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Tapering or Discontinuing Opioid Use Among Patients With Chronic Noncancer Pain: Update Report

Participant Request

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Overview

As state Medicaid and public health program administrators develop approaches to encourage tapering and discontinuing opioid medications, they need up-to-date information on the benefits and harms of these practices. A 2017 Medicaid Evidence-based Decisions Project (MED) report on this topic concluded that there was limited evidence on harms associated with tapering strategies, and the findings suggested that pain, function, and quality of life might improve during and after opioid discontinuation or dose reduction.¹ Confidence in these findings was limited by the overall very low quality of evidence.¹

This MED report updates the clinical evidence section of the previous report and synthesizes evidence on patient-initiated versus non-patient-initiated opioid tapering and discontinuation. Center researchers identified 9 new observational studies, all of poor methodological quality; the studies' findings were consistent with previous evidence.

Key Findings

- We identified 9 observational studies published since the last MED report:
 - 4 studies of individualized tapering developed by health care providers in partnership with patients
 - 2 studies of multidisciplinary pain programs
 - 2 studies in a cohort of patients with and without substance use disorders (SUD) whose clinicians had discontinued their opioid therapy
 - 1 study of a health plan-initiated dose reduction and risk mitigation program
- We rated all the newer studies as having poor methodological quality.
- The new evidence was consistent with previous evidence and did not raise the overall quality of the evidence ratings from very low for any of the following outcomes:
 - Reduction in morphine milligram equivalents (MME)
 - Pain and function
 - Adverse events
- A study using U.S. Department of Veterans Affairs (VA) data of patients who underwent clinician-initiated opioid discontinuation (primarily for aberrant behaviors) found that self-identified Hispanic ethnicity, posttraumatic stress disorder (PTSD) diagnosis, and psychotic-spectrum disorder diagnoses were correlated with suicidal ideation and self-harm in the 12 months after clinician-initiated opioid discontinuation.
- Other new studies did not report information on serious adverse events such as mortality, suicide, or overdose events.
- One newer study reported no differences in pain outcomes for patient-initiated or clinician-initiated opioid discontinuation 12 months after discontinuation.
- We were not able to draw any conclusions regarding rapid versus slow tapering.

Background

Opioids are frequently prescribed to treat chronic noncancer pain, but there is a lack of evidence for their effectiveness.² A systematic review conducted in 2015 found insufficient evidence to determine the effectiveness of long-term opioid therapy for improving pain and function.²

Opioids have not been shown to be superior to nonopioid analgesics in head-to-head trials of up to 4 weeks' duration in terms of efficacy, safety, or tolerability.³ A 2017 MED report found that for multiple indications including chronic noncancer pain, nonopioid analgesics were not significantly different or were significantly better than opioids for relieving pain.⁴ According to the Centers for Disease Control and Prevention (CDC), there were more than 22,000 deaths from prescription opioids in 2015.⁵ In light of this evidence, and in an attempt to stem the opioid epidemic, clinical practice guidelines recommend tapering and discontinuing opioid therapy for patients with chronic noncancer pain whenever possible.⁶⁻⁸

Key Questions

What is the evidence for the effectiveness and harms of various strategies for tapering or discontinuing opioids among adult patients with chronic noncancer pain? Do the effectiveness or harms of these strategies vary by the following:

- a. Medication type or dosing level (e.g., particular agent, long- vs. short-acting formulation, single-drug vs. combination agent)
- b. MME at the time of taper initiation or discontinuation
- c. Population characteristics (e.g., diagnosis, length of time of opioid use, age, gender, comorbidities, social status, other drugs/medications (e.g., benzodiazepines, cannabinoids))
- d. Patient initiated vs. non-patient initiated
- e. Tapering supports (e.g., behavioral interventions, additional therapeutic modalities including pain education, other medications)
- f. Rapid vs. slow tapering

PICO

Population

- Adult patients (18 years and older) using opioids for chronic (6 months or longer) noncancer pain

Interventions

- Interventions to taper opioid dose or discontinue opioid treatment

Comparators

- No tapering
- Different opioid discontinuation or tapering strategies (head-to-head comparisons)
- No comparison

Effectiveness and Harms Outcomes

- Opioid abstinence (successful discontinuation)

- Dose reduction as a percentage of MME (a measure of success with tapering)
- Self-reported pain
- Self-reported quality of life
- Self-reported function
- Mortality (including suicide, accidental overdose, other causes)
- Adverse events (e.g., overdose)

Study Designs

- Any interventional study, with or without a comparison group

Methods

We searched Ovid MEDLINE for new studies, starting from the beginning of 2017. We excluded studies involving only patients who were incarcerated or under court order related to opioid use, and studies with interventions that were not FDA-approved (e.g., cannabis). For adverse event outcomes, we reported any event that was found to be statistically significantly different between groups or had at least a 10% difference between groups. We also contacted the first author of the Frank et al.⁹ systematic review to ask if there were additional studies their group had located as they looked to update their work.

Findings

Previous MED Report

The previous MED report was based on a good-quality systematic review conducted by Frank et al.⁹ The systematic review included 67 studies (11 RCTs and 56 observational studies) and categorized the interventions into 8 types:

- 1) Interdisciplinary pain programs (31 studies), defined as “intensive multimodal treatment with an interdisciplinary team, typically organized around a biopsychosocial model of chronic pain”
- 2) Buprenorphine-assisted dose reduction (10 studies)
- 3) Behavioral interventions (6 studies), such as cognitive behavioral therapy, meditation, motivational interviewing, and self-management education
- 4) Detoxification with pharmacological support from drugs such as clonidine and benzodiazepines to manage withdrawal symptoms (4 studies)
- 5) Interventions requiring an inpatient procedure such as rapid discontinuation with lidocaine infusion or anesthesia (4 studies)
- 6) Ketamine-assisted dose reduction (4 studies)
- 7) Acupuncture (3 studies)
- 8) Other outpatient programs that did not fit into other categories (5 studies)⁹

Frank et al. identified 40 studies that reported the effect of dose reduction or discontinuation of long-term opioid therapy on patient outcomes, including pain, function, quality of life, opioid

withdrawal, substance use, and adverse events.⁹ No study was rated as having good methodological quality, and Frank et al. downgraded the overall quality of evidence to very low for each of these outcomes using the GRADE framework.⁹ Frank et al. also rated the overall quality of evidence as very low for effectiveness of strategies to reduce or discontinue opioids, based on serious risk of bias and indirectness.⁹

From the Frank et al. review and 1 additional poor-methodological-quality observational study, the previous MED report concluded that there was scant evidence on harms associated with tapering strategies, and the findings suggested that pain, function, and quality of life might improve during and after opioid discontinuation or dose reduction.¹ The confidence in these findings was limited by the very low quality of evidence overall.¹

Overview of New Studies

We did not identify any systematic reviews or RCTs published since the end date of the searches in the last report. We included 9 observational studies published since the last MED report.¹⁰⁻¹⁸ Details of the design, population characteristics, interventions, and results of the new studies are in Appendix B. Four studies (2 of interdisciplinary pain clinics, 1 of an interdisciplinary chart review, and 1 of clinician-initiated discontinuation) used a single-arm, before-after design with no control group.^{10,13,15,17} Two studies compared patients who were offered, but did not participate in, a primary care-guided tapering intervention to those who did receive the intervention.^{14,16} One study conducted at an outpatient interdisciplinary pain clinic compared changes over time in patients with chronic pain who were using opioids at baseline to those who did not use opioids,¹² and one compared patients enrolled in a health plan that initiated an opioid dose reduction initiative to patients from a different health plan who received usual care.¹⁸ One case-control study used a VA database to identify patients whose clinicians had discontinued their opioid medications, and compared patients with suicidal ideation or self-harm in the 12 months after discontinuation to patients who did not have such behaviors on various clinical and patient factors.¹¹

All but one study (conducted at a pain clinic in central London) took place in the United States.¹³ Six interventions were conducted in primary care settings,^{11,14-18} including 4 in VA clinics.^{11,15-17} Two studies were conducted in outpatient pain clinics^{10,12} and 1 in a residential pain treatment program.¹³ Six studies were conducted at single centers.^{10,12-14,16,17}

Methodological Quality of New Studies

We rated all 9 of the new studies as poor methodological quality (Appendix B, column 1). We rated 5 studies as poor quality because they had no control group.^{10,11,13,15,17} We rated the others as poor quality because of a combination of serious methodological flaws including differences between groups at baseline,^{12,14,16,18} lack of control for confounding,^{14,16} unblinded outcome assessment,^{16,18} very high loss to follow-up (e.g., 58% at 6 months in the study by Gilliam et al.¹² and 38% in the study by Darnall et al.¹⁰), or a very low response rate (e.g., 39.7% in the intervention group in the Thakral et al. study¹⁸).

Reduction in MME and Opioid Discontinuation Rates

The systematic review by Frank et al. included 67 studies that reported the effectiveness of strategies to reduce or discontinue long-term opioid treatment (3 good methodological quality, 13 fair, 51 poor).⁹ The studies were heterogeneous with regard to patient populations, study completion, and rates of opioid reduction and discontinuation.⁹ Although rates of successful discontinuation of opioids differed across intervention categories, the review authors could not make conclusions about the comparative effectiveness of different interventions given this heterogeneity.¹ The reviewers rated the overall quality of the evidence for these outcomes very low using the GRADE framework, downgrading the rating because of serious risk of bias and indirectness.⁹

Four of the 9 studies reported a statistically significant reduction in MME from baseline to follow-up.^{10,12,13,16} Two of these studies reported results only for the subset of patients that completed the study (62% of patients in the Darnell et al. study provided 4-month follow-up data¹⁰ and 42% of patients in the Gilliam et al. study provided 6-month follow-up data¹²). One small study of 32 patients did not find a reduction in MME after initiation of a structured monitoring plan of unspecified duration in a rural primary care office,¹⁴ and another study reported dose reductions in some patients, but not patients on the highest doses (1,000 mg or higher).¹⁷ Two studies reported different analyses of a VA patient population that had discontinued long-term opioid therapy, either clinician-initiated or a mix of clinician- and patient-initiated.^{11,15} Reduction in mean MME was not assessed in the health system initiative study or in the VA database studies.^{11,15,18} In the study by Oldfield et al., patients in the intervention group were more likely to have a trial of buprenorphine (62% vs. 2%, $P < 0.01$) and had greater reductions in MME than patients in the control group: 30 mg (interquartile range [IQR] 0–120) vs. 0 mg (IQR 0–20 decrease, $P < 0.01$).¹⁶ Overall, the new evidence is consistent with previous evidence and does not change the rating of the quality of the evidence, which remains very low.

Pain and Function

In the systematic review conducted by Frank et al., 8 of 8 fair-quality studies that measured pain severity reported improved pain.⁹ Of 28 poor-quality studies, 21 reported improved pain, 4 reported no change, and 3 reported worse pain.⁹ Five of 5 fair-quality studies reported improved function.⁹ Of 12 poor-quality studies, 8 reported improved function, 2 reported no change, and 2 reported decreased function.⁹ Using the GRADE framework, the reviewers rated the overall quality of the evidence very low quality because of serious risk of bias in the individual studies.⁹

The new studies we identified for this update had findings that were consistent with the previous evidence. Six studies assessed self-reported pain using numeric scales or surveys or assessed function using self-reporting or provider-delivered tests such as the 6-minute walk test.^{10,12-15,18} No study found an increase in pain or decreased function after the interventions; all of the studies found either decreased pain or no change compared to baseline.^{10,12-15,18} For example, McPherson et al. found that for all patients, on average, pain intensity scores

decreased by one-tenth of a point per month in the 12 months after opioid discontinuation.¹⁵ Because these studies had a high risk of bias, the overall strength of the evidence remains very low for pain and function outcomes.

Adverse Events

Mortality, Suicide, or Overdose

Only 11 studies included in the systematic review by Frank et al. (all poor methodological quality) assessed adverse events.⁹ Five of the 11 assessed mortality, and 1 opioid-related overdose death was reported in 1 study of an outpatient program that offered buprenorphine-assisted dose reduction.⁹ The overdose death occurred several months after the patient discontinued buprenorphine.⁹

A retrospective cohort study conducted in a VA population whose opioid therapy was discontinued by their clinician (primarily for aberrant behaviors) reported that 12% of the cohort had documented suicidal ideation and nonfatal suicidal self-directed violence (SSV) in the 12 months after opioid discontinuation.¹¹ This study identified Hispanic ethnicity (adjusted odds ratio [OR] 7.25 (95% CI 1.96–27.18), PTSD diagnosis: 2.56 (1.23–5.32), and psychotic-spectrum disorder diagnoses (OR 3.19; 95% CI 1.14 to 8.89) were correlated with suicidal ideation and SSV in the 12 months following clinician-initiated opioid discontinuation.¹¹ Other clinical and patient factors were not statistically significant in the models.¹¹

None of the other new studies we identified for this update assessed or provided any information on mortality, suicide, or overdose outcomes.

Opioid Withdrawal Symptoms

In the systematic review by Frank et al., 18 studies (3 fair and 15 poor methodological quality) reported opioid withdrawal symptoms.⁹ Rates of withdrawal symptoms ranged widely across the studies (0% to 100%).⁹ In 4 studies, all patients reported withdrawal symptoms.⁹ Frank et al. rated the overall quality of the evidence for this outcome as very low quality using the GRADE framework, downgrading the evidence for serious risk of bias and inconsistency.⁹

The new studies we identified for this update did not provide information on withdrawal symptoms experienced by patients receiving the interventions.

Subgroup Analyses

Differences in Outcomes Based on Opioid Type or MME at Baseline

The previous MED report concluded that there was inadequate reporting and analysis to evaluate differences in the effectiveness or harms of tapering or discontinuation of opioid therapy based on the type of opioid (long- vs. short-acting), number of opioids prescribed, or total MME.¹

The newer studies contained little additional information. In the VA database study, average MME at baseline did not correlate with pain score trajectories in the 12 months after opioid

discontinuation in an adjusted analysis, although pain score prior to discontinuation did correlate with pain at a year after discontinuation.¹⁵ McCann et al. reported that patients who elected to wean off their opioid medication had a statistically lower initial MME, but the study authors did not analyze results by initial MME in the group that attempted to taper.¹⁴ Darnell et al. found that the likelihood of patients voluntarily decreasing their dose by more than 50% was not predicted by their starting dose.¹⁰ Similarly, Gilliam et al. reported that additional stratification by low-dose (< 50 mg MME) versus high-dose (\geq 50 mg MME) groups did not alter the interpretation of the results, and therefore analyses were conducted comparing the broader categories of opioid and nonopioid use groups.¹²

Patient-Initiated Versus Non-patient-Initiated Tapering or Discontinuation

Policymakers and clinicians are interested in information on the effect of tapering when it is not initiated by the patient (i.e., mandatory or provider-initiated dose reductions or restrictions on opioid prescribing), but we found very little information on this issue. In almost all of the studies included in the previous MED report and in this update, patients had some autonomy in the decision to taper their opioids. We excluded studies in patients who were incarcerated or under court order, populations that might undergo involuntary dose reductions or discontinuation.

One study included in the systematic review by Frank et al. concerned tapering via a 120 mg MME opioid dose limitation policy at an academic primary care clinic.¹⁹ However, 63% of patients on high doses (defined as >120 mg MME per day for 4 months or longer) did not actually reduce their dose below 120 mg MME after the policy's initiation.¹⁹

The VA database studies provide some new information related to clinician-initiated opioid discontinuation.^{11,15} McPherson et al. found that, in adjusted analyses, the reason for discontinuation (patient-initiated vs. clinician-initiated) was not correlated with pain score trajectory.¹⁵ Demidenko et al. excluded patients who initiated discontinuation of their opioid therapy (n = 91; 15.2%), and so this study did not provide comparative evidence about patient-initiated versus clinician-initiated discontinuation on suicidal ideation or SSV outcomes.¹¹ Approximately 75% of the clinician-discontinued patient group in the Demidenko et al.¹⁵ study had opioids stopped because of aberrant behaviors such as abnormal urine drug test results, opioid diversion, and drug misuse. Of the total sample of 509 patients, 59 had suicidal ideation or SSV documented in their charts; 47 had suicidal ideation alone, and 12 had SSV.¹⁵ Half of these patients attempted suicide with overdoses of prescription medications, primarily benzodiazepine drugs.¹⁵ Fifteen of the 59 patients had previous suicidal ideation or SSV events before discontinuation of opioid therapy.¹⁵

We identified 1 new study that compared mandatory opioid dose reduction in a health system in Washington to usual care.¹⁸ In 2007, the health system initiated a dosing threshold of 120 mg MME per day and providers with patients over this threshold were given supervisory guidance by medical directors.¹⁸ In 2010, the health system added risk mitigation strategies including a risk-stratified schedule for frequency of urine drug screening and follow-up visits, treatment

contracts, care plans, modified refill processes, an online continuing education course for providers, care practice tools integrated into electronic medical records, and on-site resources for consultation.¹⁸ Patients from clinics that were not affiliated with the health plan but that accepted the health plan's insurance served as a usual care control group (n = 653).¹⁸ Patient-reported pain outcomes, including depression, were collected through interviews conducted in 2014 and 2015.¹⁸ The researchers found no indication that patients in the intervention clinics had clinically meaningful differences in pain intensity, interference with activities and enjoyment of life, or depressive symptoms compared with control group patients.¹⁸ We rated this study as poor methodological quality based on differences between the comparison groups at baseline that were not controlled for in analyses, unblinded outcome assessment, and a very low response rate to the interviews (37.5% in the intervention group and 27.8% in the control group).¹⁸

Differences in Outcomes Based on Population Characteristics

The previous MED report found that there was insufficient evidence to evaluate differences in outcomes based on type of chronic pain diagnosis, length of time of opioid use, age, gender, comorbidities, social status, or use of other drugs or medications.¹

The new studies we identified for this update either did not analyze outcomes according to population characteristics, or did not find differences in outcomes based on population characteristics. Darnall et al. found that the likelihood of a greater than 50% opioid dose reduction was not predicted by baseline pain intensity, years prescribed opioids, or any psychosocial variable.¹⁰ Guildford et al. found that demographic and pain variables did not correlate with changes in medication use.¹³ Three additional studies were conducted exclusively within the VA system.^{11,15,16} The other studies did not report subgroup analyses by population characteristics.

Tapering Supports

The systematic review by Frank et al. found that buprenorphine-assisted dose reduction and other detoxification programs using nonopioid drugs to support tapering showed as many as 90% of patients discontinuing opioids, whereas only 20% to 21% of patients discontinued opioids with other outpatient programs and behavioral interventions.⁹ The authors of the previous MED report concluded that, because there was heterogeneity across interventions in regard to method, duration, route, dose, and frequency, and the studies lacked long-term follow-up and were of poor methodological quality, the data did not support assessment of comparative effectiveness of different models of care or opioid-tapering protocols.¹

The new studies we identified for this update included a wide range of interventions, from an intensive, residential multidisciplinary pain program,¹³ to individualized tapering developed in consultation with primary care providers,¹⁴ to a health-systemwide multifaceted risk reduction intervention.¹⁸ Because the studies were heterogeneous and were of poor methodological

quality, it is not possible to draw conclusions from this body of evidence about which tapering supports are more effective or safer than others.

Rapid Versus Slow Tapering

The previous report identified no evidence comparing rapid versus slower tapering or discontinuation.¹ The systematic review by Frank et al. reported that 7 of 8 fair-quality observational studies that evaluated patient outcomes were considered rapid tapering programs (conducted over 3 to 6 weeks).⁹ They noted that these programs used intensive, multidisciplinary teams and were likely to have different outcomes than programs conducted in outpatient settings with less support.⁹

In a new study identified for this update, patients were given the option of a slow taper or rotation to buprenorphine.¹⁶ The pace of tapering was flexible and developed with patient input, but generally started at a reduction of 5% of total daily dose every 2 to 4 weeks.¹⁶ Of 66 veterans who engaged in the Opioid Reassessment Clinic, 24 (37%) opted for the slow taper.¹⁶ Results were not presented by slow versus rapid tapering groups.¹⁶

The intervention in the study by Darnall et al. was a slow, individually designed taper conducted over 4 months.¹⁰ In the interdisciplinary pain program described in Gilliam et al., tapering occurred over a mean of 10 days for patients receiving less than 100 mg MME, but could be slower for patients with a longer duration of opioid use (more than 2 years).¹² Response was monitored and adjusted as needed.¹²

Summary and Discussion

The previous MED report found very low-quality evidence that several types of interventions could be effective to reduce or discontinue long-term opioid therapy and that pain, function, and quality of life might improve with opioid dose reduction.¹ Although many studies reported positive dose-reduction outcomes, the systematic review by Frank et al. rated the overall quality of the evidence as very low for the effectiveness of all interventions to reduce or discontinue long-term opioid therapy because of methodological limitations across studies and an absence of adequately powered randomized trials.⁹

We identified 9 new studies published since the last report; these studies' findings for most outcomes were consistent with previous evidence. Because of their poor methodological quality, the new evidence does not change the rating of the overall quality of the evidence. Importantly, the preponderance of evidence from both the systematic review by Frank et al.⁹ and more recent studies indicates that tapering or discontinuation of opioid therapy is not associated with increased pain, and may be associated with reduced pain and improved functional outcomes. One study conducted within the VA did identify suicide risk among a group of patients with clinician-initiated discontinuation of opioid therapy.¹¹ However, this study was also of poor methodological quality and the overall strength of evidence for this finding is very low.

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Appendix A. Clinical Evidence Methods

Search Strategy

We searched Ovid MEDLINE to identify systematic reviews (with and without meta-analyses), technology assessments, randomized controlled trials (RCTs), and observational studies that met the report scope using multiple terms for opioid medications, pain, and tapering or discontinuation. We limited searches to citations published after 2016. The full Ovid MEDLINE search strategy is listed below. We also contacted the lead author of the systematic review by Frank et al.⁹ to ask whether they were aware of additional studies published since their review was completed.

Ovid MEDLINE Search Strategy

Database: Ovid MEDLINE(R) <1946 to September Week 1 2018>

- 1 (exp analgesics, opioid/ or codeine/ or hydrocodone/ or morphine/ or oxycodone/) and tu.xs. (65432)
- 2 (Opioid* or opiate* or codeine or clonidine or morphine or hydrocodone or oxycodone).tw,kf,rn. (134935)
- 3 ((pain/ or exp musculoskeletal pain/ or exp back pain/ or exp chronic pain/ or exp facial pain/ or exp headache/ or metatarsalgia/ or neck pain/ or exp neuralgia/ or exp nociceptive pain/ or pain, intractable/ or pain, referred/ or exp arthralgia/ or eye pain/ or flank pain/ or glossalgia/ or exp headache/ or exp pelvic pain/ or shoulder pain/) and dt.fs.) or "Pain Measurement"/ or Pain Threshold/ (129672)
- 4 pain.tw,kf,rn. (472472)
- 5 1 or 2 (159888)
- 6 3 or 4 (505637)
- 7 5 and 6 (45764)
- 8 (Taper* or wean* or (dose* adj1 reduc*) or detox* or withdraw* or discontinuat* or cessation or tolerance or conversion or substitution).tw,kf,rn. (702531)
- 9 7 and 8 (5906)
- 10 limit 9 to (english language and humans) (3262)
- 11 limit 10 to yr="2017 -Current" (241)

Inclusion Criteria

Any study design

Exclusion Criteria

We excluded studies if they were not published in English and studies involving only patients who were incarcerated or under court order related to opioid use and studies of interventions that were not FDA approved (e.g., cannabis).

Quality Assessment

We assessed the methodological quality of the included systematic reviews and cohort studies using standard instruments developed and adapted by MED that are modifications of instruments used by several respected organizations.²⁰⁻²⁵ One experienced researcher independently rated the methodological quality of included studies.

Systematic Reviews

If a meta-analysis or network meta-analysis was conducted, the methodological quality of the analyses was considered in the overall rating for the systematic review. In brief, good-quality systematic reviews include a clearly focused question, a literature search sufficiently rigorous to identify all relevant studies, criteria used to assess study quality and select studies for inclusion (e.g., randomized controlled trials), and assessment of similarities between studies to determine whether combining them is appropriate for evidence synthesis. Fair-quality systematic reviews have incomplete information about methods that might mask important limitations or a meaningful conflict of interest. Poor-quality systematic reviews have clear flaws that could introduce significant bias.

Quasi-experimental Studies

Good-quality quasi-experimental studies have a control group that is unexposed to the intervention being studied; methods are in place to prevent contamination bias; pre- and post-measures are done concurrently; and participant characteristics are balanced between groups or controlled for by propensity scores and/or statistical adjustment. Fair-quality quasi-experimental studies have incomplete information about methods that might mask important limitations, a meaningful conflict of interest, or are at risk for contamination bias. Poor-quality quasi-experimental studies do not have a control group (i.e., before and after studies or interrupted time series) or have other clear flaws that could introduce significant bias.

Cohort Studies

Good-quality cohort studies include a sample that is representative of the source population, have low loss to follow-up, and measure and consider relevant confounding factors. Good-quality cohort studies also list their funding source(s) and have a low potential of bias from conflicts of interest. Fair-quality cohort studies might not have measured all relevant confounding factors or adjusted for them in statistical analyses, have loss to follow-up that could bias findings, consist of a sample that is not representative of the source population, or have potential conflicts of interest that are not addressed. Poor-quality cohort studies have a clear, high risk of bias that would affect findings.

Quality of Evidence Assessment

Overall Quality of Evidence

We assigned each outcome a summary judgment for the overall quality of evidence based on the system developed by the Grading of Recommendations, Assessment, Development, and Evaluation Working Group (GRADE).^{26,27} The GRADE system defines the overall quality of a body of evidence for an outcome in the following manner:

- **High:** Raters are very confident that the estimate of the effect of the intervention on the outcome lies close to the true effect. Typical sets of studies are randomized controlled trials with few or no limitations, and the estimate of effect is likely stable.
- **Moderate:** Raters are moderately confident in the estimate of the effect of the intervention on the outcome. The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is different. Typical sets of studies are randomized controlled trials with some limitations or well-performed nonrandomized studies with additional strengths that guard against potential bias and have large estimates of effects.
- **Low:** Raters have little confidence in the estimate of the effect of the intervention on the outcome. The true effect may be substantially different from the estimate of the effect. Typical sets of studies are randomized controlled trials with serious limitations or nonrandomized studies without special strengths.
- **Very low:** Raters have no confidence in the estimate of the effect of the intervention on the outcome. The true effect is likely to be substantially different from the estimate of effect. Typical sets of studies are nonrandomized studies with serious limitations or inconsistent results across studies.
- **Not applicable:** Researchers did not identify any eligible articles.

Appendix B. Evidence Table: Observational Studies of Opioid Tapering or Discontinuation

Author, year Quality	Design, Setting, Years, Country, and Funding Source	Sample Size (N) and Characteristics Baseline Opioid Use and Dose (MME)	Intervention Control Condition	Main Results
Darnall et al., 2018 Poor	Before-after Community pain clinic, years NR, U.S. National Institutes of Health and National Center for Complementary and Integrative Health	N = 110 Mean age 51 (SD 12) years 60% female Race NR Median 6-year (IQR, 3-9) duration of opioid use Median 288 mg (IQR, 153-587 mg)	Physicians offered to partner with patients to slowly reduce their opioid dosages over 4 months. Patients received a self-help book on reducing opioid use, and a slow, individually designed taper. Opioid dosages were reduced up to 5% for up to 2 dose reductions in month 1. In months 2 to 4, patients were asked to further reduce use by as much as 10% per week; dose decrements were tailored to the patient. No control group	Of 110 eligible patients, 82 (75%) agreed to taper their opioid dosages 51/82 (62.2%) completed the study (provided 4-month follow-up data) No increase in pain intensity ($P = 0.29$) or pain interference ($P = 0.44$) MME for completers at 4 months: 150 mg, IQR, 54-248mg ($P = 0.002$ vs. baseline) The likelihood of a greater than 50% opioid dose reduction was not predicted by starting dose, baseline pain intensity, years prescribed opioids, or any psychosocial variable.
Demidenko et al., 2017 Poor	Before-after VA Health System, 2012, US U.S. Department of Veterans Affairs Substance Use Disorder Quality	N = 509 Mean age 55.0 (SD 10.4) years 5.7% female 70.7% white, 16.9% black, 2.2% Hispanic, 10.2% other/unknown	Discontinuation of opioid therapy by a clinician. Overall, 75% of patients were discontinued because of aberrant behaviors, and 7.3% because of patient safety concerns. Subjects included patients with non-fatal suicidal self-directed violence (SSV) or suicidal ideation (SI) documented in the medical record in the 12 months after discontinuation of opioids (N = 59), and patients without SSV or SI documented in	Of the sample of 600 patients, 91 were excluded because the patient initiated discontinuation of therapy (15.2%) Variables associated with an increased likelihood of SI/SSV in the year after discontinuation (adjusted OR, 95% CI): Self-identified Hispanic race: 7.25 (1.96–27.18) PTSD diagnosis: 2.56 (1.23–5.32)

	Enhancement Research Initiative and U.S. Department of Veterans Affairs Health Services Research and Development	Mean MME 75.7 (SD 89.6) mg	the medical record in the 12 months after discontinuation of opioids N = 450.	<p>Psychotic-spectrum disorder diagnosis: 3.19 (1.14–8.89)</p> <p>Variables not significant in adjusted analyses: Age, male gender, white or black race, Elixhauser Medical Comorbidity Index, any Veterans Health Administration service-connected disability, bipolar disorder, other anxiety disorders, substance use disorder diagnosis, tobacco use disorder diagnosis, type of chronic pain diagnosis (musculoskeletal, neuropathic, or migraine), sleep disorder diagnosis, clinical care variables (prescribed benzodiazepine in the year prior to discontinuation, average MME in the year prior to discontinuation, reason for discontinuation of opioid therapy (aberrant behavior or patient safety concerns))</p>
Gilliam et al., 2018 Poor	Prospective cohort Pain clinic, January 2015 to December 2015, U.S. Funding NR	<p>N = 285 (142 patients taking opioids and 143 not taking opioids)</p> <p>Mean age 49.26 (SD 14.34) 62.8% female 88.7% white</p>	Intensive, outpatient interdisciplinary rehabilitation program focusing on functional restoration. Combines functional restoration with cognitive-behavioral therapy as its chief components. The treatment model entails concurrent treatment by multiple disciplines including physicians, psychologists, vocational rehabilitative specialists, nurses and clinical nurse specialists, physical therapists, occupational therapists, pharmacists, chemical dependency counselors, and dietitians. The treatment program is 15	<p>42% of participants who completed the program returned 6-month post-discharge questionnaire data assessing medication use and physical and emotional functioning</p> <p>All patients completed the taper and discontinued opioid medication</p> <p>For pain, function, and quality of life outcomes, opioid group and time period interactions were not statistically significant, indicating that patients improved irrespective of groups status (opioid use at baseline or not).</p>

		<p>Duration of pain 10.83 years (SD 10.34)</p> <p>Current opioid use 49.8%</p> <p>12.7% were taking opioids "as needed" but not daily; 51.5% were taking 1 to 40 mg per day; 26.3% were taking 41 to 90 mg per day; 25.3% took more than 90 mg.</p> <p>Patients reported taking opioids for a mean (SD) of 5.8 (4.9) years</p> <p>Mean MME 66.2 mg Median 40.0 mg (4-330 mg)</p>	<p>days in duration. Patients attend programming for 8 hours daily for 15 consecutive working days.</p> <p>Control condition: Pre-post analysis of patients who were using vs. not using opioids at baseline</p>	<p>There were no between-group differences comparing the low and high opioid groups</p>
<p>Guildford et al., 2018</p> <p>Poor</p>	<p>Before-after</p> <p>Specialty pain service in central London, UK</p> <p>August 2014 to April 2016</p>	<p>N = 452</p> <p>Mean age 46.3 (SD 12.47) years</p> <p>76.8% white</p> <p>Median pain duration 104</p>	<p>4-week, residential, interdisciplinary, group-based pain management program</p> <p>No control group</p>	<p>35 people (8%) did not provide posttreatment data because they dropped out of treatment.</p> <p>A further 61 (14%) did not provide posttreatment data but did not drop out of treatment.</p> <p>Statistically significant reductions were observed for all treatment outcomes and</p>

	National Institute for Health Research Biomedical Research Centre at South London and Maudsley NHS Foundation Trust and King's College London	(range 4-703) months Mean MME 64.6 (SD 97.7) mg Median 25 mg (IQR 94.5) At the start of treatment, 71 people (16.3%) were taking doses of 120 mg/24 hours total MME or greater		process measures. Large effect sizes were observed for depression and pain interference. Medium effect sizes were observed for average pain intensity, functioning (as measured by the Work and Social Adjustment scale), walking, pain acceptance, and committed action. Small effect sizes were observed for total morphine equivalent dose, number of classes of medication, insomnia, acceptance, and decentering. The average effect size was 0.55 and ranged from 0.17 for cognitive fusion to 1.11 for pain interference. Of patients taking doses of 120 mg MME or greater at the start of treatment, 52.3% made a clinically significant reduction in MME. Demographic and pain variables did not correlate with changes in medication use.
McCann et al., 2018 Poor	Retrospective cohort One rural primary care provider practice, March 2014 to September 2015 West Virginia, U.S. Funding NR	N =32 Mean age 66.86 (range 48-81) 31% female Race NR Mean MME 24.98 mg (overall) 30.61 (SD 19.03) mg (those who	Structured monitoring plan. A list of patients with chronic noncancer pain on opioid medications was generated from a targeted search of the electronic health record of a single rural practitioner's practice to ensure that all qualifying patients in this group were notified of the specifics 3 months before the change in practice. The notification letter explained that this change was to improve care and to become compliant with both legal and professional obligations. Protocol options for the patients were to continue opioid	17 (52%) remained on opioid medications, 12 (38%) stopped opioid medications, and 3 (9%) were transferred or referred to other physicians. MME at follow-up of the 17 who remained on opioids: Mean 28.84 (SD 18.6; range 3.3-60); P = 0.457 vs. baseline Patients who elected to wean off opioid medications had a statistically lower initial MME.

		<p>remained on opioids) 17.01 (SD 12.52) mg (those who weaned off)</p>	<p>medication management of their chronic pain, manage their pain without opioids, or be referred to another provider for pain management. One day each month was dedicated solely to the management of chronic pain patients on opioid medication in 1-hour blocks. Before each visit, the patients completed a packet of information pertinent to chronic pain. The data for the above history and tools were completed by the patient and available to the clinician before the visit. The packet also included information regarding the safe disposal of medication, chronic pain and the different options for treatment, opioid medication side effects, and abuse/dependency. A structured clinical note was created detailing the dates of last drug screen, the date of signing of chronic pain agreement, the date of the last review of the controlled substance database, the data from the patient-completed packet noted above as well as structured history, examination, assessment, and plan</p> <p>Control condition: Patients who opted to remain on opioids</p>	<p>Depression, pain, and quality-of-life scores demonstrated stability through the time studied</p>
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<p>McPherson et al., 2018</p> <p>Poor</p>	<p>Retrospective cohort</p> <p>VA Health System, 2012, US</p> <p>U.S. Department of Veterans Affairs Substance Use Disorder Quality Enhancement Research Initiative and U.S. Department of Veterans Affairs Health Services Research and Development</p>	<p>N = 600 (300 with a SUD and 300 without a SUD)</p> <p>Mean age 54.63 (SD 10.96) years</p> <p>5.3% female</p> <p>71.1% white, 15.6% black, 2.5% Hispanic, 10.7% other/unknown</p> <p>Average daily dose 75.8 mg MME</p>	<p>Discontinuation of opioid therapy by a clinician; 15.4% of discontinuations were patient-initiated</p> <p>No control</p>	<p>551/600 patients (91.8%) had valid pain intensity scores and were included in the analysis</p> <p>Pain scores decreased, on average across all patients, by approximately one-tenth of a point on the NRS per month for the year after opioid discontinuation</p> <p>Patients' average pre-discontinuation pain scores were significantly related to pain score slope after long term opioid therapy discontinuation -0.018 (0.008); $P < .05$</p> <p>The higher an individual's average pain before discontinuation, the less reduction in pain the patient experienced over time after opioid discontinuation.</p> <p>No other covariates were associated with change in pain across the 12-month post-discontinuation period (diagnoses, comorbidities, other clinical variables, or reason for discontinuation of therapy [patient initiated vs. clinician initiated])</p>
<p>Oldfield et al., 2018</p> <p>Poor</p>	<p>Retrospective cohort</p> <p>Multidisciplinary clinic in a primary care setting in a</p>	<p>N= 105 (66 intervention, 39 control)</p> <p>Mean age 62 (SD 11)</p> <p>5.6% female</p>	<p>Opioid Reassessment Clinic (ORC): During initial assessment, patients are assessed for OUD. If they are diagnosed with OUD, they are presented with the option of transitioning to 1 of 2 opioid agonist treatments: methadone or buprenorphine. While patients may receive buprenorphine in the ORC, if the</p>	<p>The intervention group demonstrated a median (IQR) decrease of 30 (0–120) mg vs. the control group, for whom no decrease was detected (0 mg change, IQR, 0–20 mg increase); $P < 0.01$</p> <p>Patients in the intervention group were more likely to trial buprenorphine (62% vs. 2%, $P < 0.01$) and had greater reductions in</p>

	Veterans Health Administration hospital, U.S. March 1, 2016, to March 1, 2017	83.8% white MME median (IQR) 85 (35-180) mg (intervention) 60 (30-156) mg (control)	patient requires more structured support than the ORC can provide or if the patient opts for methadone therapy, the patient is referred via warm handoff to specialty addiction treatment settings at the same Department of Veterans Affairs facility. Patients who do not have OUD but demonstrate physiological opioid dependence where the benefits of LTOT do not outweigh the harms are offered a choice: slow opioid taper or fast taper and rotation to buprenorphine. Patient preference is the main driver determining next steps; however, patients with very high opioid doses (e.g., >400 mg morphine equivalent daily dose [MEDD]), those who are co-prescribed benzodiazepines or other sedatives, and those who are already experiencing opioid-related harms (e.g., over-sedation) are counseled that changes to their regimen need to start immediately. Control condition: Veterans referred to the ORC who did not successfully have an appointment	their MME than those in the control group (30 mg [interquartile range 0–120] vs 0 mg [IQR 0–20] decrease, $P < 0.01$) Pain outcomes not assessed
Rivich et al., 2018 Poor	Before-after Single center, January 1, 2015 to March 31, 2015, Colorado, U.S. Not funded	N = 147 Median age 61 years 10% female All were prescribed 200	Opioid Safety Initiative Initiative placed increased focus on patient education; improvement of monitoring practices, including urine drug screens, and querying of prescription drug monitoring program databases; and utilization of nonopioid and non-medication pain management modalities. Another goal was to	12 months after initial review, 34% of patients had a reduction in opioid dose with an average change of 60 mg MEDD; median MEDD decreased from 315 mg to 278 mg ($P < 0.05$) No dose change was observed in patients taking 1,000 mg MME or more at the time of initial review.

		<p>mg MME or more Median 315 mg 44% were taking between 200 and 299 mg, 26% were prescribed 400-999 mg</p>	<p>encourage safe prescribing through reduction in use of high-dose long-term opioid treatment, which at time of review was defined as greater than or equal to 200 mg MEDD, and to decrease the concurrent use of benzodiazepines and opioids. Changes were implemented through policy development and performance of systematic multidisciplinary chart reviews. The chart reviews provided specific recommendations that were documented in the electronic medical record and the opioid prescriber was co-signed to the electronic chart note. Veterans Integrated Service Network (VISN) 19 policy requires the Consent for Long-Term Opioid Therapy document (which replaced the Opioid Therapy Agreement on 05/06/2014) to be reviewed and signed by both the patients and their prescriber. VISN 19 policy also mandates performance of UDS twice yearly, at a minimum, and follow-up with primary opioid prescriber at least every 6 months. If a patient did not meet these parameters at the time their chart was reviewed, the prescriber was alerted to areas where improvements in patient monitoring could be made.</p> <p>No control group</p>	<p>Pain outcomes not assessed</p>
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Thakral et al., 2018	Prospective cohort Group practice clinics	N= 1,588 (935 intervention, 653 control)	The group practice clinics implemented opioid risk reduction initiatives for chronic opioid therapy patients in 2 phases: dose reduction starting in 2007 and multifaceted risk mitigation strategies in 2010. During the dose reduction period, a dosing threshold of 120 mg MED per day was implemented and prescribers with high numbers of patients above this dosing threshold were given supervisory guidance by medical directors. The following strategies were implemented during the risk mitigation period: a risk-stratified schedule for the frequency of urine drug screening and follow-up visits, treatment contracts, care plans, modified refill processes, an online continuing education course for providers, care practice tools integrated into electronic medical records, and on-site resources for consultation.	Mean difference between groups (95% CI) PEG score: average of pain severity, interference with activities and interference with enjoyment of life (range = 0–10): -.03 (-.25 to .19) Pain severity (range = 0–10): .17 (-.02 to .35) Pain interference in daily activities (range = 0–10): -.12 (-.40 to .16) Pain interference in enjoyment of life (range = 0–10): -.18 (-.47 to .11) PHQ-8 score (measure of depression) (range = 0–24): -.64 (-1.19 to -.08)
Poor	September 2014 through January 2016, U.S. (Washington)	Mean age 62 (SD 12) years 63.5% female	Control condition: Clinics that were not affiliated with Group Health but were under contract to accept Group Health insurance	
	Patient-Centered Outcomes Research Institute, National Institute on Aging	85.8% non-Hispanic white Mean daily MME 58 (SD 78) mg < 15 mg: 20.7% 15 to < 50 mg: 45.8% 50 to < 120 mg: 22.0% 120 mg or more: 11.5%		

Abbreviations. IQR: interquartile range; MEDD: morphine equivalent daily dose; MME: morphine milligram equivalents; NR: not reported; NRS: numeric rating scale; OUD: opioid use disorder; PTSD: posttraumatic stress disorder; SD: standard deviation; SUD: substance use disorder; UDS: urine drug screen.

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