

# Epic CDS Hooks Support

Last updated: July 28, 2021

---

Notice: This document is the Intellectual property of Epic, and must not be distributed outside the recipient organization without permission from Epic.

## Table of Contents

- CDS Hooks specification overview ..... 3
  - Accessing the Specification.....3
  - Navigating the Specification .....3
- Epic support for CDS Hooks ..... 4
  - Epic Aug 2021 release.....5
  - Epic May 2021 release.....5
  - Epic Feb 2021 release .....5
  - Epic Nov 2020 release.....6
  - Epic Aug 2020 release.....6
  - Epic May 2020 release.....6
  - Epic Feb 2020 release .....7
  - Epic Nov 2019 release.....7
  - Epic Aug 2019 release.....7
  - Epic May 2019 release.....7
  - Epic Aug 2018 release.....7
- CDS Hooks copyright and license ..... 8

## ■ CDS Hooks specification overview

CDS Hooks is an HL7 standard for in-workflow decision support integrations between Electronic Health Record systems and external Decision Support Services. The following section describes how to access and navigate the specification. A summary understanding of the specification is necessary for the discussion of state of Epic support for CDS Hooks in subsequent sections of this document.

### Accessing the Specification

Being formally an HL7 specification, the CDS Hooks spec is intended to reside at

- <https://cds-hooks.hl7.org/>

However, because the specification is still under active development, a more up to date version of the specification can be found at

- <https://cds-hooks.org/>

Development on the specification, and issue tracking, happens in this GitHub repository

- <https://github.com/cds-hooks/docs/>

Community help on CDS Hooks can be obtained via the CDS Hooks channel at

- <https://chat.fhir.org/#narrow/stream/179159-cds-hooks>

### Navigating the Specification

Broadly speaking, the CDS Hooks specification can be broken down into two components – the specification itself, and various hook definitions.

#### *The specification*

This describes the data interchange format, and the various interactions between the Electronic Health Record, and the Decision Support Service. Noteworthy parts of the specification are:

- **Service Discovery:** this describes a mechanism for the Decision Support Service provider to advertise metadata about various services it provides to the Electronic Health Record system in a machine-readable manner.
- **CDS Request:** this describes the format in which information is presented on the wire when the Electronic Health Record makes a request for Decision Support against the Decision Support Service.
  - **Prefetch:** this describes the mechanism by which specified FHIR resources, which are necessary for the Decision Support Service to evaluate, are packaged in the CDS Request.
  - **FHIR Authorization:** this describes how information about the Electronic Health Record's FHIR server, including an OAuth2 access token, can be furnished to the Decision Support Service in the CDS Request, in order to allow the service to query the FHIR server for additional information it may need.
- **Authentication:** when the Electronic Health Record system makes a CDS Hooks request against the Decision Support Service, it authenticates itself to the service using a flavor of JSON Web Tokens.
- **CDS Response / Card:** once the Decision Support Service evaluates the CDS Hooks request, various pieces of Decision Support Advice it has for the Electronic Health Record are returned as an array of Cards in the CDS Response.

- **Displayable Information:** textual information to be presented to the clinician as decision support advice may be included in the Card. This displayable information can be formatted using [GitHub Flavored Markdown](#).
- **Suggestions:** actionable decision support recommendations that the Electronic Health Record should present to the clinician may be included in the Card in a machine readable format, that uses FHIR resources to exchange clinical concepts.
- **Links:** external links to reference material, or to SMART on FHIR Applications that can provide additional decision support, may also be included in the Card.

## Hook definitions

Hooks codify various clinical workflows where decision support may be provided by the Decision Support Service, and identifies the workflow specific contextual information necessary to be exchanged between the Electronic Health Record and the Decision Support Service.

## ■ Epic support for CDS Hooks

Beginning with Epic’s August 2018 release, Epic has added support for various parts of the CDS Hooks specification. The overall state of CDS Hooks support within Epic is as follows:

- Epic supports making a CDS Hooks request from the Electronic Health Record system to a Decision Support Service configured within the system, and displaying the decision support returned by the service in the same framework that displays decision support notifications natively built into Epic – called BestPractice Advisories.
- Resources sent in the **Prefetch** of the CDS Hooks request are configured by the health system and can include the FHIR Resources that are [already supported by Epic](#).
- Epic supports including **FHIR Authorization** in the request, and allowing the Decision Support Service to query back into Epic using the Electronic Health Record’s FHIR server.
- Epic supports authenticating the request to the Decision Support Service using a **JSON Web Token (JWT)**.
  - Epic supports the **RS384** signing algorithm for the JWT, and the “jku” (**JKU**) claim pointing to Epic’s public keys endpoint. This allows an external decision support service to verify the token.
  - Epic also supports the **RS256** signing algorithm, but not with the use of the JKU claim.
  - New CDS Hooks integrations are expected to support RS384 JWT authentication with a JKU claim. This is the intended authorization mechanism as stated in the CDS Hooks specification.
- Epic supports presenting CDS Hooks based decision support notifications from a variety of workflow triggered events. Examples include viewing a patient’s chart or entering a new diagnosis, problem, or allergy for a patient.
- Epic’s implementation of CDS Hooks currently always uses the patient-view hook. Epic supports formatting **displayable** information in the response Card(s) using GitHub Flavored Markdown as per the CDS Hooks specification.
- Epic supports **Links** in the response Card. Note that, reference links do not require any additional configuration, but SMART App links need to be added to the allowlist in Epic configuration.
- Epic supports dynamic override reasons in the response Card.
- Epic supports the following types of **suggestions** in the response Card:
  - **Suggestions** containing **CREATE actions** for **Condition** resources.

- Medication single-order follow-up **suggestions** sent with **CREATE** actions using **MedicationRequest** resources.
- Procedure single-order follow-up **suggestions** with **CREATE** actions using **ProcedureRequest** resources for STU3 FHIR and **ServiceRequest** resources for R4 FHIR.
- SmartSet, OrderSet, Pathway, and Express Lane suggestions containing **CREATE** actions using **ProcedureRequest** resources for STU3 FHIR and **ServiceRequest** resources for R4 FHIR.
- Removing unsigned medication single-orders with **DELETE** actions using **MedicationRequest** resources.
- Removing unsigned procedure single-orders with **DELETE** actions using **ServiceRequest** resources for R4 FHIR and **ProcedureRequest** resources for STU3 FHIR .
- Epic can accept **billable ICD-10** codes and **SNOMED** codes for problem and visit diagnosis suggestions.
- Epic can accept CMS and HHS **HCC** codes for visit diagnosis suggestions.
- Epic **DOES NOT** support automated service **discovery**.
- CDS Hooks should be used only to trigger real-time, end user-facing decision support. Epic recommends against using this feature for other purposes; if you need only a notification, we instead recommend using an event based [interface](#).
- Due to a risk of poor, clinical, user experience, CDS Service developers should strive for average response times around 300 milliseconds.

Version specific breakdown of what is available in each Epic release since the introduction of CDS Hooks support is detailed below:

## Epic Aug 2021 release

The following additions were made to Epic’s CDS Hooks implementation in the August 2021 release:

- Removing medication single-orders is now supported with **DELETE** actions using **MedicationRequest** resources. Similarly, removing procedure single-orders is now supported with **DELETE** actions using **ServiceRequest** resources for R4 FHIR and **ProcedureRequest** resources for STU3 FHIR.

## Epic May 2021 release

The following additions were made to Epic’s CDS Hooks implementation in the May 2021 release:

- Epic now supports the “**order-select**” hook in workflows when a clinician is entering orders for a patient. This hook is invoked during decision support evaluation, and it allows for collection of all unsigned order details, as well as the list of FHIR IDs for the newly selected orders, to be sent in the CDS Hooks call as **MedicationRequest**, **ServiceRequest**, or **ProcedureRequest** resources.

## Epic Feb 2021 release

The following additions were made to Epic’s CDS Hooks implementation in the February 2021 release:

- Epic now supports the “**order-sign**” hook in workflows when a clinician is ready to sign orders for a patient. This hook is invoked during decision support evaluation, and it allows for collection of all unsigned order details to be sent in the CDS Hooks call as **MedicationRequest**, **ServiceRequest**, or **ProcedureRequest** resources.

## Epic Nov 2020 release

The following additions were made to Epic's CDS Hooks implementation in the November 2020 release:

- Medication single-order follow-up **suggestions** can now be returned with CREATE actions using **MedicationRequest** resources. Similarly, procedure single-order follow-up suggestions can be returned with CREATE actions using **ProcedureRequest** resources for STU3 FHIR and **ServiceRequest** resources for R4 FHIR. The following limitations apply:
  - For medication follow-ups, Epic supports standard code systems like NDC, as well as custom code systems based on customer preference lists.
  - For procedure follow-ups, Epic supports only custom code systems based on customer preference lists.
- Support was added for returning SmartSet, OrderSet, Pathway, and Express Lane **suggestions** using CREATE actions containing **ServiceRequest** resources for R4 FHIR or **ProcedureRequest** resources for STU3 FHIR.
- Epic systems can now send **Feedback** to endpoints about whether a **suggestion** was accepted or rejected by a clinician.
- Support was added for override reasons, which can be used to gather additional feedback on why a **card** was rejected by a clinician.
- The CMS HCC code system is now supported for visit diagnosis **suggestions** returned using CREATE actions containing a **Condition** FHIR resource. This feature is supported for both R4 and STU3 FHIR versions.
- You can now specify whether a suggested follow-up action is selected by default using the `card.suggestion.isRecommended` property.
- You can now use the `Card.source.topic` property to specify the Card ID of a BestPractice Advisory.
- The system now validates the value of `Card.selectionBehavior` and suppresses the card throwing an error if the value is set to anything other than "any".

## Epic Aug 2020 release

The following additions were made to Epic's CDS Hooks implementation in the August 2020 release:

- The JWT header can contain a "jku" (JKU) claim pointing to Epic's public keys endpoint. This allows an external decision support service to verify the token.
- Epic now supports the **RS384** signing algorithm for the JWT
- Epic only supports the JKU claim with the RS384 signing algorithm.
- Before the August 2020 version of Epic, Epic supports the **RS256** algorithm where key distribution must be done via other agreed upon mechanisms between the Electronic Health Record and the Decision Support Service.

## Epic May 2020 release

The following additions were made to Epic's CDS Hooks implementation in the May 2020 release:

- Support FHIR version specified on the client record instead of always using STU3.
  - Currently supported versions are DSTU2, STU3 and R4.
  - However, **prefetch** is not supported using DSTU2.

## Epic Feb 2020 release

The following additions were made to Epic's CDS Hooks implementation in the Feb 2020 release:

- User interface improvements to better support multiple cards.
- Support for the `Card.indicator` field was added allowing the CDS Service to influence the priority and coloring of the decision support notification.
- Support was added for `Suggestions` containing `CREATE actions` using `Condition` resources. The following limitations apply:
  - A `suggestion` may only contain a single `action` within it. `Suggestions` containing multiple `actions` are not supported. However, a card may contain multiple `suggestions`, as long as each `suggestion` contains exactly one `action`.
  - The Epic implementation currently ignores the value of `Card.selectionBehavior`, and always treats it as `'any'`.

## Epic Nov 2019 release

The following changes were made to Epic's CDS Hooks implementation in the Nov 2019 release:

- The `Context.userid` property in the CDS Hooks request provides a FHIR ID to identify the clinician who will be presented with the decision support notification. Prior to Epic May 2020 release, this ID was always a `Practitioner` resource ID. This has been changed to preferentially use a `PractitionerRole` resource ID where possible, and only send a `Practitioner` resource ID, if a `PractitionerRole` resource could not be found for the user (*usually because the user is not a clinical user*).
  - This change is being made in response to a proposed change to the CDS Hooks standard documented in GitHub pull request: <https://github.com/cds-hooks/docs/pull/515> (and balloted with CDS Hooks 1.1).

## Epic Aug 2019 release

Epic added support for GitHub Flavored Markdown in the Epic August 2019 release.

## Epic May 2019 release


Epic added support for `prefetch` in the Epic May 2019 release. However, only FHIR version STU3 is supported.

## Epic Aug 2018 release

Epic added initial support for CDS hooks in the Epic August 2018 release.

- This version does not support `prefetch`.
- This version does not support GitHub Flavored Markdown.
- Multiple cards in the CDS Hooks response are consolidated into one clinician-facing decision support notification within Epic.

## ■ CDS Hooks copyright and license

CDS Hooks® and ® are trademarks of HL7 and Boston Children's Hospital, copyrighted and licensed under a Creative Commons Attribution 4.0 International License (<https://creativecommons.org/licenses/by/4.0> as specified at <https://cds-hooks.hl7.org>). Content from the CDS Hooks repository (<https://github.com/cds-hooks/docs>) is licensed per Apache License 2.0 (<https://github.com/cds-hooks/docs/blob/master/LICENSE>).

---