Introduction to HL7 and the V2 Standard Video Transcript:

Welcome to an Introduction to HL7 and the V2 Standard.
In this training, we'll cover interoperability, the background and history of HL7,
and the main HL7 standards that are used in public health.
By the end of this video, you will be able to: define interoperability,
distinguish between syntactic and semantic interoperability, examine the history of HL7,
and describe the commonly used HL7 standards and their role in public health.
Let's begin by defining interoperability and examining the two main types of interoperability.
There are many different definitions of interoperability depending on where you look.
Wikipedia defines interoperability as "a property of a product or system, whose interfaces are
completely understood, to work with other products or systems, present or future,
without any restricted access or implementation". Other sources define interoperability as "the
ability of two parties, either human or machine, to exchange data or information".
One definition that seems to capture the overall goal of interoperability is this:
Interoperability is the ability of two or more systems or components
to exchange information and use the information that has been exchanged.
And that second part is really the most important part. It's not enough to just send data from
one place to another. It must be usable. Simply put, interoperability allows us to reliably send
data from one place to another without ambiguity around how it should be processed or understood.
In general, there are two types of interoperability: syntactic
and semantic. Syntactic interoperability is the organization of information into a
specific format or structure. Think of it like the arrangement of words or phrases to create
well-formed sentences in a language. Once we transport information from one system to another,
we need to know the syntax or structure of the information to understand what was sent.
Some common data formats to exchange public health data are CSV, XML, and HL7. Semantic
interoperability is more about the meaning of the content. If syntactic interoperability
provides the rules for creating well-formed sentences with all the necessary parts,
then semantic interoperability ensures that we can derive the same meaning from the selected words.
For example, if a doctor writes the word "cold" in a patient's chart,
does that mean the patient was feeling cold or that they had a diagnosis of a cold?
Semantic interoperability ensures that different systems can interpret concepts in the same way.
Let's look at an example of how these concepts apply to public health.
Probably the simplest example of syntactic interoperability in public health would be
an Excel spreadsheet. Data are organized into discrete columns and we should have uniformity
in what is sent in each column from one record or row to the next. In this example, the top row of
the spreadsheet lists the data elements included in the data set in the order that they should be
sent. Syntactic interoperability assumes that the sender and receiver have agreed upon this
format to organize the data that will be shared. Recall from our definition of interoperability,
we said that the information exchanged between systems must be usable.
Using the same Excel spreadsheet example, semantic interoperability is the way in which
systems interpret and use the content sent in each cell. The sending and receiving systems
may not store data in the same way, but semantic interoperability ensures that both systems will
be able to understand that a sex value of "M" means male and a race value of "W" means white.
A common way of achieving this is by the sender sharing a data dictionary with the receiver.
A data dictionary is a collection of data element names, definitions, and related attributes,
and is commonly used to communicate both the structure and content of the data being captured.
Interoperability may seem like a simple enough concept when looking at an Excel spreadsheet,
but how do we achieve interoperability in real-world data systems? By conforming to
standards! There are national and international standards for both messaging and terminology,
which refers to the specialized words and meanings that we use in public health.
Since you're taking this training you've probably at least heard of HL7 standards, which are the
most widely used set of international standards for messaging or exchanging health data.
Some common terminology standards used in public health include the Logical Observation Identifiers
Names and Codes, or LOINC, and the Systemized Nomenclature of Medicine for Clinical Terms,
or SNOMED CT. These systems provide standard codes for lab tests and results,
as well as organism, specimen types, and many other data elements of interest.
ICD-10 is the tenth revision to the International Classification of Diseases,
and includes codes for diseases, signs and symptoms, and other abnormal clinical findings.
Using standards for messaging and terminology is essentially an extension of the data dictionary
we just discussed, and ensures that any systems that exchange data play by the same set of rules.
We just mentioned that HL7 is a widely used set of standards for exchanging health data. Before we
dive into the HL7 standards themselves, let's talk about some of the background and history of HL7.
HL7, or Health Level 7, is a set of messaging standards that
promotes interoperability by allowing clinical applications to exchange data.
Why is it called Health Level 7? HL7 standards cover topics related to clinical
and public health data, including laboratory reporting, vaccinations, cancer registries,
newborn screening, and many others. The "7" in HL7 refers to the seventh layer in
the International Standards Organization's Open Systems Interconnection model. Level 7, or the
application level, is where applications and end users produce the data that is to be exchanged.
HL7 standards are written, reviewed, and published by HL7 International, a not-for-profit,

ANSI-accredited standards developing organization that was founded in 1987. HL7 International is a member-based organization with representatives from over 50 countries.

HL7 standards help to facilitate data exchange throughout the healthcare ecosystem by providing the content and structure needed for those interfaces, essentially ensuring that systems can achieve both semantic and syntactic interoperability. Some of the many organizations and entities who are part of that ecosystem are shown in the diagram on the screen, and can include insurance and healthcare providers, government agencies, employers, and more. For more information about HL7 International ,please visit info.hl7.org/orientation-station.

Now that we've learned about some history and background of HL7, let's wrap up by discussing different versions of HL7 standards and how they are used in public health.

Arguably the most widely implemented standard for healthcare in the world is the HL7 version 2 suite. The first HL7 V2 standard was published in 1987, with updated versions being released as recently as 2019. Typically, when people think of HL7, they think of the "pipe and caret" structure of the V2 message, like the sample message you see on the screen. While this structure is not meant to be human readable, informaticians must be able to understand and interpret this structure in order to troubleshoot V2 messages. But don't worry! Our future trainings will take a deep dive into the structure and content of V2 messages. HL7 V2 standards are built to be backward compatible, meaning that a later standard would not replace anything in a previous standard, but rather add to the previous standard. Today, around 95% of healthcare organizations in the United States use some HL7 V2 standard for health data exchange. In public health, HL7 V2 messages are commonly used for electronic lab reporting from labs to public health agencies, queries to and responses from immunization registries, and for lab order and results interfaces between labs and submitters, such as hospitals and healthcare providers. The most common V2 versions currently used in public health are V2.3.1 and V2.5.1.

Another common standard for exchanging health data is HL7 V3.

V3 provides a framework for two different formats:

messaging, like the V2 messaging just covered, and CDA, or clinical document architecture. Unlike HL7 V2 messaging, V3-based messaging has not achieved widespread adoption within healthcare. However, V3-based CDA, as seen here, is HL7's most widely adopted V3 standard. CDA is an XML-based document-centric standard. It can be used to share clinical information for a variety of use cases, for example, discharge summaries, medical histories, or pathology reports, and emphasizes flexibility, wholeness, and human readability. The CDA standard utilizes a library of modular templates that can be constrained and reused. Examples of constraints used in public health are the CCD, or Continuity of Care Document, and the C-CDA, or consolidated CDA.

The most recently developed HL7 standard is FHIR, or Fast Healthcare Interoperability Resources. FHIR emphasizes ease of implementation and is organized into individual components called "resources". Resources are a set of commonly defined ways to represent discrete pieces of data in either JSON or XML and can be used as building blocks to represent healthcare information. FHIR focuses on exchange of healthcare data between systems, and supports "push" or "pull" of information using REST APIs.

Let's wrap up by reviewing some of the things we just learned. After each question, you may pause the video to answer on your own before we reveal the correct answer.

What are the two types of interoperability that were discussed in this video? Syntactic, didactic, semantic, classic, or archaic

The correct answers are syntactic and semantic.

As a reminder, syntactic interoperability focuses more on the structure of the data, while semantic interoperability focuses on the interpretation of the content.

Which HL7 standard is the most implemented standard for healthcare and public health? Version 2, Version 3, FHIR, or none of the above

The correct answer is version 2. HL7 version 2 is used across healthcare and public health for exchanging data.

What are some examples of applications of HL7 V2 in public health? This is not an exhaustive list, but some examples that we learned about today are electronic laboratory reporting, queries to and responses from immunization registries, and laboratory orders and results.

Which of the following is not a standard used to support interoperability in healthcare? HL7 Version 2, SNOMED-CT, CDC, ICD-10, or LOINC

The correct answer is CDC, which is the Centers for Disease Control and Prevention, and not a standard used for healthcare interoperability.

Thank you for viewing our Introduction to HL7 video! In this training, we covered the definition of interoperability, and the differences between syntactic and semantic interoperability. We discussed the background and history of HL7 International, and finally, we described commonly used HL7 standards and their role in public health. Stay tuned for future training opportunities where we will take a deep dive into the HL7 V2 message and other informatics topics. If you have any questions about this or future trainings, please don't hesitate to visit our website at www.jmichael-consulting.com or email us at support@jmichael-consulting.com. Our website also includes some companion materials that you are welcome to print and share, as well as a brief satisfaction survey. Responses to the survey will help us improve our current training and develop future trainings that are targeted to your needs. Thank you!