

Beyond Tapering: Conventional, Pharmacological, and Complementary Strategies to Facilitate Long-Term Benzodiazepine Discontinuation

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ABSTRACT

Background: Long-term benzodiazepine (BZD) use remains a major clinical challenge because discontinuation may be complicated by physical dependence, rebound symptoms, recurrence of the underlying disorder, withdrawal manifestations, and psychological reliance on medication. Although gradual individualized reduction remains central to deprescribing, successful discontinuation may also depend on educational, behavioral, pharmacological, and complementary interventions.

Objective: To provide a clinically oriented narrative review of conventional, pharmacological, behavioral, and complementary strategies used to facilitate long-term BZD discontinuation, with particular attention to quantitative outcomes and the distinction between dose reduction, complete discontinuation, sustained discontinuation, and withdrawal tolerability.

Methods: Human studies directly addressing BZD or related sedative-hypnotic reduction or discontinuation were reviewed, including systematic reviews, meta-analyses, randomized and nonrandomized trials, and observational studies. Complementary interventions were evaluated using the same outcome-oriented framework as conventional treatments. Studies addressing only anxiety or insomnia without a BZD-discontinuation context were considered indirect evidence.

Results: Structured withdrawal and brief interventions increased cessation compared with usual care, with odds ratios of 5.96 and 4.37, respectively. Direct patient education resulted in 27% versus 5% discontinuation at 6 months in the EMPOWER trial. CBT combined with supervised withdrawal produced complete discontinuation rates ranging from approximately 75% to 85% in selected trials, with benefits persisting for up to 12 months. Pharmacological adjuncts showed heterogeneous results; pooled melatonin data did not demonstrate increased complete discontinuation. Complementary approaches produced heterogeneous quantitative findings. At 12 months after E2R hypnotherapy, 57.5% had completely discontinued medication and 79.5% had reduced or stopped it. Adjunctive *Passiflora incarnata* was associated with $\geq 50\%$ BZD reduction in 95.69% versus 72.04% of controls and complete discontinuation in 69.89% versus 52.69% at 3 months. A multicomponent program incorporating balneotherapy produced 75.3% overall reduction and 41.4% complete discontinuation at 6 months. Controlled acupuncture studies yielded differing results.

Conclusions: BZD deprescribing should not be represented by a single binary endpoint. Dose reduction, complete discontinuation, sustained discontinuation, and withdrawal tolerability are clinically distinct outcomes. The available evidence supports individualized, patient-centered, and frequently

multicomponent management, with conventional and complementary interventions evaluated according to study design and quantitative outcomes rather than treatment category alone.

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1. INTRODUCTION

Benzodiazepines and related sedative-hypnotic drugs have occupied an important place in clinical practice for more than half a century. Their rapid anxiolytic, hypnotic, anticonvulsant, and muscle-relaxant effects explain their continuing therapeutic relevance. The principal clinical difficulty arises when treatment initiated for a short-term indication evolves into prolonged or indefinite use. Long-term exposure may be accompanied by tolerance, physical dependence, cognitive and psychomotor effects, psychological reliance on medication, and increasing difficulty with discontinuation.

Deprescribing in this setting is more complex than simply reducing a prescription. Patients may experience recurrence of the disorder for which treatment was originally prescribed, rebound insomnia or anxiety, withdrawal manifestations, anticipatory anxiety concerning dose reduction, and behavioral dependence on the medication as a perceived source of safety or sleep. These phenomena may coexist, making long-term BZD discontinuation a multidimensional clinical problem.

The literature on BZD deprescribing has developed along several parallel pathways. Structured withdrawal programs and gradual supervised reduction constitute the conventional foundation of treatment. Meta-analyses have demonstrated that active discontinuation strategies outperform passive continuation or usual care [1,2]. More recently, a large systematic review of randomized trials reinforced the importance of patient education, medication review, and other structured deprescribing strategies, while also demonstrating considerable heterogeneity among interventions and outcomes [3].

Behavioral interventions, particularly cognitive behavioral therapy (CBT) and CBT for insomnia (CBT-I), have been evaluated as methods of treating the clinical factors maintaining BZD use. Pharmacological adjuncts have also been studied in attempts to reduce withdrawal symptoms or facilitate cessation, although the evidence varies substantially among agents [4].

Complementary and integrative approaches have received less unified attention despite direct human studies of acupuncture, electroacupuncture, *Passiflora incarnata*, valerian, homeopathic preparations, hypnotherapy, and multicomponent programs incorporating balneotherapy [5–11]. Importantly, complementary interventions should neither be dismissed because they fall outside conventional pharmacotherapy nor assumed effective merely because positive observational results exist. The same principles should apply across treatment categories: study design, comparator, sample size, magnitude of effect, outcome definition, and duration of follow-up should determine interpretation.

A further problem is that “successful withdrawal” is inconsistently defined. A reduction in BZD consumption is not equivalent to complete cessation; complete cessation immediately after an intervention does not establish sustained abstinence; and improvement in insomnia or anxiety does not necessarily increase the probability of discontinuation. Conversely, an intervention that improves withdrawal tolerability may be clinically useful even if it does not independently increase cessation rates.

The present narrative review therefore examines conventional, behavioral, pharmacological, complementary, and integrative approaches to long-term BZD discontinuation using four distinct clinical outcomes: dose reduction, complete discontinuation, sustained discontinuation, and withdrawal tolerability or symptom control.

2. METHODS

This article was designed as a clinically oriented narrative review rather than a systematic review or meta-analysis. The literature was examined with emphasis on human studies directly addressing reduction or discontinuation of benzodiazepines or closely related sedative-hypnotic drugs.

Evidence considered included systematic reviews and meta-analyses, randomized controlled trials, controlled clinical studies, prospective and retrospective observational studies, and pragmatic real-world investigations. Major evidence syntheses were used to contextualize individual studies and to identify established conventional strategies [1–4].

For complementary and integrative interventions, inclusion was not restricted to randomized controlled trials because the available literature encompasses randomized, observational, pragmatic, and multicomponent studies. Study design was explicitly considered when interpreting numerical results. Evidence from studies evaluating an intervention for anxiety or insomnia without concurrent BZD reduction or withdrawal was regarded as indirect and was not used as evidence of BZD-discontinuation efficacy.

The evidence was organized into conventional behavioral and organizational interventions, pharmacological adjuncts, and complementary or integrative interventions. Outcomes were subsequently reorganized according to four predefined clinical domains: (1) reduction in BZD exposure, (2) complete discontinuation, (3) sustained discontinuation, and (4) withdrawal tolerability or symptom improvement.

Because this was a narrative synthesis, no pooled effect estimate was calculated. Quantitative results from individual studies and published meta-analyses were retained whenever they could be independently verified. When complete numerical data could not be retrieved, values were not reconstructed from secondary descriptions.

3. RESULTS

3.1. Conventional, Behavioral, and Educational Interventions

Structured withdrawal and brief interventions consistently increased the probability of BZD discontinuation compared with passive continuation or usual care. In the meta-analysis by Parr et al. [2], gradual withdrawal was associated with a substantially greater likelihood of successful discontinuation than usual care (OR 5.96, 95% CI 2.08–17.11), while brief interventions were also effective (OR 4.37, 95% CI 2.28–8.40). Psychological treatment combined with gradual withdrawal increased discontinuation compared with usual care (OR 3.38, 95% CI 1.86–6.12) and compared with gradual withdrawal alone (OR 1.82, 95% CI 1.25–2.67). These quantitative estimates are directly reported in the published meta-analysis.

Patient-directed education also produced measurable changes in medication use. In the EMPOWER cluster-randomized trial involving 303 older chronic BZD users [12], complete discontinuation at 6 months occurred in 27% of participants receiving the educational intervention compared with 5% receiving usual care, corresponding to an absolute difference of approximately 23% and a number needed to treat of approximately four. An additional 11% achieved dose reduction, while 62% initiated a conversation about discontinuation.

The largest discontinuation percentages among conventional approaches were observed in several studies combining psychological intervention with supervised withdrawal. Baillargeon et al. [13] randomized 65 older adults with chronic insomnia. Immediately after treatment, 77% (26/34) receiving CBT-I combined with gradual withdrawal had completely discontinued BZDs compared with 38% (11/29) receiving withdrawal alone. At 12 months, 70% (23/33) versus 24% (7/29), respectively, remained BZD-free (OR 7.2, 95% CI 2.4–23.7).

Morin et al. [14] studied 76 older adults with chronic insomnia who had used BZDs for a mean of 19.3 years. Across interventions, medication quantity decreased by approximately 90% and frequency by approximately 80%. Complete discontinuation was achieved by 85% receiving supervised withdrawal combined with CBT, compared with 48% receiving withdrawal alone and 54% receiving CBT alone. Reductions were largely maintained through 12 months, and CBT-containing interventions produced greater subjective improvement in sleep.

Comparable findings were observed when anxiety was the principal clinical context. In the randomized study by Gosselin et al. [16], approximately 75% of patients with generalized anxiety disorder receiving CBT-assisted withdrawal completely discontinued BZDs compared with approximately 37% in the comparison condition, with the difference maintained at 3, 6, and 12 months.

The quantitative results of conventional interventions are summarized in Table 1.

3.2. Pharmacological Adjuncts

Pharmacological adjuncts have been evaluated as potential facilitators of withdrawal, particularly through the control of insomnia, anxiety, and other withdrawal-associated symptoms. However, improvement in symptoms has not consistently translated into higher complete-discontinuation rates.

The Cochrane review by Baandrup et al. [4], including 38 trials and 2,543 participants, evaluated numerous pharmacological strategies but found considerable heterogeneity in agents, populations, and endpoints. This literature illustrates an important distinction between reducing withdrawal burden and independently facilitating complete cessation.

Melatonin provides a useful example. In the systematic review and meta-analysis by Wright et al. [18], which included six randomized trials and 322 participants, melatonin did not significantly increase complete BZD discontinuation (OR 0.72, 95% CI 0.21–2.41). Sleep outcomes were heterogeneous. Thus, symptomatic outcomes and medication-discontinuation outcomes should be reported separately.

3.3. Complementary and Integrative Interventions

Direct human evidence was identified for hypnotherapy, *Passiflora incarnata*, balneotherapy as part of a multicomponent program, acupuncture, electroacupuncture, valerian, and homeopathic preparations. Considerable heterogeneity was present in study design, comparator, duration, and endpoint definition. Accordingly, numerical outcomes rather than qualitative labels were used to characterize these interventions (Tables 2 and 3).

Bastian et al. [20] evaluated medication use 12 months after E2R hypnotherapy in 73 previously treated BZD/BZRA users. At follow-up, 79.5% had reduced or stopped medication, with a mean reduction of 55%. Complete discontinuation was reported in 57.5% (95% CI 45.4–69.0), while another 21.9% reported only occasional medication use. The investigation was observational rather than randomized, an important consideration when interpreting these percentages. The study design and sample of 73 patients are confirmed in the published report.

Passiflora incarnata was evaluated in a comparative real-world investigation involving 186 patients, 93 receiving adjunctive *Passiflora* during BZD reduction and 93 controls [10]. At one month, at least 50% reduction in BZD exposure occurred in 76.35% versus 26.88% ($p < 0.001$), respectively. At three months, the corresponding proportions were 95.69% and 72.04% ($p < 0.001$).

Complete discontinuation occurred in 32.26% versus 12.90% at one month ($p=0.002$) and 69.89% versus 52.69% at three months ($p=0.016$). Subsequent follow-up provided longer-term information regarding maintenance [11].

De Maricourt et al. [7] evaluated 70 long-term BZD users participating in a program combining balneotherapy with psychoeducational and behavioral components. At six months, overall BZD consumption had decreased by 75.3%, and 29 of 70 participants (41.4%) had completely discontinued medication. Because this was a multicomponent intervention, the observed effect cannot be attributed to balneotherapy alone.

Controlled acupuncture studies produced differing findings. In the randomized sham-controlled study by Yeung et al. [8], involving 144 long-term BZD users, medication exposure at week 16 decreased by 40.23% with electroacupuncture and 48.76% with sham acupuncture. Complete discontinuation occurred in 9.17% and 10.83%, respectively, without significant between-group differences in insomnia, anxiety, depression, or withdrawal symptoms.

Fan et al. [9] subsequently conducted a multicenter randomized placebo-acupuncture controlled trial involving 64 patients with benzodiazepine-dependent insomnia. Sixty-three completed the study. Active acupuncture combined with BZD reduction produced a significantly greater drug-reduction rate than placebo acupuncture combined with reduction, with between-group differences at week 4 ($p=0.002$) and week 12 ($p<0.001$). Successful discontinuation according to the study definition was also significantly more frequent with active acupuncture at week 12 ($p<0.05$). Insomnia severity improved to a greater extent ($p=0.005$), and lower fatigue and withdrawal-symptom scores were observed, including a significant between-group difference in withdrawal symptoms at week 12 ($p=0.036$).

Valerian was evaluated in a different context. Poyares et al. [5] studied 19 patients with insomnia who had previously used BZDs nightly for a mean of 7.1 ± 5.4 years. Because medication had already been withdrawn before comparative treatment, the study does not measure the probability of BZD cessation itself. Valerian was associated with better subjective sleep quality and reduced wake after sleep onset compared with placebo, whereas sleep-onset latency did not significantly improve.

Cialdella et al. [6] evaluated homeopathic preparations in a double-blind placebo-controlled study in the context of BZD substitution or withdrawal. The complete article could not be retrieved, and the accessible bibliographic information did not provide sufficient numerical outcome data for independent verification. The study was therefore retained in the qualitative evidence map, but numerical outcomes were not reconstructed.

The quantitative findings of complementary and integrative interventions are summarized in Table 2.

3.4. Outcomes Rather Than Treatment Categories

Reorganization of the evidence according to outcome demonstrates why BZD deprescribing should not be represented as a single binary event.

For dose reduction, substantial changes in exposure were reported across different therapeutic categories. Morin et al. [14] observed approximately 90% reduction in medication quantity during structured behavioral treatment; E2R hypnotherapy was associated with a mean 55% reduction at 12 months [20]; at least 50% reduction at three months occurred in 95.69% of patients receiving adjunctive *Passiflora* versus 72.04% of controls [10]; and the program incorporating balneotherapy produced an overall reduction of 75.3% at six months [7]. These results arise from markedly different study designs and should not be interpreted as head-to-head comparisons. For complete discontinuation, reported proportions included 85% after CBT combined with supervised withdrawal in the Morin trial [14], 77% immediately after CBT-I plus withdrawal in Baillargeon et al. [13], approximately 75% with CBT-assisted withdrawal in generalized anxiety disorder [16], 69.89% at three months in the *Passiflora* group [10], 57.5% at 12 months following E2R hypnotherapy [20], and 41.4% at six months following the multicomponent program incorporating balneotherapy [7].

Evidence for sustained discontinuation was reported less consistently. Baillargeon et al. documented 70% BZD-free status at 12 months with CBT-I plus withdrawal compared with 24% with withdrawal alone [13]. Improvements reported by Morin et al. were largely maintained for 12 months [14], and the difference in the GAD trial persisted through 12 months [16]. Hypnotherapy outcomes were themselves measured at 12 months [20], and longer-term observational data are available for *Passiflora* [11].

Finally, withdrawal tolerability and symptom control constituted a separate therapeutic domain. CBT-containing interventions frequently addressed insomnia or anxiety while facilitating discontinuation [13,14,16]. Valerian primarily influenced sleep-related outcomes [5]. Acupuncture in the Fan et al. trial affected insomnia, fatigue, and withdrawal symptoms in addition to medication outcomes [9], whereas the earlier electroacupuncture trial did not demonstrate significant active-versus-sham symptom differences [8].

An outcome-specific quantitative evidence map, distinguishing dose reduction, complete discontinuation, sustained discontinuation, and withdrawal tolerability or symptom control, is presented in Table 3.

4. DISCUSSION

This review demonstrates that long-term BZD discontinuation is best conceptualized as a multidimensional therapeutic process rather than a simple medication-withdrawal event. The available literature encompasses interventions ranging from brief educational messages to intensive psychological treatment, pharmacological adjuncts, and complementary approaches. Across these categories,

the most important methodological issue is not whether an intervention is classified as conventional or complementary, but what outcome was measured, under what study design, against which comparator, and for how long.

The conventional literature provides clear evidence that active intervention is preferable to passive continuation. The magnitude of this effect is clinically meaningful. Parr et al. reported ORs of 5.96 for gradual withdrawal and 4.37 for brief interventions compared with routine care [2]. The contemporary BMJ synthesis likewise found that patient education, medication review, and related structured approaches may increase discontinuation, although uncertainty and heterogeneity remain across many comparisons [3]. A particularly important finding is the effect of psychological treatment when it addresses the clinical reason for continued medication use. Chronic BZD consumption is frequently maintained not merely by pharmacological dependence but by persistent insomnia, anxiety, fear of recurrence, and expectations that sleep or emotional stability will be impossible without medication. CBT and CBT-I therefore act on mechanisms that may otherwise perpetuate use. The 12-month outcomes reported by Baillargeon et al. and Morin et al. suggest that such interventions may contribute not only to initial cessation but also to maintenance [13–15].

At the same time, the pharmacological literature illustrates why symptomatic benefit should not automatically be interpreted as deprescribing efficacy. An adjunctive agent may improve sleep, anxiety, or withdrawal discomfort yet have little measurable effect on complete cessation. Conversely, improved tolerability may remain clinically meaningful because it can reduce suffering during the discontinuation process. These are different therapeutic goals and should be analyzed separately.

The complementary literature deserves the same methodological treatment. Its evidence base is smaller and more heterogeneous, but it contains clinically relevant quantitative observations that should not be obscured by broad qualitative labels. Hypnotherapy, for example, was associated with 57.5% complete discontinuation at 12 months and 79.5% reduction or cessation in an observational population [20]. These are substantial numerical observations, while the absence of randomization prevents causal inference comparable to that of an RCT. Both statements are simultaneously valid.

Likewise, the Passiflora study demonstrated substantial between-group differences in both dose reduction and complete discontinuation [10]. Its real-world design provides a different type of evidence from randomized controlled trials but does not make the numerical findings irrelevant. Conversely, the electroacupuncture RCT by Yeung et al. [8] found similar medication reductions and cessation rates between active and sham groups. The more recent Fan et al. trial [9] reported statistically greater medication reduction and successful discontinuation with active acupuncture. These apparently differing results underscore the need for replication and careful consideration of population, acupuncture protocol, endpoint definitions, and comparator characteristics rather than categorical conclusions about “acupuncture” as a single homogeneous intervention.

Balneotherapy raises another methodological issue. The reported 75.3% reduction in BZD consumption and 41.4% complete discontinuation occurred within a program that also incorporated psychoeducational and behavioral components [7]. The appropriate interpretation is therefore that the multicomponent program produced these outcomes; attribution to balneotherapy alone would exceed what the design can establish.

Valerian illustrates the importance of endpoint classification particularly well. Because BZDs had already been withdrawn before comparative treatment [5], improvements in sleep cannot be interpreted as evidence that valerian increases discontinuation. They instead concern post-withdrawal symptom management. This distinction prevents both overstatement and inappropriate dismissal of potentially useful supportive therapies.

The inability to retrieve the full Cialdella report [6] also illustrates an important principle adopted throughout this review. The existence of a double-blind placebo-controlled study is relevant to mapping the literature, but numerical findings that cannot be independently verified should not be reconstructed from incomplete secondary information. Accordingly, the study was acknowledged without assigning numerical efficacy estimates.

4.1. Toward Phenotype-Directed Deprescribing

The evidence suggests that the optimal supportive strategy may depend on the predominant barrier maintaining BZD use. A patient whose major difficulty is chronic insomnia represents a different therapeutic phenotype from one dominated by generalized anxiety, withdrawal manifestations, fear of discontinuation, or complex psychiatric and medical comorbidity.

This perspective provides a rationale for individualized supportive treatment. CBT-I may be particularly relevant when insomnia perpetuates medication use, while anxiety-focused psychological intervention may be appropriate when anticipatory anxiety or an underlying anxiety disorder dominates. Interventions targeting relaxation, sleep, withdrawal symptoms, or psychological reliance may similarly occupy different supportive roles.

This framework should not be interpreted as a rigid algorithm. Rather, it emphasizes identification of the principal obstacle to discontinuation and selection of interventions that address that obstacle while medication reduction remains individualized and clinically supervised.

This phenotype-directed, integrative approach to benzodiazepine deprescribing is summarized in Figure 1, which links initial clinical assessment and individualized tapering with problem-oriented conventional and complementary supportive strategies and the separate evaluation of clinically relevant outcomes.

4.2. A Common Evidentiary Language for Conventional and Complementary Medicine

A central methodological principle emerging from this review is that conventional and complementary interventions should be described using the same evidentiary language.

An RCT should be identified as an RCT; an observational study should be identified as observational. Sample size, comparator, follow-up, absolute proportions, effect estimates, and statistical uncertainty should be reported whenever available. Large percentages from uncontrolled studies should neither be ignored nor interpreted as equivalent to randomized evidence. Similarly, conventional treatments should not be presumed effective simply because they are pharmacological or routinely used.

This approach is particularly important in deprescribing research because study outcomes are unusually heterogeneous. A treatment may improve symptoms without facilitating cessation, increase reduction without increasing complete discontinuation, or facilitate initial cessation without preventing later resumption. Evidence hierarchy and outcome definition must therefore be considered simultaneously.

5. CLINICAL IMPLICATIONS

Several practical principles emerge from the evidence. First, long-term BZD discontinuation is more likely to succeed when it is actively supported rather than approached as a passive prescription change. Education, shared decision-making, medication review, psychological treatment, and continued clinical follow-up can all contribute to the process.

Second, the condition maintaining BZD use should be addressed concurrently. Insomnia, anxiety, fear of withdrawal, psychological reliance, and comorbid disorders may each require different supportive approaches.

Third, complementary therapies can reasonably be considered within an integrative framework when supported by direct human evidence, provided that patients and clinicians understand the design and limitations of the relevant studies. Their role should be judged according to measurable outcomes rather than predetermined assumptions based on therapeutic category.

Finally, treatment success should be documented across more than one dimension. A clinically meaningful outcome may include reduced exposure, complete cessation, maintenance of cessation, improved sleep or anxiety, reduced withdrawal burden, or combinations of these endpoints.

6. RESEARCH PRIORITIES

Future trials should standardize outcome definitions and report at least four domains separately: percentage reduction in medication exposure, complete discontinuation, maintenance of discontinuation at clinically meaningful follow-up, and withdrawal or symptom burden.

Studies should provide absolute numerator/denominator data in addition to relative effect measures and should clearly distinguish BZDs from related hypnotics when mixed populations are included. Longer follow-up is particularly important because short-term cessation may overestimate durable success.

Complementary interventions require additional randomized and adequately powered studies. The observational findings for hypnotherapy and *Passiflora* warrant further controlled investigation, while the differing results among acupuncture studies justify replication using standardized outcomes and transparent comparator procedures.

Future research should also investigate whether treatment matching based on the predominant discontinuation barrier—such as insomnia, anxiety, withdrawal sensitivity, or psychological reliance—improves outcomes compared with uniform deprescribing strategies.

7. LIMITATIONS

This review has limitations. It was designed as a narrative rather than systematic review and therefore did not employ a formal PRISMA-based selection process or generate new pooled estimates. The literature is heterogeneous with respect to patient characteristics, duration of previous BZD exposure, intervention content, comparator, follow-up duration, and definitions of successful discontinuation.

The evidence base for several complementary interventions is smaller than that for established behavioral strategies and includes observational and multicomponent studies. Direct numerical comparison across studies is therefore inappropriate. Some studies included BZDs together with related sedative-hypnotic medications.

In addition, the complete report of the homeopathy study by Cialdella et al. [6] could not be retrieved, preventing independent extraction of quantitative results. This study was therefore included descriptively without numerical efficacy estimates.

8. CONCLUSIONS

Long-term benzodiazepine discontinuation is a multidimensional clinical process in which medication reduction is only one component. Structured withdrawal, patient education, CBT and CBT-I, pharmacological adjuncts, and several complementary or integrative interventions have been investigated, with markedly different study designs and outcomes.

The evidence does not support reducing therapeutic success to a single question of whether medication was stopped. Four outcomes should be distinguished: dose reduction, complete discontinuation, sustained discontinuation, and withdrawal tolerability or symptom control.

Conventional and complementary interventions should be evaluated according to the same methodological principles: study design, comparator, sample size, quantitative effect, follow-up duration, and endpoint definition. Within this framework, individualized and frequently multicomponent care provides a coherent model for supporting patients through long-term BZD deprescribing.

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Conflict of Interest

The author declares no conflicts of interest relevant to this manuscript.

Ethics Approval

Ethics committee approval was not required because this article is a narrative review of previously published literature and contains no new research involving human participants or animals.

Consent for Publication

Not applicable.

Data Availability

No new datasets were generated or analyzed for this narrative review. All information discussed in the manuscript derives from previously published sources.

Use of Artificial Intelligence-Assisted Technology

The manuscript was originally conceived and written by the author in Portuguese. ChatGPT (OpenAI) was used to assist with translation into English and with language editing, including grammar, readability, organization, and clarity of expression. The author critically reviewed, revised, and approved the complete manuscript, independently evaluated the scientific content and cited literature, and assumes full responsibility for the final text. Artificial intelligence was not considered an author and did not assume responsibility for any aspect of the work.

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Table 1. Quantitative outcomes of conventional interventions for benzodiazepine discontinuation

Intervention study	Study design and population	Dose reduction	Complete discontinuation	Sustained discontinuation	Withdrawal tolerability / symptoms
Structured withdrawal brief interventions [1,2]	/ Meta-analyses of controlled interventions	Increased reduction usual care	Gradual withdrawal: OR 5.96 (95% CI 2.08–17.11); brief Psychological intervention: OR 4.37 (2.28–8.40); intervention + withdrawal vs usual care: OR 3.38 (1.86–6.12)	Psychological withdrawal vs withdrawal alone: OR 1.82 (1.25–2.67)	Psychological interventions + addressed anxiety, insomnia and withdrawal-related symptoms
EMPOWER [12]	Cluster RCT; n=303 chronic users	RCT; older BZD achieved reduction	11% 27% vs 5% at 6 months; absolute difference ≈23%; NNT ≈4	Assessed at 6 months	62% initiated a discussion about discontinuation
CBT-I withdrawal [13]	RCT; + older with insomnia	n=65 ≥50% reductions favored chronic combined treatment	77% (26/34) vs 38% (11/29) post-treatment	70% (23/33) vs 24% (7/29) BZD-free at 12 months; OR 7.2 (2.4–23.7)	targeted insomnia

Intervention study	Study design and population	Dose reduction	Complete discontinuation	Sustained discontinuation	Withdrawal tolerability / symptoms
CBT supervised withdrawal [14]	+ RCT; n=76; mean previous BZD use 19.3 years	~90% reduction in quantity; 80% in frequency	85% vs 48% vs 54%	Largely maintained through 12 months	Greater subjective sleep improvement in CBT-containing groups
CBT withdrawal GAD [16]	+ in RCT; n=61	NR	~75% vs 37%	Difference maintained at 3, 6 and 12 months	GAD symptoms improved
Melatonin [18]	Meta-analysis; 6 RCTs, n=322	Heterogeneous	OR 0.72 (95% CI 0.21–2.41)	No consistent effect established	Heterogeneous sleep outcomes

Abbreviations: BZD, benzodiazepine; CBT, cognitive behavioral therapy; CBT-I, cognitive behavioral therapy for insomnia; CI, confidence interval; GAD, generalized anxiety disorder; NNT, number needed to treat; NR, not reported; OR, odds ratio; RCT, randomized controlled trial.

Table 2. Quantitative outcomes of complementary and integrative interventions during benzodiazepine discontinuation

Intervention study	Design/population	Dose reduction	Complete discontinuation	Sustained discontinuation	Withdrawal tolerability/symptoms
E2R hypnotherapy [20]	Observational; n=73	79.5% reduced/stopped; mean reduction 55%	57.5% (95% CI 45.4–69.0) at 12 months	Evaluated at 12 months; 21.9% occasional use	NR as separate primary symptom endpoint
<i>Passiflora incarnata</i> [10,11]	Comparative real-world study; n=186 (93 vs 93)	≥50% reduction: 76.35% vs 26.88% at 1 month and 95.69% vs 72.04% at 3 months; both p<0.001	32.26% vs 12.90% at 1 month (p=0.002); 69.89% vs 52.69% at 3 months (p=0.016)	Longer-term follow-up reported maintenance	Anxiety/depression monitored
Balneotherapy + psychoeducation [7]	Prospective multicomponent cohort; n=70	75.3% reduction at 6 months	41.4% (29/70)	Assessed at 6 months	Multicomponent intervention
Electroacupuncture [8]	Sham-controlled RCT; n=144	–40.23% vs –48.76% sham	9.17% vs 10.83%	No between-group advantage	No significant between-group symptom differences
Acupuncture [9]	Multicenter placebo-acupuncture RCT; n=64; 63 completed	Active > placebo: p=0.002 week 4; p<0.001 week 12	Successful discontinuation according to study definition with active treatment at week 12, p<0.05	Evaluated through week 12	ISI improvement p=0.005; BWSQ difference at week 12 p=0.036; fatigue also improved
Valerian [5]	Placebo-controlled study; n=19	NA	NA	NA	Improved subjective sleep quality and WASO; sleep-onset latency not significantly improved
Homeopathic preparations [6]	Double-blind placebo-controlled study	NR	NR	NR	NR; complete quantitative results unavailable for independent verification

Abbreviations: BZD, benzodiazepine; BWSQ, Benzodiazepine Withdrawal Symptom Questionnaire; CI, confidence interval; ISI, Insomnia Severity Index; NA, not applicable; NR, not retrievable/not reported; RCT, randomized controlled trial; WASO, wake after sleep onset.

Table 3. Outcome-specific quantitative evidence map of interventions for benzodiazepine discontinuation

Intervention	Dose reduction	Complete discontinuation	Sustained discontinuation	Withdrawal tolerability symptoms	/
Structured/brief interventions [1,2]	Increased vs usual care	OR 5.96 gradual withdrawal; OR 4.37 brief intervention	Psychological intervention + withdrawal vs withdrawal alone: OR 1.82	Psychological support incorporated	
EMPOWER [12]	Additional 11% reduced	27% vs 5%	NR beyond 6 months	62% initiated cessation discussion	
CBT-I + withdrawal [13]	≥50% reduction favored combination	77% vs 38%	70% vs 24% at 12 months	Insomnia targeted	
CBT + supervised withdrawal [14]	≈90% quantity; 80% frequency reduction	85% vs 48% vs 54%	Largely maintained to 12 months	Greater subjective sleep improvement	
CBT + withdrawal in GAD [16]	NR	≈75% vs 37%	Maintained through 12 months	GAD symptoms improved	
Melatonin [18]	Heterogeneous	OR 0.72 (0.21–2.41)	No consistent effect	Heterogeneous sleep outcomes	
E2R hypnotherapy [20]	79.5% reduced/stopped; mean –55%	57.5% (45.4–69.0)	Outcomes at 12 months	NR	
<i>Passiflora</i> [10,11]	≥50% reduction at 3 months: 95.69% vs 72.04%	69.89% vs 52.69%	Longer-term follow-up available	Anxiety/depression monitored	
Balneotherapy + psychoeducation [7]	75.3% at 6 months	41.4%	6-month assessment	Multicomponent	
Electroacupuncture [8]	–40.23% vs –48.76%	9.17% vs 10.83%	No active-treatment advantage	No significant symptom advantage	
Acupuncture [9]	Active > placebo, p=0.002/p<0.001	Active > placebo at week 12, p<0.05	Evaluated through week 12	ISI and BWSQ improved	
Valerian [5]	NA	NA	NA	Improved sleep quality and WASO	
Homeopathy [6]	NR	NR	NR	NR	

Abbreviations: BZD, benzodiazepine; BWSQ, Benzodiazepine Withdrawal Symptom Questionnaire; CBT, cognitive behavioral therapy; CBT-I, cognitive behavioral therapy for insomnia; CI, confidence interval; GAD, generalized anxiety disorder; ISI, Insomnia Severity Index; NA, not applicable; NR, not retrievable/not reported; OR, odds ratio; WASO, wake after sleep onset.

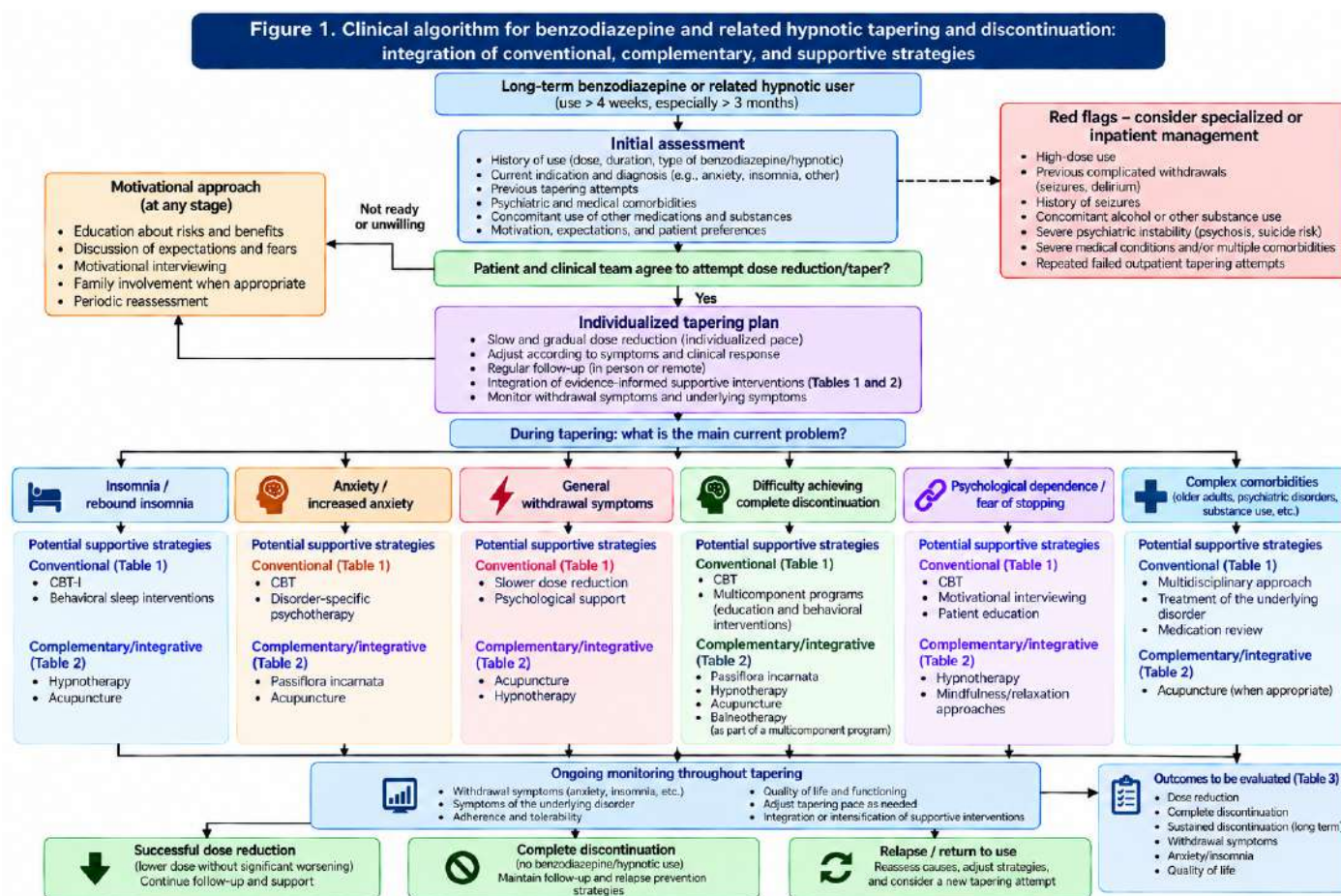


Figure 1. Clinical algorithm for benzodiazepine and related hypnotic tapering and discontinuation: integration of conventional, complementary, and supportive strategies. The proposed framework begins with clinical assessment and identification of situations that may require specialized or inpatient management, followed by shared decision-making and an individualized, clinically supervised reduction plan. Supportive interventions are selected according to the predominant problem during discontinuation, including insomnia or rebound insomnia, anxiety, withdrawal symptoms, difficulty achieving complete discontinuation, psychological dependence or fear of stopping, and complex comorbidities. Conventional and complementary/integrative strategies may be incorporated according to the clinical context and available evidence. Ongoing monitoring includes withdrawal symptoms, recurrence of the underlying disorder, tolerability, quality of life, and treatment progress. Outcomes should be evaluated separately as dose reduction, complete discontinuation, sustained discontinuation, withdrawal symptoms, anxiety/insomnia, and quality of life. The figure is intended as a conceptual clinical framework and not as a prescriptive medication-withdrawal protocol.