ASTRONAUT

ELECTRONIC HEALTH RECORD FOR THE NEXT FRONTIER

Export Format Documentation

Table of Contents

Purpose

The purpose of this Export Documentation is to outline the structure and syntax specifications for the seamless exportation of Electronic Health Information (EHI) from our Electronic Health Record (EHR) system, Astronaut EHR. The outlined specifications herein aim to streamline the export process, enabling compatibility and consistency while preserving data integrity and confidentiality throughout the exportation of EHI from Astronaut EHR.

Although we use the C-CDA (Consolidated Clinical Document Architecture) format for a majority of our EHI data, we also have some information that will be bundled within its own proprietary format and will be available alongside/within the C-CDA XML export file. This ensures adherence to industry protocols, allowing the authorized user to access the relevant information present in a patient's chart (as designated in the record set defined in 45 CFR 164.502, excluding psychotherapy notes).

Accessing Data

Our data is stored in a FHIR (Fast Healthcare Interoperability Resources) server where patient information is consistently uploaded and updated. To access the server's contents, one must be an authorized user and granted permission by Astronaut EHR's IT staff. Our IT staff will walk an end-user through the process of how extracting data from the server works and will give the necessary permissions to do so.

Authorized users will have the option to do a Single Patient Export and/or a Bulk Patient Export depending on their needs through the capabilities of our FHIR server.

C-CDA Format Guide

The Consolidated Clinical Document Architecture (C-CDA) utilizes XML (eXtensible Markup Language) to represent structured clinical information for healthcare data exchange. Understanding the XML format is essential for end-users to interpret and utilize the data effectively.

C-CDA documents are structured hierarchically using XML tags and elements. The document follows a specific format, employing various sections and templates to organize clinical information.

1. **Header Section:** Contains metadata such as patient demographics, author information, document type, and timestamps.

```
<ClinicalDocument>
    <!-- Header Information -->
    <recordTarget>
        <!-- Patient Demographics -->
    </recordTarget>
    <author>
        <!-- Author Information -->
    </author>
    <!-- Other Metadata -->
</ClinicalDocument>
```

2. **Body Sections:** Comprise clinical content organized into discrete sections (e.g., allergies, medications, procedures) using specific XML tags.

```
<component>
    <!-- Allergies Section -->
    <section>
        <!-- Allergy Information -->
    </section>
</component>
<component>
    <!-- Medications Section -->
    <section>
        <!-- Medication Information -->
```

```
    </section>
</component>
<!-- Other Sections -->
```

3. **Clinical Data Elements:** Each section contains data elements represented by XML tags, structured according to predefined templates.

```
<entry>
    <!-- Allergy Entry -->
    <observation>
        <!-- Allergy Details -->
    </observation>
</entry>
<entry>
    <!-- Medication Entry -->
    <substanceAdministration>
        <!-- Medication Details -->
    </substanceAdministration>
</entry>
<!-- Other Data Elements →
```

C-CDA Sections

There are a variety of sections within our C-CDA that each detail different aspects of a patient's chart. The specifics of each sections is present in HL7's official C-CDA documentation found in the link below:

https://build.fhir.org/ig/HL7/cda-ccda-2.2/StructureDefinition-2.16.840.1.113883.10.20.22.1.2.html

Below is a summary of each section and what each entails (paraphrased/quoted from FL7's website). Through the format guidelines outlined in "C-CDA Format Guidelines" and the summary below, a user should be able to decipher the contents of the C-CDA XML appropriately. If a user needs to know certain specifics about the syntactic language then we recommend going to the website above.

Allergies

This section lists and describes any medication allergies, adverse reactions, idiosyncratic reactions, anaphylaxis/anaphylactoid reactions to food items, and metabolic variations or adverse reactions/allergies to other substances (such as latex, iodine, tape adhesives). Lists currently active and any relevant historical allergies and adverse reactions.

Immunizations

The Immunizations Section defines a patient's current immunization status and pertinent immunization history. The primary use case for the Immunization Section is to enable communication of a patient's immunization status. The section should include current immunization status, and may contain the entire immunization history that is relevant to the period of time being summarized.

Medications

The Medications Section contains a patient's current medications. This section describes a patient's prescriptions and information about intended drug monitoring. This section will indicate if the subject is not known to be on any medications; otherwise, the entries will summarize the subject's medications.

Plan of Treatment

This section contains data that define pending orders, interventions, encounters, services, and procedures for the patient. It is limited to prospective, unfulfilled, or incomplete orders and requests only. These are indicated by the @moodCode of the entries within this section (see HL7 website for more details). All active, incomplete, or pending orders, appointments, referrals, procedures, services, or any other pending event of clinical significance to the current care of the patient should be listed. Clinical reminders are placed here to provide prompts for disease prevention and management, patient safety, and healthcare quality improvements, including widely accepted performance measures. The plan may also indicate that patient education will be provided.

Goals

This section represents patient Goals. A goal is a defined outcome or condition to be achieved in the process of patient care. Goals include patient-defined overarching goals and health concern-specific or intervention-specific goals to achieve desired outcomes.

Problem(s)

This section lists and describes all relevant clinical problems at the time the document is generated. All pertinent current and historical problems are listed. The Problem(s) section includes diagnoses a patient has in their chart.

Results (Lab)

The Results Section contains observations of results generated by laboratories, imaging procedures, and other procedures. These coded result observations are contained within a Results Organizer in the Results Section. The scope includes observations such as hematology, chemistry, serology, virology, toxicology, microbiology, plain x-ray, ultrasound, CT, MRI, angiography, echocardiography, nuclear medicine, pathology, and procedure observations. The section often includes notable results such as abnormal values or relevant trends, and could contain all results for the period of time being documented.

Laboratory results are typically generated by laboratories providing analytic services in areas such as chemistry, hematology, serology, histology, cytology, anatomic pathology, microbiology, and/or virology. These observations are based on analysis of specimens obtained from the patient and submitted to the laboratory. Imaging results are typically generated by a clinician reviewing the output of an imaging procedure, such as where a cardiologist reports the left ventricular ejection fraction based on the review of a cardiac echocardiogram.

Procedure results are typically generated by a clinician to provide more granular information about component observations made during a procedure, such as where a gastroenterologist reports the size of a polyp observed during a colonoscopy.

Vitals

The Vital Signs Section contains relevant vital signs for the context and use case of the document type, such as blood pressure, heart rate, respiratory rate, height, weight, body

mass index, head circumference, pulse oximetry, temperature, and body surface area. Vital signs are represented in the same way as other results, but are aggregated into their own section to follow clinical conventions.

Procedures

This section describes all interventional, surgical, diagnostic, or therapeutic procedures or treatments pertinent to the patient historically at the time the document is generated. The common notion of "procedure" is broader than that specified by the HL7 Version 3 Reference Information Model (RIM), therefore this section contains procedure templates represented with three RIM classes: Act. Observation, and Procedure. Procedure act is for procedures that alter the physical condition of a patient (e.g., splenectomy). Observation act is for procedures that result in new information about a patient but do not cause physical alteration (e.g., EEG). Act is for all other types of procedures (e.g., dressing change).

Social History

This section contains social history data that influence a patient's physical, psychological or emotional health (e.g., smoking status, pregnancy). Demographic data, such as marital status, race, ethnicity, and religious affiliation, is captured in the header.

Encounters

This section lists and describes any healthcare encounters pertinent to the patients current health status or historical health history. An encounter is an interaction, regardless of the setting, between a patient and a practitioner who is vested with primary responsibility for diagnosing, evaluating, or treating the patient's condition. It may include visits, appointments, or non-face-to-face interactions. It is also a contact between a patient and a practitioner who has primary responsibility (exercising independent judgment) for assessing and treating the patient.

Functional Status

The Functional Status Section contains observations and assessments of a patient's physical abilities. A patient’s functional status may include information regarding the patient’s ability to perform Activities of Daily Living (ADLs) in areas such as Mobility (e.g., ambulation), Self-Care (e.g., bathing, dressing, feeding, grooming) or Instrumental

Activities of Daily Living (IADLs) (e.g., shopping, using a telephone, balancing a check book). Problems that impact function (e.g., dyspnea, dysphagia) can be contained in the section.

Medical Equipment

This section defines a patient's implanted and external health and medical devices and equipment. This section lists any pertinent durable medical equipment (DME) used to help maintain the patient's health status.

Assessments

This section represents the clinician's conclusions and working assumptions that will guide treatment of the patient. The assessment may be a list of specific disease entities or a narrative block.

Advanced Demographics and Remaining EHI

Although the most important patient information is contained within the C-CDA, the advanced demographics and remaining EHI is bundled in a proprietary CSV (Comma-Separated Values) format. Due to the naming convention of our CSV, deciphering the data is fairly straightforward.

The demographic will be named and its value will be in the next slot. After the value is the next demographic category. A fictional example below will help illustrate the process:

Place of Birth, USA, Mother's Maiden Name, Annabelle, Spouse's Employer Name, Astronaut LLC, Date of Retirement, 10/31/2023...(etc)

The way the remaining EHI data is bundled is optimized to be easy to understand while also excluding categories that have no data assigned to them. The user can rest assured that all available data will be present upon exportation.

Acknowledgements

We acknowledge the utilization of HL7 (Health Level Seven) standards as a fundamental framework for facilitating the exchange of healthcare information. We appreciate the information on their webpage that helps both users and developers understand the purpose and implementation of the different standards expected as a certified entity.

Additionally, we recognize our adherence to SLI Compliance standards and appreciate their communicative approach and essential feedback. Our representatives have been instrumental in our success in adhering with the standards, and we appreciate their prompt and easy-to-understand responses when we have essential questions regarding our certification activities.

Thank you.