Open@Epic CONFERENCE

CDS Hooks

Clinical Decision Support at Point of Care

Presenters



Howard Strasberg

FDB



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Epic

Learning Objectives

1. Introduce CDS Hooks & Epic’s support
2. Learn how to be successful using CDS Hooks

Agenda

01 **Intro to CDS Hooks**

Purpose, operations, Epic's support

02 **FDB & CDS Hooks**

Wins & obstacles overcome

03 **Looking Forward**

R3, CRD, Connectathon

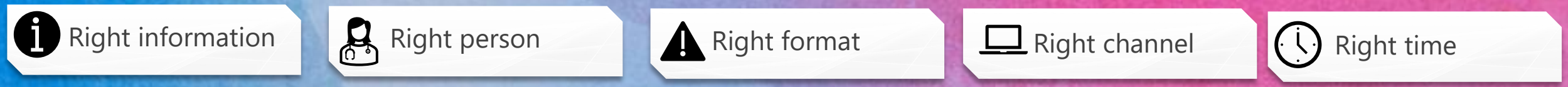
04 **Industry Best Practices**

From HL7

What is Clinical Decision Support (CDS)?

process for enhancing health-related decisions and actions with pertinent, organized clinical knowledge and patient information to improve healthcare and healthcare delivery

Osheroff, J.A., Teich, J.A., D. Levick et al. Improving Outcomes with Clinical Decision Support: An Implementer's Guide. 2nd Edition. Chicago, IL: HIMSS, 2012: p. 15.



Osheroff J.A., Teich J.M., Middleton B., Steen E.B., Wright A., Detmer D.E. A roadmap for national action on clinical decision support. J. Am. Med. Inform. Assoc. 2007;14:141–145. doi: 10.1197/jamia.M2334.

CDS in Epic

Asynchronous Advisories
Navigator Advisories
Storyboard Advisories
OurPractice Engine
SmartSets & Order Sets
Express Lanes
Pop-up Advisories
Care Paths
Health Maintenance
Diagnosis-Related Meds and Labs
Preference Lists
Active Guidelines
Clinical Pathways
Inline Order Entry CDS
Push Notifications
Order & Result Routing
Workflow Reminders
Nested Panels
Clinical Calculators
Procedure Pass
Duplicate Order Checks
Order Validation
Scoring Systems
Dashboards & Reports
Documentation Templates
Documentation Validation
Required Documentation
Alternatives
Medication Warnings
Background Monitoring

Patient-facing
Clinical References & InfoButton
Care Journeys
Care Companion
Patient Reminders

Passive ⟷ Active

CDS HOOKS

… realtime, clinician-facing, remote decision support

- simple HTTP APIs using FHIR
- standardized clinical workflow via hooks

EHR Med Order

℞ Toprol XL 50 mg daily

1

EHR triggers a **CDS hook** and invokes a remote service

CDS Services

2

CDS Service executes its own rules, leveraging FHIR data as needed

EHR FHIR Server

3

Returns **CDS cards** (incl. **overrideReasons**)

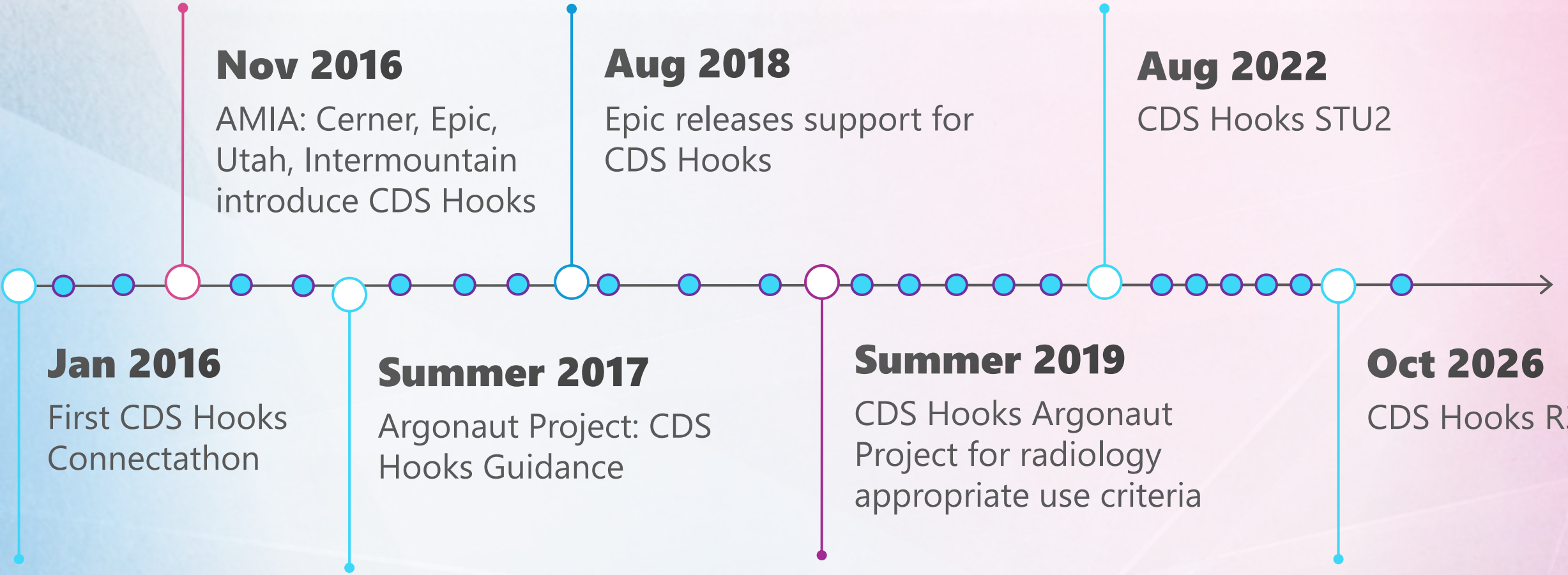
suggestion card

Try HCTZ as first-line due to patient age (71)

Switch to HCTZ

4 Returns **Feedback**

CDS Hooks Timeline



Epic Support for CDS Hooks

Hooks

- patient-view
- order-select
- order-sign
- appointment-book

Cards

- Info Card
- Suggestions
  - systemAction
- App Link Card
  - autolaunchable

Suggestions

- Create encounter diagnosis
- Create problem list item
- Create medication order
- Delete medication order
- Create procedure order
- Update procedure order
- Delete procedure order

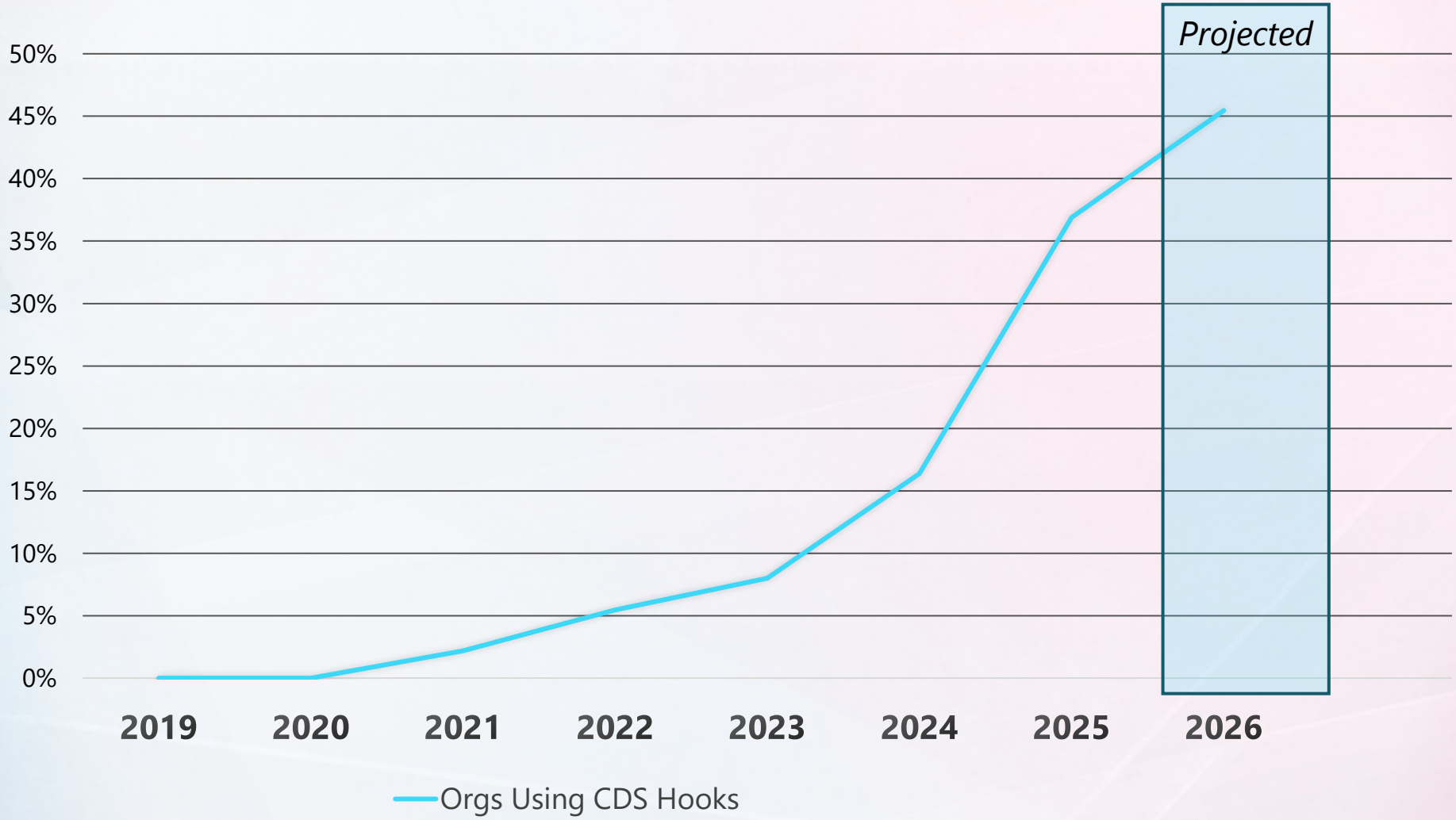
Feedback

- Accepted suggestions
- Card UUID
- Override reasons
- User comment

Prefetch

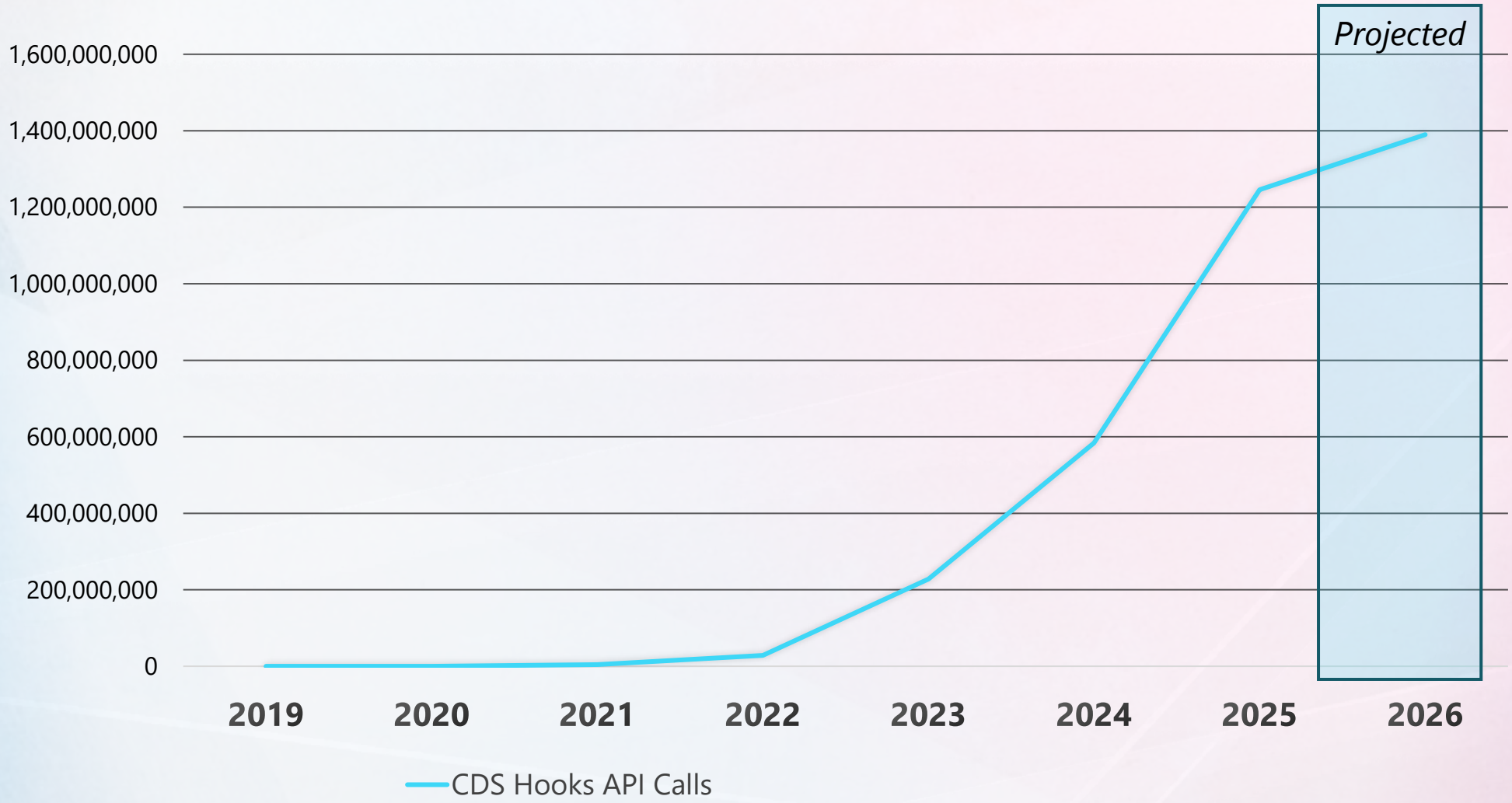
- Supports any REST resource
- Relative dates
- Contained Medication
- Tokens
  - userPractitionerId
  - userPractitionerRoleId

% of Epic Orgs using CDS Hooks



As of June, 2026

CDS Hooks API Calls across all Epic Orgs



As of June, 2026

CDS Hooks Tutorial

Introduction

Clinical Decision Support (CDS) Hooks is an HL7 standard for in-workflow decision support integrations between electronic health record systems and remote, real-time, provider-facing decision support services. This tutorial describes Epic's support for this standard.

Epic's support for CDS Hooks is built on a workflow engine and CDS rule engine. Organizations using Epic can configure native CDS alerts by defining the workflow point at which they are triggered, known as the hook, and the criteria to evaluate when they are triggered. These criteria determine whether a CDS alert appears to the clinician and, if it does, what information it contains. Epic's implementation of CDS Hooks enables native criteria to call a remote CDS Hooks API when evaluating whether to show a CDS alert. In Epic, the native CDS alert is referred to as an OurPractice Advisory (OPA).

Guidance to CDS Developers

CDS Hooks is a powerful integration technology because it directly interacts with clinician workflows. Treat the ability to interact with clinicians carefully. As a CDS developer, you now share responsibility for a positive user experience. Your CDS service must be fast, must avoid alert fatigue, and should improve over time.

Hooks

As of Epic version May 2021, Epic primarily supports three standard hooks built on pre-existing CDS alert workflow triggers. Note that Epic supports many more native workflow triggers than CDS Hooks has standardly defined.

patient-view

The patient-view hook is triggered in two scenarios:

1. When a patient's chart is opened. The native Epic trigger is named Open Patient Chart. Epic recommends against firing a CDS Hooks request every time a patient chart is opened because it results in a poor user experience. Instead, work with the health system to use this trigger in combination with more specific, native business criteria in

n organizat
rkflow step
ve Epic trig

more orders (which triggers the order-
ndle of both the newly selected orders
aftOrders bundle are newly selected. Dec

support using this hook should focus on the newly selected orders.

The draftOrders bundle can contain the MedicationRequest, ServiceRequest, or ProcedureRequest resource.

Epic's CDS Hooks Tutorial

Epic CDS Hooks features, considerations and examples.

https://fhir.epic.com/Documentation?docId=cds-hooks

Implementing a CDS Hooks App

CDS Hooks apps use web services associated with OurPractice Advisories (OPAs – formerly BPAs) for real-time decision support workflows. Certain Epic workflows can trigger an outbound message to your CDS service which can send back a card that displays as an OPA alert to the Epic user. Depending on your app's functionality, these cards can display text recommendations, enable a specific action like placing an order, or serve as a notification to launch a SMART on FHIR app.

Designing your Workflow

CDS Hooks apps provide decision support at key points during a provider's workflow in interacting with a patient chart in Epic. As such, it's important to have discussions at the beginning of implementation about how your decision support fits into providers' daily work. Here are some key questions to ask of your users:

When should you see our Decision Support?

Your users' desired timing and location of your decision support will inform the IT team's Epic configuration. In the May 2021 version and above, Epic supports the patient-view, order-select, and order-sign hooks. (Refer to the Hooks section of the CDS Hooks Tutorial.) Under the hood, these are broken down into several distinct workflow points when an OPA could be triggered and where it could display.

Discuss with your end users whether your decision support needs to show at a specific point in the workflow, or after a user takes a specific action. This will determine whether your alert will be interruptive or passive. Interruptive alerts show as a popup to the user, and they **must** act on it to continue their workflow. Passive alerts are displayed alongside their current workflow, and there may be color coding, a score, or an icon to indicate if a user may want to review, but they are not required to act on the CDS to continue their workflow. Here are some common examples of when CDS Hooks cards can show.

Alerts should show:	Interruptive / Passive?	Notes
Once when opening a patient's chart	Interruptive	This is not recommended in most scenarios. Consider the other options below first.
As its own section in-line with the user's	Passive	Customer IT would configure this to show as a "General Navigator section" or "General BPA section" dependi
		always visi
After entering a lab result	Interruptive	

Implementing CDS Hooks

at Epic customers

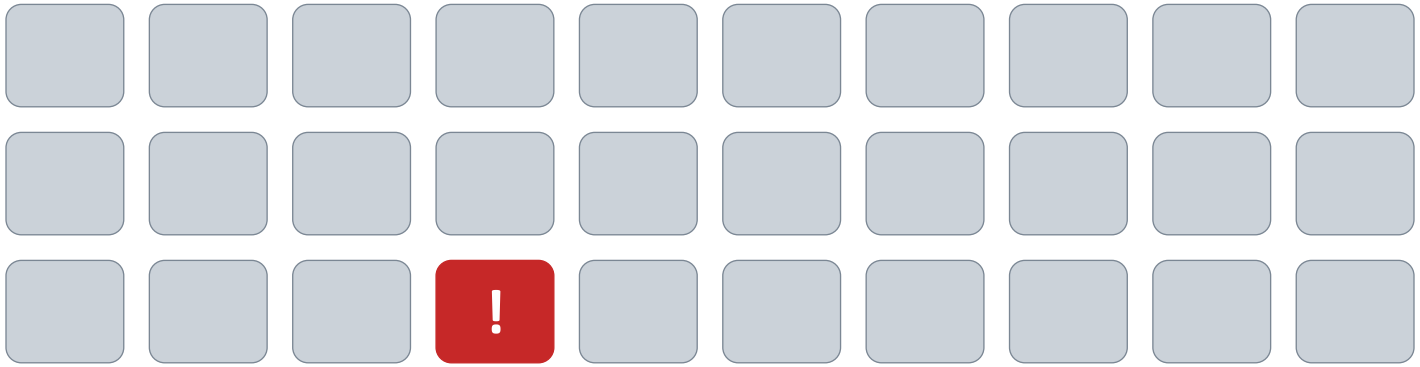
https://fhir.epic.com/Documentation?docId=implementing&section=implementingcdshooks

FDB Experience

Clinical use cases
Workflow triggers
Usage analysis
Implementation tradeoffs
Future CDS Hooks development

Alert Fatigue Overview

One clinician's alert stream



Low relevance for this patient (noise)

High relevance for this patient (signal)

Drug-interaction alerts:

90% overridden

10% accepted

Too many alerts
Low patient relevance

→

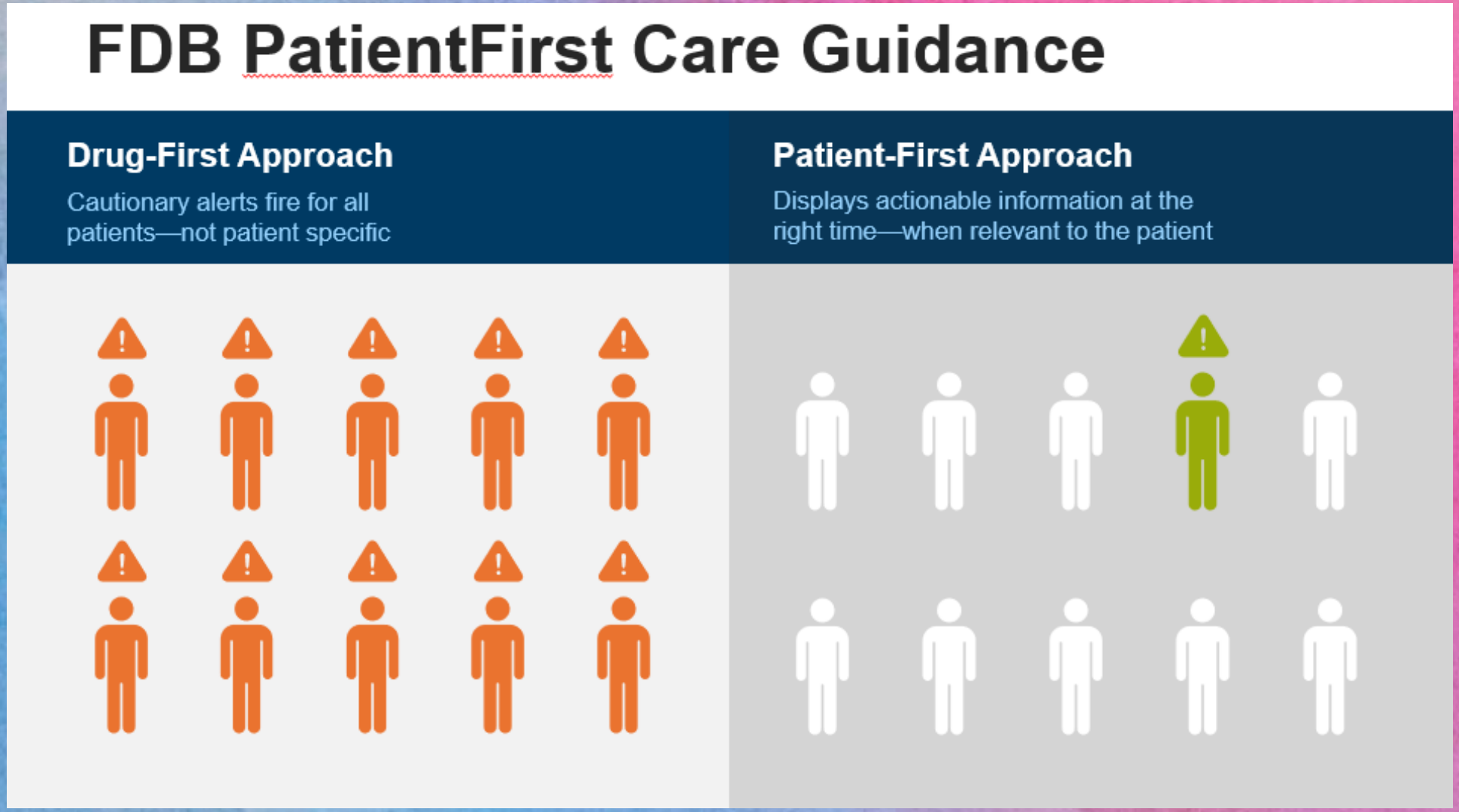
Habituation
Override by reflex

→

Signal is missed
Patient harm possible

Source: Felisberto M, et al. Override rate of drug-drug interaction alerts in clinical decision support systems: a systematic review and meta-analysis. Res Rev Pharm Pharm Sci. 2023;12(5):1-10. Pooled override rate 90% (95% CI 85–95%).

FDB Targeted Medication Warnings



FDB Targeted Medication Warnings

Targeted Medication Warnings with CDS Analytics

fdb First Databank

Content Catalog

- Hyperkalemia
- QT Prolongation
- Outpatient Opioid Risk
- Therapeutic Drug Monitoring
- Epidurals and Anticoagulants
- Nephrotoxicity
- Inpatient Opioid Risk
- Neutropenia
- Thrombocytopenia
- MRI & Transdermal Patch
- Opioid Naïve & Long-Acting Prescribed
- Antibiotic Timing in Transitions of Care
- Cognitive Decline Risk
- Fall Risk
- Hyperglycemia
- Pharmacogenomics
- Digoxin Toxicity
- Hypoglycemia

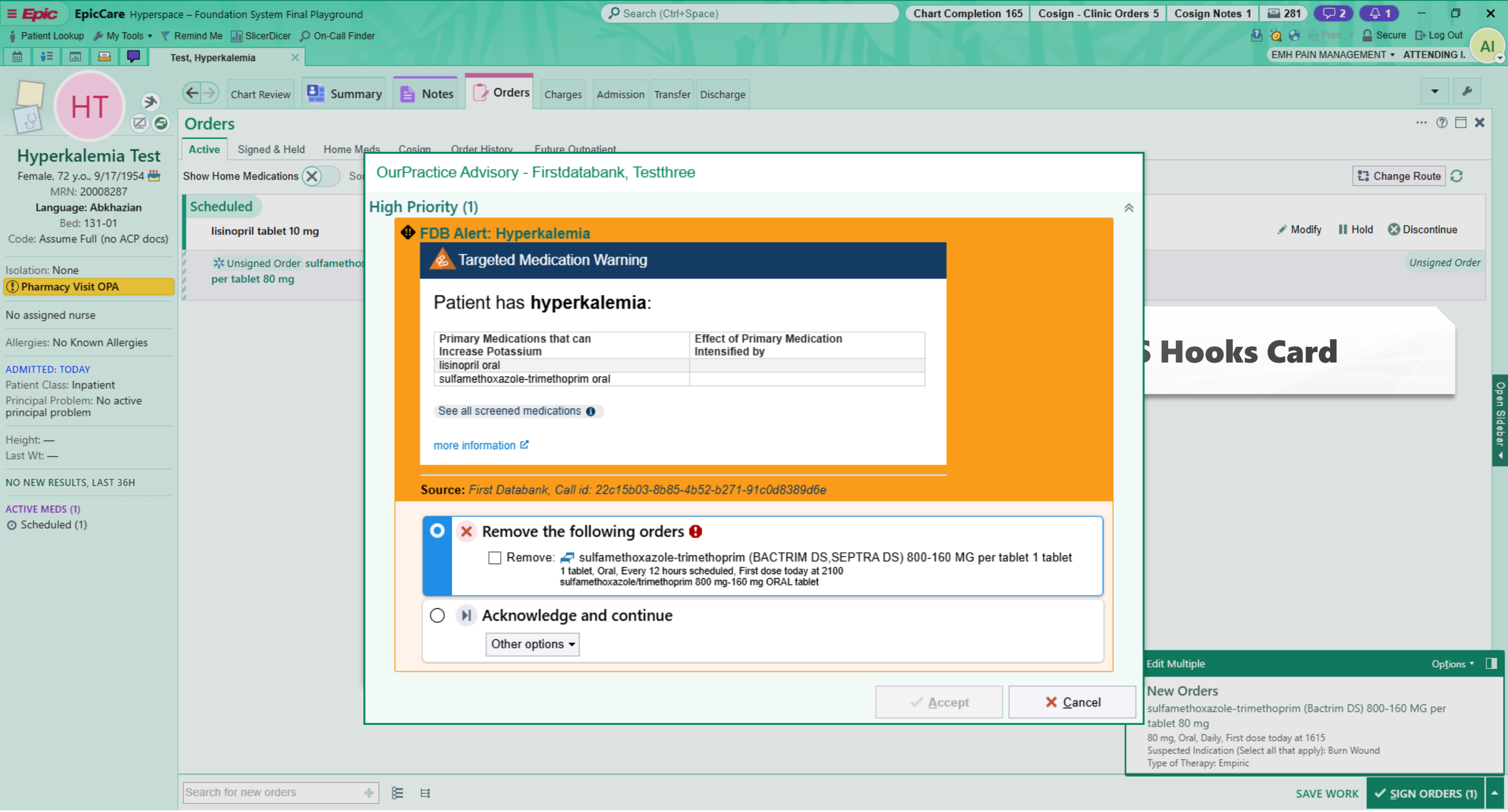
FDB Scenario 1

72 year old female taking lisinopril 20 mg daily for hypertension.

Recent lab results show a potassium of 5.6 mEq/L.

New prescription for trimethoprim-sulfamethoxazole for acute UTI.





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FDB Scenario 2



78 year old female admitted for heart failure.

Current medications:

- Furosemide for heart failure
- Sotalol for atrial fibrillation
- Risperidone for behavioral symptoms of dementia.

During admission, she develops oropharyngeal candidiasis and depression.

New orders are entered for:

- Fluconazole
- Citalopram.

FDB Experience

Common Epic workflow triggers

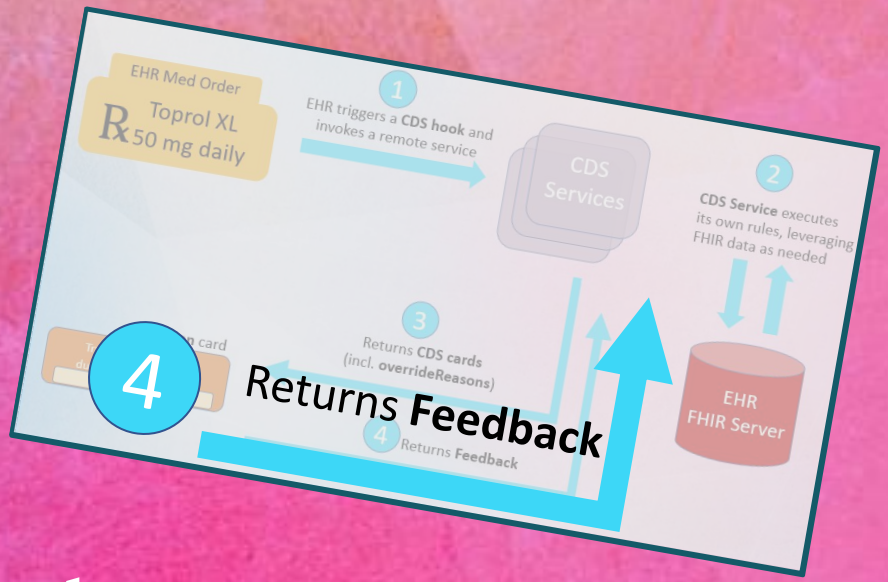
Workflow trigger	Hook type
Enter order	order-select
Order sign	order-sign
Open orders sidebar	patient-view
Open order verification	patient-view
Verify new orders	patient-view

Key Point

Epic may offer multiple workflow triggers for the same CDS Hooks hook type

FDB Experience

Usage analysis



- **Alert shown in 32% of requests**
- **Alert acceptance rate 29%***

* Includes both accepted outcome and overridden outcome with “Will Review” as the override reason.

OPA + CDS Hooks Tradeoff

Where you put the local criteria determines the tradeoff between call volume and implementation effort.

Minimal local criteria

- Send everything to the cloud
- Simpler to set up
- Higher call volume

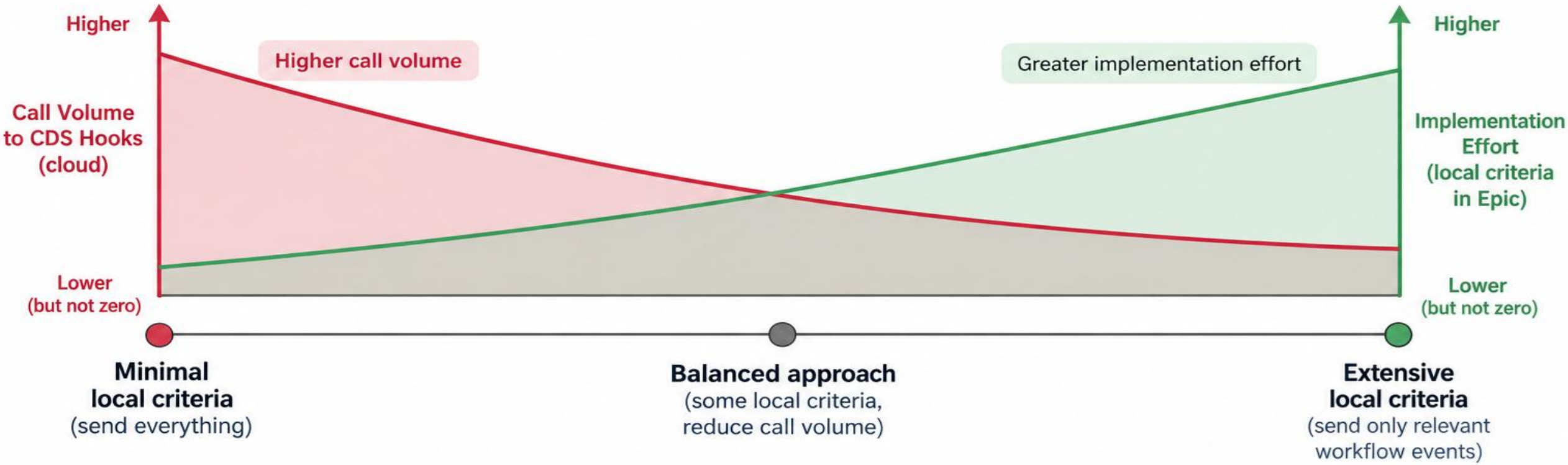
A continuum — you can choose the right balance for your needs

Fewer local criteria
(send more to cloud)

More local criteria
(send less to cloud)

Extensive local criteria

- Send only relevant workflow events to the cloud
- More complex implementation
- Lower call volume



More local criteria = Lower call volume = Higher implementation effort

It's a continuum — neither call volume nor implementation effort goes to zero. Choose the balance that fits your organization's goals, resources, and use case.

FDB - Next Steps for CDS Hooks

- **New hook for medication-verify (maturity level 1)**
  - https://build.fhir.org/ig/HL7/cds-hooks-library/en/medication-verify.html
- **For discussion: Discontinue existing orders**

What's Next for CDS Hooks

Da Vinci CRD

CDS Hooks is being used by health systems and payers for prior authorization as part of CMS requirements for the Coverage Requirements Discovery.

R3 Publication

- Published Oct, 2026
- Partially Normative
- Introduces advanced Prefetch

Jan Connectathon

January, 2027: Join the virtual HL7 FHIR CDS Hooks Connectathon track.

CDS Hooks
Overview
Specification (external link)
Hooks (external link)
Quick Start
Cheat Sheet
Best Practices
Security Considerations
Examples
Community
Logo Use

Implementation Best Practices

The Clinical Decision Support Hooks standard aims to provide real-time, actionable support to clinicians with minimal intrusion. Including existing security and safety recommendations, this living document outlines best practices to support secure, minimally intrusive decision support. These best practices are not a substitute for the security and legal review conducted by a health system before integrating 3rd party software.

Table of contents
CDS Service Developers:
Implementation Considerations for CDS Service Developers
CDS Clients (such as EHRs)
Health Systems and Other CDS Hook Users:

CDS Service Developers:

- CDS Services must be *fast*.

CDS Hooks Best Practices

HL7 CDS Workgroup defined best practices

https://cds-hooks.org/best-practices/

MI Module

- Use supported search parameters to **limit** the data returned. Test and analyze a variety of

Takeaways

An Additional Tool

For real-time, clinician-facing, remote decision support.

Growing Adoption

Increasing use, including prior auth with FHIR driving familiarity.

Best Practices

Follow Epic's, HL7's published best practices for more successful integrations.

FHIR Connectathon

Next CDS Hooks FHIR Connectathon is virtual, January 12-14, 2027.

Q&A

OEC32

Wrap-Up: Putting It All Together

Form closes today at 5:00 PM

Wrap Up

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