Advancing Electronic Case Reporting of Sexually Transmitted Infections

Version 3
March 15, 2018

Public Health Informatics Institute

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High-Level Change Log

Note that minor wording changes were made between version publications but such changes will not be detailed here.

Version Released	Publication Date	Description	Author
3	March 15, 2018	Narrative updated to reflect pilot implementation preliminary evaluation findings and publication of HL7 eICR guidance; LOINC 43406-8, 45073-4, and 80367-6 added to CT-2L value set	PHII
2	July 19, 2016	Recommended case report data elements laboratory results and lab test(s) performed changed from *required* to *required if available*	PHII
1	July 1, 2016	Initial publication	PHII

Acronyms Used in this Report

APHL – Association of Public Health Laboratories
ASTHO - Association of State and Territorial Health Officials
CDA - Clinical Document Architecture
CDC - Centers for Disease Control and Prevention
CSTE - Council of State and Territorial Epidemiologists
DSTDP – CDC Division of Sexually Transmitted Disease Prevention
eCR – electronic case reporting
EHR - electronic health record
eICR - electronic initial case report
ELR - electronic laboratory report
FQHC - Federally Qualified Health Center
HL7 - Health Level Seven®
HIE – health information exchange
ICD-10 - International Classifications of Diseases, 10th Revision
LIMS – laboratory information management system
NACCHO - National Association of County and City Health Officials
NEDSS - National Notifiable Diseases Surveillance System
ONC - Office of the National Coordinator for Health Information Technology
PHER – Public Health and Emergency Response
PHII – Public Health Informatics Institute
RCKMS –Reportable Conditions Knowledge Management System
SDC – structured data capture
SNOMED – Systematized Nomenclature of Medicine
STD – sexually transmitted disease
STI – sexually transmitted infection
STU – standard for trial use

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Executive Summary

Today, most health care providers use manual methods, such as fax or web form, to submit case reports. This manual process is burdensome for both the provider and public health and allows many opportunities for data errors and unreported cases.

Leveraging electronic health record (EHR) data for case reporting of sexually transmitted infections (STIs) can dramatically lessen the burden of current manual reporting mechanisms for clinicians and public health agencies alike. Automating the building and sending of STI case reports with EHR technologies promises to improve data accuracy, timeliness and completeness.

This report reflects the input of health care professionals, public health practitioners and informaticians to define how EHRs should help primary care providers automatically detect and report STI cases. Specifically, this guidance details case detection logic and the core set of case report data elements for EHR-based electronic case reporting (eCR) of chlamydia and gonorrhea. By advancing the state-of-the-art for eCR, we aim to develop an approach for STIs that may be extended to other conditions.

Due to the high level of interest in eCR, many organizations are developing tools, standards and infrastructure to support this important opportunity. The Public Health Informatics Institute (PHII) has been fortunate to collaborate with the Centers for Disease Control and Prevention's (CDC) Center for Surveillance, Epidemiology and Laboratory Services and the Council of State and Territorial Epidemiologists (CSTE) on the Reportable Conditions Knowledge Management System (RCKMS) and with Health Level 7 (HL7) on the Public Health Case Report Implementation Guide, respectively. We plan to continue this collaboration with these national efforts as we seek harmonization on electronic case reporting approaches.

Introduction

Background

With the broad adoption of electronic health records (EHRs), public health has the opportunity to take advantage of the availability of electronic health data to improve surveillance. Today, many clinical care providers use manual mechanisms (e.g., fax, web form, email or mailed paper forms) to report cases of reportable and nationally notifiable diseases and conditions to public health authorities. Manual reporting creates a burden on both the clinical provider and public health and increases opportunities for data errors. Much of the data needed for the case report exists in the patient's EHR. Automating building and sending of case reports with EHR technologies promises to reduce the burden of reporting while improving data accuracy, timeliness and completeness.

Sexually transmitted infections (STIs) account for the majority of the reportable condition case reports received by state and local public health agencies. In 2016, more than 2 million cases of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* infections were reported to the Centers for Disease Control and Prevention (CDC) (CDC, 2017). STI cases account for approximately 85% of notifiable infectious condition reports each year; the disease with the next greatest number of reported cases is campylobacteriosis at 60,120 (CDC, 2016). Clearly, automating STI reporting warrants particular attention.

Leveraging EHR data for case reporting of chlamydia and gonorrhea alone can dramatically lessen the burden of notifiable disease surveillance for clinicians and public health agencies alike. In recent years, timeliness of reporting has improved because public health departments began receiving electronic reports of laboratory test results for reportable conditions from various laboratories. However, these electronic laboratory reports (ELRs) often lack case demographic data that are crucial for tracking disease trends and developing public health responses. Case reports sent automatically from EHRs can further improve data quality through more complete reports and by fulfilling reporting requirements when ELRs and paper-based reports are not provided to public health.

While sending a case report by fax or web form involves electronic communications, the term *electronic case reporting* (eCR) refers specifically to the approach whereby an EHR or intermediary system (e.g., a health information exchange) automatically detects reportable conditions and sends a case report to a public health surveillance system. eCR depends on clear communications between public health and clinical care about what to include in a case report and what values or codes in a patient's clinical record should trigger report sending. In an effort to facilitate public health agencies' communication of these requirements for eCR of chlamydia and gonorrhea, CDC's Division of Sexually Transmitted Disease Prevention (DSTDP) collaborated with the Public Health Informatics Institute (PHII) to develop this technical guidance.

Purpose

The Advancing eCR of STI Project brings health care providers, informaticians and public health practitioners together to define how EHRs should help primary care providers automatically detect and report STI cases. This guidance provides support to public health agencies and their clinical partners for initiating electronic case reports of chlamydia and gonorrhea. Our aim is to advance the state-of-the-art for eCR in collaboration with other national efforts.

National Efforts

Supporting the capacity for eCR from clinical care to public health is a goal of many national organizations that guide public health practice and develop policy. The Office of the National Coordinator for Health Information Technology (ONC), the Council of State and Territorial Epidemiologists (CSTE), the Association of Public Health Laboratories (APHL), the Association of State and Territorial Health Officials (ASTHO), CDC, Health Level Seven® International (HL7) and the National Association of County and City Health Officials (NACCHO) are involved in the following efforts:

- ONC has defined certification criteria for EHRs to be able to electronically send case reports for Meaningful Use Stage 3.
- CSTE has defined data elements for the electronic initial case report and is working with CDC on the Reportable Conditions Knowledge Management System (RCKMS) to support eCR for all notifiable conditions.
- The HL7 Public Health and Emergency Response Working Group has balloted a Standard for Trial Use CDA® [clinical document architecture] R2 Implementation Guide for Public Health Case Report, Release 2.

The Advancing eCR of STI Project moves eCR forward by focusing on an approach for STIs that can be a model for or extended to other conditions. This guide advances discussions toward consensus among public health practitioners regarding the case detection algorithms and set of reporting variables to generate an electronic STI case report. PHII is grateful for the collaboration with representatives from the national efforts described previously and envisions that the resulting eCR approach for STIs can be implemented in ways that are consistent with those efforts.

Methods

Expert Panel

This guidance is based on the work of a panel of experts from national, state and local public health agencies and supported by subject-matter experts in epidemiology and standards-based terminologies. The expert panel met through three webinars and an in-person meeting to identify data elements to include in the STI case report and the case detection logic that triggers a report to be sent from the EHR system to the local public health agency. A list of the expert panel members is located in the Acknowledgments section. A smaller group of expert panel members participated on a technical working group to vet the documents created from the recommendations of the expert panel by PHII and the subject-matter experts.

Webinars

During the three webinars hosted by PHII, the expert panel oriented the members to the topic of eCR and the decisions to be made. The following topics were addressed:

- Webinar 1 — the context of eCR and the goals of the Advancing eCR of STI Project
- Webinar 2 — case detection criteria for chlamydia and gonorrhea
- Webinar 3 — case report contents for eCR

In-Person Meeting

The webinars were followed by an in-person meeting on December 3–4, 2015, at the PHII offices in Decatur, Georgia. The group spent the first day coming to consensus regarding data elements to be included in a case report and which ones would be required for acceptance by the health department. On the second day, the group reviewed the CSTE position statements for chlamydia (CSTE, 2009a) and gonorrhea (CSTE, 2009b, 2013) and considered the criteria for triggering a case report from the EHR. Recommendations from the expert panel guided development of the case detection logic and associated code value sets (Appendix A) and the data elements for the case report (Appendix B), which are described in detail later in this guidance. As this work pre-dated the release of the *HL7 CDA® R2 Implementation Guide: Public Health Case Report, Release 2 - US Realm - the Electronic Initial Case Report (eICR)*, the following guidance has been updated to reflect this emerging standard.

Technical Working Group and Subject-Matter Experts

A technical working group was convened as a subcommittee of the expert panel and was composed of implementers — representatives from health departments and clinical providers — and staff of CDC's DSTDP Surveillance and Data Management Branch. On the basis of the expert panel's recommendations, vocabulary and surveillance subject-matter experts created a draft document with the case detection logic and value sets codes for each condition. The working group vetted the document through two webinars and by e-mail correspondence. The final document is included with this guide as Appendix A.

Standards-Based Pilot Implementation

PHII partnered with AllianceChicago in 2017 to implement the case detection logic developed by the expert panel. AllianceChicago is a Health Resources and Services Administration funded health center-controlled network and Agency for Healthcare Research and Quality certified practice-based research network. Their work includes management, implementation and support of a centralized EHR system that serves 28 community health center organizations across 18 states. AllianceChicago worked with their commercial EHR vendor to install enhancements to allow for case report creation as specified in *HL7 CDA® R2 Implementation Guide: Public Health Case Report, Release 2: the Electronic Initial Case Report (eICR), Release 1, Standard for Trial Use (STU) Release 1.1 - US Realm*. Key findings and future efforts based on this pilot experience are reflected in the body of this document. An executive summary of the implementation can be found in Appendix C.

Learning Resources

The expert panel and additional public health community members were invited to follow the progression of the pilot implementation through a three-part webinar series. This group discussed the following topics:

- Webinar 1 —pilot implementation partners and scope
- Webinar 2 —evaluation plan
- Webinar 3 —evaluation findings and major lessons learned

Presentation materials from these webinars as well as an eLearning course, Introduction to eCR for STIs, can be found in the learning resources section at phii.org/ecr-sti.

Scope

The Advancing eCR of STI Project is bound by the requirements for eCR of chlamydia and gonorrhea. Included in those bounds and presented in this guidance document are the reportability criteria for each disease, the case detection logic for identifying potential cases, the coded value sets for each condition that correlate with each rule in the logic, and the data elements to be included in a chlamydia or gonorrhea case report. Out-of-scope for this project are the specifications for message or document formats and message transport mechanisms.

The project has benefited directly from concurrent eCR efforts of other national public health organizations. Specifically, the work of the CSTE Initial Case Report Task Force guided our earlier work of vetting data elements for STI case reports (Appendix B). The CSTE work also provided a starting point for the HL7 Public Health and Emergency Response (PHER) working group's Standard for Trial Use (STU) for public health case reporting referenced earlier. Concerns with specific case report data elements noted by our expert panel have also been identified by the PHER working group, who were able to spend considerable time and receive input from a larger sector of eCR stakeholders than ours. Given the alignment between the data elements proposed by the expert panel and those included in the HL7 STU, we strongly recommend organizations seeking to implement this technical guidance also obtain the HL7 eICR implementation guide for data element format specifications.

Additionally, as participants on the expert panel, staff from the RCKMS project shared their invaluable knowledge of eCR, including the complexities involved in determining the triggering logic and lists of codes used by jurisdictions engaged with that project. Their participation guided development of the case detection logic and value sets documented in Appendix A. We hope our guidance facilitates the work of these and other eCR projects.

Guidance for eCR of STIs

The complexities involved in implementing eCR of STIs can best be understood through delineating the associations between the entities and systems involved. This guidance first clarifies the eCR context and then describes the specific processes and inputs to be implemented for successful eCR.

Context of eCR

Reportable condition case reports represent conditions that must be reported to state and local public health agencies by clinical care and laboratories. Public health case reporting by clinicians is legally mandated by each state. After receiving a report, individual jurisdictions determine if it is a reportable case and if an investigation is needed. The case reports are sent in different formats (e.g., by telephone, fax or web-based data entry systems), and states vary to some extent in the conditions and data elements they require to be reported. eCR is intended to help clinicians meet their reporting requirements while improving public health surveillance.

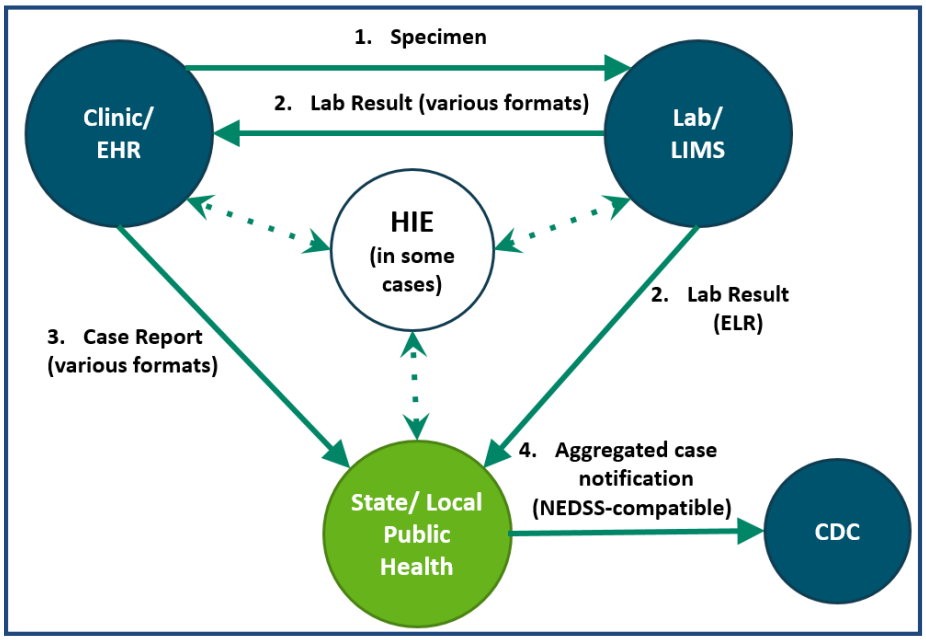

Figure 1. The Context of Electronic Case Reporting [LIMS – laboratory information management system; HIE – health information exchange; NEDSS – National Electronic Disease Surveillance System]

Figure 1 can be understood through the following example:

1. A patient presents at a clinical setting (e.g., hospital, physician's office, community health center or public health clinic) and meets the screening guidelines for chlamydia or gonorrhea (e.g., female, age 20 years and sexually active). Physical specimens are collected and sent to a laboratory for testing.

2. After testing, the laboratory sends the test results to the clinic and, if positive, also to the state or local public health agency. (Some states request reporting of negative results also.) Results might be sent electronically by using HL7 standards or another format.

3. When results are positive, the clinician is also required to send a case report to the state or local public health agency. The case report might be sent by telephone or as a fax, by U.S. Postal Service mail, by manual entry into a web-based system, or by the clinic's EHR as an eCR.

4. Finally, each state aggregates the data they receive for each notifiable condition and sends reports on a regular basis to CDC. This is called *case notification*. Certain large municipalities and territories also send aggregate reports to CDC. CDC then disseminates the data to internal programs (e.g., DSTDP) that use it for planning, research, reporting and intervention development. CDC further makes the data available to the public (e.g., through the *Morbidity and Mortality Weekly Report*).

Figure 1 also illustrates that case reporting can be mediated by a health information exchange (HIE) when an HIE organization is operational in a public health agency's jurisdiction.

Within this context, the eCR process depends on public health communicating to clinical care specific requirements for the EHR to identify cases, build reports, and send them to public health (Figure 2). The requirements include (1) case detection logic that evaluates data in the patient record to match to (2) value sets containing specific codes and, when a match is found, builds the case report with (3) specific data elements from the patient record. After a report is sent, the public health agency determines the disposition of the case on the basis of the report, ELR data if available, and possibly, data from contact tracing, partner management or an investigation.

Figure 2 presents the entire eCR process as taking place within the EHR. Another option is for the case detection logic to reside outside the EHR, which is addressed later in this guide. Regardless of the information technology infrastructure and implementation, the case detection logic and related coded value sets can be used.

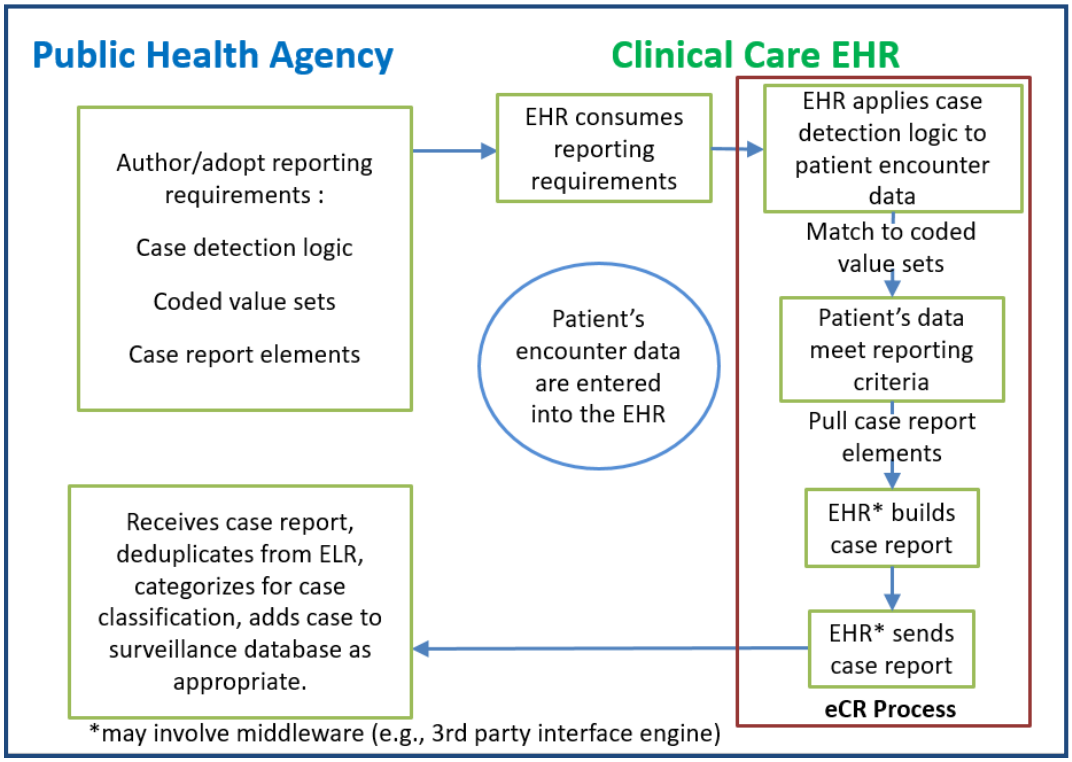

Figure 2. Interactions between the Public Health Agency and Clinical Care for eCR

Case Reporting Criteria

The eCR for STI expert panel deliberated over the criteria that would determine whether a case report should be sent to public health from the EHR. The CSTE position statements for chlamydia and gonorrhea outline criteria sufficient for reporting a case to public health. It is important to not conflate case *reporting* criteria with *case classification* criteria. The latter is a distinct function of a public health agency. The case reporting criteria are listed below.

Chlamydia (CSTE, 2009a)

1. Health care record contains a diagnosis of infection caused by *C. trachomatis.*
2. Isolation of *C. trachomatis* by culture of a clinical specimen.
3. Detection of *C. trachomatis* antigen by direct fluorescent antibody staining in a clinical specimen.
4. Detection of *C. trachomatis* antigen by enzyme-linked immunosorbent assay in a clinical specimen.
5. Detection of *C. trachomatis* nucleic acid by hybridization with a nucleic acid probe in a clinical specimen.
6. Detection of *C. trachomatis* by nucleic acid amplification (e.g., polymerase chain reaction) in a clinical specimen.

Gonorrhea (CSTE, 2013, 2009b)

1. Health care record contains a diagnosis of infection or illness caused by *N. gonorrhoeae* (from the 2009 Position Statement only).
2. Isolation of *N. gonorrhoeae* by culture of a clinical specimen.
3. Microscopic visualization of *N. gonorrhoeae* (gram-negative intracellular diplococci of typical morphology associated with neutrophils) in a urethral specimen from men.
4. Detection of *N. gonorrhoeae* by nucleic acid amplification (e.g., polymerase chain reaction) in a clinical specimen. Detection of *N. gonorrhoeae* nucleic acid by hybridization with a nucleic acid probe in a clinical specimen.
5. Detection of *N. gonorrhoeae* antigens in a clinical specimen.
6. Microscopic visualization of *N. gonorrhoeae* (gram-negative intracellular diplococci of typical morphology associated with neutrophils) in an endocervical specimen from a woman.

The expert panel understood that the term *diagnosis* in the 2009 statements was meant to indicate that laboratory evidence of the disease existed. Although the latest statement on gonorrhea does not include a diagnosis alone as sufficient for reporting, their consensus was that a clinical diagnosis of infection due to *C. trachomatis* or *N. gonorrhoeae* (as evidenced by a SNOMED [Systematized Nomenclature of Human Medicine] or ICD-10 [*International Classifications of Diseases*, 10th Rev.] code in the EHR) should trigger a case report being sent to public health, even when a laboratory result is unavailable in the EHR. The public health agency is then responsible for classifying the case (e.g., confirmed, probable, suspect, not a case).

The interaction of the case reporting criteria and the codes that are matched to those criteria is not a one-to-one association. Rather, for chlamydia and gonorrhea, a single diagnosis code might match the criteria while in another case two codes representing the laboratory test performed* and the lab result* together match the criteria. The expert panel determined the single- and two-factor case detection logic displayed in Table 1 for reporting cases of chlamydia and gonorrhea. The table includes examples of possible code combinations that should *not* send a case report. This case detection logic and associated value sets are detailed in Appendix A.

Each factor alone or in a pair that would result in the creation and sending of a case report is defined by a set of codes called a *value set*. For example, single-factor case detection based on a chlamydial infection diagnosis represented in Example 1 of Table 1 corresponds to a value set that might include the following ICD-10 codes:

- A56.00 (Chlamydial infection of lower genitourinary tract, unspecified
- A56.19 (Other chlamydial genitourinary infection)

Case detection based on two-factors require two value sets, one for each factor. Chlamydia and gonorrhea each require a value set of codes for each factor. This results in eight separate value sets — four for chlamydia and four for gonorrhea.

In theory, a reportable case might be detected by a code for a laboratory test performed in combination with its positive quantitative result. However, the value of quantitative results that indicates a positive result varies from test to test. Consequently, there is no single coded value for quantitative results that can be used for case detection purposes. One option is to utilize the abnormal flag that an EHR creates to indicate an abnormal result. The expert panel decided to not include quantitative test results in this eCR guidance, but to rely on the ELR to capture these cases.

**The laboratory test performed and laboratory result are two components of a laboratory observation and are distinct from a laboratory order.*

Table 1. Examples of single- and two-factor case detection logic for chlamydia and gonorrhea

Example	Factor 1	Factor 2	Type*	Action
1	Code for diagnosis of infection due to *Chlamydia trachomatis* or *Neisseria gonorrhoeae*	None	Single-factor	Send report
2	Code for a positive laboratory result indicating organism name	None	Single-factor	Send report
3	Code for laboratory test performed yielding qualitative result	Code for a positive laboratory result (qualitative indicating presence)	Two-factor	Send report
4	Code for laboratory test performed yielding quantitative result	No code available; potential for abnormal flag	Two-factor	Do not send report
5	Code for laboratory test performed (qualitative or quantitative result)	Code for a negative laboratory result	Two-factor	Do not send report
6	Code for laboratory test performed yielding qualitative result	Code for other laboratory result (e.g., indeterminate, abnormal)	Two-factor	Do not send report
7	Code for treatment for chlamydia or gonorrhea	None	Single-factor	Do not send report

* Single-factor case detection is based on one value (e.g., a diagnosis code). Two-factor case detection is based on two values that share an association (e.g., code for laboratory test performed and code for test result).

Case Report Data Elements

If the patient data stored in the EHR satisfies the case detection logic, the next step in the eCR process (Figure 2) is to build the case report. The Advancing eCR of STI Project expert panel reviewed the CSTE Initial Case Report Task Force's (CSTE, 2015) proposed data elements and categorized each element as *required*, *required if available* or *optional*.

A case report should include all required elements plus any of the required if available elements that exist in the patient record. The optional elements might also be included. The elements are designated as being of three potential types — provenance, patient and clinical (Appendix B).

The expert panel categorized 49 elements for inclusion in a case report (Table 2). See Appendix B for more information about expert panel discussions of the data elements considered for the eCR.

The panel desired to align this work to the HL7 implementation guide once published, which became publicly available in Fall 2016. Table 2 has been modified to illustrate the alignment between this expert panel's recommendations and the data elements within the HL7 guide.

The HL7 guide specifies the submission of the electronic initial case report (eICR) using HL7's Clinical Document Architecture Release 2 (CDA R2) format. For consistency, we use the term *electronic initial case report* or eICR when referring to a case report that follows this specific standard. The eICR standard is designed to support case reporting for all reportable conditions, including chlamydia and gonorrhea, and is expected to evolve as further pilot work is conducted. The implementation guide (release 1.1 at the time of this publication) is freely available for download with a HL7 user account.

Table 2. Data elements to be included in electronic case reports for chlamydia and gonorrhea

	Element Name	Inclusion	Included in HL7 eICR?		Element Name	Inclusion	Included in HL7 eICR?
1	Date of the Report	Required if available	Yes	**26**	Patient Sex	Required if available	Yes
2	**Report Submission Date/Time**	**Required**	Yes*	**27**	Patient Class	Required if available	Yes
3	**Sending Application**	**Required**	Yes*	**28**	Race	Required if available	Yes
4	Provider ID	*Required if available	Yes	**29**	Ethnicity	Required if available	Yes
5	Provider Name	*See Provider ID	Yes	**30**	Preferred Language	Required if available	Yes
6	Provider Phone	*See Provider ID	Yes	**31**	Occupation	Required if available	Yes
7	Provider Fax	*See Provider ID	Yes	**32**	Pregnant	Required if available	Yes
8	Provider Email	*See Provider ID	Yes	**33**	Travel history	Optional	Yes
9	Provider Facility/Office Name	*See Provider ID	Yes	**34**	Insurance Type	Required if available	Yes*
10	Provider Address	*See Provider ID	Yes	**35**	Immunization history	Optional	Yes
11	Provider County	Optional	Yes*	**36**	Visit Date/Time	Required if available	Yes
12	Facility ID Number	Required if available	Yes	**37**	Admission Date/Time	Required if available	Yes
13	Facility Name	Required if available	Yes	**38**	Date of Onset	Required if available	Yes
14	Facility type	Optional	Yes	**39**	Symptoms (list)	Required if available	Yes
15	Facility Phone	Required if available	Yes	**40**	Lab Order Code	Optional	Yes
16	Facility Address	Required if available	Yes	**41**	Placer Order Number	Required if available	Yes*
17	Facility Fax	Optional	Yes	**42**	Diagnosis	Required if available	Yes
18	Hospital Unit	Required if available	Yes	**43**	Date of Diagnosis	Required if available	Yes
19	Patient ID Number	Required if available	Yes	**44**	Medication provided	Required if available	Yes
20	**Patient Name**	**Required**	Yes	**45**	Death Date	Required if available	Yes
21	Parent/Guardian Name	Needs more discussion	Yes	**46**	Date Discharged	Optional	Yes
22	Parent/Guardian Phone	Patient: Required if available	Yes	**47**	Laboratory Results	Required if available	Yes
23	Parent/Guardian Email	Patient: Required if available	Yes	**48**	**Trigger code that initiated eCR**	**Required**	Yes
24	Street Address	Required if available	Yes	**49**	Lab Test(s) Performed	Required if available	Yes
25	Birth Date	Required if available	Yes				

*Indicates data element present in HL7 Implementation Guide that is in addition to data elements recommended by the CSTE Initial Case Report Task Force.

Implementation Considerations

Incorporating eCR into the Context of Clinical Workflow

Before further discussing specific implementation considerations, it is helpful to visualize how the eCR process may integrate with clinical workflow. Figure 3 diagrams one hypothetical STI eCR workflow. For practical considerations, we assume that a patient receives STI testing and subsequent treatment in an ambulatory setting. The case detection logic and eCR process are amenable to various types of clinical settings; however, those settings and workflows may present a different set of facilitators and barriers to eCR implementation. While there are many other steps needed to support the delivery of clinical care, this workflow diagram emphasizes only those steps relevant to eCR. Variations across EHR systems and implementations may produce alternative workflows.

The steps with the label "A" in Figure 3 represent three possible options where patient data may satisfy the eCR case detection logic and initiate the creation of the eICR. Note that while the data reflected in Step 15 could also satisfy the eCR case detection logic, excluding it may help to prevent subsequent unrelated encounters (e.g., an orthopedic office visit for a broken ankle) documented in the same EHR system from generating superfluous eICRs. This is one example of the decisions implementing organizations will need to consider after conducting their own business analysis.

Implementation guidance available to date does not specify any time delay between case detection, building the eICR and sending the eICR to public health. Assuming that an organization implements eCR in a manner where these three events occur instantaneously, it is possible to build the eICR and sent it to public health before the patient has received STI treatment, which may require the patient to physically return to the clinic, pick up a prescription from a pharmacy, or both. While STI treatment may be given preemptively in some circumstances, it is common for several days to pass before a patient receives treatment following a positive STI laboratory result. Public health helps to ensure that patients receive appropriate treatment. Therefore, it is the authors' understanding that the eICR is intended to include treatment information related to the condition(s) being reported. This potential discrepancy between the timing of case detection and that of STI treatment entry into the EHR may necessitate future modifications to the case detection logic. (Recall from Table 1 that treatment codes do not send a case report under the current case detection logic.) Alternatively, this discrepancy could be addressed by imposing a time delay between case detection and building the eICR, taking into account jurisdictional reporting requirements.

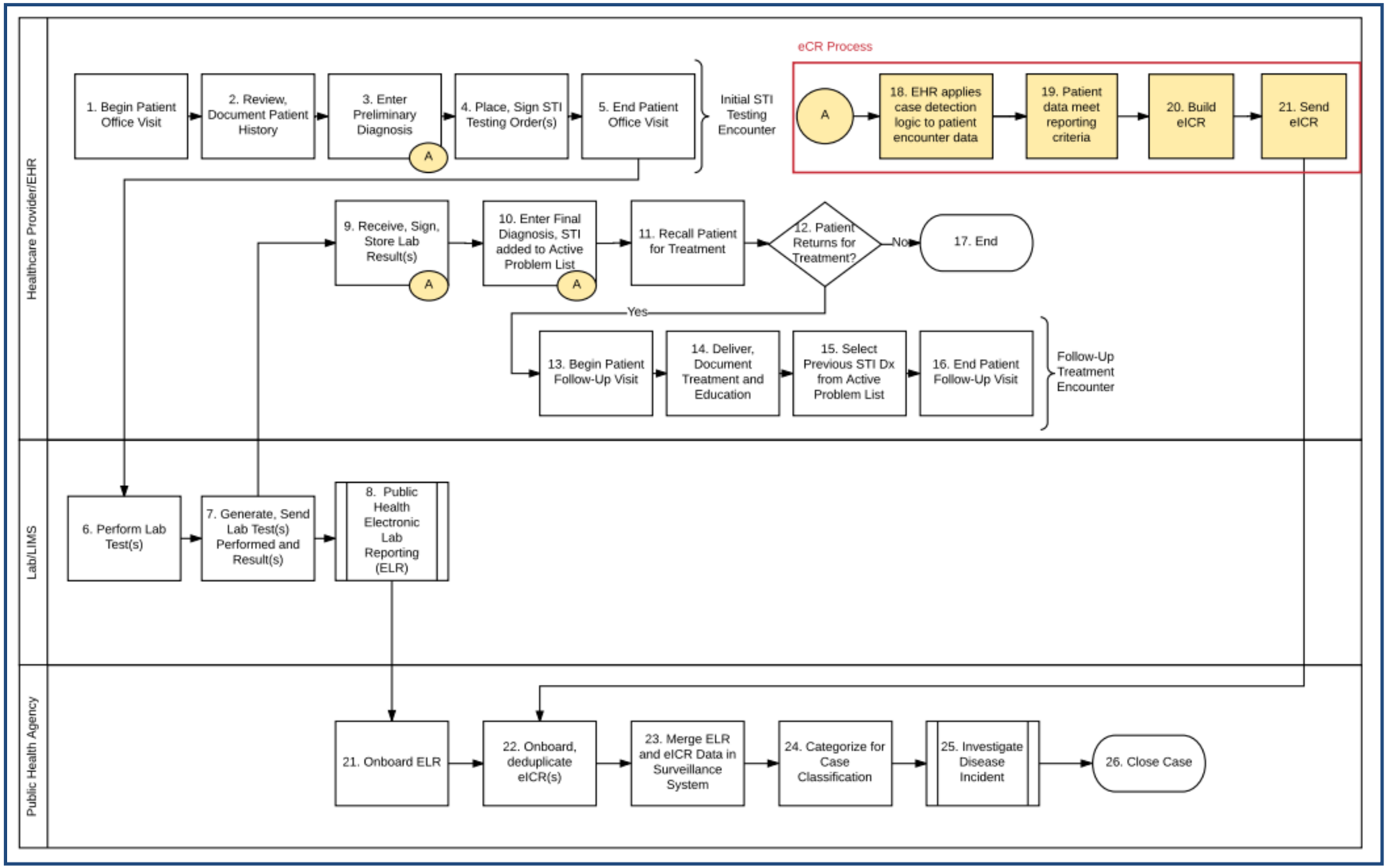

Figure 3. Sample STI eCR Workflow for a Reportable Case of Chlamydia or Gonorrhea

Note: Steps are numbered for convenient reference but may not necessarily represent chronological events.

Thus far, this guide has focused on implementation of eCR as a direct interaction between a clinical provider and a public health agency. As standards-based systems and processes are adopted by public health and opportunities for participation in shared services like health information exchanges and cloud-based decision support are leveraged, other scenarios are emerging that bring their own implementation caveats to be considered.

Furthermore, this guide does not specify transport standards. As standards like HL7 C-CDAs evolve and new ones like Structured Data Capture (SDC) develop, public health must stay informed about the most robust options for data exchange with health care.

eCR Implementation Approaches

eCR might be implemented in various ways depending on the presence or absence of any intermediaries like HIEs in a public health jurisdiction.

Provider to Public Health

Although public health has legal authority for receiving case reports by whatever means is available to the clinical provider, implementing eCR will involve collaborating with clinical entities in their jurisdiction and asking them to work with their EHR vendors to implement eCR. The clinical entities might not immediately understand the value of expending the time and financial costs necessary to implement eCR. Public health agencies should be prepared to make the value case from the perspective of the clinical entities. Stage 3 Meaningful Use criteria include incentive payments for eCR. In addition, eCR creates opportunities for public health to report back to clinical care about risks and exposures of their patient population.

Provider to Intermediary to Public Health

Increasingly, public health agencies are participating in data exchange with clinical entities through such intermediaries as HIE organizations. At a national level, CDC, CSTE, ASTHO and APHL are working toward cloud-based services supporting data exchange between health care and public health. These opportunities can increase access to eCR for public health agencies and can reduce costs through increased efficiencies for health care and public health alike. Intermediary technologies for health information exchange and public health reporting have legal implications for what data can be accessed by whom and when. Although many data security concerns have been addressed technologically, the public's trust needs to be built and maintained. Because eCR promises more complete reporting, the volume of data to be received (particularly for chlamydia and gonorrhea) must be considered. Using case detection logic that yields a specific result with few false-positives can reduce the burden of data volume on technology and the persons involved alike.

Future Efforts

Next steps for this project include seeking additional opportunities to pilot test this technical guidance with public health agencies and clinical settings in their jurisdiction. Continued collaboration with national eCR initiatives will also continue. We anticipate this will include comparing findings with other pilot implementations to examine differences in the sensitivity and specificity of eCR results and how those differences may be influenced by particular eCR implementation approaches described above.

Case Detection Logic

The case detection logic was designed to support future extensibility. Future work may include supporting chlamydia and gonorrhea case identification based on abnormal flags for laboratory results and laboratory tests with coded quantitative results. Additionally, further pilot experience may support the need to create a subsequent eICR for a previously detected case following STI treatment data entry into the EHR. As CSTE case definitions and reporting criteria evolve, it may be necessary to reconvene the expert panel to harmonize the case detection logic.

Potential Refinements to the HL7 eICR Implementation Guide

EHR system capabilities may limit an organization's ability to conform to the eICR standard. For example, there is frequently no single data element that categorizes a patient as pregnant or not pregnant. It may be some time before implementing provider organizations can readily provide pregnancy data within the eICR. Future iterations of the HL7 implementation guide should evaluate the pros and cons of including a time delay between case detection and eICR submission. This time delay guidance may need to be specific to individual clinical settings (e.g., emergency department, ambulatory, inpatient) given the different time sequence of clinical events in each.

eCR Pilot Activities and Guidance for Public Health Jurisdictions

To date, pilot activities of this guidance have focused on the implementation and evaluation of eCR within the ambulatory health care setting as supported by an EHR system. While this is a practical approach given that EHR systems capture patient data, public health jurisdictions will require further guidance to operationalize eCR. This guidance could include implementation considerations for onboarding eICRs into a surveillance system, deduplicating eICRs when reported by multiple health care organizations, merging eICR and ELR data, and case classification (e.g., confirmed, probable, suspect, not a case).

Structured Data Capture for Case Follow-Up

For certain conditions, local health departments might need to request additional clinical data not included in the eICR as part of a public health response (e.g., an investigation or case management). SDC is a standard that can be used for providing electronic forms to request and capture such supplemental information. However, given the high volume of chlamydia and gonorrhea case reports, having logic that identifies true cases and minimizes any subsequent requests to clinicians for additional case data for these conditions is highly desirable.

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Appendix A: Case Detection

The purpose of this appendix is to describe rules for triggering an electronic case report of chlamydia or gonorrhea so that it may be subsequently populated and sent from an electronic health record system to a public health agency. The value sets presented correspond to the trigger decision logic and trigger rules described below.

This appendix is also available as an electronic spreadsheet at the Public Health Informatics Institute's web site (phii.org/ecr-sti-report). The electronic spreadsheet includes additional information that should facilitate implementation of this case detection logic.

Table 1 of this appendix is intended as orientation to the value sets included in this appendix. Each row represents a discrete logic set for case detection.

Definitions for terms used in Table 1 include the following:

Condition: the reportable condition for which the trigger decision logic applies.

Rule: If “True”, then an occurrence of any of these evaluating to true always triggers a case report to be generated and sent.

Factors: The number of factors (data elements) that must be examined together to evaluate the trigger rule.

Trigger Category: Holds a category of rule. These different categories are created to facilitate implementation as each category contains one-to-many code values that are all handled the same way in terms of rule logic. This categorization is intended to facilitate future expansion of this case detection logic to additional conditions or criteria.

D = Coded Diagnosis

R = Coded Laboratory Results (any laboratory test)

L = Coded Laboratory Tests

Factor 1 Value Set: A value set that represents the first of 1 or 2 factors used in the logic set. For the value sets described in this document, 2 factors are joined by a Boolean AND statement. The values for each value set are listed later in this appendix.

Factor 2 Value Set: A value set that represents the second of 2 factors used in the logic set. For the value sets described in this document, 2 factors are joined by a Boolean AND statement. The values for each value set are listed later in this appendix.

Table 1. Logic Sets for Chlamydia Trachomatis and Gonorrhea Case Detection

Condition	Rule	Factors	Trigger Category	Factor 1 Value Set	Factor 2 Value Set	Comment
Chlamydia Trachomatis (CT)	True	1	D = Coded Diagnosis	CT-1D	[none – not applicable]	Rule for diagnosis
Chlamydia Trachomatis (CT)	True	1	R = Coded Laboratory Results (any laboratory test)	CT-1R	[none – not applicable]	Rule for named result (i.e., CT identified) from any lab test
Chlamydia Trachomatis (CT)	True	2	L = Coded Laboratory Tests	CT-2L	CT-2R	Rule for presence vs. absence (lab test requiring result for two-factor evaluation)
Gonorrhea (GC)	True	1	D = Coded Diagnosis	GC-1D	[none – not applicable]	Rule for diagnosis
Gonorrhea (GC)	True	1	R = Coded Laboratory Results (any laboratory test)	GC-1R	[none – not applicable]	Rule for named result (i.e., GC identified) from any lab test
Gonorrhea (GC)	True	2	L = Coded Laboratory Tests	GC-2L	GC-2R	Rule for presence vs. absence (lab test requiring result for two-factor evaluation)

This convention results in the following value sets for chlamydia trachomatis and gonorrhea case detection (Table 2 below). The values included in each value set are listed later in this appendix.

Table 2. Value Sets for Chlamydia Trachomatis and Gonorrhea Case Detection

Value Set	Description
CT-1D	Chlamydia Trachomatis Single Factor Diagnosis/Disorder/Problem Trigger Codes
CT-1R	Chlamydia Trachomatis Single Factor Laboratory Result Trigger Codes (any lab test): organism type or subtype, or substance
CT-2L	Chlamydia Trachomatis Two Factor Laboratory Test Trigger Codes: Coded Tests Having Coded Results Presence
CT-2R	Chlamydia Trachomatis Two Factor Laboratory Result Trigger Codes: Coded Results Presence vs. Absence
GC-1D	Gonorrhea Single Factor Diagnosis/Disorder/Problem Trigger Codes
GC-1R	Gonorrhea Single Factor Laboratory Result Trigger Codes (any lab test): organism type or subtype or substance
GC-2L	Gonorrhea Two Factor Laboratory Test Trigger Codes: Coded Tests Having Coded Results Presence
GC-2R	Gonorrhea Two Factor Laboratory Result Trigger Codes: Coded Results Presence vs. Absence

Table 3. Value Set CT-1D (see electronic version of this appendix for additional details)

Code	Display Name	Code System
240589008	Chlamydia trachomatis infection (disorder)	SNOMED CT
426247003	Acute genitourinary Chlamydia trachomatis infection (disorder)	SNOMED CT
143511000119105	Perihepatitis due to Chlamydia trachomatis (disorder)	SNOMED CT
107500510001191105	Chlamydia trachomatis infection in mother complicating childbirth (disorder)	SNOMED CT
420910002	Chlamydia trachomatis infection of anus and rectum (disorder)	SNOMED CT
446642005	Infection of anus due to Chlamydia trachomatis (disorder)	SNOMED CT
447372001	Infection of rectum due to Chlamydia trachomatis (disorder)	SNOMED CT
428015005	Chlamydia trachomatis infection of genital structure (disorder)	SNOMED CT
447353001	Infection of cervix due to Chlamydia trachomatis (disorder)	SNOMED CT
446471004	Infection of epididymis due to Chlamydia trachomatis (disorder)	SNOMED CT
446902002	Infection of testis due to Chlamydia trachomatis (disorder)	SNOMED CT
447402003	Infection of vagina due to Chlamydia trachomatis (disorder)	SNOMED CT
446752000	Infection of peritoneum due to Chlamydia trachomatis (disorder)	SNOMED CT
198176005	Female chlamydial pelvic inflammatory disease (disorder)	SNOMED CT
446594000	Infection of pharynx due to Chlamydia trachomatis (disorder)	SNOMED CT
447386002	Infection of vulva due to Chlamydia trachomatis (disorder)	SNOMED CT
240591000	Neonatal chlamydial conjunctivitis (disorder)	SNOMED CT
179101003	Urethritis due to Chlamydia trachomatis (disorder)	SNOMED CT
112121000119105	Venereal disease due to Chlamydia trachomatis (disorder)	SNOMED CT
1621000119101	Chlamydia trachomatis infection in pregnancy (disorder)	SNOMED CT

56009001	Inclusion conjunctivitis of the adult (disorder)	SNOMED CT
367504009	Pelvic inflammatory disease with female sterility due to Chlamydia trachomatis (disorder)	SNOMED CT
A55	Chlamydial lymphogranuloma (venereum)	ICD10CM
A56.00	Chlamydial infection of lower genitourinary tract, unspecified	ICD10CM
A56.01	Chlamydial cystitis and urethritis	ICD10CM
A56.02	Chlamydial vulvovaginitis	ICD10CM
A56.09	Other chlamydial infection of lower genitourinary tract	ICD10CM
A56.11	Chlamydial female pelvic inflammatory disease	ICD10CM
A56.19	Other chlamydial genitourinary infection	ICD10CM
A56.2	Chlamydial infection of genitourinary tract, unspecified	ICD10CM
A56.3	Chlamydial infection of anus and rectum	ICD10CM
A56.4	Chlamydial infection of pharynx	ICD10CM
A56.8	Sexually transmitted chlamydial infection of other sites	ICD10CM
A71.0	Initial stage of trachoma	ICD10CM
A71.1	Active stage of trachoma	ICD10CM
A71.9	Trachoma, unspecified	ICD10CM
A74.0	Chlamydial conjunctivitis	ICD10CM
A74.81	Chlamydial peritonitis	ICD10CM
A74.89	Other chlamydial diseases	ICD10CM
A74.9	Chlamydial infection, unspecified	ICD10CM
P23.1	Congenital pneumonia due to Chlamydia	ICD10CM
J16.0	Chlamydial pneumonia	ICD10CM

Table 4. Value Set CT-1R (see electronic version of this appendix for additional details)

Code	Display Name	Code System
63938009	Chlamydia trachomatis (organism)	SNOMED CT
115289001	Chlamydia trachomatis, serotype A (organism)	SNOMED CT
115290005	Chlamydia trachomatis, serotype B (organism)	SNOMED CT
115291009	Chlamydia trachomatis, serotype Ba (organism)	SNOMED CT
115292002	Chlamydia trachomatis, serotype C (organism)	SNOMED CT
115293007	Chlamydia trachomatis, serotype D (organism)	SNOMED CT
115294001	Chlamydia trachomatis, serotype E (organism)	SNOMED CT
115295000	Chlamydia trachomatis, serotype F (organism)	SNOMED CT
115319008	Chlamydia trachomatis, serotype G (organism)	SNOMED CT
115328009	Chlamydia trachomatis, serotype H (organism)	SNOMED CT
115296004	Chlamydia trachomatis, serotype I (organism)	SNOMED CT
115297008	Chlamydia trachomatis, serotype J (organism)	SNOMED CT
442505006	Chlamydia trachomatis, serotype Ja (organism)	SNOMED CT
115298003	Chlamydia trachomatis, serotype K (organism)	SNOMED CT
115299006	Chlamydia trachomatis, serotype L (organism)	SNOMED CT
115300003	Chlamydia trachomatis, serotype L1 (organism)	SNOMED CT
115301004	Chlamydia trachomatis, serotype L2 (organism)	SNOMED CT
115318000	Chlamydia trachomatis, serotype L3 (organism)	SNOMED CT
121181000	Chlamydia trachomatis deoxyribonucleic acid (substance)	SNOMED CT
708219005	Deoxyribonucleic acid of Chlamydia trachomatis L2 (substance)	SNOMED CT
121106008	Chlamydia trachomatis ribosomal ribonucleic acid (substance)	SNOMED CT
121002007	Chlamydia trachomatis antigen (substance)	SNOMED CT
121015003	Chlamydia trachomatis F antigen (substance)	SNOMED CT
121016002	Chlamydia trachomatis G antigen (substance)	SNOMED CT
121017006	Chlamydia trachomatis K antigen (substance)	SNOMED CT

Note that other organism codes for different subspecies of chlamydia were explicitly excluded by request of the State SMEs on Expert Panel.

Table 5. Value Set CT-2L (see electronic version of this appendix for additional details)

Code	Display Name	Code System
14464-2	Chlamydia trachomatis [Presence] in Vaginal fluid by Organism specific culture	LOINC
14510-2	Chlamydia trachomatis Ag [Presence] in Vaginal fluid by Immunofluorescence	LOINC
14463-4	Chlamydia trachomatis [Presence] in Cervix by Organism specific culture	LOINC
14465-9	Chlamydia trachomatis [Presence] in Urethra by Organism specific culture	LOINC
14467-5	Chlamydia trachomatis [Presence] in Urine sediment by Organism specific culture	LOINC
45095-7	Chlamydia trachomatis [Presence] in Genital specimen by Organism specific culture	LOINC
6349-5	Chlamydia trachomatis [Presence] in Unspecified specimen by Organism specific culture	LOINC
14461-8	Chlamydia trachomatis [Presence] in Blood by Organism specific culture	LOINC
14462-6	Chlamydia trachomatis [Presence] in Cerebral spinal fluid by Organism specific culture	LOINC
45093-2	Chlamydia trachomatis [Presence] in Anal by Organism specific culture	LOINC
45094-0	Chlamydia trachomatis [Presence] in Conjunctival specimen by Organism specific culture	LOINC
45096-5	Chlamydia trachomatis [Presence] in Nasopharynx by Organism specific culture	LOINC
14509-4	Chlamydia trachomatis Ag [Presence] in Cervix by Immunofluorescence	LOINC
14511-0	Chlamydia trachomatis Ag [Presence] in Urethra by Immunofluorescence	LOINC
14513-6	Chlamydia trachomatis Ag [Presence] in Urine sediment by Immunofluorescence	LOINC
6352-9	Chlamydia trachomatis Ag [Presence] in Stool by Immunofluorescence	LOINC
6351-1	Chlamydia trachomatis Ag [Presence] in Conjunctival specimen by Immunofluorescence	LOINC
6355-2	Chlamydia trachomatis Ag [Presence] in Unspecified specimen by Immunofluorescence	LOINC
14470-9	Chlamydia trachomatis Ag [Presence] in Cervix by Immunoassay	LOINC
14471-7	Chlamydia trachomatis Ag [Presence] in Vaginal fluid by Immunoassay	LOINC
14472-5	Chlamydia trachomatis Ag [Presence] in Urethra by Immunoassay	LOINC
14474-1	Chlamydia trachomatis Ag [Presence] in Urine sediment by Immunoassay	LOINC
6354-5	Chlamydia trachomatis Ag [Presence] in Unspecified specimen by Immunoassay	LOINC
6350-3	Chlamydia trachomatis Ag [Presence] in Conjunctival specimen by Immunoassay	LOINC
45092-4	Chlamydia trachomatis Ag [Presence] in Nasopharynx by Immunoassay	LOINC

16600-9	Chlamydia trachomatis rRNA [Presence] in Genital specimen by DNA probe	LOINC
16601-7	Chlamydia trachomatis rRNA [Presence] in Urine by DNA probe	LOINC
21192-0	Chlamydia trachomatis rRNA [Presence] in Urethra by DNA probe	LOINC
23838-6	Chlamydia trachomatis rRNA [Presence] in Genital fluid by DNA probe	LOINC
45067-6	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Cervix by DNA probe	LOINC
45069-2	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Genital specimen by DNA probe	LOINC
45070-0	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Vaginal fluid by DNA probe	LOINC
45074-2	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Urine by DNA probe	LOINC
45075-9	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Urethra by DNA probe	LOINC
45076-7	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Unspecified specimen by DNA probe	LOINC
45078-3	Chlamydia trachomatis rRNA [Presence] in Cervix by DNA probe	LOINC
45080-9	Chlamydia trachomatis rRNA [Presence] in Vaginal fluid by DNA probe	LOINC
4993-2	Chlamydia trachomatis rRNA [Presence] in Unspecified specimen by DNA probe	LOINC
21188-8	Chlamydia trachomatis rRNA [Presence] in Conjunctival specimen by DNA probe	LOINC
45072-6	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Anal by DNA probe	LOINC
45085-8	Chlamydia trachomatis rRNA [Presence] in Nasopharynx by DNA probe	LOINC
45089-0	Chlamydia trachomatis rRNA [Presence] in Anal by DNA probe	LOINC
21187-0	Chlamydia trachomatis DNA [Presence] in Conjunctival specimen by Probe and target amplification method	LOINC
21189-6	Chlamydia trachomatis DNA [Presence] in Cervical mucus by Probe and target amplification method	LOINC
21190-4	Chlamydia trachomatis DNA [Presence] in Cervix by Probe and target amplification method	LOINC
21191-2	Chlamydia trachomatis DNA [Presence] in Urethra by Probe and target amplification method	LOINC
21613-5	Chlamydia trachomatis DNA [Presence] in Unspecified specimen by Probe and target amplification method	LOINC
36902-5	Chlamydia trachomatis+Neisseria gonorrhoeae DNA [Presence] in Unspecified specimen by Probe and target amplification method	LOINC
42931-6	Chlamydia trachomatis rRNA [Presence] in Urine by Probe and target amplification method	LOINC
43304-5	Chlamydia trachomatis rRNA [Presence] in Unspecified specimen by Probe and target amplification method	LOINC
44806-8	Chlamydia trachomatis+Neisseria gonorrhoeae DNA [Presence] in Urine by Probe and target amplification method	LOINC
44807-6	Chlamydia trachomatis+Neisseria gonorrhoeae DNA [Presence] in Genital specimen by Probe and target amplification method	LOINC

45068-4	Chlamydia trachomatis+Neisseria gonorrhoeae DNA [Presence] in Cervix by Probe and target amplification method	LOINC
45084-1	Chlamydia trachomatis DNA [Presence] in Vaginal fluid by Probe and target amplification method	LOINC
45086-6	Chlamydia trachomatis DNA [Presence] in Nasopharynx by Probe and target amplification method	LOINC
45090-8	Chlamydia trachomatis DNA [Presence] in Anal by Probe and target amplification method	LOINC
47211-8	Chlamydia trachomatis L2 DNA [Presence] in Unspecified specimen by Probe and target amplification method	LOINC
47362-9	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Unspecified specimen from donor by Probe and target amplification method	LOINC
50311-0	Chlamydia trachomatis DNA [Presence] in Unspecified specimen from donor by Probe and target amplification method	LOINC
50387-0	Chlamydia trachomatis rRNA [Presence] in Cervix by Probe and target amplification method	LOINC
50411-8	Chlamydia trachomatis rRNA [Presence] in Unspecified specimen from donor by Probe and target amplification method	LOINC
51578-3	Chlamydia trachomatis DNA [Presence] in Semen by Probe and target amplification method	LOINC
53925-4	Chlamydia trachomatis rRNA [Presence] in Urethra by Probe and target amplification method	LOINC
53926-2	Chlamydia trachomatis rRNA [Presence] in Vaginal fluid by Probe and target amplification method	LOINC
57287-5	Chlamydia trachomatis rRNA [Presence] in Anal by Probe and target amplification method	LOINC
57288-3	Chlamydia trachomatis rRNA [Presence] in Nasopharynx by Probe and target amplification method	LOINC
6356-0	Chlamydia trachomatis DNA [Presence] in Genital specimen by Probe and target amplification method	LOINC
43406-8	Chlamydia trachomatis+Neisseria gonorrhoeae DNA [Presence] in Unspecified specimen by Probe and signal amplification method	LOINC
45073-4	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Tissue by DNA probe	LOINC
80367-6	Chlamydia trachomatis [Presence] in Rectum by Organism specific culture	LOINC

Table 6. Value Set CT-2R (see electronic version of this appendix for additional details)

Code	Display Name	Code System
373066001	Yes (qualifier value)	SNOMED CT
260348001	Present ++ out of ++++ (qualifier value)	SNOMED CT
43261007	Abnormal presence of (qualifier value)	SNOMED CT
441517005	Present two plus out of three plus (qualifier value)	SNOMED CT
52101004	Present (qualifier value)	SNOMED CT
260350009	Present ++++ out of ++++ (qualifier value)	SNOMED CT
260351008	Just noticeable (qualifier value)	SNOMED CT
260411009	Presence findings (qualifier value)	SNOMED CT
441614007	Present one plus out of three plus (qualifier value)	SNOMED CT
10828004	Positive (qualifier value)	SNOMED CT
260347006	Present + out of ++++ (qualifier value)	SNOMED CT
260408008	Weakly positive (qualifier value)	SNOMED CT
260349009	Present +++ out of ++++ (qualifier value)	SNOMED CT
260405006	Trace (qualifier value)	SNOMED CT
46651001	Isolated (qualifier value)	SNOMED CT
441521003	Present three plus out of three plus (qualifier value)	SNOMED CT
260373001	Detected (qualifier value)	SNOMED CT
260976002	Presence of infection (qualifier value)	SNOMED CT

Table 7. Value Set GC-1D (see electronic version of this appendix for additional details)

Code	Display Name	Code System
15628003	Gonorrhea (disorder)	SNOMED CT
235861001	Abscess gonococcal (disorder)	SNOMED CT
240573005	Gonococcal Bartholin's gland abscess (disorder)	SNOMED CT
236687008	Gonococcal urethral abscess (disorder)	SNOMED CT
444834005	Abscess of urethral gland due to Neisseria gonorrhoeae (disorder)	SNOMED CT
240578001	Gonococcal Littré gland abscess (disorder)	SNOMED CT
17305005	Acute gonorrhea of genitourinary tract (disorder)	SNOMED CT
30168008	Acute gonococcal epididymo-orchitis (disorder)	SNOMED CT
111806005	Acute gonococcal prostatitis (disorder)	SNOMED CT
65049003	Acute gonococcal seminal vesiculitis (disorder)	SNOMED CT
54825009	Acute gonorrhea of lower genitourinary tract (disorder)	SNOMED CT
80604007	Acute gonococcal bartholinitis (disorder)	SNOMED CT
20943002	Acute gonococcal cervicitis (disorder)	SNOMED CT
24868007	Acute gonococcal cystitis (disorder)	SNOMED CT
29864006	Acute gonococcal urethritis (disorder	SNOMED CT
2390000	Acute gonococcal vulvovaginitis (disorder)	SNOMED CT
50970007	Acute gonorrhea of upper genitourinary tract (disorder)	SNOMED CT
65295003	Acute gonococcal endometritis (disorder)	SNOMED CT
45377007	Acute gonococcal salpingitis (disorder)	SNOMED CT
27681008	Chronic gonorrhea (disorder)	SNOMED CT
28572009	Chronic gonorrhea of genitourinary tract (disorder	SNOMED CT
35526001	Chronic gonococcal epididymo-orchitis (disorder)	SNOMED CT
60893000	Chronic gonococcal prostatitis (disorder)	SNOMED CT
23975003	Chronic gonococcal seminal vesiculitis (disorder)	SNOMED CT
186915005	Chronic gonorrhea lower genitourinary tract (disorder)	SNOMED CT
12373006	Chronic gonococcal bartholinitis (disorder)	SNOMED CT
76802005	Chronic gonococcal cervicitis (disorder)	SNOMED CT
88813005	Chronic gonococcal cystitis (disorder)	SNOMED CT
44412000	Chronic gonococcal urethritis (disorder)	SNOMED CT
11906007	Chronic gonococcal vulvovaginitis (disorder)	SNOMED CT
80388004	Chronic gonorrhea of upper genitourinary tract (disorder)	SNOMED CT
31999004	Chronic gonococcal endometritis (disorder)	SNOMED CT
53529004	Chronic gonococcal salpingitis (disorder)	SNOMED CT
186931002	Gonococcal anal infection (disorder)	SNOMED CT
46699001	Gonococcal bursitis (disorder)	SNOMED CT
240584003	Gonococcal cellulitis (disorder)	SNOMED CT
240576002	Gonococcal Cowperitis (disorder)	SNOMED CT
197848003	Gonococcal cystitis (disorder	SNOMED CT
236766009	Gonococcal epididymitis (disorder)	SNOMED CT

236772009	Gonococcal epididymo-orchitis (disorder)	SNOMED CT
240581006	Gonococcal female pelvic infection (disorder)	SNOMED CT
237083000	Gonococcal cervicitis (disorder)	SNOMED CT
237069002	Gonococcal endometritis (disorder)	SNOMED CT
240579009	Gonococcal paraurethral gland abscess (disorder)	SNOMED CT
237038001	Gonococcal salpingitis (disorder)	SNOMED CT
240574004	Gonococcal Skenitis (disorder)	SNOMED CT
237046000	Gonococcal tubo-ovarian abscess (disorder)	SNOMED CT
237095000	Gonococcal vulvovaginitis (disorder)	SNOMED CT
237096004	Neonatal gonococcal vulvovaginitis (disorder)	SNOMED CT
9241004	Gonococcal heart disease (disorder)	SNOMED CT
61048000	Gonococcal endocarditis (disorder)	SNOMED CT
235863003	Gonococcal hepatitis (disorder)	SNOMED CT
35876006	Gonococcal infection of eye (disorder)	SNOMED CT
231858009	Gonococcal conjunctivitis (disorder)	SNOMED CT
28438004	Gonococcal conjunctivitis neonatorum (disorder)	SNOMED CT
111807001	Gonococcal endophthalmia (disorder)	SNOMED CT
342381000119109	Gonococcal iritis (disorder)	SNOMED CT
9091006	Gonococcal iridocyclitis (disorder)	SNOMED CT
40149008	Gonococcal keratitis (disorder)	SNOMED CT
44743006	Gonococcal infection of joint (disorder)	SNOMED CT
406581000	Gonococcal infection of the central nervous system (disorder)	SNOMED CT
151004	Gonococcal meningitis (disorder)	SNOMED CT
60335002	Gonococcal keratosis (disorder)	SNOMED CT
240577006	Gonococcal Littritis (disorder)	SNOMED CT
238419002	Gonococcal lymphangitis of penis (disorder)	SNOMED CT
90428001	Gonococcal pericarditis (disorder)	SNOMED CT
194910001	Acute gonococcal pericarditis (disorder)	SNOMED CT
237042003	Gonococcal perihepatitis (disorder)	SNOMED CT
186939000	Gonococcal peritonitis (disorder)	SNOMED CT
307423008	Gonococcal pelvic peritonitis (disorder)	SNOMED CT
1087061000119106	Gonococcal pneumonia (disorder)	SNOMED CT
197967000	Gonococcal prostatitis (disorder)	SNOMED CT
301990003	Gonococcal seminal vesiculitis (disorder)	SNOMED CT
53664003	Gonococcal spondylitis (disorder)	SNOMED CT
266138002	Gonococcal synovitis or tenosynovitis (disorder)	SNOMED CT
240582004	Gonococcal synovitis (disorder)	SNOMED CT
240039005	Gonococcal tenosynovitis (disorder)	SNOMED CT
240575003	Gonococcal Tysonitis (disorder)	SNOMED CT
236682002	Gonococcal urethritis (disorder)	SNOMED CT
5085001	Gonococcemia (disorder)	SNOMED CT
272006008	Gonococcal arthritis dermatitis syndrome (disorder)	SNOMED CT
74372003	Gonorrhea of pharynx (disorder)	SNOMED CT
42746002	Gonorrhea of rectum (disorder)	SNOMED CT
186932009	Gonococcal rectal infection (disorder)	SNOMED CT

240572000	Gonorrhea with local complication (disorder)	SNOMED CT
199161008	Maternal gonorrhea during pregnancy, childbirth and the puerperium (disorder)	SNOMED CT
35255008	Gonorrhea in mother complicating pregnancy, childbirth AND/OR puerperium (disorder)	SNOMED CT
10754031000119105	Gonorrhea in mother complicating childbirth (disorder)	SNOMED CT
199163006	Maternal gonorrhea during pregnancy - baby delivered (disorder)	SNOMED CT
199165004	Maternal gonorrhea during pregnancy - baby not yet delivered (disorder)	SNOMED CT
199164000	Maternal gonorrhea in the puerperium - baby delivered during current episode of care (disorder)	SNOMED CT
199166003	Maternal gonorrhea in the puerperium - baby delivered during previous episode of care (disorder)	SNOMED CT
240571007	Neonatal gonococcal infection (disorder)	SNOMED CT
A54.00	Gonococcal infection of lower genitourinary tract, unspecified	ICD10CM
A54.01	Gonococcal cystitis and urethritis, unspecified	ICD10CM
A54.02	Gonococcal vulvovaginitis, unspecified	ICD10CM
A54.03	Gonococcal cervicitis, unspecified	ICD10CM
A54.09	Other gonococcal infection of lower genitourinary tract	ICD10CM
A54.1	Gonococcal infection of lower genitourinary tract with periurethral and accessory gland abscess	ICD10CM
A54.21	Gonococcal infection of kidney and ureter	ICD10CM
A54.22	Gonococcal prostatitis	ICD10CM
A54.23	Gonococcal infection of other male genital organs	ICD10CM
A54.24	Gonococcal female pelvic inflammatory disease	ICD10CM
A54.29	Other gonococcal genitourinary infections	ICD10CM
A54.30	Gonococcal infection of eye, unspecified	ICD10CM
A54.31	Gonococcal conjunctivitis	ICD10CM
A54.32	Gonococcal iridocyclitis	ICD10CM
A54.33	Gonococcal keratitis	ICD10CM
A54.39	Other gonococcal eye infection	ICD10CM
A54.40	Gonococcal infection of musculoskeletal system, unspecified	ICD10CM
A54.41	Gonococcal spondylopathy	ICD10CM
A54.42	Gonococcal arthritis	ICD10CM
A54.43	Gonococcal osteomyelitis	ICD10CM
A54.49	Gonococcal infection of other musculoskeletal tissue	ICD10CM
A54.5	Gonococcal pharyngitis	ICD10CM
A54.6	Gonococcal infection of anus and rectum	ICD10CM
A54.81	Gonococcal meningitis	ICD10CM
A54.82	Gonococcal brain abscess	ICD10CM
A54.83	Gonococcal heart infection	ICD10CM

A54.84	Gonococcal pneumonia	ICD10CM
A54.85	Gonococcal peritonitis	ICD10CM
A54.86	Gonococcal sepsis	ICD10CM
A54.89	Other gonococcal infections	ICD10CM
A54.9	Gonococcal infection, unspecified	ICD10CM
O98.211	Gonorrhea complicating pregnancy, first trimester	ICD10CM
O98.212	Gonorrhea complicating pregnancy, second trimester	ICD10CM
O98.213	Gonorrhea complicating pregnancy, third trimester	ICD10CM
O98.219	Gonorrhea complicating pregnancy, unspecified trimester	ICD10CM
O98.22	Gonorrhea complicating childbirth	ICD10CM
O98.23	Gonorrhea complicating the puerperium	ICD10CM

Table 8. Value Set GC-1R (see electronic version of this appendix for additional details)

Code	Display Name	Code System
68704007	Neisseria gonorrhoeae (organism)	SNOMED CT
414809001	Neisseria gonorrhoeae, beta lactamase negative (organism)	SNOMED CT
83410001	Gram-negative diplococcus (organism)	SNOMED CT
277503000	Cephalosporin-resistant Neisseria gonorrhoeae (organism)	SNOMED CT
409805000	Fluoroquinolone-resistant Neisseria gonorrhoeae (organism)	SNOMED CT
277501003	Penicillinase-producing Neisseria gonorrhoeae (organism)	SNOMED CT
277504006	Spectinomycin-resistant Neisseria gonorrhoeae (organism)	SNOMED CT
277502005	Tetracycline-resistant Neisseria gonorrhoeae (organism)	SNOMED CT
703483000	Neisseria gonorrhoeae deoxyribonucleic acid (substance)	SNOMED CT
121172006	Neisseria gonorrhoeae ribosomal ribonucleic acid (substance)	SNOMED CT
120977006	Neisseria gonorrhoeae antigen (substance)	SNOMED CT

Table 9. Value Set GC-2L (see electronic version of this appendix for additional details)

Code	Display Name	Code System
688-2	Neisseria gonorrhoeae [Presence] in Cervix by Organism specific culture	LOINC
691-6	Neisseria gonorrhoeae [Presence] in Genital specimen by Organism specific culture	LOINC
14127-5	Neisseria gonorrhoeae [Presence] in Anal by Organism specific culture	LOINC
30099-6	Neisseria gonorrhoeae [Presence] in Conjunctival specimen by Organism specific culture	LOINC
690-8	Neisseria gonorrhoeae [Presence] in Endometrium by Organism specific culture	LOINC
692-4	Neisseria gonorrhoeae [Presence] in Genital lochia by Organism specific culture	LOINC
693-2	Neisseria gonorrhoeae [Presence] in Vaginal fluid by Organism specific culture	LOINC
694-0	Neisseria gonorrhoeae [Presence] in Semen by Organism specific culture	LOINC
695-7	Neisseria gonorrhoeae [Presence] in Synovial fluid by Organism specific culture	LOINC
696-5	Neisseria gonorrhoeae [Presence] in Throat by Organism specific culture	LOINC
697-3	Neisseria gonorrhoeae [Presence] in Urethra by Organism specific culture	LOINC
698-1	Neisseria gonorrhoeae [Presence] in Unspecified specimen by Organism specific culture	LOINC

21414-8	Neisseria gonorrhoeae DNA [Presence] in Cervical mucus by Probe and target amplification method	LOINC
21415-5	Neisseria gonorrhoeae DNA [Presence] in Urethra by Probe and target amplification method	LOINC
21416-3	Neisseria gonorrhoeae DNA [Presence] in Urine by Probe and target amplification method	LOINC
24111-7	Neisseria gonorrhoeae DNA [Presence] in Unspecified specimen by Probe and target amplification method	LOINC
32198-4	Neisseria gonorrhoeae rRNA [Presence] in Cervix by DNA probe	LOINC
32199-2	Neisseria gonorrhoeae rRNA [Presence] in Urethra by DNA probe	LOINC
32705-6	Neisseria gonorrhoeae DNA [Presence] in Vaginal fluid by Probe and target amplification method	LOINC
33904-4	Neisseria gonorrhoeae rRNA [Presence] in Conjunctival specimen by DNA probe	LOINC
35735-0	Neisseria gonorrhoeae DNA [Presence] in Conjunctival specimen by Probe and target amplification method	LOINC
36902-5	Chlamydia trachomatis+Neisseria gonorrhoeae DNA [Presence] in Unspecified specimen by Probe and target amplification method	LOINC
43305-2	Neisseria gonorrhoeae rRNA [Presence] in Unspecified specimen by Probe and target amplification method	LOINC
43403-5	Neisseria gonorrhoeae DNA [Presence] in Unspecified specimen by Probe and signal amplification method	LOINC
43406-8	Chlamydia trachomatis+Neisseria gonorrhoeae DNA [Presence] in Unspecified specimen by Probe and signal amplification method	LOINC
44806-8	Chlamydia trachomatis+Neisseria gonorrhoeae DNA [Presence] in Urine by Probe and target amplification method	LOINC
44807-6	Chlamydia trachomatis+Neisseria gonorrhoeae DNA [Presence] in Genital specimen by Probe and target amplification method	LOINC
45067-6	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Cervix by DNA probe	LOINC
45068-4	Chlamydia trachomatis+Neisseria gonorrhoeae DNA [Presence] in Cervix by Probe and target amplification method	LOINC
45069-2	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Genital specimen by DNA probe	LOINC
45070-0	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Vaginal fluid by DNA probe	LOINC
45072-6	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Anal by DNA probe	LOINC
45073-4	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Tissue by DNA probe	LOINC
45074-2	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Urine by DNA probe	LOINC
45075-9	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Urethra by DNA probe	LOINC
45076-7	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Unspecified specimen by DNA probe	LOINC
47362-9	Chlamydia trachomatis+Neisseria gonorrhoeae rRNA [Presence] in Unspecified specimen from donor by Probe and target amplification method	LOINC
47387-6	Neisseria gonorrhoeae DNA [Presence] in Genital specimen by Probe and target amplification method	LOINC

5028-6	Neisseria gonorrhoeae rRNA [Presence] in Unspecified specimen by DNA probe	LOINC
50326-8	Neisseria gonorrhoeae DNA [Presence] in Unspecified specimen from donor by Probe and target amplification method	LOINC
50388-8	Neisseria gonorrhoeae rRNA [Presence] in Cervix by Probe and target amplification method	LOINC
50412-6	Neisseria gonorrhoeae rRNA [Presence] in Unspecified specimen from donor by Probe and target amplification method	LOINC

Table 10. Value Set GC-2R (see electronic version of this appendix for additional details)

Code	Display Name	Code System
373066001	Yes (qualifier value)	SNOMED CT
260348001	Present ++ out of ++++ (qualifier value)	SNOMED CT
43261007	Abnormal presence of (qualifier value)	SNOMED CT
441517005	Present two plus out of three plus (qualifier value)	SNOMED CT
52101004	Present (qualifier value)	SNOMED CT
260350009	Present ++++ out of ++++ (qualifier value)	SNOMED CT
260351008	Just noticeable (qualifier value)	SNOMED CT
260411009	Presence findings (qualifier value)	SNOMED CT
441614007	Present one plus out of three plus (qualifier value)	SNOMED CT
10828004	Positive (qualifier value)	SNOMED CT
260347006	Present + out of ++++ (qualifier value)	SNOMED CT
260408008	Weakly positive (qualifier value)	SNOMED CT
260349009	Present +++ out of ++++ (qualifier value)	SNOMED CT
260405006	Trace (qualifier value)	SNOMED CT
46651001	Isolated (qualifier value)	SNOMED CT
441521003	Present three plus out of three plus (qualifier value)	SNOMED CT
260373001	Detected (qualifier value)	SNOMED CT
260976002	Presence of infection (qualifier value)	SNOMED CT

Appendix B. Case Report Contents

Case report elements with comments from expert panel discussion.

Provenance/Provider/Facility Data Elements			
No.	**Element Name**	**Inclusion**	**Comments**
1	Date of the Report	Required if available	
2	Report Submission Date/Time	Required	
3	Sending Application	Required	
4	Provider ID	*Required if available	*The group agreed that at least one Provider identifier/ contact variable must be required, but did not care which one. How and whether this caveat could be implemented needs further discussion.
5	Provider Name	*See Provider ID	
6	Provider Phone	*See Provider ID	
7	Provider Fax	*See Provider ID	
8	Provider Email	*See Provider ID	
9	Provider Facility/Office Name	*See Provider ID	
10	Provider Address	*See Provider ID	
11	Provider County	Optional	
12	Facility ID Number	Required if available	
13	Facility Name	Required if available	
14	Facility type	Optional	
15	Facility Phone	Required if available	
16	Facility Address	Required if available	
17	Facility Fax	Optional	
18	Hospital Unit	Required if available	Most state/locals did not expect to need this for STI. Some might want it for Hospital Acquired Infections.

Patient Data Elements			
No.	**Element Name**	**Inclusion**	**Comments**
19	Patient ID Number	Required if available	Would need metadata to determine what type of ID is being provided (SSN, MRN, etc).
20	Patient Name	Required	
21	Parent/Guardian Name	Needs more discussion	There are legal implications here. A "required" designation could trump a doctor's legal responsibilities to protect patient privacy especially for emancipated minors. Could we redefine "if available" to mean the data is in the EHR and it is OK to include with respect to law, regulations, etc?
22	Parent/Guardian Phone	Patient: Required if available	The Parent/Guardian variables should be separated as two discrete elements. No decision was made about the Guardian variables because of the emancipated minor issues mentioned above. Need to consider other communication modes, devices.
23	Parent/Guardian Email	Patient: Required if available	Parent/Guardian: needs more discussion
24	Street Address	Required if available	
25	Birth Date	Required if available	
26	Patient Sex	Required if available	HL7 makes a distinction between "administrative" and "biological" sex, the latter requiring a blood test. The sex noted in the EHR is likely administrative as it is probably recorded based on observation by a clerical person. Harmonize with other HL7 practices for recording sex.
27	Patient Class	Required if available	
28	Race	Required if available	Need to determine which vocabulary, Centers for Disease Control and Prevention (CDC) (Public Health Information Network Vocabulary Access and Distribution System); White House Office of Management and Budget (OMB)/HL7; Office of the National Coordinator (ONC) Common Clinical Data Set (CCDS). Should be designed to roll up to the OMB standard because "unknown" is not in the OMB standard, but is in CDC's designations.
29	Ethnicity	Required if available	See comment for race.
30	Preferred language	Required if available	See ONC CCDS, but also consider specifying spoken versus written language.
31	Occupation	Required if available	
32	Pregnant	Required if available	
33	Travel history	Optional	

34	Insurance type	Required if available	Changed from original element of *insurance*. Clarify Insurance type or status versus insurance carrier (first is priority).
35	Immunization history	Optional	Changed from original element *immunization status*. Using "immunization" corresponds to wording in the CCDS, which is prudent.

Clinical elements

No.	Element name	Inclusion	Comments
36	Visit /Time	Required if available	The group agreed that this is an ambiguous variable. More relevant dates might be "specimen collection date" or "laboratory test date."
37	Admission Date/Time	Required if available	
38	Date of Onset	Required if available	Data quality concerns. Patients often do not have symptoms of chlamydia or gonorrhea or cannot recall when symptoms started, or the discovery of the infection is a result of a routine screening.
39	Symptoms (list)	Required if available	The group was unsure how the data are recorded in the EHR, whether it is structured data with a value set and if public health would only receive symptoms associated with the event of interest. Also discussed were asymptomatic patients. Providers would prefer a dichotomous asymptomatic indicator (e.g., a checkbox).
40	Laboratory order code	Optional	Comorbidity information is desirable, especially if human immunodeficiency virus-infected. Might be more interested in laboratories performing tests rather than those ordered.
41	Placer order number	Required if available	
42	Diagnosis	Required if available	Changed from "diagnoses." The group decided that if the patient had comorbid conditions, they would want one electronic case report per reportable condition. Concern was expressed about legal authority if public health receives all diagnoses or all related diagnoses (e.g., pelvic inflammatory disease).
43	Date of diagnosis	Required if available	
44	Medication provided	Required if available	Changed from "medication administered (list)." Want medication, dosage, and date. CCDS data element name is "medications" and references RXNorm (National Library of Medicine, https://www.nlm.nih.gov/research/umls/rxnorm/) as the standard.
45	Death date	Required if available	
46	Date discharged	Optional	
47	Laboratory results	Required if available	Added to original list; while the expert panel elected to make this a required element, the designation of required if available is consistent with the case detection logic and a scenario where the

			medical record has a diagnosis code but no record of laboratory results.
48	Trigger code that initiated electronic case report	Required	Added to original list. Given the high volume of chlamydia and gonorrhea case reports, having logic that identifies true cases and minimizes any subsequent requests to clinicians for additional case data for these conditions is highly desirable.
49	Laboratory test(s) performed	Required if available	Added to original list; while the expert panel elected to make this a required element, the designation of required if available is consistent with the case detection logic and a scenario where the medical record has a diagnosis code but no record of laboratory tests performed.

Additional data elements considered:

Proposed data element	**Comments**
HIV status	Should be "positive" or "unknown." Could this be collected as supplemental data after eICR, through Structured Data Capture? How would this be defined in terms of data available in the electronic health record? "Date of recent HIV test and result"?
Partner management	Include expedited partner therapy. This is problematic in terms of where or if this is documented in the electronic health record. Including it might convey standards of care to the provider. Could be provided as supplemental Structured Data Capture.
Preexposure prophylaxis (PrEP)	Could this be a proxy for HIV status?
Date laboratory results received	
Emancipated minor	
Specimen collection date	More specific than visit date
Asymptomatic checkbox, yes/no	Could this be captured as supplemental data with Structured Data Capture?

Appendix C. Executive Summary of AllianceChicago STI eCR Pilot Implementation, 2017

Ninad Mishra[1], Natalie Viator[2*], Roxane Padilla[3], Jeremy Carr[3], Jessica Park[3], Michael DeMayo[2], Elizabeth McKnight[3], Andrew Hamilton[3], Jim Jellison[2]

Background: The increasingly robust use of electronic health record (EHR) systems presents new opportunities for public health surveillance, including automating case reporting from clinical care to public health, known as electronic case reporting (eCR). In 2016, the Centers for Disease Control and Prevention Division of Sexually Transmitted Disease Prevention and the Public Health Informatics Institute convened a group of epidemiology and surveillance subject matter experts to develop technical guidance for eCR of chlamydia and gonorrhea. We collaborated with clinical and informatics partners to conduct the first standards-based pilot of the resulting technical guidance in 2017.

Methods: We partnered with AllianceChicago, a health center controlled network, to implement our sexually transmitted infection (STI) case detection logic comprised of diagnosis and laboratory observation codes into existing health information technologies. AllianceChicago's EHR vendor installed upgrades to automate the creation of the electronic initial case report (eICR). We evaluated this process against 12,420 ambulatory encounters among adolescents and adults ages 15 and older seen at eight Chicago-area Federally Qualified Health Centers (FQHCs) between May 1 - June 30, 2017. We tabulated the frequency of matches between the case detection logic and patient data and compared the eCR identified cases to paper case reports to determine if eCR increased the number of reported cases. The accuracy of these additional cases was assessed by chart review. Additionally, we examined a subset of the eICRs to determine data completeness at the time of creation.

Results: For chlamydia and gonorrhea, the case detection logic identified 94 and 29 reportable cases, respectively, including 56 additional chlamydia cases and 16 additional gonorrhea cases not reported on paper. Subsequent chart review confirmed that all of the additional cases were identified appropriately. The case detection logic demonstrated sensitivity and specificity values above 99% for both conditions. 100% of eICRs examined for completeness (n=60) showed the medication list was populated. As this list includes all medications, not only those relevant to the condition(s) being reported, STI medication was often not yet prescribed at the time of eICR creation due to the need for patient follow-up.

Conclusion: eCR successfully and accurately identified more reportable cases of chlamydia and gonorrhea when compared to paper reporting alone. Due to the high volume of STI cases seen in FQHCs, eCR may prove especially valuable in this type of clinical setting to help ease provider reporting burden. Opportunities exist to further align the eICR standard to ambulatory workflow.

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