

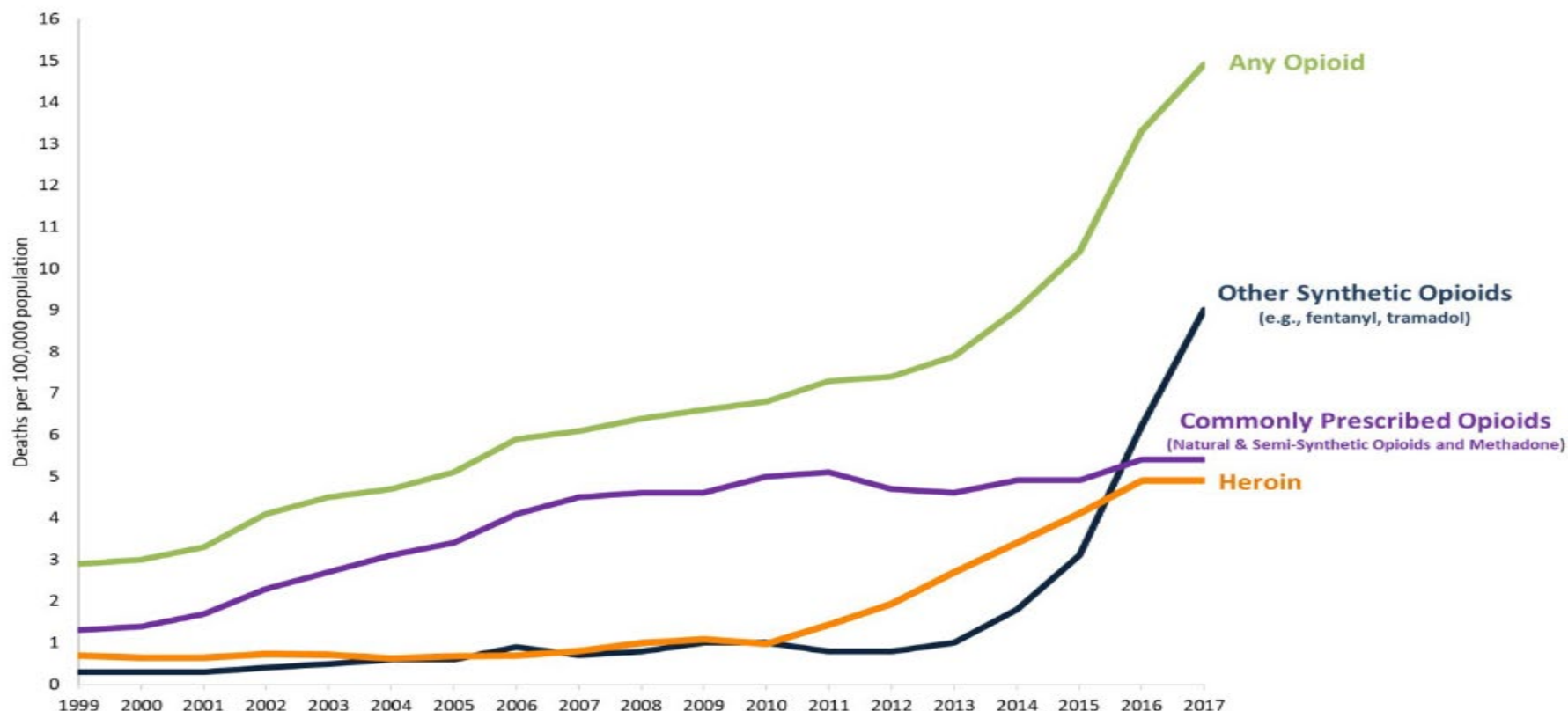
Improving Opioid Prescribing through Electronic Clinical Decision Support Tools: Implementation of CDC's Guideline for Prescribing Opioids for Chronic Pain

Wesley Sargent, EdD, MA
Health Scientist

Division of Overdose Prevention
National Center for Injury Prevention and Control

December 19, 2019

Overdose Death Rates Involving Opioids, by Type, United States, 2000-2017

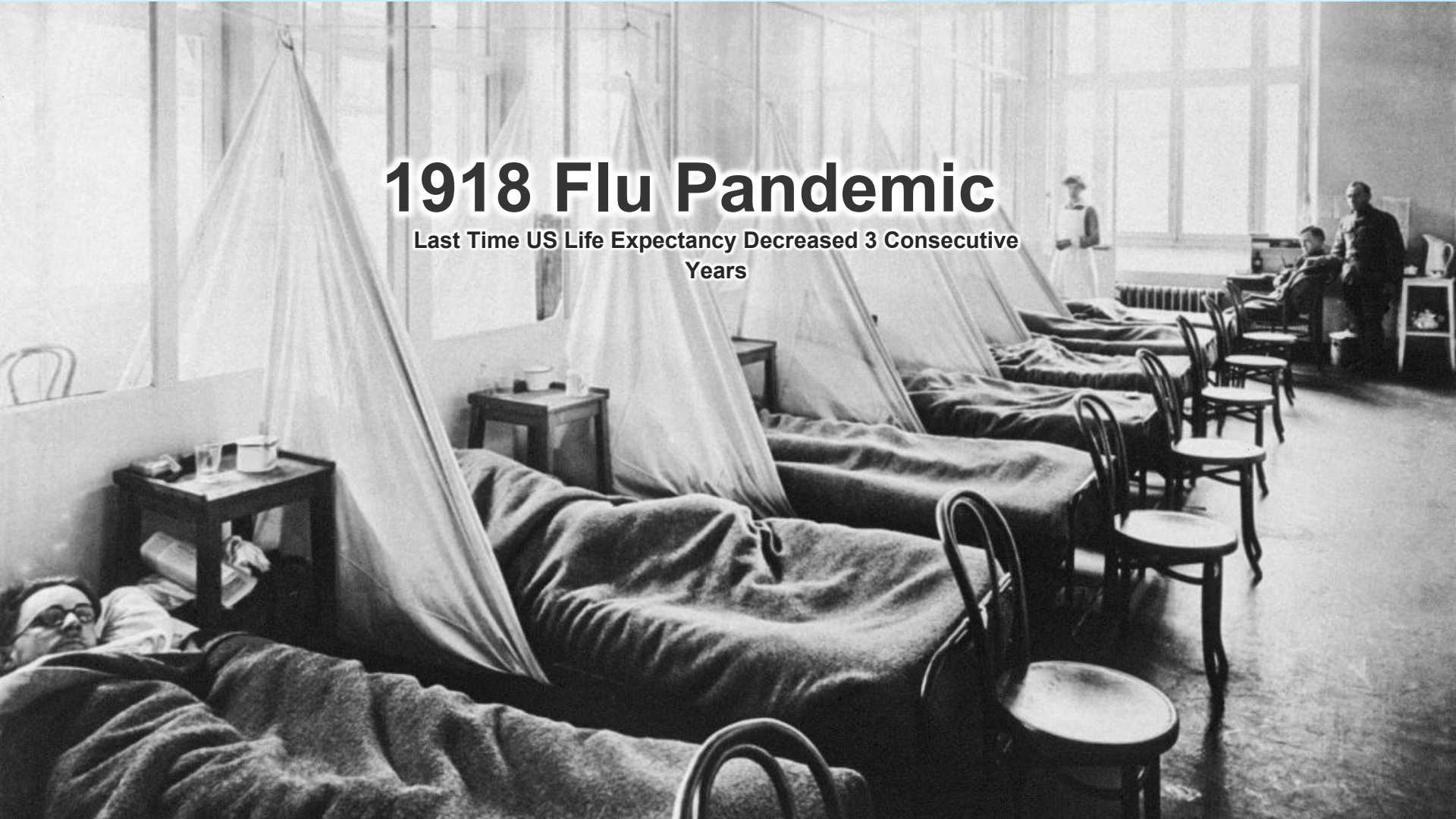


SOURCE: CDC/NCHS, National Vital Statistics System, Mortality. CDC WONDER, Atlanta, GA: US Department of Health and Human Services, CDC; 2018.
<https://wonder.cdc.gov/>.

www.cdc.gov
Your Source for Credible Health Information

1918 Flu Pandemic

Last Time US Life Expectancy Decreased 3 Consecutive Years



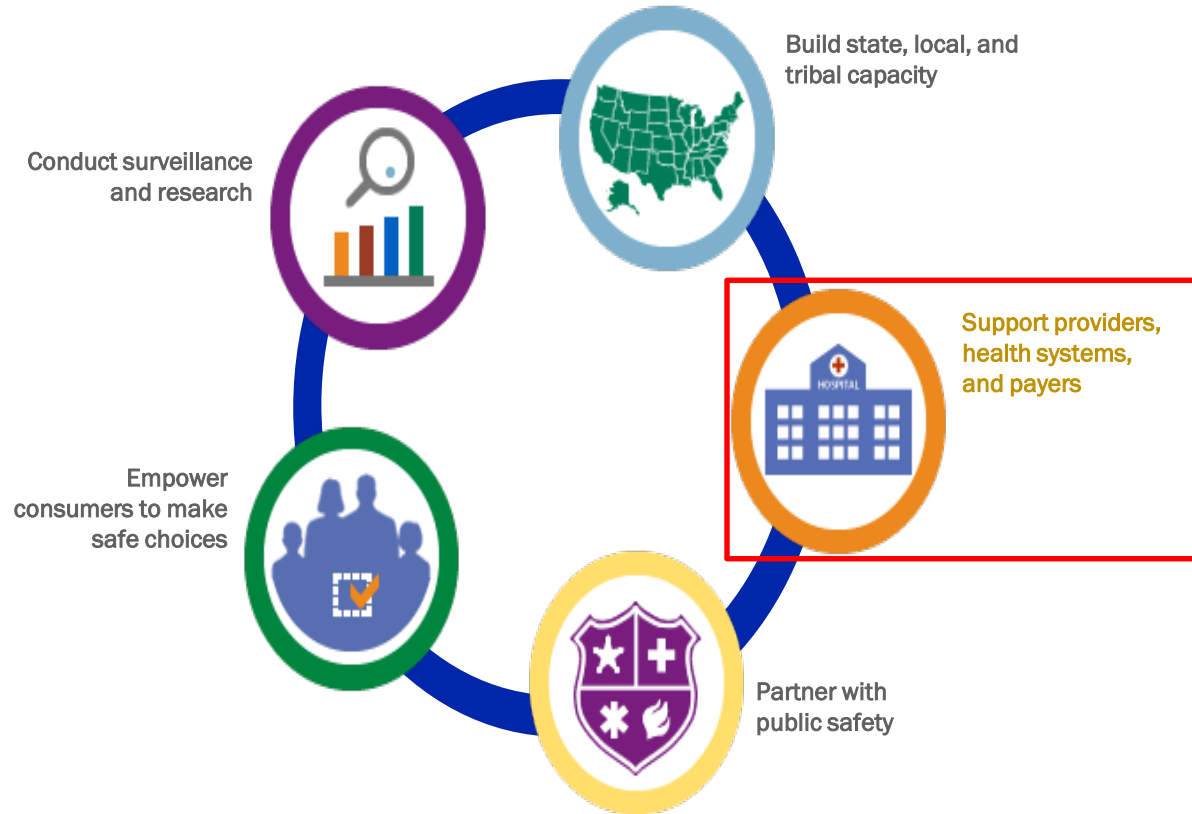
CDC North Star

VISION

Prevent opioid-related harms & overdose deaths



Preventing Opioid Overdoses and Opioid-Related Harms



Support Providers, Health Systems, and Payers



- Promote use of the *CDC Guideline for Prescribing Opioids for Chronic Pain*
- Train healthcare providers on implementation of Guideline
- Provide tools to help integrate into clinical practice

Centers for Disease Control and Prevention

MMWR

Recommendations and Reports / Vol. 65 / No. 1

W morbidity and Mortality Weekly Report

March 18, 2016

CDC Guideline for Prescribing Opioids for Chronic Pain — United States, 2016



Continuing Education Examinations available at <https://www.cdc.gov/mmwr/ce/index.html>



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

- Primary care providers
- Patients 18 years or older with chronic pain
- Outpatient settings
- Outside of active cancer, palliative, and end of life care

**GUIDELINE FOR
PRESCRIBING
OPIOIDS FOR
CHRONIC PAIN**

www.cdc.gov

Organization of Guideline Recommendations

12 recommendations grouped into 3 conceptual areas:

- Determining when to initiate or continue opioids for chronic pain
- Opioid selection, dosage, duration, follow-up, and discontinuation
- Assessing risk and addressing harms of opioid use



EMPOWERING PROVIDERS.

www.cdc.gov

GUIDELINE FOR PRESCRIBING
OPIOIDS FOR CHRONIC PAIN

Comprehensive Implementation Approach for the CDC Prescribing Guideline



Translation & Communication

OVERDOSE DEATHS

involving prescription opioids have quadrupled since 1999

As many as
1 in 4
PATIENTS



receiving long-term opioid therapy in a primary care setting struggles with addiction.

Pharmacists are an essential part of the health care team. On the front lines of dispensing opioid pain medications and providing medication-related services, pharmacists can serve as a first line of defense by engaging in prevention and treatment efforts of opioid use disorder and overdose.

Tips for Communicating with Patients

- Ask open-ended questions
- Be empathetic
- Use active listening
- Use clear explanations—avoid jargon
- Include verbal and written materials

SIMPLE WAYS TO START CONVERSATION

- ✓ What medications are you taking?
- ✓ What medications have you taken to manage pain and how did you respond?
- ✓ Describe how you normally take your medications.
- ✓ How well is your medication controlling your pain?
- ✓ Are you experiencing any side effects from your pain medications?
- ✓ In addition to medications, what other ways are you managing your pain?
- ✓ Do you know which medications you should avoid while taking opioids?
- ✓ What questions do you have about your medications?

RESOURCES AND EDUCATION

American Pharmacists Association: www.pharmacist.com/
CDC Injury Prevention and Control Opioid Overdose: www.cdc.gov/drugoverdose/
CDC What Patients Need to Know factsheet: www.cdc.gov/drugoverdose/pdf/aha-patient-opioid-factsheet-a.pdf
Substance Abuse and Mental Health Services Administration: www.samhsa.gov
PDMP Resource: www.namsd.org/prescription-monitoring-programs.cfm
Drug Enforcement Administration: www.dea.gov/index.shtml



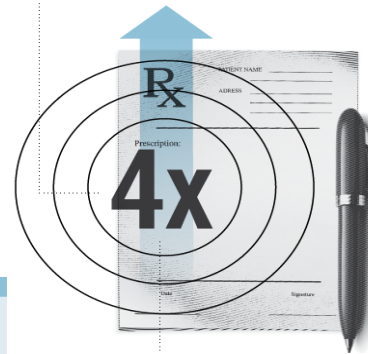
U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

www.cdc.gov/drugoverdose

PHARMACISTS: ON THE FRONT LINES

Addressing Prescription Opioid Abuse and Overdose

Sales of prescription opioids in the U.S. nearly
QUADRUPLED
from 1999 to 2014,

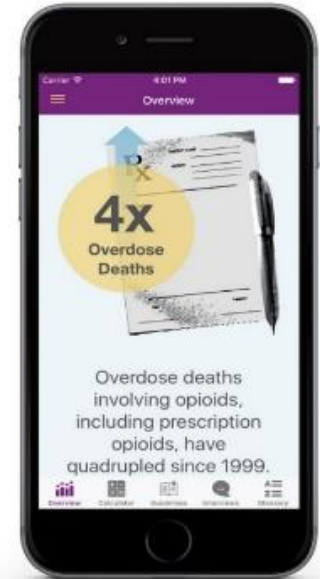


but the amount of pain
Americans reported remained
UNCHANGED



GUIDELINE FOR PRESCRIBING
OPIOIDS FOR CHRONIC PAIN

*Recommendations focus on pain lasting longer than 3 months or past the time of normal tissue healing, outside of active cancer treatment, palliative care, and end-of-life care.



APP includes:
— MME Calculator
— Prescribing Guidance
— Motivational Interviewing



EMPOWERING PROVIDERS.

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GUIDELINE FOR PRESCRIBING
OPIOIDS FOR CHRONIC PAIN

Clinician Education & Training

Online training modules & webinars for clinicians



Free Interactive Trainings:

1. Addressing the Opioid Epidemic: Recommendations from CDC
2. Treating Chronic Pain Without Opioids
3. Communicating with Patients
4. Reducing the Risk of Opioids
5. Assessing and Addressing Opioid Use Disorder
6. Dosing and Titration of Opioids: How Much, How Long, and How and When to Stop
7. Determining Whether to Initiate Opioids for Chronic Pain
8. Implementing CDC's Prescribing Guideline into Clinical Practice
9. Opioid Use and Pregnancy
10. Motivational Interviewing
11. Collaborative Patient-Provider Relationship in Opioid Clinical Decision Making

To learn more:

www.cdc.gov/drugoverdose/training/index.html



Clinical Outreach and Communication Activity (COCA) Free Webinars

1. Overview of Guideline
2. Nonopioid Treatments for Chronic Pain
3. Assessing Benefits and Harms of Opioid Therapy
4. Dosing and Titration of Opioids
5. Opioid Use Disorder—Assessment and Referral
6. Risk Mitigation Strategies
7. Effective Communication with Patients

To learn more:

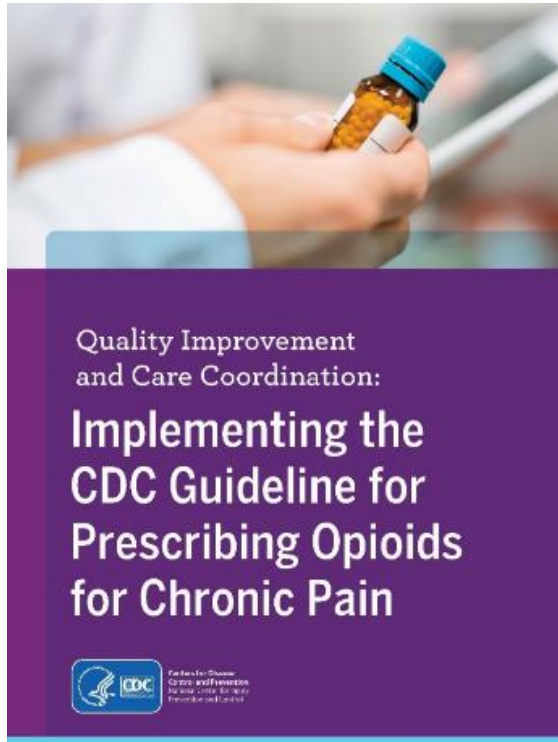
<https://www.cdc.gov/drugoverdose/training/webinars.html>

Health Systems Interventions

- **Clinical Quality Improvement and Care Coordination**
- **EHR and PDMP (prescription drug monitoring program) Data Integration**
- **Clinical decision support (CDS) tools embedded into electronic health records (EHRs)**



Quality Improvement (QI) and Care Coordination Resource



- Companion resource to facilitate implementation of the Guideline recommendations into practice
- Intended to help healthcare systems and providers integrate QI measures and care coordination into their clinical practice

Quality Improvement (QI) Measures

- 16 clinical QI opioid measures align with the 12 Guideline recommendation statements
- Support safe and effective opioid prescribing and pain management and treatment—rather than performance management
- Should be tailored to individual practice policies on opioid prescribing and pain management, or reflect state laws or regulations
- Organized into two categories:
 - 1) New opioid prescriptions
 - 2) Long-term opioid therapy



**PRESCRIBE
WITH
CONFIDENCE.**

**GUIDELINE FOR
PRESCRIBING
OPIOIDS FOR
CHRONIC PAIN**

www.cdc.gov

CDC Resources

CDC Opioid Overdose Prevention Website

www.cdc.gov/drugoverdose

State Efforts

<https://www.cdc.gov/drugoverdose/states/index.html>

CDC Guideline for Prescribing Opioids for Chronic Pain

<https://www.cdc.gov/mmwr/volumes/65/rr/rr6501e1.htm>

Resources for Patients

<https://www.cdc.gov/drugoverdose/patients/index.html>

Resources for Providers

<https://www.cdc.gov/drugoverdose/providers/index.html>

Clinical Decision Support Resources

- **Implementation Guide Output:** <http://build.fhir.org/ig/cqframework/opioid-cds/>
- **Source for the implementation guide:** <https://github.com/cqframework/opioid-cds>
- **Supporting Java packages for the CQL-to-ELM translator and CQL Engine:** <https://github.com/cqframework/opioid-cds-logic>
- **Agency for Healthcare Research Quality's CDS Connect:** <https://cds.ahrq.gov/cdsconnect/artifact/factors-consider-managing-chronic-pain-pain-management-summary>



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Please note that the findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



The Office of the National Coordinator for
Health Information Technology

Overview of ONC and Clinical Decision Support (CDS) Interventions for the CDC Guideline for Prescribing Opioids for Chronic Pain

December 19, 2019

Lolita Kachay, ONC



Health IT is Critical for Combating the Opioid Epidemic

How can health IT help...

Enhance Prescription Drug Monitoring Programs (PDMPs) and improve prescribing practices

Integrating PDMPs and electronic health records (EHRs) enables providers to routinely query a patient's controlled substance history prior to prescribing. Standards based electronic data exchange between EHRs, pharmacies, and PDMPs allows more seamless and timely access to medication history data to those who need it most.

Improve provider/prescriber education

Advancing clinical decision support standards and functionality in certified EHRs can provide evidence based pain management recommendations to providers/prescribers directly in their workflow.

Connect and refer individuals to drug addiction treatment services

Standards based electronic data exchange between EHRs, HIEs, and PDMPs would improve transitions of care and care coordination between primary care, SUD treatment centers, behavioral health, and social services.

Improve access to more complete, accurate, and timely data and reporting

Standard data capture and exchange within and across complex health systems can support more robust state and federal public health reporting.

ONC's Opioid-Related Efforts

- ONC's current opioid work focuses on utilizing health IT to help reduce the inappropriate use of opioids and opioid-related harms:
 - » ONC Health IT Certification Program to support Care Continuum
 - » Prescription Drug Monitoring Programs (PDMPs) & Health IT Data Integration
 - » Clinical Decision Support (CDS)
 - » Electronic Prescribing of Controlled Substances (EPCS)
 - » Policy Vehicles, Coordination, and Stakeholder Engagement

Background - Clinical Decision Support (CDS)

- In March 2016, the CDC released its Guideline for Prescribing Opioids for Chronic Pain based on the most recent scientific evidence (see <http://www.cdc.gov/drugoverdose/prescribing/guideline.html>)
- However, not all physicians may be aware of the CDC prescribing guideline and adoption of the guideline can vary by state and setting
- Integrating the Guideline recommendations electronically into a provider's workflow can help them make more informed clinical decisions when prescribing opioids
- In 2016, the CDC and ONC began working collaboratively to convert the opioid clinical practice guideline into standardized and shareable electronic CDS interventions to be used in EHRs to support appropriate prescribing. The collaboration continues to update and modify CDS content
 - » This collaboration successfully modified CDS content and developed an electronic CDS guide for six of the twelve recommendation statements (<http://build.fhir.org/ig/cqframework/opioid-cds/>)



CONTACT INFORMATION

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@ONC_HealthIT



@HHS ONC

CDC OPIOID CLINICAL DECISION SUPPORT PROJECT: OVERVIEW

GREG WHITE
PROJECT MANAGER
SECURITY RISK SOLUTIONS

CDC PRESCRIBING GUIDELINE

- For opioid use for chronic pain outside of active cancer treatment, palliative care, or end-of-life care



GUIDELINE FOR PRESCRIBING OPIOIDS FOR CHRONIC PAIN

IMPROVING PRACTICE THROUGH RECOMMENDATIONS

CDC's *Guideline for Prescribing Opioids for Chronic Pain* is intended to improve communication between providers and patients about the risks and benefits of opioid therapy for chronic pain, improve the safety and effectiveness of pain treatment, and reduce the risks associated with long-term opioid therapy, including opioid use disorder and overdose. The Guideline is not intended for patients who are in active cancer treatment, palliative care, or end-of-life care.

<https://www.cdc.gov/drug-overdose/prescribing/guideline.html>

Determining when to initiate or continue opioids for chronic pain

1. Opioids are not first-line therapy
2. Establish goals for pain and function
3. Discuss risks and benefits

Opioid selection, dosage, duration, follow-up, and discontinuation

4. Use immediate-release opioids when starting
5. Use the lowest effective dose
6. Prescribe short durations for acute pain
7. Evaluate benefits and harms frequently

Assessing risk and addressing harms

8. Use strategies to mitigate risk
9. Review PDMP data
10. Use urine drug testing
11. Avoid concurrent opioid and benzodiazepine prescribing
12. Offer treatment for opioid use disorder

CDC OPIOID DECISION SUPPORT PROJECT

- Goal: provide point-of-care support for [CDC Guideline for Prescribing Opioids for Chronic Pain](#)
- CDC-sponsored effort. Contributors: ONC, AHRQ, Yale, Indiana University, Duke, Security Risk Solutions, Epic, Cerner, and many others.
- Approach:
 - Leverage health IT standards for representing clinical knowledge & integrating into EHR
 - Pilot with multiple healthcare organizations and EHR products

STANDARDS-BASED DISSEMINATION

- **EHR data retrieval: HL7 FHIR**
 - FHIR = Fast Healthcare Interoperability Resources
- **Guideline knowledge representation: HL7 CQL**
 - CQL = Clinical Quality Language
- **EHR workflow integration: HL7 CDS Hooks**
- **EHR app integration: HL7 SMART**
 - SMART = Substitutable Medical Apps, Reusable Technologies
- **Key enabler: EHR vendor support for these standards**

TRANSLATING EVIDENCE TO EXECUTABLE CDS

Knowledge Level	Description	Example
L1	Narrative	Guideline for a specific disease that is written in the format of a peer-reviewed journal article
L2	Semi-structured	Flow diagram, decision tree, or other similar format that describes recommendations for implementation (HUMAN READABLE)
L3	Structured	Standards-compliant specification encoding logic with data model(s), terminology/code sets, value sets that is ready to be implemented (COMPUTER/MACHINE READABLE)
L4	Executable	CDS implemented and used in a local execution environment (e.g., CDS that is live in an electronic health record (EHR) production system) or available via web services



KNOWLEDGE RESOURCES & PILOT IMPLEMENTATIONS

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VICE CHAIR FOR CLINICAL INFORMATICS, DEPT. OF BIOMEDICAL INFORMATICS
CO-CHAIR, HL7 CLINICAL DECISION SUPPORT WORK GROUP
MEMBER, US HEALTH IT ADVISORY COMMITTEE

DISCLOSURES

- In the past year, I have served as a consultant, sponsored researcher, or invited speaker with honorarium for the U.S. Office of the National Coordinator for Health IT (via Security Risk Solutions), Hitachi, McKesson InterQual, Klesis Healthcare, RTI International, Mayo Clinic, and UC San Francisco

1.0.0 Opioid Prescribing Support Implementation Guide 🌐

1.1.0 Introduction 🌐

This implementation guide provides resources and discussion in support of applying the Centers for Disease Control and Prevention (CDC) Opioid Prescribing Guidelines:

[CDC guideline for prescribing opioids for chronic pain](#)

This implementation guide was developed as part of the Clinical Quality Framework Initiative, a public-private partnership sponsored by the Centers for Medicare & Medicaid Services (CMS) and the U.S. Office of the National Coordinator for Health Information Technology (ONC) to identify, develop, and harmonize standards for clinical decision support and electronic clinical quality measurement.

This project is a joint effort by the Centers for Disease Control and Prevention (CDC) and the Office of the National Coordinator for Health IT (ONC) focused on improving processes for the development of standardized, shareable, computable decision support artifacts using the CDC Opioid Prescribing Guideline as a model case.

1.2.0 Scope 🌐

This implementation guide includes support for the following guideline recommendations:

- [Recommendation #1 - Nonpharmacologic and Nonopioid Pharmacologic Therapy Consideration](#)
- [Recommendation #2 - Opioid Therapy Goals Discussion](#)
- [Recommendation #3 - Opioid Therapy Risk/Benefit Discussion](#)
- [Recommendation #4 - Opioid Release Rate When Starting Opioid Therapy](#)
- [Recommendation #5 - Lowest Effective Dose](#)
- [Recommendation #6 - Prescribe Lowest Effective Dose and Duration](#)
- [Recommendation #7 - Opioid Therapy Risk Assessment](#)
- [Recommendation #8 - Naloxone Consideration](#)
- [Recommendation #9 - Consider Patient's History of Controlled Substance Prescriptions](#)
- [Recommendation #10 - Urine Drug Testing](#)
- [Recommendation #11 - Concurrent Use of Opioids and Benzodiazepines](#)
- [Recommendation #12 - Evidence-based Treatment for Patients with Opioid Use Disorder](#)

1.3.0 Getting Started 🌐

For a quick start to get up and running and see how the artifacts work, refer to the [Quick Start](#)

Contents

[Opioid Prescribing Support Implementation Guide](#)

[Introduction](#)

[Scope](#)

[Getting Started](#)

<http://build.fhir.org/ig/cqframework/opioid-cds-r4/>

Opioid Prescribing Support Implementation Guide

8.16.0 Recommendation #11 - Concurrent Use of Opioids and Benzodiazepines 🌐

Recommendation #11:

Clinicians should avoid prescribing opioid pain medication and benzodiazepines concurrently whenever possible (*recommendation category: A, evidence type: 3*).

8.16.1 Functional Description 🌐

Patient is being prescribed opioids for chronic pain.

Patient does not appear to be at end of life.

If patient is prescribed opioid medication concurrently with Benzodiazepine medication, provide a recommendation to revise order:

Avoid prescribing opioid pain medication and benzodiazepine concurrently whenever possible.

Provide links to the CDC Guidance.

One of the following responses should be required:

- Will revise order.
- Risk of overdose carefully considered and outweighed by benefit; snooze 3 months.
- N/A-see comment (will be reviewed by medical director); snooze 3 months.

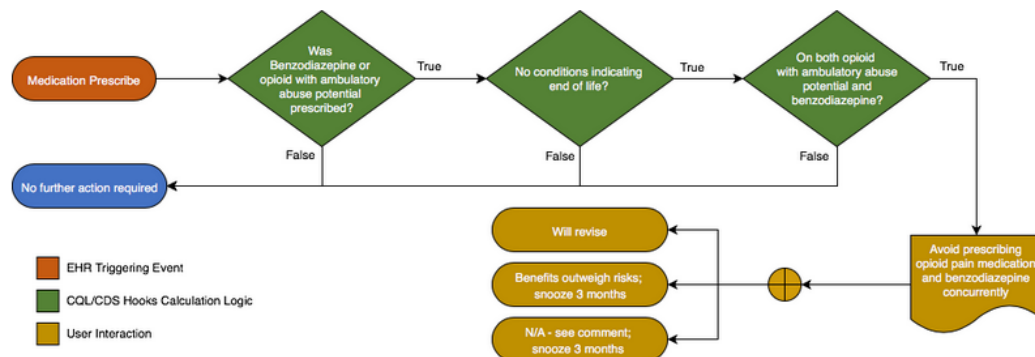
Contents

Recommendation #11 -
Concurrent Use of Opioids and
Benzodiazepines

Functional Description

Content

- Functional Description
- Process Flow
- Computable Content
- Test Cases

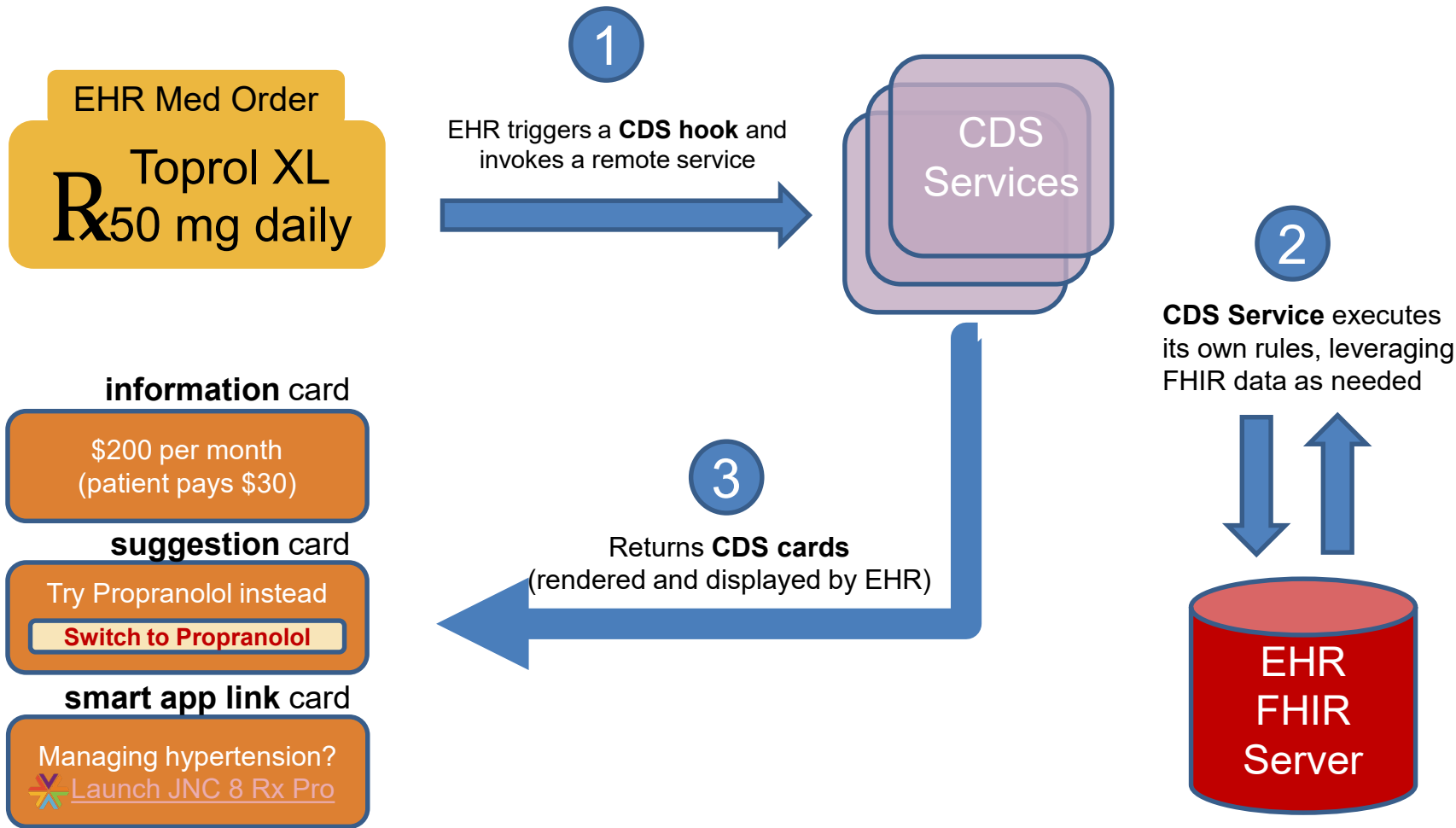


EXAMPLE CQL

```
50 context Patient
51
52 define "Lookback Year":
53     Interval[Today() - 12 months - 1 days, Today() - 1 day]
54
55 define "Inclusion Criteria":
56     AgeInYears() >= 18
57     and exists (Common."Active Ambulatory Opioid Rx")
58     and AnyTrue(Common.ProbableDaysInRange(Common."Active Ambulatory Opioid Rx", 90, 80))
59     and
60         ("No Urine Screening In Last 12 Months"
61         or "Has Evidence of Opioids"
62         or "Has Evidence of Illicit Drugs")
63
64 define "Illicit Drug Urine Screenings in Last 12 Months":
65     (
66         [Observation: "code" in Common."Illicit Drug Screening"] IllicitDrugScreen
67         where date from IllicitDrugScreen.effective in day of "Lookback Year"
68     ) IllicitDrugScreenDuringLookback
69     sort by effective.value
```


PILOTED EHR INTEGRATION APPROACHES

- **Direct CQL execution**
 - Enables fast execution, even across large populations of patients
 - Requires native EHR vendor system to understand CQL
- **SMART on FHIR**
 - Accessible as a tab in the EHR
 - Requires proactive usage
- **CDS Hooks**
 - Alert or reminder
 - Could contribute to alert fatigue
 - Can also suggest use of a SMART on FHIR app



OVERVIEW OF PILOTS

- **Pilot with Custom Infrastructure: University of Utah**
 - With SMART on FHIR and custom CDS Hooks infrastructure layered on top of Epic Best Practice Advisory Web service infrastructure
 - Recommendation #5 (lowest effective dosing)
- **Pilot with Native EHR Infrastructure, #1: Epic / Yale**
 - With CDS Hooks, recommendations #10 (drug testing) & 11 (benzo)
- **Pilot with Native EHR Infrastructure, #2: Cerner / Indiana U.**
 - With CQL in population health management platform
 - Recommendations #10 and 11
- **Pilot with Native EHR Infrastructure, #3: Epic / Duke**
 - With CDS Hooks, recommendations #10 and 11

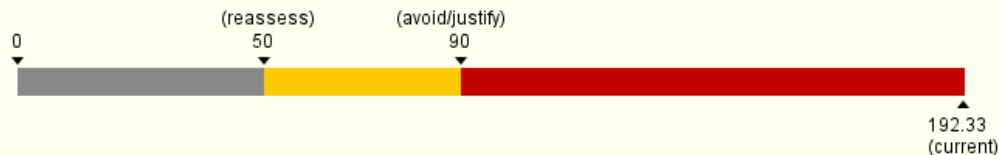
PILOT 1:

**UNIVERSITY OF UTAH HEALTH
EPIC EHR**

**CDS HOOKS W/CUSTOM INFRASTRUCTURE
SMART ON FHIR W/NATIVE EHR INFRASTRUCTURE**

Patient's average oral morphine equivalence (OME) is **192.33 mg/day**.

Daily Average OME (mg/day)



For adults, CDC recommends reassessing evidence of individual benefits and risks when increasing dosage to ≥ 50 OME/day, and avoid increasing dosage to ≥ 90 OME/day or carefully justifying such a decision.

Active Opioid Rx	Avg OME/day*
New Oxycodone Hydrochloride 15 MG Oral Tablet ⌵	135 mg
FENTANYL CITRATE 200 MCG BU LPOP ⬆	17.33 mg

⚠ Verify taking; Rx may have expired



Sig: Place 1 each (200 mcg) inside cheek every 2 hours as needed. Use prior to bowel movements, maximum 4 per day

Morphine equivalence: 130x. For 1 lozange, OME = 26 mg.

Rx by Smith, John on 02/07/18. Disp 20 each, Refills 0.

Start date: 02/07/18. End date (estimated): 02/12/18. Based on dispense quantity and max daily dose in sig.

Daily dose (avg): Fentanyl Oral Lozenges 20 dispense * 0.2 mg / 30d supply (assumed) = 0.13 mg.

Daily dose (max): Fentanyl Oral Lozenges 4 (daily max per sig) * 0.2 mg = 0.8 mg.

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✓ Accept

Cancel

Discern: (1 of 1)



High risk for opioid overdose - taper now.

Maximum morphine equivalent daily dose (MEDD) is **365 mg/day** (PRN meds assumed to be taken at maximum allowed frequency). Taper to < 50.

Active Opioid Rx	Max MEDD
[New] Oxycodone Hydrochloride 5 MG Oral Capsule > Sig: 5 mg Oral Every 4 hours as needed > Daily dose: Oxycodone Oral Capsule 6/d 5 mg = 30 mg. Morphine equivalence: 1.5x.	45 mg
72 HR Fentanyl 0.1 MG/HR Transdermal System > Sig: 1 patch q3d > Prescriber: Michael Flynn, MD (Internal Medicine/Pediatrics). > Daily dose: Fentanyl patch: 1 0.1 mg/hr = 0.1 mg/hr. Morphine equivalence: 2400x.	240 mg
Buprenorphine 2 MG Sublingual Tablet > Sig: Place 1 tablet under the tongue Every 6 hours as needed. > Prescriber: Michael Flynn, MD (Internal Medicine/Pediatrics). Rx date: 2017-10-19. > Dispense: 120 tablets. Refills: 0. Expected supply duration: through 2017-07-30. > Daily dose: Buprenorphine Sublingual Tablet 1/d 1 tablet 2 mg = 2 mg. Morphine equivalence: 30x.	60 mg
Methadone Hydrochloride 10 MG Oral Tablet > Sig: Take 0.5 tablets by mouth Every 6 hours as needed for pain. > Prescriber: Michael Flynn, MD (Internal Medicine/Pediatrics). Rx date: 2017-10-19. > Dispense: 120 tablets. Refills: 0. Expected supply duration: through 2017-08-05. > Daily dose: Methadone Oral Tablet 1/d 0.5 tablet 10 mg = 5 mg. Morphine equivalence: 4x.	20 mg
Total	365 mg

[CDC opioid recommendation #5](#)[MME conversion table](#)

Source: CDC

History

OK

[Admit Dt: 8/31/2017 2:29 PM] Loc: 1S, Baseline West

Inpatient

PETERS, TIMOTHY - 10000883

Done

op date 11/01/17 9:08:00 CDT, DO not forget to take tab...

0 CDT, Nurse Collect Non-Blood Specimens

18/17 15:22:00 CDT

18/17 15:21:00 CDT

:00 CDT, Nurse Collect Non-Blood Specimens

0/18/17 12:07:00 CDT, Nurse Collect Non-Blood Specim...

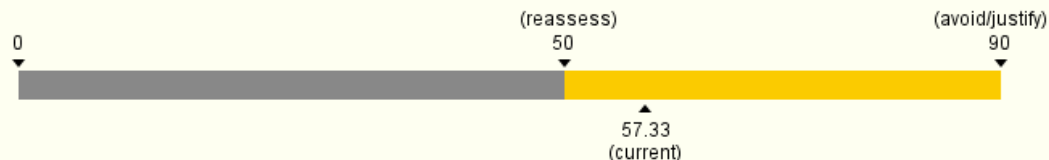
17 3:00:00 CDT

Orders For Signature

Outpatient Opioid Oral Morphine Equivalence (OME) Calculator

Patient's average oral morphine equivalence (OME) is **57.33 mg/day**.

Daily Average OME (mg/day)



For adults, CDC recommends reassessing evidence of individual benefits and risks when increasing dosage to ≥ 50 OME/day.

Active Opioid Rx

Avg
OME/day*

FENTANYL CITRATE 200 MCG BU LPOP ⚠

17.33 mg

⚠ Verify taking; Rx may have expired

HYDROCODONE-ACETAMINOPHEN 10-325 MG PO TABLET ⚠

40 mg

⚠ Verify taking; Rx may have expired

⚠ Not adding OME for presumed redundant Rx's with start dates of 02/07/18 and 03/07/18.

Total Average OME/Day

57.33 mg

*Avg OME = (qty dispensed)/(days supply). 30d supply assumed unless otherwise noted in Sig or note to pharmacy.

*Max OME (see details) = max amount patient may take on a given day according to Sig, even if patient runs out of med early.

[OME conversion table](#)

[CPG opioid Rx guideline](#)

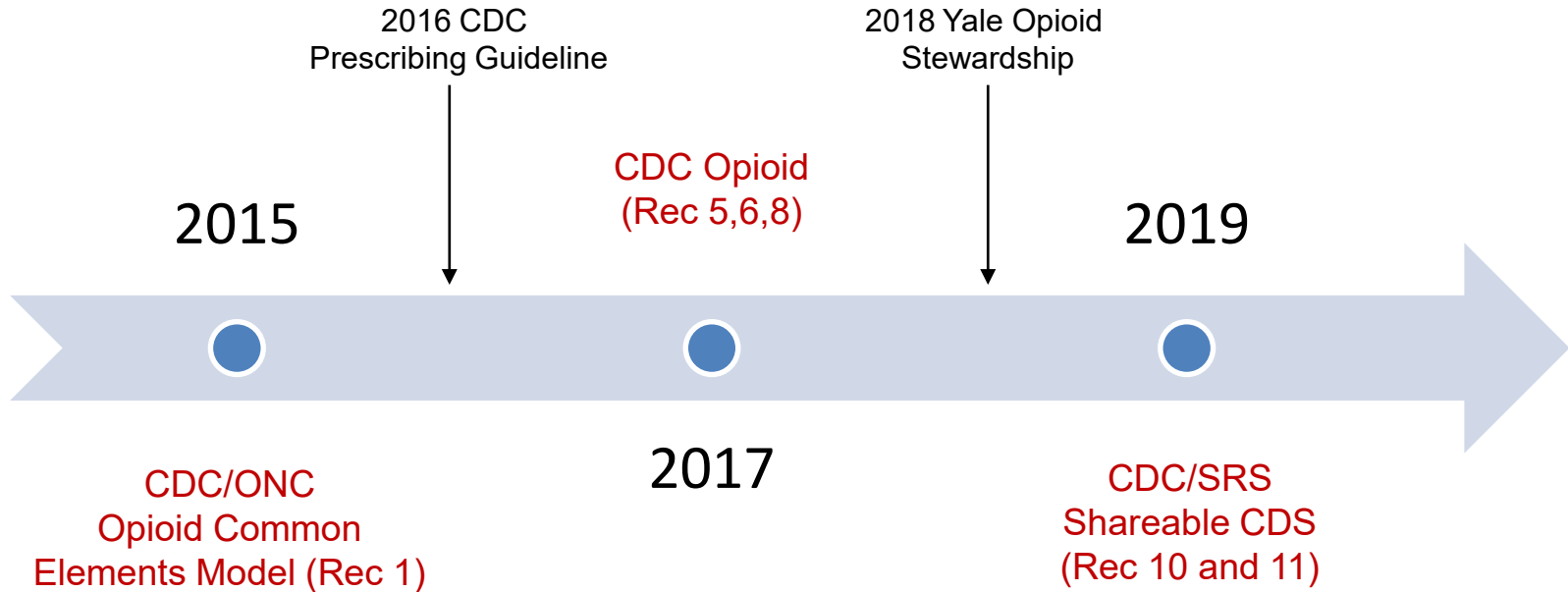
Source: CDC opioid Rx guideline -- recommendation #5

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PILOT 2:

**YALE NEW HAVEN HEALTH
EPIC EHR
NATIVE EHR INFRASTRUCTURE
EHR CDS TOOLS + CDS HOOKS**

YALE OPIOID DECISION SUPPORT JOURNEY



2015: WHEN TO CONSIDER OPIOIDS, ALTERNATIVES


BestPractice Advisory - Zzzlab,Adult

▼ Care Guidance (Advisory: 1)

⚠ Clinicians should only consider opioids if pain is moderate or severe AND has failed to respond to non-opioid therapies. Consider alternative treatments by clicking "Accept" below. If you believe this patient needs opioid therapy, please click the appropriate "Acknowledge Reason".

Alcohol: [REDACTED] has no alcohol history on file.
Drug Abuse: [REDACTED] reports that she uses illicit drugs, including Cocaine.

Remove the following orders? _____

 oxyCODONE-acetaminophen (PERCOCET) 5-325 mg per tablet Take 1 tablet by mouth every 6 (six) hours as needed. Normal, Disp-30 tablet, R-0

Apply the following? _____

[Orders for managing pain preview](#)

[CDC opioid prescribing guidelines](#) ↗

[Go to CT Prescription Monitoring Program website](#) ↗

Acknowledge Reason _____

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Based on several guidelines related to opioid prescriptions for treatment of chronic non-cancer pain

[Common Elements in opioid prescribing guidelines](#)

[Go to CT Prescription Monitoring Program website](#)

▼ Documentation

▸ Progress Notes

▸ Referrals- Guidelines support the use of the following modalities for use in patients with chronic pain

▼ Medications for mild to moderate pain - Try these first

▸ First Line Medications

▸ Muscle Relaxants

▸ Topical Preparations

▼ Medications for moderate to severe pain

▸ Non-Opioid pain meds

▸ Opioids for chronic pain - Therapeutic trial, initiate with low dose and titrate slowly

▼ Labs- Urine toxicology screen

▸ Chronic Pain Labs

▸ Patient Information / Instructions

▸ Follow up

▼ Additional SmartSet Orders

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2017: CDS FOR RISK MITIGATION

BestPractice Advisory - Kurt, Testten

▼ Medication Alerts (Advisory: 1)

1 Problem: Chronic Opioid use with high total dose. At risk for respiratory depression.

2 Recommended Action (Use SmartSet or select alternate acknowledgements):
Consider tapering Opioids to <50 MEDD
Consider Naloxone prescription

3 Data:
Cumulative Morphine Equivalent Daily Dosage (MEDD) is: **120**
(based on actual dispense data, prn meds assumed to be taken at maximum allowable frequency)

4 Utox
Cocaine: No results found within last 12 months
Cannabis: No results found within last 12 months
PCP: No results found within last 12 months

5 Narcotics by Subclass
Analgesic Narcotic Agonists
oxyCODONE (ROXICODONE) 5 MG
Immediate Release tablet

6 **CHRONIC OPIOID GUIDANCE MME** preview

7 Evidence: CDC Opioid Guidelines ↗

8 Acknowledge Reason _____

9

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Meds Naloxone

▼ **AMB NALOXONE**

- ☐ naloxone 2 mg/actuation Spry
- ☐ naloxone (NARCAN) 4 mg/actuation spray

Labs- Urine toxicology screen

▼ **Chronic Pain Labs**

- ☐ POCT urine pregnancy Routine
- ☐ 9 Drug toxicology panel, urine, w/ conf. (YH) Routine
- ☐ Drug tox monitoring 9 w/confirm, urine (Q) Routine
- ☐ Toxicology screen, urine (BH L) Routine

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2019: CDS HOOKS (NATIVE EHR FUNCTIONALITY)

BestPractice Advisory ·

Advisory (1)



Patient has active prescriptions for opioid pain medication and benzodiazepines

⚠️ Avoid prescribing opioid pain medication and benzodiazepines concurrently whenever possible

Source: CDC guideline for prescribing opioids for chronic pain

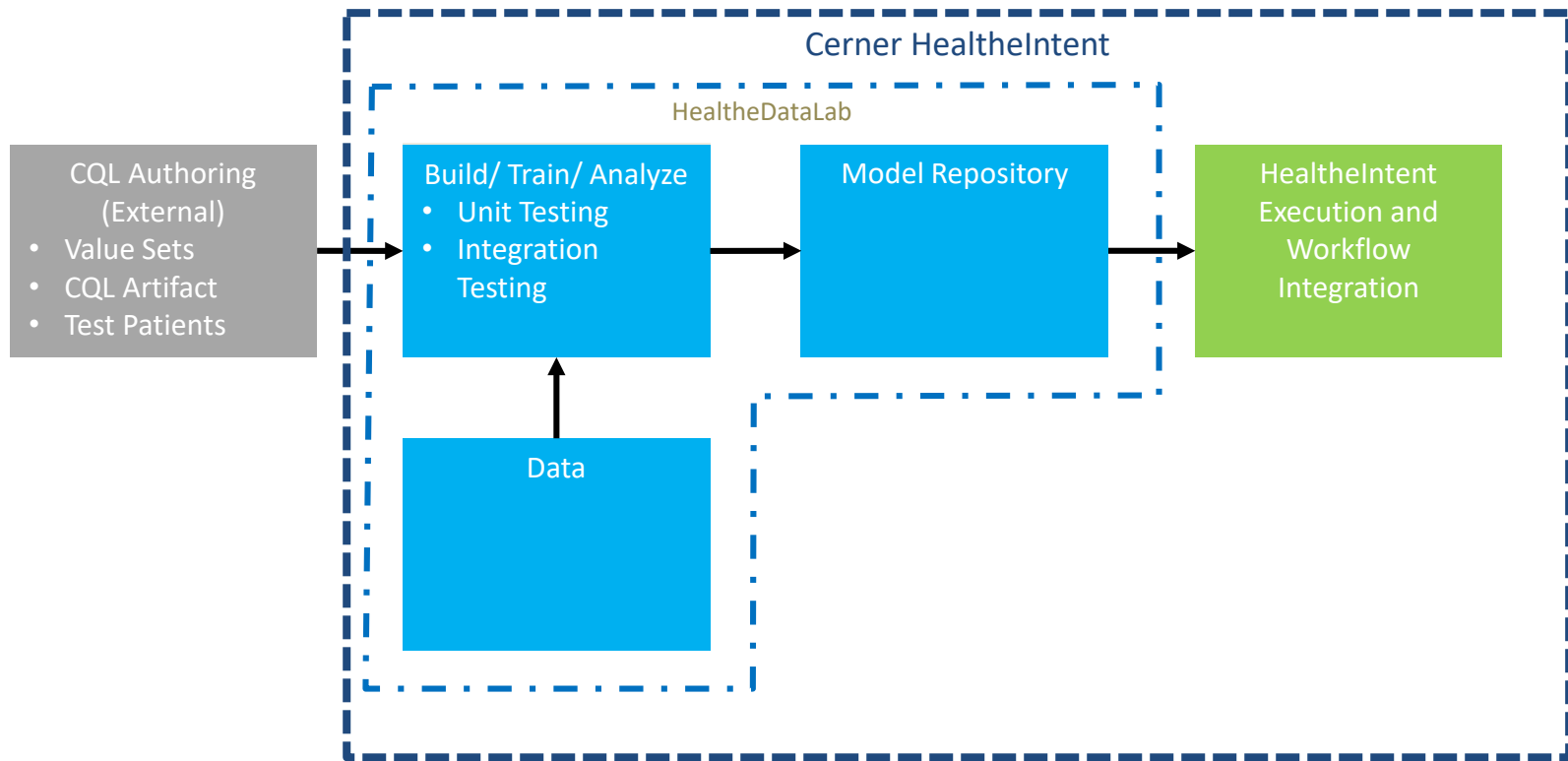
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✓ OK

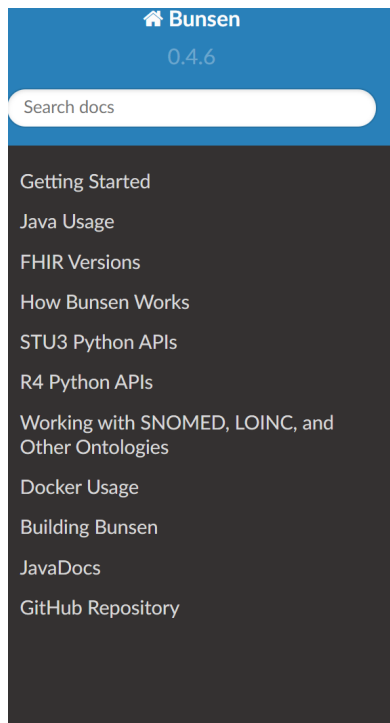
PILOT 3:

**INDIANA UNIVERSITY HEALTH PILOT
CERNER EHR
NATIVE CQL EXECUTION**

EXECUTION TESTING AND DATA FLOW



BUNSEN – ENABLE FHIR EXECUTION



[Docs](#) » [Bunsen: FHIR Data with Apache Spark](#)

[View page source](#)

Bunsen: FHIR Data with Apache Spark

Bunsen lets users load, transform, and analyze FHIR data with Apache Spark. It offers Java and Python APIs to convert FHIR resources into Apache Spark Datasets, which then can be explored with the full power of that platform, including with Spark SQL.

- [Getting Started](#)
- [Java Usage](#)
- [FHIR Versions](#)
- [How Bunsen Works](#)
- [STU3 Python APIs](#)
- [R4 Python APIs](#)
- [Working with SNOMED, LOINC, and Other Ontologies](#)
- [Docker Usage](#)
- [Building Bunsen](#)

Compatibility Matrix

Bunsen release	Spark version	FHIR
0.4.*	2.3	STU3, R4
0.3.0	2.2	STU3, R4
0.2.0	2.2	STU3
0.1.0	2.1	STU3

- <https://engineering.cerner.com/bunsen/0.4.6/>

Project work was divided into two Sprints.

- **Technical implementation**

1. Integrate CQL Logic into IU Health's data in Cerner HealthDataLab
2. Test integration with IU Health population data

- **Clinical User Testing**

1. Design mock environment and user testing script
2. Conduct interviews and analyze responses

DEMO OF THE DATA

```
In [1]: spark.sql("SHOW DATABASES").toPandas()
```

```
In [2]: query= ""  
library OpioidCDS_STU3_REC_10 v
```

```
In [3]: from foresight.  
fhir_database =  
version = "2019  
fhir_databases
```

```
In [28]: read_result
```

```
Out[28]: 113227
```

Recommendation Outcomes

Total Population

113,227

Total Met

36,602

Excluded

26,167

Has Dx CHF

True

Gender

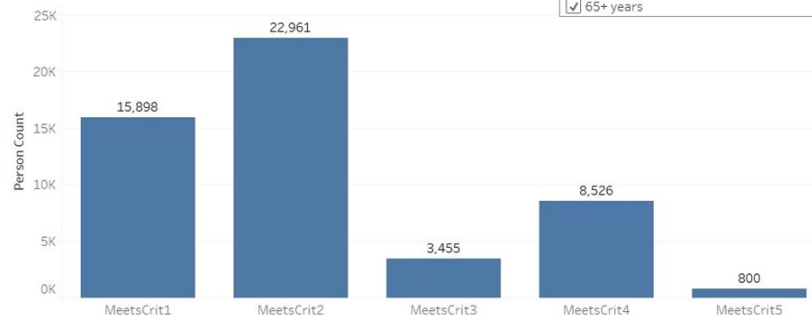
(All)

Age Group

(All)

- ☒ (All)
- ☒ 0-18 years
- ☒ 19-64 years
- ☒ 65+ years

Criteria Met



```
"Evidence Opioids Indicator",  
"Evidence of Opioids Summary",  
"Evidence of Opioids Detail",  
"Evidence of Illicit Drugs Indicator",  
"Evidence of Illicit Drugs Summary",  
"Evidence of Illicit Drugs Detail"]
```

```
session_today="2018-12-31T14:40:00-00:00")
```



PREVIOUS WORK

[illegible]

1 tab. Oral, every 4 hr. PRN: as needed for pain. 0 Refill(s)

Document History: Completed by Cerner Test, N

All Visits

Last 18 months

No Results Found

All Visits

Last 1 month

No Results Found

All Visits

Last 3 yrs

No Results Found

All Visits

Last 50 Bases

No Results Found

[View Forecast](#)

1 tab, Oral, every 4 hr, PRN: as needed for pain, 0 Refill(s)

Last Dose

Source

Compliance

Compliance Comments

Order Date

Responsible Provider

Estimated Supply Remaining

Order Comments

Consider Urine Drug Screening

Concurrent Opioid and Benzodiazepine Prescription



MILLER, BETTY

Allergies: aspirin, penicillins

Care Team: <No Primary Contact>

DOB: 4/13/54

Dose Weight:

Loc: RC Family Pract

Age: 65

Isolation:

No Outside Records

Sex: Female

Resuscitation Status:

HealtheLife: Yes

FIN: 000274150

Clinical Trials:

Advanced Dir: Living will

Menu - Inpatient < ▾ Provider View

Full screen

Print

0 minutes ago

Provider View

Results Review

Orders + Add

Documentation + Add

Outside Records

Activities and Interventions

Allergies + Add

Clinical Media + Add

Diagnoses and Problems

Form Browser

Growth Chart

Histories

Interactive View and I&O

MAR

MAR Summary

Medication List + Add

Patient Information

Recommendations

Multi-Disciplinary Rounding

Ambulatory Workflow

Clinical Staff Orders

Demographics

Future Orders

Home Medications (2)

naloxegol (naloxegol 12.5 mg oral tablet) 12.5 mg = 1 tab, Oral, every morning, on an empty stomach 1 hour before or 2 hours...	Cerner Test, Physician - Prim
oxyCODONE-acetaminophen (Percocet 2.5/325 oral tablet) 1 tab, Oral, every 4 hr, PRN: as needed for pain, 0 Refill(s)	--

Document History: Completed by Cerner Test, N

Labs

All Visits Last 18 months Las

No Results Found

Diagnostics (0)

All Visits Last 1 month

No Results Found

Pathology (0)

All Visits Last 3 ye

No Results Found

Microbiology (0)

All Visits Last 50 Repo

No Results Found

Immunizations

View Forecast

Vaccine

Status

Adminis...

Next Reco

Renew Cancel/DC Complete

oxyCODONE-acetaminophen (Percocet 2.5/325 oral tablet)

1 tab, Oral, every 4 hr, PRN: as needed for pain, 0 Refill(s)

Last Dose Source

Compliance

Compliance Comments

Order Date Responsible Provider


JUL 02, 2019 08:47

Estimated Supply Remaining

Order Comments

--

MILLER, BETTY X



MILLER, BETTY
Allergies: aspirin, penicillins
Care Team: <No Primary Contact>

DOB: 4/13/54
Dose Weight:
Loc: RC Family Pract

Age: 65
Isolation:
No Outside Records

Sex: Female
Resuscitation Status:
HealtheLife: Yes

FIN: 000274150
Clinical Trials:
Advanced Dir: Living will

Menu - Inpatient

Ambulatory Workflow

Quick Orders and Charges

Inpatient Workflow

Discharge Workflow

Documents (50)

Histories

Labs ...

Diagnostics ...

New Order Entry ...

Outstanding Orders ...

Visits ...

Immunizations ...

Prior Authorizations ...

Asthma Action Plan ...

Order Profile ...

Quick Visits ...

Reminders ...

Scales and Assessments ...

Pathology ...

Subjective/HPI

Review of Systems

Patient Education ...

Objective/Physical Exam

Procedures

Care Team ...

Goals Management ...

Assessment and Plan

Patient Information ...

Hierarchical Condition Categories ...

HealtheRegistries ...

Opioid Review

Create Note

Office Visit Note- New

Opioid Review

Failed Previous Tox Screen: No | Missing Opioid Treatment Agreement: No | More than 3 Opioid Rx in the last 90 days: No | Coprescribed Opioid and Benzo: Yes | Previous Overdose: No

Acute Narcotic Administrations (0) Morphine mg Equivalent View Details

Prescribed Narcotics (3) 22.5 Daily Morphine mg Equivalent

Prescription	Date	Stat...	Dispense Quantity	Refills	MM...	MM...
acetaminophen-oxycodone	JUL 02, 20...	Completed	--	--	0	0
acetaminophen-oxycodone (Percocet 2.5/325 or...	JUL 03, 20...	Prescribed	24 tab	--	22.5	90
hydrocodone-acetaminophen (Norco 325 mg-5...	JUN 24, 2...	Completed	24 tab	--	0	0

☐ I certify that I have reviewed PDMP Information. PDMP Reviewed: --

Mark as Reviewed

Subjective/HPI

Review of Systems

Objective/Physical Exam

Assessment and Plan

Slide courtesy of Cole Erdmann

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MILLER, BETTY

Allergies: aspirin, penicillins

Care Team: <No Primary Contact>

DOB: 4/13/54

Dose Weight:

Loc: RC Family Pract

Age: 65

Isolation:

No Outside Records

Sex: Female

Resuscitation Status:

HealthLife: Yes

FIN: C

Clinic

Advan

Provider View

Full screen

Print

Ambulatory Workflow

Quick Orders and Charges

Inpatient Workflow

Discharge Workflow

Chief Complaint

Problems

Home Medications (6)

Vital Signs

Recommendations

Charges

Media Gallery (18)

Documents (38)

Histories

Labs

Diagnostics (1)

New Order Entry

Outstanding Orders (13)

Visits (8)

Immunizations

Prior Authorizations (8)

Asthma Action Plan (1)

Order Profile (1)

Quick Visits ...

Reminders ...

Scales and Assessments ...

Pathology ...

Subjective/HPI

Review of Systems

Patient Education ...

Objective/Physical Exam

Procedures

Care Team

Recommendations

Pending

Not Due / Historical

HealthRegistries

Communication Preference: Telephone Edit

☐ My Role Only ☐ Group By Category

Recommendation	Due	Last Action	Recs...	Source	Orders
Substance Abuse Screening	Overdue (3 months)	--	Every 1 years	✓ HealthRegistries	Orders ▾
Diabetes Maintenance-Eye Exam	Overdue (23 months)	Eye Exam Done Elsewher...	Every 1 years	✓ HealthRegistries	
Diabetes Maintenance-Serum Creatinine	Overdue (10 months)	64.12 mg/dL (22 mon...	Every 1 years	--	Order: Creatinine
Colorectal Screening	Today	--	Unknown	① HealthRegistries	Orders ▾
COPD Management-Spirometry	Today	--	Unknown	① HealthRegistries	
Depression Screening	Today	--	Unknown	① HealthRegistries	
Diabetes Maintenance-Distal Symmetr...	Today	--	Every 1 years	--	
Diabetes Maintenance-Fasting Lipid Pr...	Today	Ordered (2 years ago)	Every 1 years	--	Order: Lipid Profile P...
Diabetes Maintenance-Foot Exam	Today	--	Unknown	① HealthRegistries	
Diabetes Maintenance-Footwear Educa...	Today	--	Every 1 years	--	
Diabetes Maintenance-Medication Pres...	Today	--	Every 1 years	--	
Diabetes Maintenance-Psychosocial As...	Today	--	Every 1 years	--	
Diabetes Maintenance-Statins Therapy...	Today	--	Every 1 years	--	
Diabetes Maintenance-Urine Dipstick	Today	Ordered (15 months ago)	Every 1 years	--	Orders ▾
Fall Risk Screening	Today	--	Unknown	① HealthRegistries	
Influenza Vaccine	Today	0.500000 mL (13 mon...	Seasonal	① HealthRegistries	Orders ▾
Meningococcal Dose 1	Today	--	One-time o...	--	Orders ▾
Pertussis Vaccine	Today	--	One-time o...	--	Orders ▾
Physical Exercise Education	Today	--	Every 1 years	--	
Pneumococcal Vaccine	Today	Ordered (15 months ago)	One-time o...	① HealthRegistries	Orders ▾
Tetanus/TD Vaccine	Today	--	Every 10 ye...	--	
Zoster Vaccine	Today	--	One-time o...	--	

Subjective/HPI

Font

Size

Review of Systems

Font

Size


Objective/Physical Exam

Font

Size

Assessment and Plan

MILLER, BETTY



MILLER, BETTY

Allergies: aspirin, penicillins

Care Team: <No Primary Contact>

DOB: 4/13/54

Dose Weight:

Loc: RC Family Pract

Age: 65

Isolation:

No Outside Records

Sex: Female

Resuscitation Status:

HealthLife: Yes

FIN: 000274150

Clinical Trials:

Advanced Dir: Living will

< > ▾

Provider View

Full screen

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0 minutes ago

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Home

Review Opioid Risks

The following details of MILLER, BETTY need to be evaluated prior to completion of this order

Concurrent opioid and benzodiazepine prescription

Alert Action:

☐ Cancel prescription

☐ Continue prescription

OK

Labs

No Res

OK

Diagnostics (0)

No Results Found

Pathology (0)

No Results Found

Microbiology (0)

No Results Found

Immunizations

View Forecast

Vaccine

Status

Adminis

Next

Renew

Cancel/DC

Complete

oxyCODONE-acetaminophen (Percocet 2.5/325 oral tablet)

1 tab, Oral, every 4 hr, PRN: as needed for pain, 0 Refill(s)

Last Dose

Source

Compliance

Compliance Comments

Order Date

Responsible Provider

Estimated Supply Remaining

Order Comments

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SUMMARY & LESSONS LEARNED

- Standards-based CDS knowledge artifacts are now available for all 12 recommendations in CDC guideline
- Pilot implementations have been successful to date
- Shareable CDS could reduce the time taken to develop, test and deploy CDS, expediting guideline adoption
- Local skills are still required for deployment, testing, and maintenance; should be reduced as approach matures
- Additional EHR capabilities are desired for optimal user experience (e.g., triggering based off of ordering workflow, 1-click execution of recommended actions)

FUTURE DIRECTIONS

- Pilot additional recommendations
- Pilot at additional clinical sites
- Support more production clinical deployments
- Evaluate impact
- Iteratively enhance resources based on feedback
 - Knowledge artifacts
 - Supporting resources (e.g., implementation manual, testing scripts)
- Contribute to maturation of underlying standards

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DISCLAIMER

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THANK YOU!

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DISCUSSION QUESTIONS

- Can you share anything your organization is engaged in that is similar?
- Do you see opportunities for this approach to be applied to your work and priorities?
- Where are the gaps in the standards, and how can we work to address these?