

CLINICAL GUIDANCE

The 2022 CDC opioid guideline in the record: from dose thresholds to decision support

ABSTRACT

The 2016 CDC opioid guideline was voluntary, but its numbers — 50 and 90 morphine milligram equivalents a day, three and seven days — were written into statutes, pharmacy claim edits and electronic health record alerts. The 2022 guideline moved dosage specifics out of its recommendation statements and said they must not be applied as inflexible standards. This paper traces that path and appraises what EHR interventions have been shown to do. Default quantities change prescribing in randomized and before-and-after studies; guideline-concordance decision support has rarely been tested against patient outcomes; and the MME on which dose rules depend varies with its definition.

Type Guideline and evidence review **References** 27 **Reading time** 15 min

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1 A voluntary guideline, executed as code

In March 2016 the Centers for Disease Control and Prevention published a guideline for prescribing opioids for chronic pain. It was addressed to primary care clinicians, called its recommendations “voluntary, rather than prescriptive standards”, and contained a few figures: 50 and 90 morphine milligram equivalents (MME) per day, 3 and 7 days, every 3 months.¹ Within three years those figures were in state statutes and Medicare pharmacy claim edits, and they were written into reference decision-support logic for electronic health records.

In November 2022 CDC replaced it. The new guideline covers acute, subacute and chronic pain, largely takes specific dosages and durations out of its recommendation statements, and says they “should not be applied as inflexible standards of care across patient populations”.² Software does not read a preamble. A rule that fires at 90 MME keeps firing after the document it came from has changed.

This paper follows the numbers into the record: how the 2016 thresholds became rules, what 2022 changed, and what EHR-based interventions have been shown to do. The short answer is uneven. Default quantities in the prescribing screen change what clinicians prescribe, in randomized as well as before-and-after studies. Guideline-concordance decision support has been widely built and rarely tested

against patient outcomes. The MME on which every dose rule depends is computed, and its value turns on definitions. And five of the 2022 recommendations sit in a category the guideline defines as requiring individual decisions, which a population rule cannot make.

5 of 12

2022 recommendations in category B: individual decision-making needed

+0.19 tablets

prescribed per one-tablet rise in the EHR default, in a randomized study

3.5–10.3%

California opioid patients classed “high dose”, depending on the MME definition

2 What the 2016 guideline said, and what it rested on

The 2016 guideline made 12 recommendations, 11 in category A and one, on urine drug testing, in category B, on evidence it graded from type 2 to type 4.¹ The dosage recommendation said clinicians “should carefully reassess evidence of individual benefits and risks when increasing dosage to ≥ 50 morphine milligram equivalents (MME)/day, and should avoid increasing dosage to ≥ 90 MME/day or carefully justify a decision to titrate dosage to ≥ 90 MME/day.” The acute-pain recommendation ended: “Three days or less will often be sufficient; more than seven days will rarely be needed.” Benefits and harms were to be re-evaluated “every 3 months or more frequently”, prescription drug monitoring program (PDMP) data reviewed “ranging from every prescription to every 3 months”, and urine testing considered “at least annually”.

Each figure came with a verb of judgment: reassess, carefully justify, often, rarely, consider. A number survives transcription into code; its verb usually does not.

A line drawn on a gradient

The dosage figures rest on observational dose–response data. In a Veterans Health Administration case-cohort study, Bohnert and colleagues compared 750 unintentional overdose decedents with a random sample of 154,684 patients treated with opioids for pain, 2004 to 2008.³ Against a maximum prescribed daily dose of 1 to less than 20 mg, a dose of 100 mg or more carried adjusted hazard ratios of 4.54 to 11.99 across four diagnostic subgroups, with approximate absolute risk differences of 0.14% to 0.45%; fatal overdose was estimated at 0.04% of treated patients. Risk rose with dose as a gradient, not a step. A threshold is a point chosen on that gradient, with large relative and small absolute differences on either side.

3 How the numbers left the guideline

Prescribing was already falling. An interrupted time-series analysis of national retail pharmacy data, 2012 to 2017, found the guideline's release associated with a steeper decline: the monthly fall in prescriptions at ≥ 90 MME/day went from 3.56 to 8.00 per 100,000 persons, and in the overall prescribing rate from 23.48 to 56.74.⁴ The study had no control population and was funded by CDC; it shows that declines steepened after the guideline's release, not that the guideline caused them or that patients were better off.

Into statute

A national legal review counted 26 states with mandatory limits on prescribing or dispensing opioids for acute pain by the end of 2017; 17 of the 26 were passed in 2017.⁵ The authors found no data on whether the laws affected opioid-related morbidity or mortality, or on unintended effects.

Tennessee enacted its own limits in 2018. Public Chapter 1039, codified at Tenn. Code Ann. § 63-1-164, bars a practitioner from treating a patient with more than a three-day supply of an opioid or more than 180 MME in total, subject to exceptions.⁶ In the 2025 edition of the code, which lists no amendment after 2024, a ten-day supply and 500 MME is permitted after documented steps that include recording the ICD-10 code for the primary disease in the chart and on the prescription, and a thirty-day supply and 1,200 MME in rare cases the statute defines, one route requiring the phrase “medical necessity” on the prescription. Exemptions include cancer treatment, palliative and hospice care, sickle cell disease, and pain management specialists as defined in § 63-1-301 where the patient is personally assessed; an exempt prescription must carry the ICD-10 code and the word “exempt”. These are statutory requirements on the prescription itself, untouched by the 2022 guideline.

Into the pharmacy claim

Medicare Part D added opioid safety alerts at dispensing from 1 January 2019.⁷ CMS's prescriber guidance describes a hard edit on more than a 7-day supply for opioid-naïve enrollees, those without a recent fill “such as within the past 60 days”; a care-coordination alert when cumulative dosage “reaches or exceeds 90 MME”; and an optional plan hard edit at 200 MME or more.⁸ Long-term care residents, hospice, palliative and end-of-life patients, and patients with cancer-related pain or sickle cell disease are exempt. By 2018 a majority of state Medicaid agencies reported having implemented the guideline in fee-for-service programs.⁹

Into the EHR

CDC and the Office of the National Coordinator for Health IT built computable logic for the 2016 recommendations, published in AHRQ's CDS Connect repository.¹⁰ The artifact for recommendation 5 is triggered when a provider prescribes an opioid, and its recommendation applies to “adults aged ≥ 18 years with chronic pain prescribed ≥ 50 MME per day of opioid medications for ≥ 80 days in the previous 90 days”, excluding active cancer treatment, palliative and end-of-life care. At 50 MME its card

reads “High risk for opioid overdose - consider tapering to <50 MME per day”; at 90 MME, “High risk for opioid overdose - taper now to <50 MME per day”. The page describes the artifact as in development and being piloted; how widely this logic was deployed is not established here.

The recommendation it encodes concerned increasing dosage, and its authors later wrote that the 90 MME statement “does not address or suggest discontinuation of opioids already prescribed at higher dosages”.⁹ A taper is not a discontinuation, and a card is not an order. But the code is more directive than the recommendation, and it fires for patients already on long-term therapy.

4 Misapplication, and what stopping costs

By 2019 the guideline’s authors were cataloguing misuse: “inflexible application of recommended dosage and duration thresholds”, policies encouraging “hard limits and abrupt tapering”, dismissal of patients, extension to cancer, surgical and sickle cell pain, and application of the thresholds to treatment for opioid use disorder.⁹ A multidisciplinary consensus panel added failure to involve patients in decisions to taper, and misapplication by policy and regulatory bodies “without flexibility”.¹¹ In April 2019 the Food and Drug Administration required labeling changes after reports of harm from sudden discontinuation, including serious withdrawal, uncontrolled pain, psychological distress and suicide.¹² It says no standard taper suits all patients, and gives a general increment of “no more than 10 percent to 25 percent every 2 to 4 weeks”: another number, as liable to become a rule.

The observational signal

Agnoli and colleagues used US claims data from 2008 to 2019 on 113,618 patients at stable doses of 50 MME/day or more, defining a taper as a relative dose reduction of at least 15%.¹³ Tapering periods had 9.3 overdose events per 100 person-years against 5.5, and 7.6 mental health crises against 3.3: adjusted incidence rate ratios of 1.68 (95% CI 1.53 to 1.85) and 2.28 (95% CI 1.96 to 2.65). Each 10% increase in the maximum monthly rate of reduction was associated with ratios of 1.09 for overdose (95% CI 1.07 to 1.11) and 1.18 for crisis (95% CI 1.14 to 1.21).

Oliva and colleagues followed 1,394,102 Veterans Health Administration patients with outpatient opioid prescriptions, October 2012 to September 2014; 2,887 died of overdose or suicide.¹⁴ Stopping was associated with higher hazard of death from overdose or suicide, rising with prior treatment length: 1.67 for 30 days or less, 2.80 for 31 to 90, 3.95 for 91 to 400, and 6.77 beyond 400. The abstract gives no confidence intervals.

The randomized signal

A randomized trial published online in July 2026 assigned 562 adults at 11 US sites, with pain for at least 6 months and at least 10 MME/day of opioids for at least 3 months, to a patient-centered taper alone or with cognitive behavioral therapy or a chronic pain self-management program.¹⁵ Success at 12 months, a dose reduction of at least 50% without increased pain or no increase with reduced pain, was reached by

50.9%, 48.6% and 44.5%; neither addition improved it (differences -2.4 , 95% CI -11.9 to 7.2 , and -5.2 , 95% CI -15.3 to 4.8 percentage points). Adverse events, including withdrawal symptoms, occurred in 66%, 54% and 64%. The Patient-Centered Outcomes Research Institute funded it, and COVID-19 reduced the sample and left the groups imbalanced.

WHAT THE TAPERING STUDIES DO AND DO NOT ESTABLISH

The overdose and mortality associations are observational, and confounding by indication is the obvious threat: doses are reduced or stopped because of the same warning signs that predict overdose. Oliva counted all discontinuations, including those after short courses; Agnoli counted reductions of 15% or more at higher doses. Neither evaluated an alert, a statute or a pharmacy edit, and nothing reviewed here links a specific EHR rule to an overdose. What they support is narrower: dose reduction and discontinuation are periods of measurable risk, associated with the speed of reduction.

5 What the 2022 guideline changed

The 2022 guideline, published 4 November 2022, applies to outpatients aged 18 or older and to clinicians providing pain care, not only primary care; it excludes pain related to sickle cell disease or cancer, and palliative and end-of-life care.² It says the recommendations are “not intended to be implemented as absolute limits” of policy or practice across populations by organizations, health systems or government, and names misapplications of 2016 that include “rigid application of opioid dosage thresholds”, rapid tapers and abrupt discontinuation, and “duration limits by insurers and pharmacies”.

The numbers were moved, not abolished. Specific dosages and durations “are generally not included in the summary recommendation statements”; more specific dosage considerations “have been moved to implementation considerations that follow each recommendation statement”; and the recommendation language was revised “to discourage the misapplication of opioid pain medication dosage thresholds as inflexible standards”.² To say the 2022 guideline eliminated MME thresholds misreads it; it demoted them from rule to consideration. The dosage recommendation now says to avoid increasing dosage “above levels likely to yield diminishing returns in benefits relative to risks to patients”. A separate tapering recommendation says that unless there are indications of a life-threatening issue such as warning signs of impending overdose, “opioid therapy should not be discontinued abruptly, and

clinicians should not rapidly reduce opioid dosages from higher dosages". The 3 and 7 days, the three-month review, the PDMP interval and the annual urine test are gone from the recommendation statements.

TABLE 1

Numeric content of five recommendations, 2016 and 2022, quoted or closely paraphrased, with category and evidence type where confirmed.

Topic	2016 ¹	2022 ²
Dosage	Reassess at ≥ 50 MME/day; avoid ≥ 90 or carefully justify (A)	Lowest effective dosage; avoid increases likely to yield diminishing returns (Rec. 4; A, type 3)
Acute pain	3 days or less often sufficient; more than 7 rarely needed (A)	No more than needed for the expected duration of pain severe enough to require opioids (Rec. 6; A, type 4)
Re-evaluation	1 to 4 weeks after starting or dose escalation; every 3 months or more often	1 to 4 weeks after starting or escalating; regularly thereafter (Rec. 7; A, type 4)
Tapering	Within re-evaluation: taper if benefits do not outweigh harms	No abrupt discontinuation or rapid reduction from higher dosages absent warning signs (Rec. 5; B, type 4)
PDMP, toxicology	PDMP every prescription to every 3 months; urine test before starting, considered at least annually	PDMP at initiation and periodically (Rec. 9; B, type 4); weigh testing (Rec. 10; B, type 4)

Category B cannot be a population rule

Category A "applies to all persons; most patients should receive the recommended course of action". Category B means "individual decision-making needed; different choices will be appropriate for different patients".² Five of the 12 are category B: nonopioid therapy for acute pain, tapering, PDMP review, toxicology testing and concurrent benzodiazepines. Seven rest on type 4 evidence, the lowest grade; only the recommendation on medications for opioid use disorder rests on type 1. A rule that fires identically for every patient implements a category B recommendation as category A, the substitution the guideline was rewritten to prevent.

As of September 2026 the 2022 guideline is current: CDC presents it without notice of revision on a page updated in May 2024,¹⁶ and CMS's Part D opioid page, modified in July 2026, links it beside the edits described above.⁷

6 Defaults work, which is why they need an owner

The EHR intervention with the clearest evidence is the least visible: the quantity pre-filled in the prescribing screen. Delgado and colleagues set a 10-tablet default for oxycodone–acetaminophen in two Philadelphia emergency departments, staggering the start so that one briefly served as control.¹⁷ Across

3,264 prescriptions, the share written for 10 tablets rose from 20.6% to 43.3%; in the first four weeks, relative to the control department, by 27.8 percentage points (95% CI 17.4 to 37.5).

Montoy and colleagues randomized the default itself. In two urban emergency departments, without announcement and in a series of five four-week blocks, the pre-populated quantity was changed from the status quo of 12 and 20 tablets to none, 5, 10 or 15 tablets under a block-randomization scheme.¹⁸ Across 4,320 prescriptions by 104 clinicians, who could change the quantity freely, each one-tablet rise in the default added 0.19 tablets (95% CI 0.15 to 0.22). Chiu and colleagues lowered a multihospital system's discharge default from 30 to 12 pills after its ten most common operations.¹⁹ Prescriptions for 12 pills rose from 2.1% (29 of 1,397) to 24.6% (349 of 1,420), the median fell from 30 to 20, and regression estimated -5.22 pills (95% CI -6.12 to -4.32) and -34.41 MME per prescription, with no significant difference in refills.

These studies measured quantities, not pain, function or overdose, and two are before-and-after designs. They show that a default is followed often enough to shift the distribution, in proportion to its value. That is the case for defaults and for governing them: a default is a clinical decision made once, by whoever configured the system, for every patient it touches. If it encodes a 2016 figure the 2022 guideline has since moved, it will go on encoding it, quietly and effectively, until someone changes it.

7 Decision support: widely built, rarely tested against outcomes

Concordance decision support is far more common than evidence about it. A scoping review of such systems for chronic non-cancer pain in primary care screened 5,068 records from 2008 to October 2019 and found 14 studies, all in the United States: 6 of locally built tools and 8 of PDMP-based tools.²⁰ Three incorporated evidence-based components. None assessed patient health outcomes.

The trials mostly put electronic tools in the comparison arm. In the TOPCARE cluster-randomized trial, 53 clinicians in 4 safety-net practices, with 985 patients on long-term opioid therapy, were randomized; controls received electronic decision tools alone.²¹ With nurse care management, a registry and academic detailing added, 65.9% of intervention patients received guideline-concordant care at one year against 37.8% of controls (adjusted OR 6.0, 95% CI 3.6 to 10.2), and mean daily dose was 6.8 mg lower than in controls, but early refills, the trial's misuse marker, did not differ: 20.7% against 20.1% (adjusted OR 1.1, 95% CI 0.7 to 1.8). In a stepped-wedge trial in 35 Louisiana primary care clinics with 632 patients analyzed, every arm had EHR decision support that prompted risk screening and displayed daily MME.²² Adding a behavioral health team did not significantly change the probability of a dose of 50 MME/day or more (difference-in-differences -0.036 , 95% CI -0.089 to 0.016), though average dose fell faster and guideline adherence improved.

The one randomized evaluation reviewed here that reported mortality tested something else. The Veterans Health Administration's STORM dashboard used a predictive model to identify patients with active opioid prescriptions at high predicted risk of overdose- or suicide-related events, and a 2018

national notice mandated interdisciplinary case review for them.²³ Across all 140 VHA medical centers and 44,042 patients, the primary outcomes, nine serious adverse events within 127 days of the high-risk designation, did not change significantly; in an exploratory analysis over the same window, the odds of all-cause mortality were 0.78 (95% CI 0.65 to 0.94) in the intervention condition. The intervention was review by people, targeted by data, not an alert at the point of prescribing.

TABLE 2

EHR-based interventions in opioid prescribing: what was changed and what was measured.

Study	Design	Intervention	Principal finding
Delgado 2018 ¹⁷	Before-after, staggered control	10-tablet default	10-tablet share 20.6% to 43.3%
Montoy 2020 ¹⁸	Block-randomized defaults	Defaults of none, 5, 10, 15 tablets vs status quo 12 and 20	+0.19 tablets per default tablet
Chiu 2018 ¹⁹	Before-after, one system	Default 30 to 12 pills	−5.22 pills per prescription
Liebschutz 2017 ²¹	Cluster RCT	Care management vs electronic tools alone	Concordant care higher than control; early refills no different
Price-Haywood 2024 ²²	Stepped-wedge	Behavioral health team vs decision support alone	No significant change at ≥50 MME/day
Strombotne 2023 ²³	Stepped-wedge	Risk model plus mandated case review	Serious adverse events unchanged; exploratory all-cause mortality OR 0.78

CDC now points implementers to an Opioid Prescribing Support implementation guide built on HL7 FHIR and says most EHR vendors support its tools.²⁴ Its current continuous build identifies itself as implementing the 2022 guideline, version 2022.1.0.²⁵ What the logic does in a given installation depends on the version installed. The guideline changed in 2022; logic installed before then does not change with it.

8 MME is computed, and the computation is a choice

An MME is not observed. It is calculated from a conversion factor, strength, quantity and days' supply, and summed across overlapping prescriptions. Dasgupta and colleagues found four distinct definitions of daily MME in the literature and in electronic prescribing tools, and noted that the “CDC definition” lacks a clearly defined denominator.²⁶ Applied to PDMP records for 3,916,461 patients and 9,436,640 prescriptions in California and Florida, the definitions produced average daily MME varying about threefold. The share classed as above 90 MME/day ranged from 3.5% to 10.3% in California and 5.9% to 14.2% in Florida, depending only on the definition.

Conversion factors add their own spread. In a convenience survey of 319 physicians, pharmacists, nurse practitioners and physician assistants, methadone 40 mg was converted to a mean of 193 mg morphine equivalent with a standard deviation of 201, and transdermal fentanyl at 75 mcg/hour to 176 mg with a standard deviation of 117.²⁷ CDC's implementation guide cautions that equianalgesic conversions “are only estimates”, that a calculated MME should not be used to convert one opioid to another, and that methadone and transdermal fentanyl need particular care.²⁵

The same patient can cross 90 MME in one system and not another: a state PDMP, a Part D claims edit and an EHR each compute MME their own way, and none is obliged to say how.

WHAT A DISPLAYED MME IS NOT

It is not a dose to convert to, by CDC's own caution. It is not a risk score: the dose–response data behind the thresholds show a gradient with small absolute differences, measured under definitions that may not match the one on the screen. And it is not portable: a figure from one system cannot be compared with one from another without knowing both definitions.

9 What survives, and what would settle it

Five statements are supported here. The 2016 figures became statute and payer edits within three years, and reference decision-support logic, some of it more directive than the text it encoded.^{5,8,10} The 2022 guideline demoted those figures from its recommendations, while statutes such as Tennessee's and Medicare's pharmacy edits remain in force.^{2,6,8} EHR defaults change quantities prescribed, in proportion to their value.^{17,18,19} Concordance decision support has rarely been evaluated against patient outcomes, and the interventions that moved process measures, or mortality in one exploratory analysis, combined data with human review.^{20,21,23} And the definition of MME changes who crosses a threshold.²⁶

Properties follow for any system that computes or displays opioid dosage. A rule should carry its source and version. What binds and what advises should look different: a statute, a payer edit and a guideline consideration are different objects. A category B recommendation should be implemented as information and a documented decision, not a block. The MME definition, denominator and conversion table included, should be stated wherever the number appears. Defaults need a named owner, a recorded rationale, a review date and a measured effect. And because risk in the observational data tracks the speed of dose reduction,¹³ a system that can see dose changes over time is in a position to show them.

What would settle the larger question does not yet exist in the material reviewed: randomized evaluations of concordance decision support against pain, function, overdose and death rather than concordance; studies of prescribing and harm after 2022, including where rules were never updated; and one stated definition of daily MME. Until then the best-supported claim is the least glamorous: the number pre-filled in the box is a policy, and it works.

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Entries 1 and 2, the 2016 and 2022 CDC guidelines, are the documents whose text the paper traces; entries 6, 7, 8 and 12 are statute, payer policy and a regulatory communication, and entries 10, 16, 24 and 25 are agency web pages and technical artifacts, cited for what they say rather than as evidence. The argument about EHR interventions rests on the randomized studies in entries 18, 21, 22 and 23 and the before-and-after studies in entries 17 and 19; the tapering associations rest on the cohorts in entries 13 and 14, and entry 15 is a trial published online in July 2026. Entry 4 was funded by CDC, entries 9 and 11 are commentary and consensus rather than data, and entry 27 is a convenience-sample survey. For entries 3, 18, 19 and 21 only the first page was confirmed, and entry 6 was checked against the 2025 edition of the code; legislation from 2026 was not reviewed.

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