

Pill Sedation in Dentistry: Simple and Effective in the Primary Care Setting — A Review of Oral Conscious Sedation and the New Age of Anaesthesia

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Abstract

Dental anxiety and fear remain among the most common barriers to timely and effective oral healthcare, and a meaningful proportion of adults avoid or delay treatment because of them. Where behavioural management and local anaesthesia alone are insufficient, pharmacological sedation offers a bridge between fully conscious treatment and general anaesthesia. Among the available sedation modalities, oral conscious sedation — colloquially "pill sedation" — is the most accessible technique for the primary care dental practitioner, requiring no intravenous access, modest equipment, and a comparatively short period of additional training. This narrative review synthesises the pharmacological, clinical and safety evidence relating to oral conscious sedation in dentistry, with particular attention to benzodiazepines (diazepam, midazolam and triazolam), historical and adjunctive agents, and emerging alternatives such as alpha-2 agonists. The literature indicates that, when appropriately prescribed, monitored and documented within recognised guidelines, oral sedation produces reliable anxiolysis, amnesia and improved patient cooperation with a wide margin of safety in healthy, appropriately selected patients. Reported adverse events are predominantly minor and related to over-sedation or respiratory compromise, and are disproportionately associated with inadequate patient selection, dosing errors, or insufficient monitoring rather than the technique itself. The review also considers how pill sedation fits into a broader, evolving "new age" of dental anaesthesia characterised by minimally invasive routes of drug delivery, objective depth-of-sedation monitoring, and individualised, pharmacogenomically informed dosing. It is concluded that oral conscious sedation remains a simple, cost-effective and evidence-supported option for managing anxious and mildly uncooperative patients in general dental practice, provided that practitioners adhere to structured training, patient selection criteria and monitoring standards, and that it should continue to occupy a central place in the primary care sedation continuum alongside newer, less invasive techniques.

Keywords

Oral Conscious Sedation; Dental Anxiety; Benzodiazepines; Midazolam; Primary Dental Care; Dental Anaesthesia.

Introduction

Dental anxiety and dental fear are widespread public health concerns that compromise access to, and continuity of, oral healthcare. Systematic reviews and meta-analyses estimate that dental fear and anxiety affect approximately 15% of adults worldwide, with roughly 12% reporting high dental anxiety and around 3% reporting severe anxiety or specific dental phobia, and prevalence is consistently higher among women and younger adults.¹

Anxious patients are more likely to delay or avoid dental visits, present with more advanced disease, and require longer or more difficult appointments, creating a cycle of avoidance and deteriorating oral health. Behavioural techniques — including tell-show-do, distraction, and structured communication — remain first-line strategies, but a substantial subset of patients require pharmacological support to complete even routine treatment comfortably and safely.²

The pharmacological continuum used in dentistry ranges from minimal sedation (anxiolysis) through moderate ("conscious") sedation, deep sedation, and general anaesthesia. Conscious sedation is classically defined as a technique in which one or more drugs produce a minimally depressed level of consciousness that retains the patient's ability to maintain a patent airway independently and continuously, and to respond appropriately to verbal command or light tactile stimulation. Within this continuum, oral (enteral) sedation — sometimes referred to informally as "pill sedation" — occupies a distinct and important niche: it does not require venepuncture, uses widely available oral medications, and can be delivered by appropriately trained general dental practitioners in a standard surgery environment.²

Access to sedation services, however, is not evenly distributed. Analyses of primary dental care sedation provision have shown that access varies considerably by geography, socioeconomic deprivation and patient demography, with intravenous and specialist-delivered techniques concentrated in secondary or referral settings. Oral sedation, by contrast, is comparatively low-cost, requires less specialised equipment than intravenous techniques, and is therefore well placed to reduce this inequity by keeping sedation care within the primary care setting for suitably selected patients.³

This review aims to (i) summarise the pharmacology, dosing and evidence base for the principal agents used in oral conscious sedation in dentistry; (ii) appraise the efficacy and safety evidence for pill sedation across adult, paediatric and special-care populations; (iii) examine its particular suitability for the primary dental care setting; and (iv) situate oral sedation within the broader, evolving landscape of dental anaesthesia — a "new age" increasingly characterised by minimally invasive drug delivery, objective sedation monitoring and individualised prescribing. The working hypothesis of this review is that, when practised within recognised training and monitoring frameworks, oral conscious sedation represents a simple, accessible and effective technique that remains highly relevant to modern, minimally invasive dental anaesthetic practice.

Materials and Methods

This article is a narrative review of the published literature on oral conscious sedation in dentistry; it did not involve human participants, patient data or animal subjects, and no ethical approval or informed consent was therefore required.

Search strategy

A literature search was conducted using PubMed/MEDLINE, Scopus, Cochrane Library and Google Scholar for articles published without a fixed lower date limit, extending to 2026. Search terms included combinations of "oral sedation", "conscious sedation", "pill sedation", "dentistry", "benzodiazepine", "midazolam", "triazolam", "dental anxiety", "dental fear", "primary dental care", and "dental anaesthesia". Reference lists of retrieved systematic reviews and narrative reviews were hand-searched for additional relevant primary studies.

Eligibility

Systematic reviews, meta-analyses, randomised and non-randomised clinical trials, retrospective cohort studies, service evaluations and authoritative professional guidance documents addressing oral or enteral sedation in dental practice were considered eligible. Studies addressing purely intravenous, inhalational (nitrous oxide) or general anaesthetic techniques were included only where necessary for comparative context. Articles not available in English, and material without accessible bibliographic verification, were excluded.

Data synthesis

Given the heterogeneity of study designs, populations (paediatric, adult and special-care) and outcome measures reported in the literature, a narrative rather than quantitative (meta-analytic) synthesis was

undertaken. Findings are organised thematically around pharmacology, efficacy, safety, primary care applicability and emerging practice.

Results and Discussion

Definitions and the sedation continuum

Professional bodies including the American Dental Association, the American Academy of Pediatric Dentistry and the American Society of Anesthesiologists describe a continuum of sedation depth — minimal, moderate, deep and general anaesthesia — rather than discrete categories, reflecting the fact that a patient's response to any sedative drug can shift along this continuum irrespective of the intended target level. Oral conscious sedation is most commonly used to achieve minimal to moderate sedation: the patient remains conversant, protective airway reflexes are preserved, and spontaneous ventilation and cardiovascular function are unaffected.⁴

Pharmacological agents

Benzodiazepines remain the mainstay of oral sedation in both adult and paediatric dentistry because of their anxiolytic, amnestic, sedative and muscle-relaxant properties combined with a wide margin of safety and the availability of flumazenil as a reversal agent. Diazepam was historically the most widely used oral benzodiazepine; midazolam, with its shorter half-life and more predictable recovery profile, has increasingly superseded it, while triazolam, a short-acting triazolobenzodiazepine, has become popular in adult dental anxiolysis because of its rapid onset and short duration of action.^{4,5}

In adults, oral triazolam in doses of 0.125–0.5 mg administered approximately one hour before treatment has been shown in double-blind trials to reduce both subjective anxiety and disruptive movement during local anaesthetic injection and operative dentistry, with efficacy comparable to intravenous diazepam but without the risks associated with parenteral administration; doses of 0.25 mg and above produce clinically significant anxiolysis without adverse changes in respiratory rate, heart rate or blood pressure. A large retrospective series covering 270 administrations of triazolam over 15 years similarly reported that oral triazolam, together with related short-acting hypnotics, could be used safely for adult dental anxiolysis using practical, easily reproducible prescribing protocols.^{6,7}

Midazolam is the most extensively studied oral sedative agent in contemporary dentistry. A double-blind randomised controlled trial in preschool children with dental anxiety demonstrated that oral midazolam produced effective sedation and reliable anterograde amnesia at both 0.3 mg/kg and 0.6 mg/kg dosing, supporting its continued first-line role in paediatric behaviour management. An umbrella review of 37 systematic reviews on paediatric dental sedation similarly identified midazolam, alone or combined with nitrous oxide, as the most extensively evidenced and commonly recommended agent, with an oral dose of approximately 0.75 mg/kg (to a practical maximum, commonly cited as 20 mg) considered optimal, while noting that the overall certainty of evidence remains only moderate and that further high-quality trials are warranted.^{8,9}

A retrospective analysis of adult patients sedated with oral midazolam in general dental practice similarly reported that the drug, when administered by trained dentists using a standardised sedation record documenting patient weight and medical history, achieved safe and effective sedation across a range of routine and surgical procedures.¹⁰

Historic agents such as chloral hydrate have become largely obsolete in contemporary practice because of their unpredictable absorption, prolonged and variable recovery, and narrower margin of safety compared with modern benzodiazepines. Newer non-benzodiazepine options — including the alpha-2 adrenergic agonists (such as clonidine and, more recently, dexmedetomidine formulated for oral or intranasal use), oral ketamine, and selected antihistamines with sedative and antisialagogue properties — are increasingly used as adjuncts or alternatives, particularly where benzodiazepine monotherapy is insufficient or contraindicated, although each carries a distinct pharmacokinetic and adverse-effect profile that must be individually weighed.¹¹

Efficacy across populations

A systematic review of the pharmacological literature comparing sedative drugs and routes in dentistry concluded that midazolam was the most frequently and successfully used single agent across surgical and non-surgical dental procedures, with intranasal ketamine and inhaled nitrous oxide also

demonstrating good efficacy, reinforcing the position of oral and enteral benzodiazepines as a first-choice minimally invasive option.¹²

A systematic review of randomised controlled trials evaluating oral sedation specifically in adult dental patients found that oral benzodiazepines reduced self-reported and observer-rated anxiety compared with placebo across the included trials, while noting considerable heterogeneity in drug choice, dosing and outcome measurement that limited pooled quantitative synthesis and underscored the need for standardised trial methodology in this field.¹³

In special-care and neurodivergent populations, narrative reviews of conscious sedation for children with autism spectrum disorder have reported that combinations of oral premedication (frequently oral diazepam or midazolam) with nitrous oxide inhalation improved cooperation and treatment completion, although the authors emphasised that communication difficulties inherent to inhalation techniques can make oral premedication a more practical first step for this population.¹⁴

Safety profile and adverse events

Across the reviewed literature, oral conscious sedation is consistently described as having a wide margin of safety in appropriately selected, healthy (ASA I–II) patients. Nonetheless, serious adverse events — predominantly related to respiratory depression, airway obstruction and, rarely, hypoxic brain injury or death — have been documented, disproportionately in young children and in cases involving polypharmacy, dosing errors, inadequate monitoring, or premature discharge. State dental-board reviews of adverse sedation events in the United States have identified failure to rescue from over-sedation, rather than the pharmacological agent itself, as the recurring root cause of serious harm, reinforcing that outcomes are determined chiefly by patient selection, dosing discipline, monitoring and emergency preparedness rather than by the sedation technique in isolation.^{15,16}

Contemporary professional guidance — including statements from the American Society of Anesthesiologists on office-based sedation and anaesthesia, and national guidance such as that of the Intercollegiate Advisory Committee for Sedation in Dentistry in the United Kingdom — converges on core safety requirements: thorough pre-operative medical and airway assessment, use of validated ASA physical status classification, continuous clinical monitoring (supplemented by pulse oximetry as a minimum), a documented sedation record, clearly defined discharge criteria, and immediate availability of resuscitative equipment and reversal agents. A retrospective cohort study across twelve Dutch paediatric dental clinics found that implementation of updated, more structured sedation guidelines was associated with a significant reduction in the adjusted odds of adverse events, providing direct evidence that procedural rigour — rather than technique substitution — is the principal safety lever available to practitioners.^{17,18}

Post-discharge monitoring is also an important, sometimes underappreciated, component of safety: studies examining recovery after paediatric oral sedation have highlighted that adverse events and residual sedative effects can persist for a variable period after clinical discharge criteria are met, supporting robust caregiver instruction and, where possible, structured follow-up contact after treatment.¹⁹

Suitability for the primary dental care setting

Unlike intravenous or general anaesthetic techniques, which typically require specialist training, dedicated equipment and, in many jurisdictions, a separate qualified anaesthesia provider, oral conscious sedation can be delivered by general dental practitioners who have completed defined, competency-based training in line with national sedation guidance. This lower barrier to entry is central to its value in primary care: analyses of sedation service distribution in England found that primary care-based sedation, delivered directly by general dental practitioners or with support from a visiting sedationist, forms the majority of sedation provision nationally, while highlighting persistent inequities in access linked to deprivation and geography that more widely available, lower-cost oral techniques are well placed to help address.³

From a practical standpoint, oral sedation avoids the need for venous access — a significant advantage in needle-phobic patients, in whom fear of injections is often a core driver of dental avoidance — and requires comparatively modest capital investment in monitoring equipment relative to intravenous sedation suites. Its principal clinical limitations are a slower and less predictable onset, variable gastrointestinal absorption, an inability to titrate the drug once administered, and a

comparatively longer recovery and discharge period; these factors make careful patient selection, conservative dosing, and structured monitoring even more important than with titratable intravenous techniques.^{9,20}

The new age of dental anaesthesia: where pill sedation fits

Dental anaesthesia and sedation practice is undergoing a broader shift toward minimally invasive, individualised and technologically supported care. This includes growing interest in non-benzodiazepine and non-parenteral agents such as dexmedetomidine and intranasal or transmucosal delivery routes, which offer rapid onset without the discomfort of injection; the incorporation of objective, quantitative depth-of-sedation monitoring — for example bispectral index (BIS) monitoring, which has been shown to correlate with validated clinical sedation scales in dental settings — to complement traditional clinical observation; and increasing recognition that sedation protocols should be individualised according to patient age, comorbidity and pharmacogenomic factors rather than applied uniformly.^{21,22}

Within this evolving landscape, oral "pill" sedation is not a legacy technique destined for replacement, but rather a durable and complementary option. Its simplicity, low cost, wide safety margin in properly selected patients, and compatibility with the primary care environment make it particularly well suited to the large population of mildly-to-moderately anxious adult patients who do not require, and may not have ready access to, more resource-intensive intravenous or general anaesthetic services. Its future development is likely to track the same broader trends described above: more precise, weight- and risk-adjusted dosing guidance; wider adoption of pulse oximetry and, where feasible, objective sedation-depth monitoring even for enteral techniques; and continued evaluation of newer oral or sublingual agents (including melatonin, alpha-2 agonists and low-dose ketamine combinations) that may offer improved predictability of onset and recovery compared with traditional benzodiazepines.^{11,21}

Limitations of the current evidence base

Several limitations recur across the literature reviewed here. Trial heterogeneity in drug choice, dosing regimens and outcome measures limits meta-analytic synthesis and direct comparison between agents. Paediatric and special-care populations are disproportionately represented relative to adults, despite adult dental anxiety being common in general practice. Long-term and large-scale safety data specific to enteral (as opposed to combined enteral-inhalational or parenteral) sedation remain comparatively sparse, and much of the adverse-event literature is drawn from regulatory case review rather than prospective surveillance. Future prospective, adequately powered trials with standardised dosing protocols and validated anxiety and sedation-depth outcome measures are needed to strengthen the evidence base underpinning primary care oral sedation guidance.

Conclusion

Oral conscious sedation remains a simple, accessible and well-evidenced technique for managing dental anxiety and mild-to-moderate behavioural difficulty in the primary dental care setting. Benzodiazepines — particularly midazolam and triazolam — continue to form the pharmacological cornerstone of pill sedation across paediatric, adult and special-care populations, offering a wide margin of safety when patients are appropriately selected, conservatively dosed, and monitored according to recognised professional guidelines. Serious adverse events, while rare, are consistently linked to lapses in patient assessment, dosing or monitoring rather than to the technique itself, reinforcing that structured training and adherence to guidance — not technique substitution — are the principal determinants of safety. As dental anaesthesia moves toward an era of minimally invasive delivery routes, objective sedation monitoring and individualised prescribing, oral sedation is well positioned not as an outdated alternative but as a durable, low-cost and readily accessible component of the modern sedation continuum, particularly suited to expanding equitable access to anxiety-managed dental care in general practice.

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Conflict of Interest

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