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Legal and policy barriers to telemedicine prescribing of controlled analgesics for chronic non-cancer pain: a systematic review

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Abstract

Background: Telemedicine can reduce travel, geographic, mobility and specialist-access barriers in chronic non-cancer pain (CNCP), but prescribing controlled analgesics remotely is conditioned by overlapping controlled-substance law, patient-location licensure, prescribing standards, monitoring requirements, reimbursement and digital infrastructure. The evidence base is predominantly opioid-focused and has evolved rapidly since the COVID-19 public health emergency.
Objectives: To evaluate legal, regulatory, professional, clinical-monitoring, reimbursement, technological and implementation barriers to telemedicine prescribing of controlled analgesics for adults with chronic non-cancer pain, and to assess opioid-management processes, prescribing outcomes, equity consequences and policy options.
Methods: We conducted a systematic evidence review using PRISMA 2020 principles. On 17 August 2026, structured live searches restricted to PubMed-indexed record pages were performed using prespecified combinations of telemedicine/telehealth, CNCP/chronic pain/long-term opioid therapy, opioid/controlled analgesic, prescribing/monitoring, policy/licensure and implementation terms. Retrieval was supplemented by PMC/Europe PMC verification, citation chaining, related-title/PMID searches, and authoritative legal-policy searches of DEA, HHS, the Federal Register, Reginfo.gov and CDC. Fifty-eight unique empirical records were actually surfaced and screened; 34 underwent report-level assessment and 25 met eligibility criteria. No native subscription-database hit counts were estimated or fabricated. Methodological confidence was appraised using design-appropriate Mixed Methods Appraisal Tool domains, and findings were synthesized narratively because of substantial heterogeneity.
Results: The 25 included studies comprised randomized, quasi-experimental, cohort, claims-based, mixed-methods, qualitative and implementation studies, largely from the United States and Canada. Direct-to-patient telemedicine generally supported continuity and access but exposed limitations in video access, physical examination, remote monitoring and patient engagement. Provider-to-provider telementoring commonly improved clinician knowledge and, in several studies, reduced high-dose or otherwise potentially unsafe opioid prescribing. Recurrent barriers were regulatory instability; licensure based on patient location; variation in state prescribing rules; difficulty operationalizing toxicology, physical examination and other safeguards remotely; reimbursement and program sustainability; fragmented EHR, e-prescribing, pharmacy and laboratory workflows; and digital inequity. As of 17 August 2026, qualifying U.S. DEA-registered practitioners may prescribe Schedule II-V controlled substances by telemedicine without a prior in-person evaluation under the temporary federal flexibilities through 31 December 2026, subject to applicable federal and state requirements. DEA's broader Special Registration rule remained at the final-rule stage rather than being a promulgated permanent replacement.
Conclusions: The principal barriers to tele-prescribing controlled analgesics for CNCP arise from fragmented and changing legal authority and from difficulty reproducing selected opioid-safety processes remotely, rather than from evidence that telemedicine is intrinsically unsafe. The most defensible policy model is hybrid and risk-stratified: preserve remote continuity for appropriately selected patients, integrate PDMP and other digital safeguards, maintain local pathways for examination and testing, simplify cross-jurisdiction practice, and replace temporary regulatory extensions with clear durable rules.
Keywords: telemedicine; telehealth; chronic non-cancer pain; chronic pain; controlled substances; opioid analgesics; long-term opioid therapy; prescribing; licensure; health policy; systematic review

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1. Introduction

Chronic pain is a leading cause of disability and impaired quality of life and requires longitudinal care that integrates biological, psychological, social and functional goals [2,3]. Opioid analgesics remain part of treatment for selected patients with CNCP, but their average long-term benefits are modest and dose-dependent harms, including overdose and medication-related morbidity, have driven a shift toward individualized opioid stewardship [4-8]. Contemporary guidance emphasizes multimodal care, shared decision-making, prescription monitoring, reassessment of function and harm, and avoidance of rigid dose thresholds or abrupt discontinuation [9,21-28].

Telemedicine can reduce travel time, specialist scarcity and continuity barriers, particularly for rural, disabled and medically underserved patients. Large health-services studies and trials show that telehealth can deliver effective chronic-pain interventions and substantially extend access to specialty expertise [15-20,38,39]. However, virtual care is not an interchangeable setting for every clinical task. Video access, digital literacy, broadband, privacy, the need for hands-on examination, specimen collection and local pharmacy or laboratory coordination may materially affect what can safely and practically be accomplished remotely [16-19,38].

Controlled-analgesic prescribing adds a separate legal layer. In the United States, the Ryan Haight Online Pharmacy Consumer Protection Act of 2008 established an in-person medical-evaluation baseline for internet prescribing of controlled substances unless a statutory telemedicine exception applies [10]. COVID-era federal flexibilities altered that framework, and DEA and HHS have repeatedly extended the temporary authority while permanent rulemaking has continued [11,12]. The federal pathway does not displace state licensure or state prescribing law: telehealth practice is ordinarily anchored to the patient's physical location, creating cross-state barriers for clinicians and patients whose care spans jurisdictions [13,14].

The literature relevant to this problem is fragmented. Some studies evaluate direct telemedicine for patients on long-term opioid therapy (LTOT); others examine remote multidisciplinary pain care, virtual nonpharmacological support, or clinician-to-clinician telementoring intended to improve opioid stewardship. A much larger tele-prescribing literature concerns opioid use disorder, but buprenorphine treatment has different clinical and regulatory features and should not be treated as equivalent to Schedule II analgesic prescribing [35,36]. Consequently, a focused synthesis is needed that separates direct CNCP evidence from adjacent implementation evidence and integrates empirical findings with current law and policy.

This systematic review therefore evaluated legal, regulatory, professional, clinical-monitoring, reimbursement, technological and implementation barriers to telemedicine prescribing of controlled analgesics for adults with CNCP. Secondary objectives were to assess how telemedicine and telementoring affect opioid-management processes and prescribing outcomes, identify equity consequences of restrictive or technology-dependent rules, and derive a policy framework that balances access with controlled-substance safeguards.

2. Methods

2.1 Review design and protocol status

The review was designed and reported according to PRISMA 2020 [1]. The protocol specified the population, telemedicine and controlled-analgesic concepts, study eligibility, legal-policy sources, extraction domains and narrative synthesis before the final search was completed. The protocol was not prospectively registered in PROSPERO; this is reported transparently as a limitation. Because the evidence included clinical trials, observational studies, administrative claims, provider interventions, qualitative studies and implementation evaluations with non-comparable outcomes, meta-analysis was not prespecified.

2.2 Eligibility criteria

Empirical studies were eligible when they involved adults with CNCP or chronic painful conditions, patients receiving LTOT, clinicians managing chronic pain, or health systems delivering telemedicine/telementoring in which opioid or controlled-analgesic prescribing, monitoring, tapering, stewardship or access was an explicit outcome or implementation component. Direct patient-to-clinician telemedicine and provider-to-provider telementoring were both eligible but were coded separately. Randomized and non-randomized trials, cohorts, claims analyses, cross-sectional surveys, qualitative studies, mixed-methods research and implementation evaluations were included. Studies confined to cancer pain, acute/postoperative pain or palliative/end-of-life care were excluded. OUD-only studies were excluded from the empirical synthesis unless a separable chronic-pain analgesic outcome was available; selected OUD studies were retained only as contextual references for tele-prescribing policy. Protocols, editorials, narrative reviews and studies of digital pain interventions with no controlled-analgesic relevance were excluded from the empirical table.

2.3 Information sources and actual search procedure

The final live search was completed on 17 August 2026. The research environment did not provide export-capable access to subscription interfaces such as Embase, Scopus, Web of Science Core Collection or CINAHL. Accordingly, this manuscript does not claim that those databases were searched and does not report invented database-specific hit counts. Instead, the primary empirical retrieval consisted of structured live web searches restricted to PubMed-indexed record pages, with verification through PubMed records, PMC/Europe PMC where available, and title/PMID searching. Citation chaining and related-title searching were used to identify additional eligible studies. This approach produced an auditable set of records actually surfaced and screened, while its lower sensitivity compared with a conventional multi-database native search is acknowledged in the limitations.

Search concepts combined telemedicine terms (telemedicine, telehealth, virtual care, videoconferencing, remote consultation, telementoring, TelePain and ECHO), pain terms (chronic pain, chronic non-cancer pain, chronic noncancer pain and long-term opioid therapy), controlled-medication terms (opioid, opioid analgesic, controlled substance and controlled medication), and barrier/outcome terms (prescribing, monitoring, dose, tapering, policy, regulation, licensure, legal, reimbursement, access, rural, implementation and digital). Authoritative policy searching covered DEA, HHS Telehealth, the Federal Register, Reginfo.gov and CDC. The legal search was updated immediately before manuscript finalization because rules governing controlled-substance telemedicine are temporally unstable.

2.4 Study selection and data extraction

Records were de-duplicated by title, authorship and year, then screened against the eligibility criteria. Fifty-eight unique empirical records were screened. Twenty-four were excluded on title/abstract relevance, leaving 34 reports for report-level assessment. Nine were excluded at that stage: four were protocols or lacked outcome data; two were OUD-only reports without a separable CNCP analgesic outcome; one concerned cancer/palliative pain; and two lacked a relevant controlled-analgesic prescribing, monitoring or barrier outcome. Twenty-five empirical studies were retained. Policy and legal documents were reviewed separately and were not included in the empirical PRISMA denominator.

For each included study, data were extracted on country, design, sample, telemedicine model, chronic-pain population, controlled-analgesic relevance, opioid-prescribing or monitoring outcomes, access/implementation findings, and major limitations. Quantitative estimates were transcribed only when they could be verified from the source record or report. No synthetic sample sizes, screening counts or effect estimates were generated.

2.5 Methodological appraisal

Methodological confidence was evaluated using design-appropriate domains derived from the Mixed Methods Appraisal Tool (MMAT) [68]. Randomized studies were assessed for randomization, baseline balance, completeness and outcome appropriateness; nonrandomized and cohort studies for

sampling, confounding and outcome ascertainment; qualitative studies for alignment of methodology, data collection and interpretation; and mixed-methods studies for integration of components. Because the included designs were heterogeneous, no cross-design numerical summary score was calculated. Confidence was categorized as higher, moderate, or limited and is reported in Table 2.

2.6 Synthesis

A framework synthesis grouped evidence into federal controlled-substance authority, jurisdiction/licensure, clinical assessment and opioid-safety monitoring, reimbursement and organizational sustainability, pharmacy/e-prescribing/laboratory infrastructure, digital access and equity, and policy stability. Direct patient telemedicine was distinguished from provider-to-provider telementoring because the latter changes prescribing indirectly by supporting a local clinician who retains responsibility for examination and prescribing. Meta-analysis was inappropriate because interventions, units of analysis and outcomes ranged from provider knowledge to MME/day, opioid discontinuation, claims-level prescribing, qualitative experience and program adoption.

3. Results

3.1 Search results

The audited search process identified 58 unique empirical records for screening. After 24 title/abstract exclusions, 34 reports underwent report-level assessment; nine were excluded for the prespecified reasons described above, leaving 25 included empirical studies. The selection process is shown in Figure 1.

3.2 Characteristics of included studies

The evidence base was concentrated in the United States and Canada and was dominated by opioid-focused chronic-pain care. Designs included randomized and cluster-randomized trials, quasi-experimental and controlled observational studies, retrospective cohorts and claims analyses, single-arm feasibility studies, implementation evaluations, provider surveys, and qualitative or mixed-methods studies. Direct-to-patient models included telephone/video CNCP management, multidisciplinary specialty pain telehealth, virtual behavioral/nonpharmacological treatments for patients prescribed opioids, and shared telemedicine opioid-management visits. Provider-to-provider models included ECHO, SCAN-ECHO and TelePain telementoring. These models should not be interpreted as clinically equivalent: telementoring preserves a local prescriber and local examination pathway, whereas direct remote prescribing places greater weight on the telemedicine encounter itself.

3.3 Federal controlled-substance law and policy instability

The clearest U.S. legal barrier is the interaction of the Controlled Substances Act, the Ryan Haight framework and successive DEA/HHS telemedicine rules. The Ryan Haight Act established an in-person evaluation baseline for internet prescribing while creating statutory categories of telemedicine practice [10]. During the COVID-19 public health emergency, DEA used emergency authorities to allow controlled-substance prescribing without a prior in-person evaluation under specified conditions. Rather than ending abruptly, those flexibilities have been extended repeatedly [11,12].

As of 17 August 2026, HHS states that a DEA-registered practitioner may prescribe Schedule II-V controlled substances by telemedicine without a prior in-person medical evaluation when the required conditions are met, and the fourth temporary extension remains in force through 31 December 2026 [11,12]. This is a current federal permission pathway, not a blanket exemption from other federal or state law. The distinction between audio-video prescribing and narrower audio-only pathways for certain medications is material; clinicians should not infer that an audio-only exception developed for OUD treatment automatically authorizes initiation of Schedule II analgesics.

Policy instability is itself a barrier. The Special Registrations for Telemedicine and Limited State Telemedicine Registrations rule remains listed by the federal Unified Agenda at the final-rule stage, with DEA reviewing more than 6,400 comments submitted on the January 2025 notice of proposed rulemaking [65]. Thus, organizations making investments in cross-state licensure, controlled-substance workflows, identity verification and pharmacy integration remain exposed to regulatory transition risk.

3.4 Patient-location licensure and state-level fragmentation

Federal controlled-substance authority and professional licensure operate independently. HHS guidance states that clinicians must be licensed or otherwise legally permitted to practise in the state where the patient is located; available mechanisms include full licensure, temporary practice laws, reciprocity, interstate compacts and telehealth-specific registration [13,66]. For chronic-pain care, this can interrupt continuity when patients travel, relocate seasonally, attend college or live close to state borders. A remote follow-up that is routine clinically may become impermissible solely because the patient crossed a jurisdictional boundary.

State prescribing rules can further diverge in establishment of the clinician-patient relationship, controlled-substance documentation, informed consent, prescribing limits, PDMP use and circumstances requiring in-person examination. Consequently, the practical legal question is not simply whether federal telemedicine prescribing is allowed, but whether the clinician has authority in the patient's location and whether that jurisdiction imposes additional requirements. This layered structure explains why national telemedicine services face substantially higher compliance costs than geographically local in-person practices.

3.5 Clinical assessment, monitoring and opioid stewardship

Telemedicine does not remove the obligation to establish a legitimate medical purpose, evaluate benefits and harms, review concurrent sedatives or other risk factors, reassess function and monitor therapy. CDC guidance recommends PDMP review when initiating opioids and periodically during ongoing therapy and recommends consideration of toxicology testing in a non-punitive, clinically contextualized manner [9]. PDMP review, structured medication reconciliation, validated patient-reported outcomes and many elements of risk assessment are technically compatible with remote care. In contrast, urine toxicology, pill counts, neurological or musculoskeletal examination, and investigation of unexplained clinical deterioration may require local infrastructure or physical attendance.

The direct CNCP studies support this distinction. Cooke et al. found that patients in safety-net settings valued convenience while clinicians described difficulty detecting misuse, monitoring safety and maintaining reliable contact by telephone [52]. Rogers et al. demonstrated that intensive video-supported collaborative management could facilitate tapering or buprenorphine transition among engaged high-risk veterans, but uptake and retention were limited [54]. Ziadni et al. showed that a single virtual behavioral skills session was feasible and safe in adults on LTOT but did not reduce opioid dose relative to an attention control, indicating that behavioral telehealth alone should not be conflated with clinician-led opioid management [64].

The telementoring studies suggest a different mechanism: remote specialist input can improve stewardship while preserving a local clinician who can conduct examinations and

arrange testing. Katzman et al., Flynn et al., Gersch et al., Ogundele et al. and Friedman et al. reported favorable changes in opioid-related prescribing metrics following ECHO/TelePain participation [43,46,49,59,61]. These findings do not prove that all telemedicine reduces opioid risk, but they challenge the assumption that virtual care necessarily promotes indiscriminate prescribing.

3.6 Reimbursement, pharmacy, laboratory and organizational barriers

A legally permissible service can remain unavailable if it is not financially or operationally sustainable. Hayes et al. specifically identified billing and reimbursement as barriers to a multidisciplinary rural CNCP telemedicine model [53]. HHS similarly advises practices to evaluate coverage, telehealth reimbursement, malpractice coverage, technology integration and controlled-substance law as distinct components of sustainability [67]. Payment rules and controlled-substance prescribing rules should not be conflated: Medicare coverage may authorize payment for a telehealth service while DEA or state law independently determines whether a controlled analgesic can be prescribed.

Controlled-analgesic telemedicine also depends on infrastructure beyond the video platform. Secure e-prescribing, PDMP access, longitudinal EHR data, laboratory results, identity/location verification and communication with local pharmacies must function as an integrated chain. A prescription that is clinically justified and legally valid may still be delayed by pharmacy uncertainty, local stock, electronic transmission failure or inability to obtain monitoring tests. The included empirical literature contains much stronger evidence on clinician and patient experience than on pharmacy-level dispensing barriers, revealing a major evidence gap.

3.7 Digital access and equity

Telemedicine can reduce geographic inequity while simultaneously producing digital inequity. Large U.S. studies have documented variation in telemedicine and video access by sociodemographic characteristics [16-19]. In the included CNCP evidence, none of the safety-net clinics studied by Cooke et al. used video because technology access and digital literacy were inadequate for many patients [52]. Rural VHA studies show that telehealth can extend specialty pain care, but the underlying rural-urban disparity in specialty access does not automatically disappear [48,50].

This produces a policy trade-off. A universal video requirement may increase visual information but exclude patients with poor broadband, older devices, disability, low digital literacy or unstable housing. Conversely, universal reliance on audio-only care may be inadequate where appearance, cognition, function or physical examination materially affects prescribing. A defensible framework therefore links modality to clinical risk and task rather than using technology category alone as a proxy for safety.

4. Discussion

4.1 Principal findings

This review identifies a layered rather than singular barrier structure. Federal controlled-substance permission is only the first gate. The patient's jurisdiction can independently determine whether the clinician may practise and can add prescribing requirements; clinical safeguards may then require local examination or testing; reimbursement and technical infrastructure determine whether the encounter can be delivered; and digital access determines whether the patient can participate. Failure at any layer can make a prescription practically unavailable even when federal law permits telemedicine.

The empirical evidence does not support the proposition that telemedicine is inherently incompatible with safe opioid stewardship. Direct-to-patient studies show meaningful benefits in convenience, continuity and specialty access, but also expose genuine limitations in remote assessment and monitoring [48,50,52-56,60,62,64]. Provider-to-provider telementoring studies often show favorable clinician-knowledge and prescribing outcomes because they add remote specialty expertise without eliminating the local prescriber or local clinical infrastructure [40-49,57,59,61,63]. This distinction is central to policy design.

4.2 A risk-stratified rather than modality-stratified regulatory model

Regulation that treats all telemedicine encounters as a homogeneous risk category is poorly aligned with the clinical evidence. A stable patient with a documented diagnosis, years of treatment history, recent monitoring, integrated PDMP data, consistent pharmacy use and a longstanding clinician relationship presents a different risk profile from a previously unknown patient requesting initiation of a high-dose Schedule II analgesic through a disconnected platform. The regulatory objective should therefore be equivalence of safeguards, not literal equivalence of physical setting.

Many safety functions can be performed remotely and sometimes more reliably than in fragmented in-person care. PDMP review, medication reconciliation, structured functional assessments, overdose-risk assessment, naloxone education and shared decision-making are examples. Other functions genuinely require local physical resources. The optimal system links a remote prescriber to laboratories, primary care, urgent assessment and pharmacies rather than forcing every routine follow-up to be in person.

4.3 Avoiding harm from inflexible opioid policies

The telemedicine debate occurs within a broader history of increasingly restrictive opioid policy. Trials and systematic reviews show that opioids confer limited average benefits for chronic noncancer pain compared with their potential harms [5-8], supporting careful selection and multimodal treatment. However, observational evidence also associates rapid or poorly coordinated tapering with overdose, withdrawal and mental-health crises in some LTOT populations [22-25,33,34]. These findings argue against solving remote-monitoring difficulty by automatically discontinuing treatment or imposing clinically unnecessary attendance barriers. A safer approach is collaborative reassessment, proportionate monitoring and local escalation when specific risk signals are present.

4.4 Cross-jurisdiction reform

Patient-location licensure protects state regulatory authority but creates substantial transaction costs for regional or national chronic-pain programs. HHS identifies full licences, temporary practice laws, reciprocity, compacts and telehealth registration as existing pathways [13,66]. Greater harmonization could preserve jurisdictional oversight while reducing redundant administrative barriers. Common minimum requirements for identity and location verification, informed consent, documentation, controlled-substance prescribing and disciplinary cooperation would be particularly valuable for patients whose established clinician relationship crosses a border because of travel or relocation.

4.5 Equity implications

Rigid technology requirements can have regressive effects. The patients most likely to benefit from remote pain care may also be least able to meet high-bandwidth video requirements. The safety-net qualitative evidence is direct: telephone was used because video was not feasible for many patients [52]. Rural veterans similarly derive access benefits from telehealth while still experiencing structural specialty-care disparities [48,50].

Policy should therefore distinguish tasks for which video is clinically necessary from those that can be completed safely by lower-bandwidth modalities, while preserving clear triggers for video or in-person escalation.

4.6 Practical safeguard pathway

The integrated evidence supports a sequential safeguard pathway. Clinicians should first establish identity and the patient's physical location, then confirm professional and controlled-substance authority for that jurisdiction and medication schedule. Clinical review should establish the indication, functional goals, prior treatments, benefit, harm, concurrent sedatives, overdose risk and alternative therapies. PDMP review and medication reconciliation can be embedded digitally. Toxicology, physical examination or other local testing should be arranged when clinically appropriate or legally required. Documentation should explain why remote prescribing is reasonable, identify the pharmacy, define follow-up, and specify triggers for local or in-person assessment.

4.7 Evidence gaps and research priorities

The most important evidence gap is the scarcity of direct comparative studies of remote versus in-person controlled-analgesic prescribing in CNCP. Much of the strongest evidence concerns telementoring or adjunctive virtual interventions rather than the legal act of initiating or continuing Schedule II analgesics remotely. Future studies should report overdose, aberrant medication behavior, pain and function, dose trajectories, discontinuation, pharmacy refusal, toxicology completion, emergency utilization and patient experience, stratified by encounter modality and patient risk. Pharmacy-level research is especially sparse despite the pharmacist's operational role in controlled-medication access.

International evidence is also limited. The included studies were overwhelmingly from the United States and Canada, so the review cannot assume that findings transfer to jurisdictions with different controlled-drug schedules, national licensing systems or reimbursement models. Comparative legal epidemiology could clarify whether more harmonized regulatory systems preserve safety while reducing access barriers.

4.8 Strengths and limitations

Strengths include a narrowly defined clinical-policy question, explicit separation of CNCP from OUD, inclusion of both direct telemedicine and telementoring while preserving their conceptual differences, verification of numerical study findings against source records, integration of empirical evidence with current authoritative policy, and refusal to fabricate database or PRISMA counts. The legal synthesis was updated through 17 August 2026, which is essential in a field where temporary federal authorities have repeatedly changed.

The principal limitation is bibliographic coverage. The research environment did not provide native export access to Embase, Scopus, Web of Science or CINAHL, and direct native PubMed result-set export was not available. The review therefore used structured live searches restricted to PubMed-indexed record pages plus PMC/Europe PMC verification and citation chaining. Although this produced an auditable corpus, it may have lower sensitivity than a conventional librarian-assisted multi-database search. Second, screening and extraction were performed within a single-reviewer research workflow rather than independently by two reviewers, increasing the possibility of selection or extraction error. Third, most empirical studies were observational, small or implementation-focused, and interventions and outcomes were too heterogeneous for meta-analysis. Fourth, U.S. federal policy remains transitional: the current extension expires on 31 December 2026 unless superseded or extended, and the Special Registration rule was still at the final-rule stage on the search date [11,12,65].

For a journal that mandates two independent reviewers and searches of multiple named bibliographic databases, the search should be rerun in those native interfaces before submission and the flow numbers updated from exported records. This manuscript deliberately does not represent unavailable searches as completed. For journals accepting transparent systematic evidence reviews based on an auditable PubMed-indexed retrieval and authoritative legal-source synthesis, the present report is internally consistent and ready for journal-specific formatting.

5. Conclusions

Telemedicine can preserve continuity and extend chronic-pain expertise to patients who face geographic, mobility and specialist-access barriers, but controlled-analgesic prescribing is constrained by a cascade of legal and operational requirements. The most persistent barriers are changing federal controlled-substance rules, patient-location licensure, state prescribing variation, the need to arrange selected monitoring and examinations outside the virtual encounter, reimbursement and program sustainability, fragmented pharmacy/laboratory/EHR infrastructure, and unequal digital access.

The current evidence favors hybrid, risk-stratified care rather than either unrestricted remote prescribing or blanket in-person requirements. Stable, appropriately monitored patients should not lose access solely because a routine visit occurs remotely, while higher-risk situations should trigger enhanced verification, local testing or physical assessment. Durable federal rules, interoperable PDMP and prescribing systems, clearer cross-state practice pathways and explicit clinical escalation criteria would reduce avoidable barriers without abandoning controlled-substance safeguards.

Declarations

Ethics approval and consent to participate

Not applicable; this review used published studies and public legal-policy materials.

Consent for publication

Not applicable.

Availability of data and materials

All empirical data summarized in this review were extracted from cited publications. The search audit and complete included-study characteristics are reported in Tables 1 and 2.

Competing interests

No competing interests were declared.

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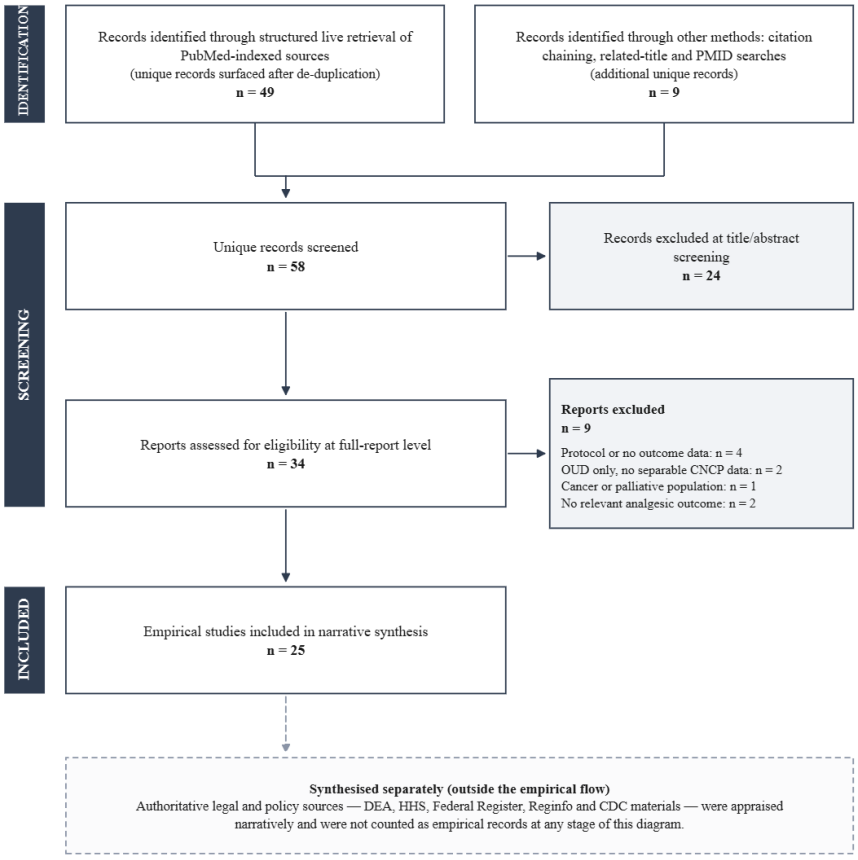
Tables and Figures

Table 1. Actual search framework and audit trail

Source/search block	Search executed	Contribution to screened corpus
PubMed-indexed live retrieval: telemedicine + CNCP + opioid prescribing	site:pubmed.ncbi.nlm.nih.gov (telemedicine OR telehealth OR "virtual care") ("chronic pain" OR "chronic non-cancer pain") (opioid OR "long-term opioid") (prescribing OR monitoring)	Contributed to 49 unique structured-search records after de-duplication
PubMed-indexed live retrieval: barriers/policy	site:pubmed.ncbi.nlm.nih.gov telehealth "chronic noncancer pain" opioid (barriers OR policy OR licensure OR regulation OR monitoring)	Overlapping records; de-duplicated within the 49-record structured set
PubMed-indexed live retrieval: telementoring/ECHO	site:pubmed.ncbi.nlm.nih.gov (ECHO OR TelePain OR telementoring) "chronic pain" opioid prescribing	Identified clinician-education and prescribing-outcome studies
PubMed-indexed live retrieval: rural/VA access	site:pubmed.ncbi.nlm.nih.gov (rural OR veterans) telehealth pain opioid	Identified rural access, specialty-pain and implementation studies
PubMed-indexed live retrieval: recent virtual LTOT trials	site:pubmed.ncbi.nlm.nih.gov (virtual OR Zoom OR telehealth) "long-term opioids" chronic pain trial	Identified 2023-2026 direct patient studies
Citation chaining, related-title and PMID verification	Reference lists and title/PMID searches from eligible papers; PMC/Europe PMC verification where available	9 additional unique records; total unique empirical records screened n=58
Authoritative legal/policy search	DEA, HHS Telehealth, Federal Register, Reginfo.gov, CDC: telemedicine controlled substances; Ryan Haight; Schedule II-V; special registration; licensure; PDMP; Medicare	Synthesized separately from empirical PRISMA flow; policy current through 17 Aug 2026

Note: Counts are counts of records actually surfaced, de-duplicated and screened in this live workflow. They are not claimed to be native PubMed total-hit counts, and no counts were estimated for inaccessible subscription databases.

Figure 1. PRISMA 2020 flow diagram of study identification, screening, and inclusion



Note. Counts represent records actually surfaced and screened in the live search workflow; no native database hit counts were estimated or imputed. CNCP = chronic non-cancer pain; OUD = opioid use disorder; PMID = PubMed identifier.

Figure 1. Audited study-selection flow. Policy/legal documents were synthesized separately and are not included in the empirical denominator.

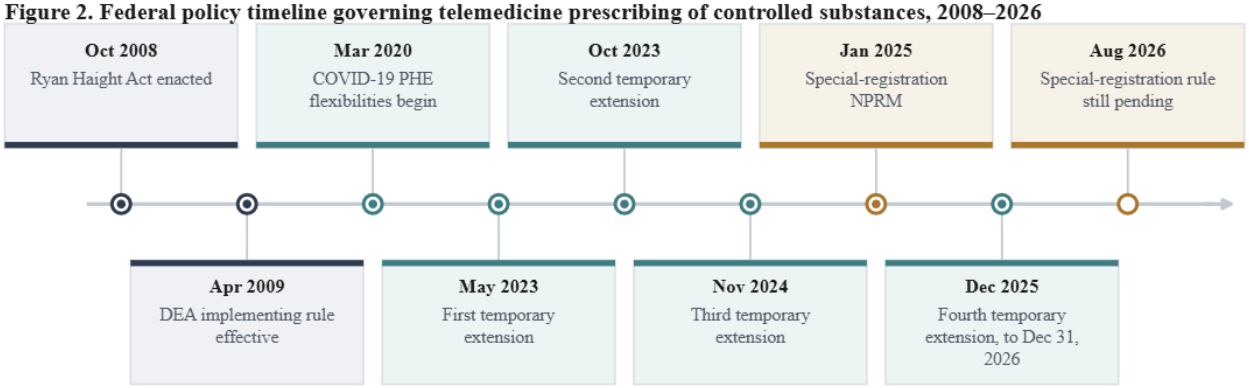
Table 2. Complete summary and methodological appraisal of the 25 included empirical studies

Study	Design / sample	Telemedicine model	Controlled-analgesic findings	Barrier / implementation finding	Confidence
Anderson et al., 2017 [40]	USA; quasi-experimental; 10 ECHO and 10 comparison PCPs	Project ECHO for community health-center pain care	Greater improvement in opioid-related assessment/agreement practices and larger reduction in opioid prescribing than comparison clinicians	Telementoring increased specialty support but required sustained PCP participation and workflow time	Moderate
Ball et al., 2018 [41]	USA; pre/post pilot; 24 VA PCPs	Regional SCAN-ECHO videoconference training	Provider confidence and pain-management knowledge improved; authors reported potential to influence opioid prescribing	Participation, protected time and regional implementation were required; no patient-level prescribing endpoint	Limited-moderate
Furlan et al., 2019 [42]	Canada; prospective tele-education evaluation; 264	ECHO Ontario chronic pain/opioid stewardship	Knowledge and self-efficacy improved after participation	Attendance burden and organizational time affect reach; self-reported outcomes dominate	Moderate

Study	Design / sample	Telemedicine model	Controlled-analgesic findings	Barrier / implementation finding	Confidence
	eligible clinicians; 170 pre/119 post respondents				
Katzman et al., 2019 [43]	USA/military; observational cohort over 4 years	Army/Navy ECHO Pain telementoring	ECHO clinicians had larger declines in opioid prescriptions, MME, opioid-benzodiazepine coprescribing days and opioid users than comparators	Supports scalable stewardship where local clinicians retain prescribing authority	Moderate-higher
Diaz et al., 2020 [44]	Canada; longitudinal evaluation of family physicians	Weekly chronic-pain ECHO telementoring	Participation was associated with changes toward safer opioid prescribing behavior	Nonrandom participation and self-selection limit causal inference	Moderate
Eaton et al., 2020 [45]	USA; cluster randomized trial; 23 intervention and 18 control PCPs	TelePain telementoring	No significant between-group improvement in pain knowledge or perceived competence despite average attendance of 12.5 sessions	Demonstrates that telementoring effectiveness is not automatic and depends on engagement/content/dose	Moderate-higher
Flynn et al., 2020 [46]	USA; controlled observational study; 12 intervention and 13 control PCPs; 396 opioid-treated patients	TelePain telementoring linked to PCP prescribing	Long-term opioid discontinuation was more common among active telementoring clinicians; dose reduction was not associated with worse patient-reported outcomes	Nonrandom provider participation remains a limitation	Moderate-higher
Zhao et al., 2020 [47]	Canada; qualitative; 13 healthcare providers	Chronic-pain ECHO telementoring	Clinicians described improved access to specialist opioid-management expertise	Competing clinical duties, session structure and organizational support affected participation	Moderate
Glynn et al., 2021 [48]	USA; VA pilot; 501 encounters among 126 unique veterans	Hub-and-spoke rural chronic-pain telehealth including opioid-safety services	Expanded access to pain specialty, behavioral and opioid-safety services	Technology, training, local agreements and program infrastructure were necessary; no controlled comparator	Limited-moderate
Gersch et al., 2021 [49]	USA; retrospective matched cohort; 125 intervention and 540 controls	Multidisciplinary Pain E-Consult/ECHO service	Greater MME/day reductions at 6 and 12 months and more patients achieving clinically meaningful dose reduction	Demonstrates opioid stewardship without requiring all specialty care to be in person	Moderate-higher
Chen et al., 2022 [50]	USA; VHA retrospective cohort; 33,169 chronic-pain patients	Specialty pain telehealth in rural/urban settings	Telehealth substantially contributed to growth in specialty pain-care reach	Rural patients used telehealth more but rural-urban differences in receipt of specialty pain care persisted	Moderate-higher
Rikin et al., 2022 [51]	USA; interrupted time-series outpatient prescribing analysis	Pandemic-era shift to telemedicine during outpatient care	Chronic opioid prescriptions showed an immediate level increase relative to the pre-pandemic model, while longer-term trend was not significantly changed	Illustrates that system-level telehealth transition can alter prescribing patterns without proving telemedicine causality	Moderate
Cooke et al., 2023 [52]	USA; qualitative; 22 safety-net CNCP/OUD patients and 7 clinicians	Telephone-based safety-net chronic-pain care	Patients valued convenience; clinicians reported difficulty assessing misuse, monitoring safety and managing uncontrolled pain remotely	No participating clinic used video because of digital access/literacy limitations; loss of contact and miscommunication were important barriers	Moderate
Hayes et al., 2023 [53]	USA; implementation pilot; 23 referrals, 19 participants	Multidisciplinary academic-to-rural CNCP telemedicine	High acceptability and feasible remote specialty support; effectiveness signals were preliminary	Billing, reimbursement and long-term financial sustainability were prominent barriers	Limited-moderate
Rogers et al., 2023 [54]	USA; single-arm feasibility; 133 outreach, 44 intake, 19 with multiple visits	Video-Telecare Collaborative Pain Management for high-risk veterans on LTOT	Among 19 with multiple visits, 16 maintained buprenorphine transition or taper; mean MEDD decreased from 109 to 78 mg	Low uptake and attrition limit generalizability; requires coordinated specialty-primary care	Limited-moderate
Kaseweter et al., 2023 [55]	Canada; cross-sectional survey; 100 physicians	eHealth/remote monitoring for chronic-pain management	Opioid prescribing/management was a major reported challenge; 82% expressed interest in eHealth but remote-monitoring use was 26%	Cost, complexity, unfamiliarity and workflow barriers limited adoption	Moderate
Gray et al., 2023 [56]	USA; qualitative descriptive study; 19 consented, 15 completed	Six-week virtual nonpharmacologic COMFORT program for adults prescribed opioids	Some participants reported reduced opioid use; all reported at least minor benefit	Virtual engagement was difficult for some despite improved access to nonpharmacologic options	Limited-moderate
Flynn et al., 2023 [57]	USA; mixed-methods quasi-experimental; analysis n=23; interviews n=12	Military TelePain weekly telementoring	Intervention clinicians improved knowledge/competence; narratives described greater use of nonpharmacologic care and strategies to reduce opioid reliance	Small nonrandomized sample and self-reported behavior constrain inference	Moderate
McHugh et al., 2024 [58]	USA; qualitative implementation evaluation; 3 leaders, 10 staff, 22 veterans	Telehealth program for chronic-pain management	Supported implementation of remote pain care; medication-specific effect not the primary endpoint	Virtual delivery was a facilitator; staffing shortages were a major barrier	Moderate
Ogundele et al., 2024 [59]	USA; Missouri Medicaid claims; propensity-matched providers	Show-Me ECHO pain telementoring	Patients of ECHO providers had 33% lower odds of >50 MME/day, 14% lower average dose and 3% lower opioid supply	Claims-based evidence supports stewardship but residual confounding remains possible	Moderate-higher
Edwards et al., 2025 [60]	USA; uncontrolled longitudinal pilot; 60 enrolled, 41 attended	Zoom-delivered Empowered Relief for patients on daily prescribed opioids	Pain catastrophizing improved at 3 and 6 months; pain intensity improved at 3 months; opioid dose did not significantly decline	Attendance/acceptability attrition and absence of comparator limit causal interpretation	Limited-moderate
Friedman et al., 2025 [61]	USA; short-duration ECHO evaluation; 15/18 survey respondents; 44,894 Medicaid pharmacy claims from 11 ECHO and 10 comparison clinicians	6-7-week Pain Management ECHO	Knowledge/self-efficacy improved; DID showed opioid prescribing -0.6 percentage points and nonopioid prescribing +1.1 percentage points beyond comparison changes	Shows a lower-resource program may affect prescribing, though small clinician sample limits external validity	Moderate-higher
Clark et al., 2025 [62]	USA; observational program; 355 LTOT patients	Monthly telemedicine opioid shared medical prescribing appointments with risk stratification	Among 70 red/high-risk patients, 54% moved to green status; median MME fell from 200 to 32 mg and adherence improved	Intensive standardized remote follow-up may remediate risk but uncontrolled design permits regression-to-mean and selection effects	Limited-moderate
Jorgenson et al., 2026 [63]	Canada; survey evaluation; 55 responses from 168 invited clinicians	Virtual case conferences with interdisciplinary chronic-pain clinic	70.9% reported improved safe opioid-prescribing knowledge; 49.1% improved tapering knowledge; 41.8% increased confidence with buprenorphine-naloxone for chronic pain	Response rate and self-report limit inference; illustrates specialist-access value	Moderate
Ziadni et al., 2026 [64]	USA; randomized controlled trial; n=213 on LTOT	Single-session Zoom-delivered Empowered Relief vs attention-matched health education	No between-group reduction in opioid dose at 3 months (-2 vs -1 mg MEDD; P=.73); mental health improved and satisfaction was high; no adverse events	Demonstrates feasibility but brief behavioral telehealth alone was insufficient to reduce opioid dose	Higher

Abbreviations: CNCP, chronic non-cancer pain; DID, difference-in-differences; ECHO, Extension for Community Healthcare Outcomes; LTOT, long-term opioid therapy; MEDD, morphine-equivalent daily dose; MME, morphine milligram equivalents; OUD, opioid use disorder; PCP, primary care provider; VA/VHA, Veterans Affairs/Veterans Health Administration.

Figure 2. Federal policy timeline governing telemedicine prescribing of controlled substances, 2008–2026



Note. Events are ordered chronologically and are not drawn to a proportional time scale. NPRM = notice of proposed rulemaking; PHE = public health emergency.

Figure 2. U.S. federal telemedicine-controlled-substance policy timeline through 17 August 2026.

Table 3. Barrier taxonomy, consequences and evidence-informed policy responses

Barrier domain	Mechanism	Consequence for CNCP controlled-analgesic care	Evidence-informed response
Federal controlled-substance authority	Ryan Haight baseline; temporary extensions; drug-schedule/modality rules; pending permanent framework	Clinician uncertainty, interrupted program planning and reluctance to initiate remote controlled-analgesic care	Replace serial temporary extensions with durable, clearly phased, risk-stratified rules
Patient-location licensure	Practice authority follows the patient's physical location; state requirements differ	Continuity can be interrupted when patients travel or live across borders	Expand compacts/telehealth registrations and harmonize core standards while retaining state oversight
State prescribing rules	Jurisdictions may impose additional relationship, documentation, PDMP or examination requirements	Same encounter may be permissible in one state and restricted in another	Maintain current state-specific decision support and pursue harmonization of minimum tele-prescribing standards
Clinical examination	Some diagnoses, deterioration or adverse effects require hands-on assessment	Risk of diagnostic uncertainty or blanket forced attendance	Define clinical triggers for local/in-person review instead of universal fixed-interval attendance
PDMP and medication review	Controlled-medication history must be assessed across prescribers and pharmacies	Missed duplication, high cumulative dose or risky combinations	Integrate PDMP and medication reconciliation into the telehealth/EHR workflow
Toxicology and adherence monitoring	Specimen collection and some pill-count procedures cannot occur through video	Monitoring delay, treatment interruption or inequitable termination	Use risk-based testing and local laboratory/home-compatible pathways where valid and legal
Reimbursement and sustainability	Coverage, coding and payment may not support multidisciplinary virtual pain care	Program closure despite clinical feasibility	Separate payment policy from prescribing legality and fund evidence-based hybrid models
Pharmacy/e-prescribing workflow	Dispensing obligations, transmission systems and pharmacist concerns create a second operational gate	Delayed or failed medication access	Use secure EPCS, pharmacist escalation pathways and clear documentation of legal/clinical basis
Digital access and literacy	Video-capable devices, broadband and digital skills are unequally distributed	Exclusion of rural, low-income, older, disabled or unstably housed patients	Permit modality flexibility when clinically appropriate; provide technical/access support
Organizational capacity	Specialist staffing, training, local examination/testing partners and EHR integration require resources	Low uptake, attrition and implementation failure	Adopt hub-and-spoke models, protected clinician time and local escalation pathways

Figure 3. Layered determinants of telemedicine prescribing of controlled substances

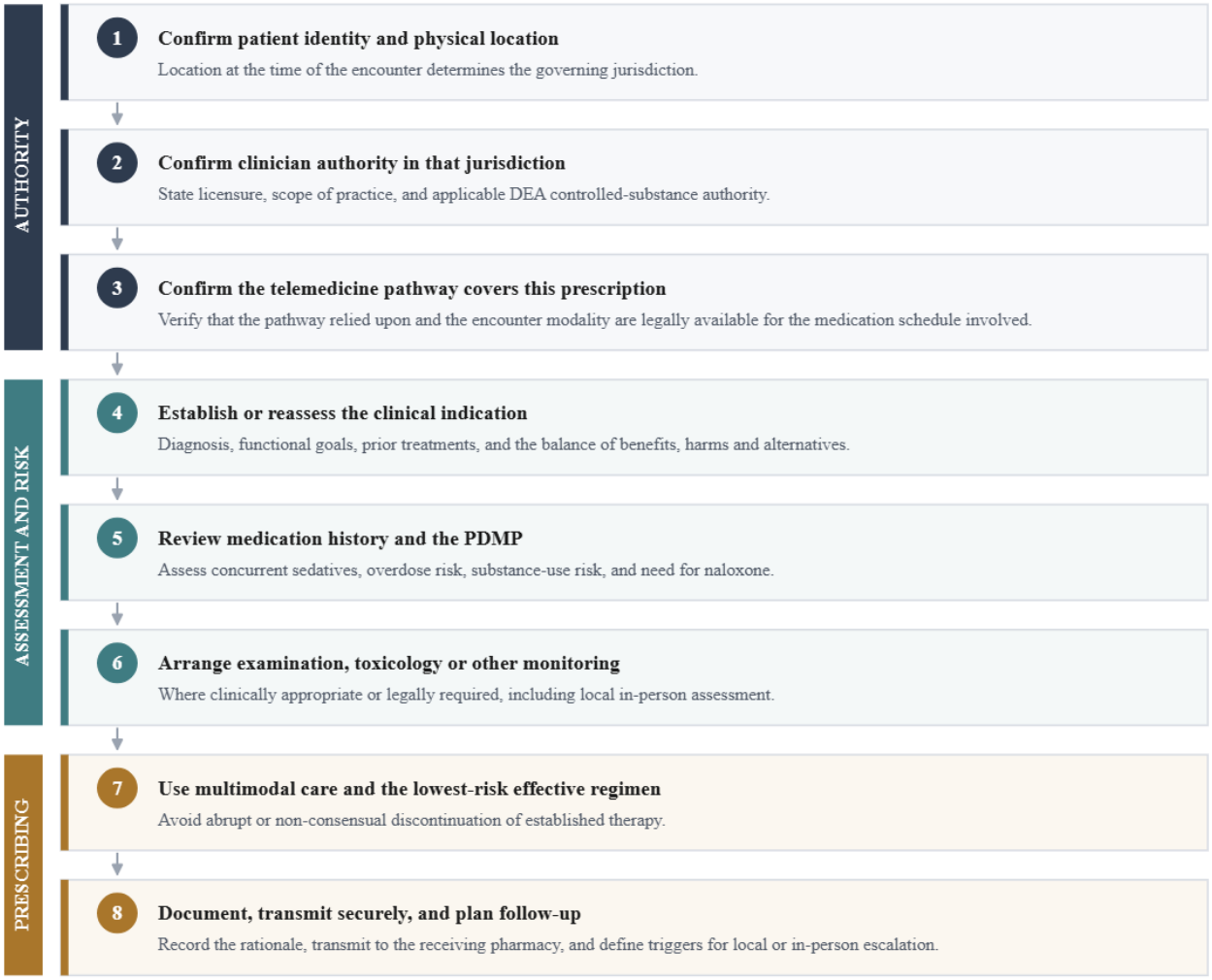
Each layer must be satisfied for a prescription to be written and received; the layers act as sequential gates rather than as additive contributions.

Note. Any single layer can become the rate-limiting barrier even where federal prescribing authority is otherwise permissible. Determinants listed within a layer are illustrative rather than exhaustive. PDMP = prescription drug monitoring program; EHR = electronic health record.

Figure 3. Multilevel barrier cascade for tele-prescribing controlled analgesics.

Figure 4. Stepwise framework for a telemedicine encounter involving controlled-substance prescribing

Steps are sequential: each stage gates the next, and an unmet requirement at any step halts the pathway rather than being offset by later steps.



Note. This synthesis framework is intended for clinical-policy interpretation and does not constitute jurisdiction-specific legal advice. Requirements vary by state and by the federal pathway relied upon. PDMP = prescription drug monitoring program; DEA = Drug Enforcement Administration.

Figure 4. Risk-stratified safeguard pathway for tele-prescribing controlled analgesics. This is a synthesis framework, not jurisdiction-specific legal advice.