

Smart Smiles, Lean Dollars: Digital Workflow and Artificial Intelligence in Massachusetts Dental Practice Management as Levers Against Unnecessary MassHealth, Medicaid and Medicare Spending — A Narrative Review with a National Interest Perspective

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Abstract:

Background: Massachusetts combines one of the most generous adult Medicaid dental benefits in the United States (MassHealth), a first-in-the-nation 83% medical loss ratio for dental insurers, and persistently high emergency-department use for preventable dental conditions. Federal and state payers face pressure to contain

unnecessary spending: the Centers for Medicare & Medicaid Services estimated US\$37.4 billion in Medicaid improper payments in fiscal year 2025, three-quarters of them attributable to insufficient documentation.

Objective: To analyze how strategic dental practice management in Massachusetts, supported by fully digital workflows and artificial intelligence (AI), can reduce avoidable expenditure by MassHealth, Medicaid and Medicare while preserving access and quality, and to frame the topic in terms of United States national interest.

Methods: Narrative review conducted in September 2026 using Consensus, PubMed and official Massachusetts (EOHHS, Health Policy Commission) and federal (CMS) documents. Peer-reviewed systematic and umbrella reviews, claims-analytics studies and policy reports were prioritized; two prior publications by the author's research group on dental practice management and on digital workflow were incorporated as framing sources.

Results: Twenty-four references were retained. Five management levers with cost-containment potential were identified: (1) documentation-grade digital records that pre-empt improper-payment findings; (2) AI-assisted scheduling and revenue-cycle management that reduce no-shows and administrative overhead; (3) AI decision support and radiograph analysis that discourage over-treatment while flagging under-treatment; (4) claims-integrity analytics — supervised, unsupervised and rule-extraction models — that detect upcoding, unbundling and duplicate billing before payment; and (5) teledentistry triage that diverts non-traumatic dental emergencies from hospital EDs, where a visit costs four to seven times more than in a dental office. Evidence for AI in claims compliance and for teledentistry cost savings is consistent in direction but of low-to-moderate methodological quality.

Conclusion: Digital workflow and AI are not merely clinical tools but management instruments capable of aligning Massachusetts dental practices with the fiscal integrity goals of MassHealth, Medicaid and Medicare. Their deliberate adoption serves the national interest by reducing waste, improving access for low-income residents and offering a replicable model for other states.

Key Word: Dental practice management; Massachusetts; MassHealth; Medicaid; Medicare; Digital workflow; Artificial intelligence; Teledentistry; Healthcare fraud, waste and abuse; National interest.

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I. Introduction

Dental practice management in the United States has moved beyond clinical excellence to demand business acumen, leadership and the deliberate adoption of innovation. In a recent narrative review, the author's research group identified strategic leadership, economic sustainability and healthcare innovation — teledentistry, artificial intelligence (AI) and digital workflows — as the three interdependent pillars of a sustainable dental practice, and noted that the expansion of Dental Service Organizations, declining reimbursement and rising operational costs have intensified the pressure on practitioners to manage more sophisticatedly¹.

Massachusetts is an unusually instructive setting in which to test those pillars. The Commonwealth restored comprehensive adult dental coverage under MassHealth in January 2021², became the first state to impose a medical loss ratio on dental insurers⁴, and has documented for more than a decade — through its Health Policy Commission (HPC) — the cost of preventable oral-health visits to hospital emergency departments (EDs)^{5,6}. At the same time, MassHealth introduced a US\$1,750 annual adult dental coverage limit in August 2026³, a signal that the state, like the federal government, is looking for ways to contain spending without withdrawing benefits.

This article argues that the digital workflow and AI, usually discussed as clinical technologies, are in fact management levers with direct bearing on the fiscal integrity of MassHealth, Medicaid and Medicare. It reviews the Massachusetts landscape, the federal cost problem, the management foundations laid out in the author's prior work, and the evidence for five specific levers — documentation, operations, decision support, claims integrity and teledentistry — before setting out a Massachusetts waste-reduction framework and a national-interest perspective.

II. Methodology

This is a narrative, non-systematic review. Searches were performed in September 2026 in Consensus (indexing Semantic Scholar, PubMed and Scopus) and PubMed using combinations of “dental practice management”, “artificial intelligence”, “digital workflow”, “teledentistry”, “Medicaid”, “Medicare”, “insurance fraud”, “claims” and “improper payments”, and in official repositories of the Massachusetts Executive Office of Health and Human Services (EOHHS), the Massachusetts Health Policy Commission and the Centers for Medicare & Medicaid Services (CMS). Peer-reviewed systematic and umbrella reviews, empirical claims-analytics studies and primary policy documents were prioritized; trade-press reporting of a CMS fact sheet was used where the primary document could not be retrieved and is identified as such. Two publications by the author's research group — a narrative review of dental practice management in the United States¹ and a book chapter on digital workflow in maxillofacial surgery¹⁰ — were incorporated as framing sources. Bibliographic details were

verified against publisher or government records where available; items available only ahead of print are cited without fabricated volume or page numbers.

III. The Massachusetts Landscape

III.1 MassHealth dental benefits: expansion, cost and a new cap

MassHealth is the Commonwealth's combined Medicaid and Children's Health Insurance Program. Adult dental coverage was cut in 2010 to core preventive services and extractions, then restored incrementally — anterior fillings in 2013, all fillings in 2014, dentures in 2015, periodontal scaling and root planing in 2019 — before crowns, endodontic treatment and oral surgery were reinstated on January 1, 2021. Together with rate increases and a rural add-on payment for five western and Cape counties, the restoration represented an annual investment of US\$88 million, a 22% increase over 2019 dental spending; MassHealth projected aggregate dental costs of approximately US\$606 million for fiscal year 2023, and added US\$9.9 million annually in June 2024 for highly utilized adult services². Effective August 1, 2026, adult members of MassHealth Standard, CommonHealth, Family Assistance and CarePlus are subject to a US\$1,750 yearly coverage limit, with exceptions for emergency services, extractions, denture repairs, anesthesia and a first full denture after extractions; implants remain uncovered³.

III.2 Provider participation and access

Massachusetts has 78 dentists per 100,000 population, above the national average, yet only 44.8% report accepting MassHealth patients — a participation gap that the state has tried to close with a 65% rate increase for dental services at Federally Qualified Health Centers and with the rural add-on described above^{2,5}. Low participation is itself a cost driver: it channels low-income patients toward the ED, the most expensive point of care in the system.

III.3 Emergency department use for preventable dental conditions

The HPC first quantified the problem in 2016: more than 36,000 ED visits for preventable oral-health conditions in 2014 cost the Massachusetts health system between US\$14.8 million and US\$36 million, 60% of them occurring during weekday hours when dental offices were open, and MassHealth was the largest single payer; an ED visit for a dental problem costs US\$440–1,500 against US\$90–200 in a dental office⁶. The 2021 update found 33,467 such visits in 2015 and, across 2017–2019, that MassHealth children visited the ED for oral conditions about six times more often than commercially insured children and non-elderly adults about seven times more often⁵. Nationally, CareQuest estimates 1.8 million ED visits for non-traumatic dental conditions (NTDCs) in 2019 at a cost of US\$3.4 billion⁸, and a Medicaid claims analysis of 13 states found that about 10% of all dental encounters are emergencies, 28% of which involve no procedure beyond the examination, prompting the authors to recommend teledental triage⁹.

III.4 The 83% dental medical loss ratio

In November 2022, 71% of Massachusetts voters approved Question 2, requiring dental insurance carriers to spend at least 83% of premium dollars on patient care rather than administration, salaries and profit, to refund the difference to covered individuals and groups, and to file financial statements with the Division of Insurance; the state already applied an 88% ratio to medical plans but had never had one for dental coverage⁴. The rule, in force since January 2024, makes Massachusetts the first US state to cap administrative overhead in dental insurance and creates an incentive for both carriers and providers to remove administrative waste from the claims cycle — precisely the domain in which digital workflow and AI operate.

IV. The Federal Cost Problem: Improper Payments in Medicaid and Medicare

CMS reported that in fiscal year 2025 the estimated improper payment rate was 6.55% (US\$28.83 billion) in traditional Medicare, 6.09% (US\$23.67 billion) in Medicare Advantage, 4.00% (US\$4.23 billion) in Part D, 6.12% (US\$37.39 billion) in Medicaid and 7.05% (US\$1.37 billion) in CHIP; the Medicaid figure rose from 5.09% in 2024 as pandemic-era eligibility flexibilities were unwound. CMS stresses that improper payments are not synonymous with fraud — most reflect missing or insufficient documentation, and in Medicare Advantage most arise when a plan's records fail to substantiate submitted diagnoses⁷. Roughly three-quarters of Medicaid improper payments are attributed to documentation failures rather than intent.

Two implications follow for dental practices. First, because documentation is the dominant driver, a practice whose clinical record, radiographs, consent and treatment rationale are generated and stored in a structured digital system is, by construction, less likely to generate an improper-payment finding in a Payment Error Rate Measurement audit. Second, because Medicare dental coverage is limited to services integral to covered medical treatment while most Medicare beneficiaries receive dental benefits through Medicare Advantage

supplemental packages, the Medicare Advantage documentation problem extends to dentistry: the same technology that supports the clinical record supports the diagnosis coding on which plan payments depend.

V. Management Foundations: Leadership, Sustainability, Innovation

The author's group has argued that strategic leadership enables the implementation of financial strategy and the adoption of innovation; that economic stability, in turn, provides the resources for technological investment; and that the principal obstacles are resistance to change, the cost of technology and regulatory barriers¹. In Massachusetts, the regulatory environment is unusually aligned with innovation: the loss-ratio rule rewards administrative efficiency, MassHealth pays rural and FQHC add-ons that improve the business case for accepting public patients, and the new annual cap rewards practices that can plan treatment sequences transparently with patients. The management question is therefore not whether to digitize but which functions to digitize first, and how to measure the return in terms that MassHealth, Medicaid and Medicare auditors recognize.

The same group's book chapter on digital workflow in the surgical treatment of facial fractures reached a conclusion that transfers directly to practice management: the digital pipeline — imaging, virtual planning, three-dimensional printing of models and patient-specific guides — improves precision, reduces operative time and improves communication with the patient, but its adoption is constrained by equipment cost, the need for trained staff and infrastructure; the authors expected these costs to fall as the technology diffused¹⁰. A dental practice manager should read this as a capital-budgeting problem with a known trajectory: the marginal cost of digital acquisition and planning is declining while the cost of documentation failure is rising.

VI. Digital Workflow as a Management Instrument

The clinical case for the digital workflow is well established. In implant prosthodontics, for example, a direct digital protocol using intraoral scanning with a calibrated splinting framework delivered passive fit in 100% of 45 full-arch zirconia prostheses and a 97.8% one-year restoration survival, with the entire chain from acquisition to milling documented as data¹¹. From a management standpoint the relevant properties are different from the clinical ones: every step of a digital workflow produces a timestamped, reproducible artifact — the scan, the plan, the design file, the milling log — which constitutes exactly the audit trail that improper-payment reviews demand. Digital radiographs and scans replace lost films; digital treatment plans document medical necessity at the time of decision; digital consent captures the patient's acknowledgment of the MassHealth annual cap and of any non-covered services such as implants³.

Digital workflow also shortens the revenue cycle. Claims submitted electronically with attached digital radiographs and narrative are adjudicated faster and denied less often, an advantage magnified in Massachusetts by the carriers' own incentive, under the 83% rule, to reduce adjudication overhead⁴. For a practice serving MassHealth members, the difference between a 30-day and a 90-day payment cycle can determine whether accepting public patients is financially viable — and therefore whether the 44.8% participation rate rises or falls⁵.

VII. Artificial Intelligence Across the Practice

VII.1 Operations: scheduling, staffing and documentation

Surdilovic et al. described how AI embedded in practice-management software enables efficient patient scheduling and staffing, increases productivity and, critically for this review, ensures evidence-based documentation and the essentials for insurance claims¹². No-show prediction, automated recall, and staffing models matched to demand reduce idle chair time, which in a practice with a high MassHealth share is the difference between a viable and an unviable public patient panel.

VII.2 Diagnostic decision support and the over-/under-treatment problem

AI analysis of radiographs is the most visible dental application. Turosz et al. evaluated commercial software on 600 panoramic radiographs and found sensitivity, specificity and precision above 90% for missing teeth, root fillings and implant-supported crowns, but only moderate performance for endodontic lesions and the lowest precision (65.3%) for crowns, concluding that clinician verification remains necessary¹³. Farooqi cautions that dental AI accuracy figures are mostly derived from developer datasets with limited independent scrutiny and that dentistry is a test case for whether external validation can keep pace with marketing¹⁴. For payers, the management relevance is symmetric: the same models that carriers deploy to flag radiographically unsupported claims can be deployed by practices to verify medical necessity before treatment is proposed, reducing both over-treatment (a cost to the payer) and under-treatment (a cost that surfaces later as an ED visit).

VII.3 Treatment planning and prosthetic design

Upstream of the claim, AI now assists planning. Khaohoen et al. reported accuracies of 90–99.5% for implant-site detection and bone assessment, crown designs within clinically acceptable deviation, design-time reductions of up to fourfold and prognostic models exceeding 90% accuracy for implant survival¹⁵; Rokhshad et

al. found that most deep-learning studies in prosthodontics concern prosthesis design and manufacturing, using intraoral scans as input¹⁶; and Vázquez-Sebrango et al., reviewing 120 implant-dentistry studies, found deep learning in 89% but a high risk of bias in eleven¹⁷. The management value lies in predictability: a plan generated with AI support, stored with its rationale, is easier to justify to a prior-authorization reviewer and less likely to be revised mid-treatment.

VII.4 Claims integrity: detecting waste before payment

The most direct contribution of AI to the Medicaid and Medicare cost problem is in claims analytics. Debener et al., working with proprietary insurer data and a field experiment, showed that unsupervised isolation forests successfully detect new fraudulent claims, that supervised models perform strongly despite few labeled cases, and that the two approaches detect different fraud on different inputs and should be used as complements¹⁸. Nabrawi and Alanazi, on labeled claims from three healthcare providers, reported random-forest accuracy of 98.2% and identified policy type, education and age as the strongest predictors¹⁹. Sbodio et al. presented a collaborative system that automatically extracts human-interpretable rules from healthcare policy documents (F1 0.72), lets professionals edit and validate them, and then executes them on claims, achieving a median F1 of 1.0 after human curation and significantly outperforming machine-learning baselines²⁰. Rule extraction of this kind maps naturally onto MassHealth's dental program regulations — frequency limits, prior-authorization requirements, the annual cap and its exceptions³ — and could run on both sides of the transaction: within a practice, to pre-validate claims and avoid the documentation failures that dominate improper-payment findings⁷, and within the payer, to target audits at upcoding, unbundling and duplicate billing rather than at compliant providers.

VIII. Teledentistry and Emergency Department Diversion

Teledentistry converts the HPC's cost arithmetic — US\$440–1,500 per dental ED visit versus US\$90–200 in an office⁶ — into an actionable management strategy. An umbrella review by Al-Buhaisi et al. found consensus that teledentistry improves oral health through early detection, increases access in remote areas and saves time and cost²¹. Scheerman et al., synthesizing ten systematic reviews, found that all economic evaluations indicated cost savings but that the conclusions rested on assumptions and low-quality primary studies, calling for RCTs and pragmatic designs²². Kengne Talla et al., in an overview of 30 systematic reviews, concluded that teledentistry is an effective and efficient alternative to in-person care for teleconsultation and telediagnosis while noting that 83% of the reviews were of low or critically low quality and that patient safety and equity were understudied²³. Among US dentists surveyed by the DentaQuest Partnership, about 23% used teledentistry; early adopters weighed benefits over drawbacks, whereas late adopters focused on upfront cost and concerns about the level of care²⁴.

For Massachusetts the strategic use is triage. Because 28% of Medicaid dental emergency encounters involve nothing beyond examination and 43% of patients return for definitive treatment within 30 days⁹, a teledental triage line staffed by a practice or a group of practices could resolve a substantial share of after-hours and weekday NTDC presentations without an ED visit, book definitive care directly, and document the encounter digitally for MassHealth reimbursement. Each diverted visit saves the payer several hundred dollars and, because MassHealth is the largest single payer of oral-health ED visits in the state^{5,6}, the savings accrue predominantly to the Commonwealth and, through the federal medical assistance percentage, to the federal Medicaid budget.

IX. A Massachusetts Waste-Reduction Framework

Bringing the evidence together, five management levers can be mapped to the payer whose unnecessary spending they most directly reduce. Lever 1, documentation-grade digital records, targets the documentation failures that account for roughly three-quarters of Medicaid improper payments and most Medicare Advantage findings⁷. Lever 2, AI-driven operations, targets the administrative overhead that the 83% loss-ratio rule now constrains on the carrier side and that erodes practice margins on the provider side^{4,12}. Lever 3, AI decision support with mandatory clinician verification, targets over-treatment and radiographically unsupported claims while flagging under-treatment^{13,14}. Lever 4, claims-integrity analytics — supervised, unsupervised and rule-extraction models — targets upcoding, unbundling and duplicate billing before payment and directs audits away from compliant practices¹⁸⁻²⁰. Lever 5, teledentistry triage, targets the six- to seven-fold excess in ED use for oral conditions among MassHealth members and the four- to seven-fold cost differential per visit^{5,6,21-23}.

Three design principles govern the framework. First, every lever must produce outputs in the language of the payer — CDT codes, radiographic evidence, medical-necessity narrative, prior-authorization references — so that reduced waste is visible to MassHealth and CMS rather than merely internal to the practice. Second, AI is deployed to support and document human clinical judgment, never to replace it; the external-validation gap identified by Farooqi¹⁴ and the bias found in a tenth of implant-dentistry AI studies¹⁷ make unsupervised automation of clinical decisions inappropriate. Third, the framework must be measured: reduction in claim denials,

days in accounts receivable, proportion of MassHealth panel, NTDC ED visits among the practice's patients, and improper-payment findings are all observable and reportable.

X. National Interest and Significance

The topic engages the national interest of the United States on four grounds. First, fiscal integrity: Medicaid and Medicare improper payments exceeded US\$90 billion in fiscal year 2025 across traditional Medicare, Medicare Advantage, Part D, Medicaid and CHIP⁷, and dental services — a high-volume, low-unit-cost, documentation-intensive benefit — are a natural target for the low-cost technological remedies reviewed here. Second, access: 1.8 million ED visits for NTDCs cost US\$3.4 billion nationally in 2019⁸, and in Massachusetts the burden falls disproportionately on MassHealth members and on the state and federal budgets that fund them⁵; teledentistry triage and higher provider participation address a national access failure through a state-level model. Third, replicability: Massachusetts is the first state to combine restored adult Medicaid dental benefits, a dental loss ratio and a defined annual cap, so management models that succeed there are transferable to the many states now considering loss-ratio legislation and to Medicaid programs weighing benefit caps. Fourth, workforce: the Commonwealth's 78 dentists per 100,000 residents coexist with a MassHealth participation rate below 45%⁵; management approaches that make public patient panels viable — faster reimbursement, lower administrative cost, fewer denials — retain and attract clinicians, including internationally trained dentists who have satisfied US licensing examinations, to the practices that serve underserved populations.

The author's perspective on these questions is shaped by 27 years of clinical practice in the Brazilian public system, including school-based and favela oral-health programs under the Family Health Strategy, and by board certification for US practice (INBDE, 2025). The Brazilian experience of high demand, constrained budgets and administrative burden mirrors the MassHealth environment; the digital and AI levers reviewed here are precisely those that a resource-constrained public system most needs and, as the author's group has argued, are becoming affordable as costs fall^{1,10}.

XI. Limitations of the Evidence

The evidence base is uneven. The Massachusetts cost data on ED use are robust but partly dated, and the new annual cap has not yet been evaluated. The claims-analytics literature is drawn mostly from general health and property insurance rather than dentistry, and from single insurers or countries. Teledentistry reviews are consistent in direction but of low methodological quality by AMSTAR-2 criteria^{22,23}. Dental AI accuracy figures often lack external validation¹⁴. No study has yet measured the combined effect of the five levers on improper-payment findings or on payer expenditure at the practice level; that is the natural next research step, and Massachusetts, with its All-Payer Claims Database, is the natural place to conduct it.

XII. Conclusion

Massachusetts has built a payment environment — restored adult MassHealth benefits, an 83% dental loss ratio, a defined annual cap, and rural and FQHC add-ons — that rewards administrative efficiency and documented medical necessity. Digital workflow and artificial intelligence, deployed as management instruments rather than as clinical novelties, allow dental practices to meet that environment on its own terms: to generate the audit trail that pre-empts improper-payment findings, to reduce the overhead that both carriers and practices must now contain, to verify necessity before treating, to detect billing waste before it is paid, and to divert preventable emergencies from the ED. The result serves patients, practices and payers alike, and the state and federal budgets that fund MassHealth, Medicaid and Medicare. Realizing it requires leadership willing to invest, clinicians willing to verify rather than defer to algorithms, and researchers willing to measure the outcome.

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