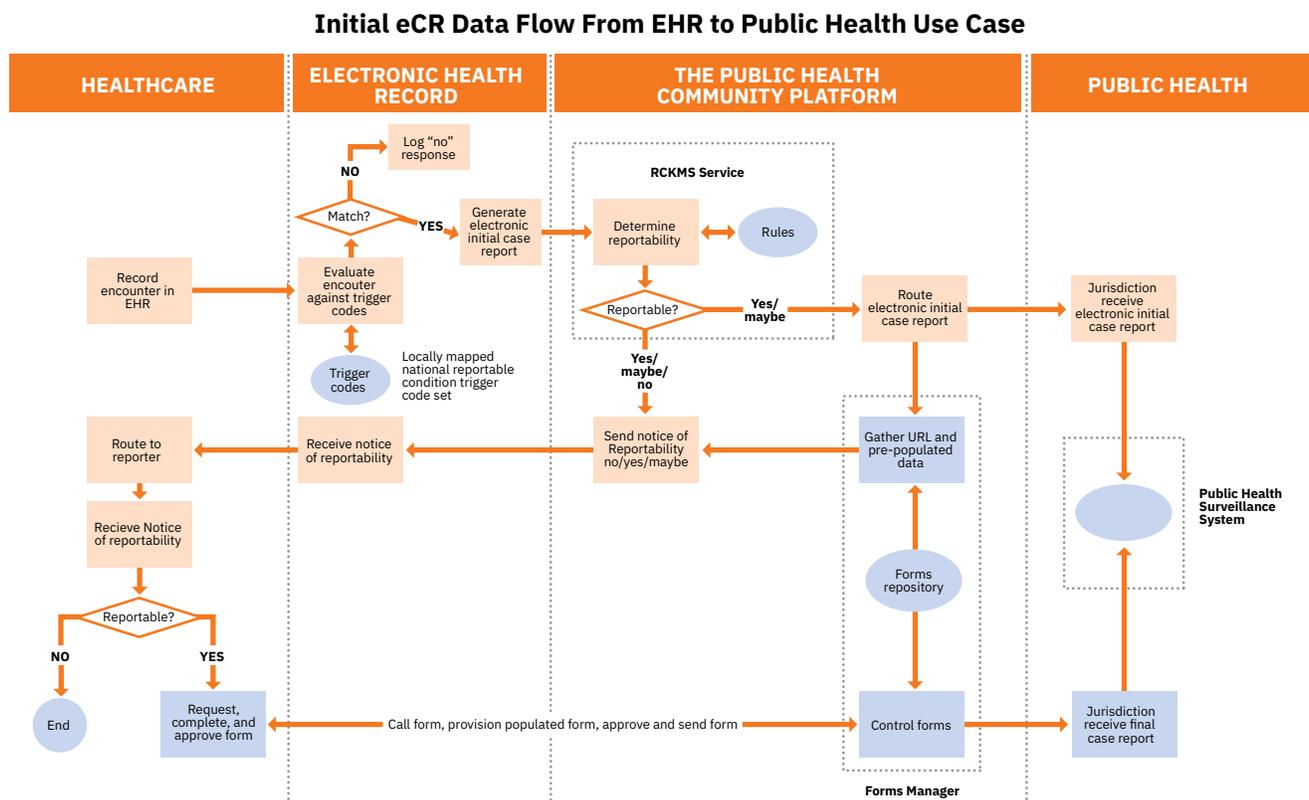
Public Health Community Platform

As one of its priority areas, the Public Health Community Platform (PHCP) sought to define a common architecture that connects public health agencies and healthcare providers for the implementation of eCR. The goal of the PHCP is to provide an accessible, flexible, and secure public health IT platform that is interoperable and responsive to the needs of eCR implementers.²⁹ Currently, an initiative underway through the Digital Bridge collaborative is advancing eCR, its architecture, and processes. Figure 3 is the PHCP proposed architecture for eCR and shows the flow of the case report from healthcare provider to public health.

Digital Bridge

Digital Bridge is a public-private partnership that envisions improving U.S. health by enhancing information exchange between healthcare and public health.³⁰ The first project of the collaborative is a multi-jurisdictional approach to eCR. Healthcare providers, public health organizations, and EHR vendors participate on work groups that are defining important aspects of eCR. The work groups include an implementation taskforce, strategy, an evaluation committee, and a legal work group. Appendix A includes a full listing of organizations involved in this collaborative

Figure 3. Proposed Architecture for eCR



The vertical boxes represent the eCR stakeholders and contain the activities (boxes), decisions (diamonds), and databases (ovals) that make up the core eCR process. These stakeholders and others in the process are discussed in the next section.

Trusted Exchange Framework and Common Agreement

In the 21st Century Cures Act (Cures Act), Congress identified the importance of interoperability and set out a path for the interoperable exchange of Electronic Health Information. Specifically, Congress directed ONC to “develop or support a trusted exchange framework, including a common agreement among health information networks nationally.” The Draft Trusted Exchange Framework, released on January 5, 2018, outlines a common set of principles for trusted exchange and minimum terms and conditions for trusted exchange. This is designed to bridge the gap between providers’ and patients’ information systems and enable interoperability across disparate health information networks (HINs). Principles for Trusted Exchange (Part A)—guardrails and general principles that Qualified Health Information Networks (QHINs) and Health Information Networks (HINs) should follow to engender trust amongst Participants and End Users.

Minimum Required Terms and Conditions for Trusted Exchange (Part B)—specific terms and conditions that will be incorporated into a single Common Agreement by a Recognized Coordinating Entity (RCE). The final Trusted Exchange Framework and Common Agreement (TEFCA) will include Parts A and B, as well as the Common Agreement, and will be published in the Federal Register.

Electronic Case Reporting Legal Issues

There are legal and privacy implications in collecting protected health information for the purposes of public health surveillance. In addition to complying with HIPAA, the public health community needs to ensure that data flowing through intermediary platforms remain secure.¹ SHOs should include legal experts in the early stages of eCR implementation planning.

In 2016, ASTHO convened a meeting of its eCR pilot participants and public health legal experts who were involved with the ASTHO Legal and Policy Committee. The goal of the meeting was to provide tangible experience from the eCR pilots to drive PHCP's policy decisions going forward. The meeting participants discussed the need for sample legal agreements between public health agencies, decision support intermediaries, and healthcare providers. At the time, there were no existing agreements in place to draw from. The participants also discussed the intermediaries' roles and responsibilities, as well as the other main stakeholders. They agreed that it is important to clarify whom the intermediaries are acting on behalf of—public health or the healthcare providers—within the agreements. One meeting recommendation was to draft sample agreements that state public health agencies could use to begin implementing eCR.

Digital Bridge's governing body, as well as working groups of CSTE, ASTHO, and NACCHO, are discussing and defining solutions to the legal issues surrounding eCR. Digital Bridge's Legal and Regulatory workgroup was similarly charged with identifying and defining the best available legal approaches to eCR, including drafting sample legal agreements.³¹ The workgroup was charged specifically with conducting a legal risk assessment, drafting template agreements, and developing a long-term legal and regulatory strategy. It is scheduled to continue its work through 2018 and will be publishing its findings and resources on the Digital Bridge website. For current eCR implementations, the APHL AIMS platform will be a business associate of the healthcare organization to perform reporting to Public Health Agencies.

The community's concerns with data vulnerability must be addressed if the data are available for more than a minimal amount of time on intermediary platforms that would be out of jurisdictional control.

Meaningful Use And Electronic Case Reporting

HITECH was enacted to promote and expand the use of IT to improve healthcare quality.³²⁻³³ It provides financial incentives to eligible healthcare providers for adoption and meaningful use of certified EHRs through meeting specific objectives. Beginning in 2018, eCR is an optional measure included in the public health and clinical data registry reporting objective for Stage 3 Meaningful Use. Table 3 details the public health reporting objectives.

Public health departments' readiness to accept eCR and their resources to assist in implementation may become important factors in whether providers adopt eCR.

Table 3. Public Health and Clinical Data Registry Reporting³⁴

Eligible providers must attest YES to three of the following five measures
1. Immunization Registry Reporting – The eligible provider is in active engagement with a public health agency to submit immunization data and receive immunization forecasts and histories from the public health immunization registry/immunization information system.
2. Syndromic Surveillance Reporting – The eligible provider is in active engagement with a public health agency to submit syndromic surveillance data from a non-urgent care ambulatory setting for eligible providers.
3. Case Reporting – The eligible provider is in active engagement with a public health agency to submit case reporting of reportable conditions.
4. Public Health Registry Reporting – The eligible provider is in active engagement with a public health agency to submit data to public health registries.
5. Clinical Data Registry Reporting – The eligible provider is in active engagement to submit data to a clinical data registry.

To meet the requirements for Meaningful Use, healthcare providers are required to attest to three of the five public health measures listed above. In this context, attestation is a process documenting that an organization or individual has successfully demonstrated the objective's requirements. The attestation is completed through CMS in order to receive the financial incentives.

Before providers choose eCR as part of their Meaningful Use attestation, public health agencies must declare their readiness to participate in eCR. An agency is ready when it is fully prepared and willing to accept eCR messages from healthcare providers. Public health departments' readiness to accept eCR and their resources to assist in implementation may become important factors in whether providers adopt eCR.

Use Case Examples of Electronic Data Exchange in Public Health Practice

Immunization Information Systems

Immunization information systems (IIS), or immunization registries, are confidential, population-based, computerized databases that record all immunization doses administered by participating providers to persons residing within a given geopolitical area.³⁵ IIS provide consolidated immunization history at the point of care and aggregate data for use in surveillance at the population level. IIS exists in most every state and represent statewide vaccination data. In some states, laws mandate provider participation. Traditionally, IIS has unidirectional exchange, though some states' IIS support bidirectional data exchange with EHRs to ensure that children get only the vaccines that meet the standard vaccine schedule.¹⁰

Newborn Screening

Newborn screening for heritable and congenital disorders is a federally mandated public health program aimed at the early identification of conditions for which early, timely interventions can lead to the elimination or reduction of associated mortality, morbidity, and disabilities.³⁶ Gaining timely access to newborn screening results is critical to provide effective continuity of care to newborns. Providers experience barriers to gaining access to the screening results, such as infants born in a facility where the provider has no privileges, transfers to the provider's practice, infants born in other states, and manual processes to receive results. For example, there are initiatives to create bidirectional information exchange for newborn screening at Johns Hopkins Hospital and the Maryland Department of Health and Mental Hygiene.

Syndromic Surveillance

Chief complaint data from emergency departments are sent from EHRs to syndromic surveillance systems, which analyze and group them into syndromes. Epidemiologists are alerted to potential outbreaks based on system algorithms. The New York City Department of Health and Mental Hygiene (NYDOHMH) launched an effort to utilize syndromic data and bidirectional data exchange with public health systems to carry out a fuller array of public health and clinical care functions.³⁷ Specifically, NYDOHMH targeted data exchange for syndromic surveillance of tobacco use risks. This allowed NYDOHMH to send clinical sites the results of the aggregated data analysis for communities.

Another case example is the BioSense platform which serves as a means to support electronic syndromic surveillance reporting in partnership with NEDSS. This partnership will allow for combining state surveillance data and BioSense clinical data from hospital emergency departments. The combined data sources could allow for more efficient, timely case notification between states and CDC

eCR Adoption and Implementation Challenges

Public health agencies are facing difficult new challenges, such as emerging infections like Zika virus and a sharp increase in chronic diseases due to a rapidly aging population. These trends highlight the need for public health to effectively exchange information with healthcare providers. The promise of eCR and its benefits also come with many barriers that public health leadership and their community partners must address.

Socio-Technical Barriers to eCR Implementation

Challenges to eCR implementation affect all stakeholders in the process. These challenges are not just limited to public health and not all are currently known. The Digital Bridge eCR implementation sites are expected to document challenges and lessons learned as they work through the implementation process.³⁸ Several known barriers to implementation are categorized and listed below.

Technical Barriers

- ▶ **Infrastructure** – The technical infrastructure needed to implement eCR may be cost prohibitive, particularly in financially limited state health departments.
- ▶ **Interoperability** – If electronic data are not reported in standard data formats, it may be prohibitive for public health systems to accept and analyze data appropriately.
- ▶ **Data standards** – Jurisdictions must request standardized eCR data elements, reporting formats, and structures for reporting. Utilizing standards requires close collaboration with surveillance and EHR vendors, which can cause delays and extra cost.
- ▶ **Messaging standards** – In addition to utilizing standard data elements, standard messaging is important. However, the HL7 CDA Standard might be difficult to understand and implement without the appropriate resources.

Organizational Barriers

- ▶ **Infrastructure investment** – Public health jurisdictions and healthcare providers are not prepared to receive and process eCR without additional investment, guidance, and assistance to enhance their IT infrastructure and workforce.¹
- ▶ **Return on investment** – IT investments are valuable only to the extent that they produce results. When projects fail to show results in a timely manner, funding is sometimes redirected to other priorities. It is currently unclear what the return on investment is for eCR at this early stage of implementation.
- ▶ **Legal and privacy issues** – Public health leaders must address the legal and privacy concerns of collecting personally identifiable information from their constituents.

Workforce Barriers

- ▶ **Training for public health professionals** – Public health jurisdictions will need to make additional investments for training for IT and epidemiology staff to implement and effectively use eCR.
- ▶ **Training for healthcare providers** – Additional training is needed for healthcare providers and their staff to implement and effectively use eCR.

Benefits of eCR Implementation

Despite the barriers to eCR, there are many benefits to electronic data exchange. Implementing eCR allows for a more complete case record in near real-time that will allow epidemiologists in public health agencies to respond more efficiently and effectively. Because eCR data is near real-time, cases can be detected earlier, which will facilitate earlier investigation and, potentially, earlier identification of risk factors for the spread of disease. As the infrastructure for eCR is developed and improved, these investments can be leveraged for other uses within the health department. In addition to the above benefits, additional potential benefits to providers and public health are listed in Table 4 below.

Implementing eCR allows for a more complete case record in near real-time that will allow epidemiologists in public health agencies to respond more efficiently and effectively.

Table 4. Benefits of eCR in Public Health and Clinical Care

POTENTIAL BENEFITS TO HEALTHCARE PROVIDERS	POTENTIAL BENEFITS TO PUBLIC HEALTH
<ul style="list-style-type: none"> ▶ Increased compliance with public health reporting laws. ▶ Increased transparency of patient data provision. ▶ Increased awareness of potential public health follow up. ▶ Increased standardization of initial reporting data elements. ▶ Reduced workload for staff. ▶ Decreased “one-off” public health reporting. ▶ Decreased interruptions by public health investigators. ▶ Decreased “situational” workflow tangential decisions. ▶ Decreased training time of medical record and office staff. ▶ Access to electronic record of reporting to public health. 	<ul style="list-style-type: none"> ▶ Increased disease reporting timeliness and completeness. ▶ Increased public health intervention and prevention activity. ▶ Increased focus on epidemiologic data (e.g., risk factors, exposure). ▶ Increased ability to share case information inter-jurisdictionally. ▶ Increased capacity to leverage shared tools and solutions. ▶ Increased reusable technical solutions for data reporting process. ▶ Decreased person-resources for data collection. ▶ Decreased redundancy in system development projects. ▶ Increased infrastructure for other public health reporting solutions. ▶ Provides a framework for the development of public health decision support algorithms and tools.

SECTION THREE

CALL TO ACTION



SECTION THREE: CALL TO ACTION

ASTHO plans to work with state public health agencies, other public health professional associations, Digital Bridge, EHR vendors, and healthcare providers to support the implementation of eCR in the U.S. state health departments.

The following are recommendations for SHOs to build consensus for eCR implementation:

Build relationships with healthcare providers and other community partners. Solid relationships among these partners are critical to the success of eCR implementation. SHOs should work closely with their providers to build trust and improve the understanding of public health among the clinical care community. Public health and clinical care have the same goal: to improve the health of the community. This partnership will be strengthened through enhanced communication and information sharing.

SHO functioning in role as chief health strategist. The chief health strategist, in partnership with community leaders, develops comprehensive strategies to improve overall health status. These partnerships and the governance structures will support these efforts and will aid in the understanding of organizational and technical barriers. Partnerships facilitates communication and data sharing among the community organizations that improves the health of the community.

Data-driven decision making. Data must inform choices at all levels of care, so more data is needed to effectively assess the needs of individuals and communities. More complete data will provide a more accurate understanding of the public health burden in the community and allow for a more effective allocation of resources to address these conditions.

Effectively communicate with EHR vendors. Technology and standards are constantly changing. SHOs and public health staff must work closely with EHR vendors to meet these demands. A clear understanding of the collected clinical data's purpose and how that data would also be used to improve population health is critical to generate information that will improve the community's health.

Communicate the eCR value proposition to policymakers and legislators. Funding for improvements to infrastructure and staff training is critical to the success of eCR. SHOs should communicate the value of eCR to decision makers and funders.

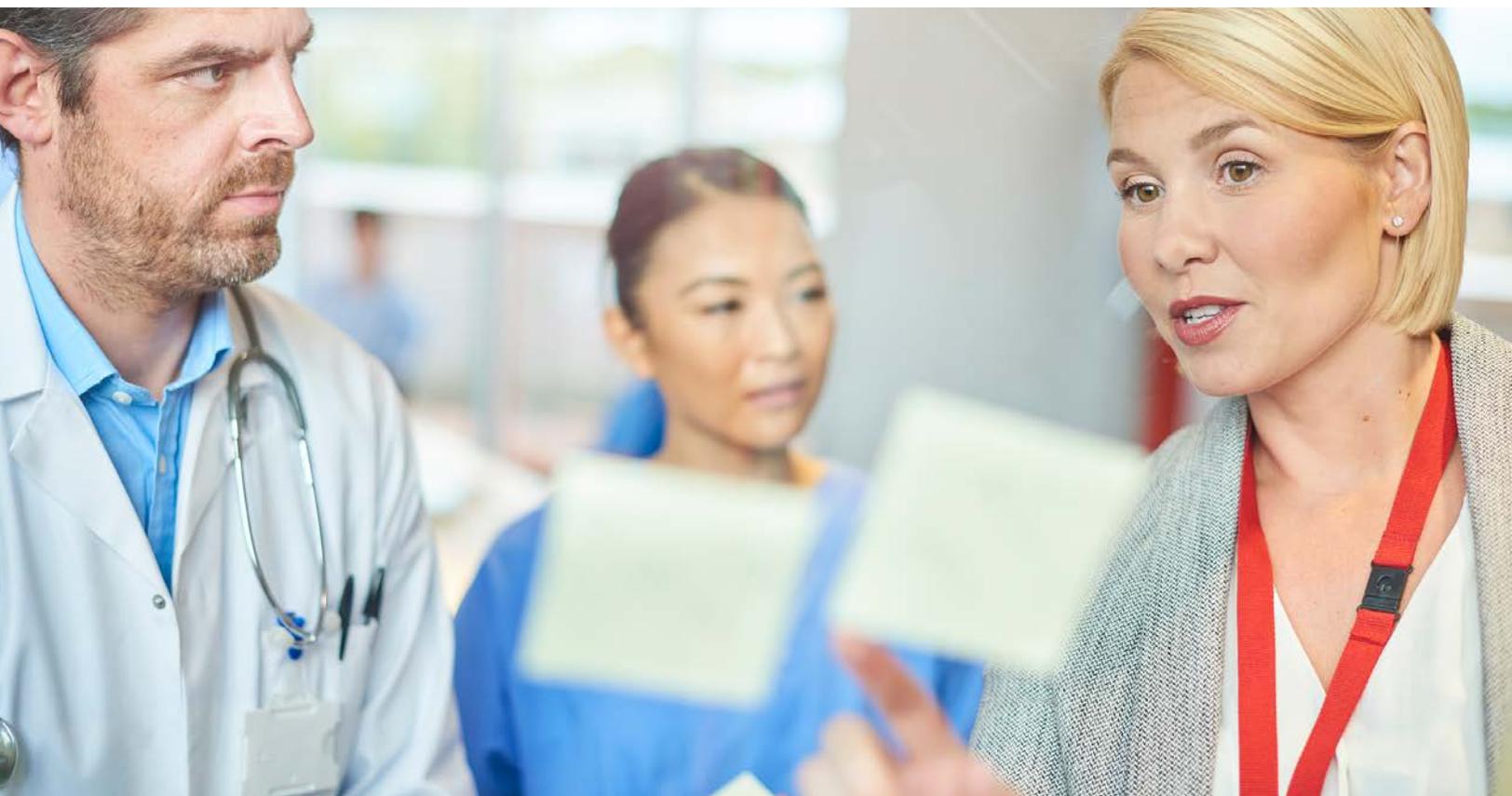
Anticipate future trends and emerging needs for eCR. Emerging infections, as well as an increase in number and severity of chronic disease, often requires prompt action on the part of public health agencies. SHOs and their staff must work to anticipate these needs in order to accommodate anticipated changes to eCR.

Recommendations (continued)

Increase awareness of and support for eCR's role in public health. eCR is a valuable tool that will vastly improve surveillance. eCR reduces the workload to retrieve data, improves efficiency, and captures more comprehensive data, which streamlines the reporting process.

Increase awareness of and support for eCR's role in healthcare. Electronic case reporting standardizes the approach that supports healthcare partners' Meaningful Use initiatives. Public health departments' readiness to accept eCR and their resources to assist in implementation may become important factors in whether providers adopt eCR. This process will be enhanced through the use of common terminologies among public health professionals, public health, and the provider community.

Invest in workforce development for eCR. Assess the public health workforce's readiness and competency for eCR. SHOs need to ensure that the workforce has the required skillset, through competency-based training efforts, to meet the challenges of coordinating and connecting clinical EHR data to public health surveillance that supports integration across public health programs.



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APPENDIX A. DIGITAL BRIDGE PARTICIPATING ORGANIZATIONS

Funders

Robert Wood Johnson Foundation

de Beaumont Foundation

Program Management Office

Public Health Informatics Institute

Deloitte

Participating Organizations

Allscripts

Association of Public Health Laboratories

Association of State and Territorial Health Officials

Centers for Disease Control and Prevention

Cerner Corporation

Council of State and Territorial Epidemiologists

eClinicalWorks

Epic Systems Corporation

HealthPartners

Kaiser Permanente

MEDITECH (Medical Information Technology, Inc.)

National Association of County and City Health Officials

The Office of the National Coordinator for Health Information Technology (ONC)

Partners HealthCare