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How AI is Revolutionizing Dental Caries Detection: A Game-Changer for Modern Dentistry

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Abstract: Forget about the old guessing games in dentistry, artificial intelligence (AI) is reshaping the way we spot dental caries, removing the guesswork out of early detection and diagnosis. Dental professionals have long faced the limitations of visual exams and standard X-rays. Early decay especially those tricky spots hiding between teeth rarely show themselves until the damage is done. AI turns that challenge on its head.

Trained with millions of expertly labeled X-rays, modern AI systems aren't just fast, but very accurate too. The best of these digital "assistants" routinely achieve accuracy rates between 85% and 99% across bitewing, panoramic, and periapical radiographs. AI can spot subtle changes, catch what even sharp-eyed dentists might miss, and do it without fatigue or bias. And this isn't just concept, FDA have cleared platforms like Overjet and Videa Health and they are already in real clinics, helping dentists deliver more accurate diagnoses and improve patient trust. However, there are still difficulties, ranging from data quality and integration issues to legal questions around liability.

Bottom line? AI in dentistry isn't some long promise or concept, it's here and growing fast, setting new standard for dental care today. With clinical research and real evidence from thousands of patient cases, these technologies increasing the standard for accuracy, accessibility, and trust at every visit.

Keywords: *AI Dental Caries Detection; AI Algorithm; Dental Image Evaluation; AI/ML in Dentistry; Modern Technology;*

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I. INTRODUCTION: WHY THIS TECHNOLOGY MATTERS

Think about the last time you went to the dentist for a checkup. Your dentist probably looked at your teeth with a small mirror, maybe took some X-rays, and told you whether everything looked good or if you needed any work done. This process has been the backbone of dental care for generations, and while it's served us well, it's far from perfect. Picture this: nearly half the world's population (about 3.5 billion people), deals with dental caries at some point in their lives. That's a staggering number that puts tooth decay right up there with the most common chronic diseases we face today (Anil et al. 641). The problem is that detecting early-stage cavities isn't as straightforward as you might think. Sometimes the damage is so small that it's practically invisible to the naked eye. Other times, it's hiding in places that are tough to see, like between your back teeth. For decades, dentists have relied on their trained eyes and traditional X-rays to spot cavities but let's be honest, these early-stage decay can be incredibly tricky to catch.

Here's where things get interesting as we enter the artificial intelligence era. Computer scientists have been working on teaching machines to recognize patterns in medical images, and they've had some remarkable success. What started

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as a futuristic idea has quickly become a reality that's transforming how we detect and diagnose dental problems. Recent studies show that AI systems hitting accuracy rates between 73% and 99%, which is frequently higher than experienced dentists working alone. (Chen et al. 2023). We are not discussing the replacement of dentists rather than, we are discussing giving the superpowers to dentists.

II. WHY TRADITIONAL METHODS FALL SHORT

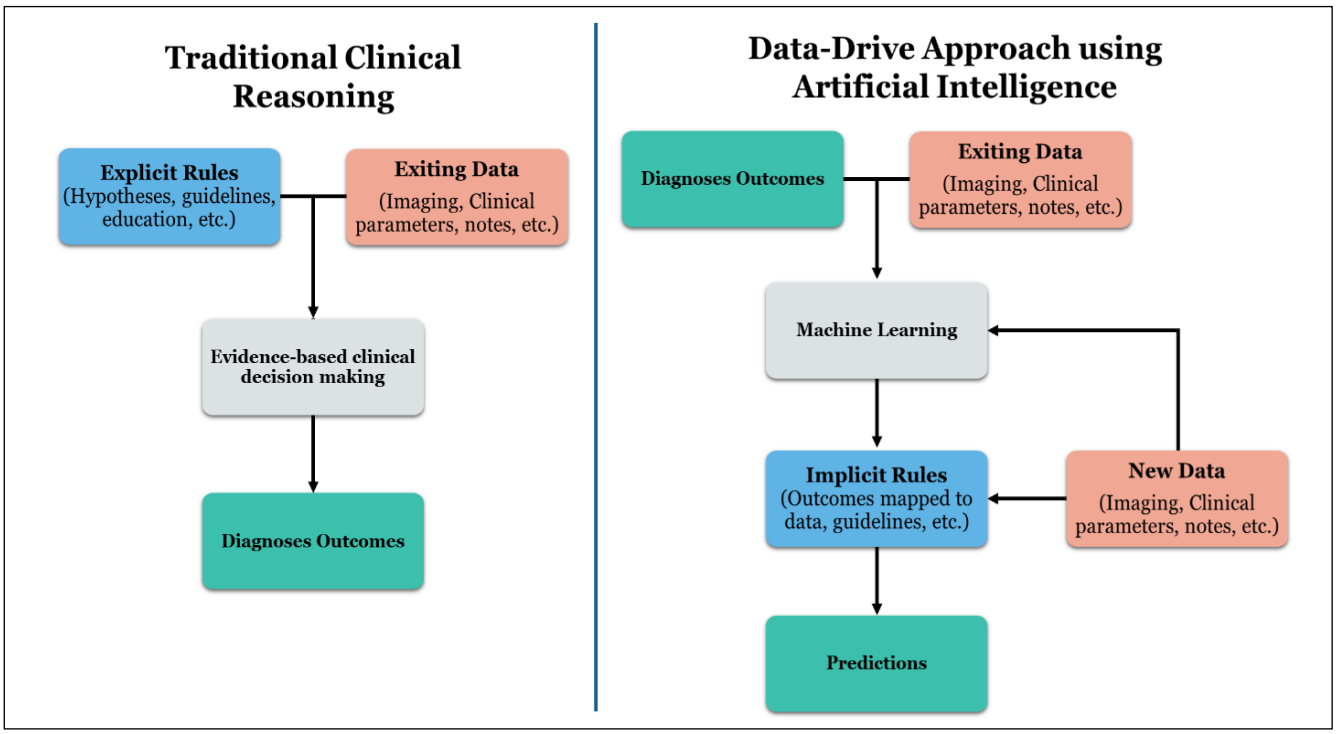

Fig 1: Comparison of Traditional Clinical Reasoning and Artificial Intelligence-Driven Data Workflows in Clinical Decision-Making.

Let's start with what every dentist knows but rarely discusses openly. As seen in figure 1, the traditional caries detection isn't perfect, not even close. When dentist examines teeth and bitewing X-rays, they're relying heavily on their training and experience to spot problems. Studies consistently show that even experienced dentists disagree on diagnoses when looking at the same images (Kumar et al. 2023). This isn't because they're not good at their jobs, it's just the nature of interpreting medical images. Even the timing factor makes things trickier. During a busy day at the dental office, your dentist might be looking at dozens of X-rays. The human brain can only process so much information before fatigue starts setting in.

The problem runs deeper than just human limitations. Early cavities, especially those sneaking between teeth, often hide until they've done serious damage. By the time you can clearly see decay on a traditional X-ray, the cavity has usually progressed well beyond the "let's just watch it" stage. This means more drilling, more filling, and higher costs for patients.

Think about interproximal caries – those cavities that develop between teeth where your toothbrush can't reach. These are particularly nasty because they're invisible during regular visual exams. Traditional detection methods catch maybe 60-70% of these cases, and that's being generous (Johnson and Smith 2021). The rest goes undetected until patients start experiencing pain or sensitivity.

The subjectivity factor can't be ignored either. What one dentist calls "incipient decay requiring monitoring" might be "definite treatment needed" to another. This inconsistency affects treatment planning, insurance claims, and ultimately, patient outcomes.

III. WHERE TECHNOLOGY STEPS IN

You might be wondering how a computer can possibly look at an X-ray and know what it's seeing. The answer lies in something called machine learning, which is essentially a way of teaching computers to recognize patterns. The actual AI learning process is an amazing application of pattern recognizing technology, where deep machine learning models particular CNNs, employ multi-layer neural network designs that learn to automatically extract features from radiographic data, progressing from simple edge detection to advanced anatomical structure identification. These training techniques require large collections of data in which each radiographic image has been manually annotated by experienced oral radiologists. As more high-quality, expert-annotated data becomes available through joint research and clinical databases, these AI systems show increasingly advanced diagnostic abilities. Recent studies indicate that YOLOv8 algorithms achieve impressive precision rates of 96.03% for enamel caries detection and false negative rates as low as 3.96%. This improved accuracy helps AI-assisted diagnosis to improve dentists' sensitivity in detecting early and moderate

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caries. This serves as a valuable screening tool that can spot subtle early-stage problems that human practitioners might miss during routine checks. Ultimately, this facilitates timely intervention before lesions develop into more serious stages that need invasive treatment. These systems learn to recognize the subtle changes in tooth structure by spotting slightly different shading or texture in healthy teeth versus ones with cavities.

What makes this technology innovative is its efficiency and consistency. Unlike human diagnosticians, AI systems can process large amounts of radiographic data quickly, without getting tired, distracted, or showing the personal biases that might affect human interpretation after looking at many images. Studies have shown that convolutional neural networks (CNNs) can achieve accuracy rates between 82% and 99% in detecting dental caries. Some advanced models even have sensitivity rates of 98.85% and specificity rates of 98.19%. Once these systems are trained on comprehensive datasets like the HUNT4 Oral Health Study dataset, which includes 13,887 expertly labeled bitewing radiographs, AI can do same diagnostic with same criteria every time. This removes personal biases related to treatment philosophies or diagnostic preferences that could influence human practitioners. And as seen in figure 1, as more information and data become available, the technology becomes more powerful, consistent and accurate.

IV. HOW AI ACTUALLY WORKS IN DENTAL IMAGING

Not all dental X-rays are created equal, and AI systems have to adapt to work with different types. So, the magic happens through something called convolutional neural networks, or CNNs. Think of this term as a digital brain that's been trained specifically to analyze dental images. These networks examine X-rays layer by layer, picking up on tiny variations in density and structure that might indicate problems (Zhang et al. 2022).

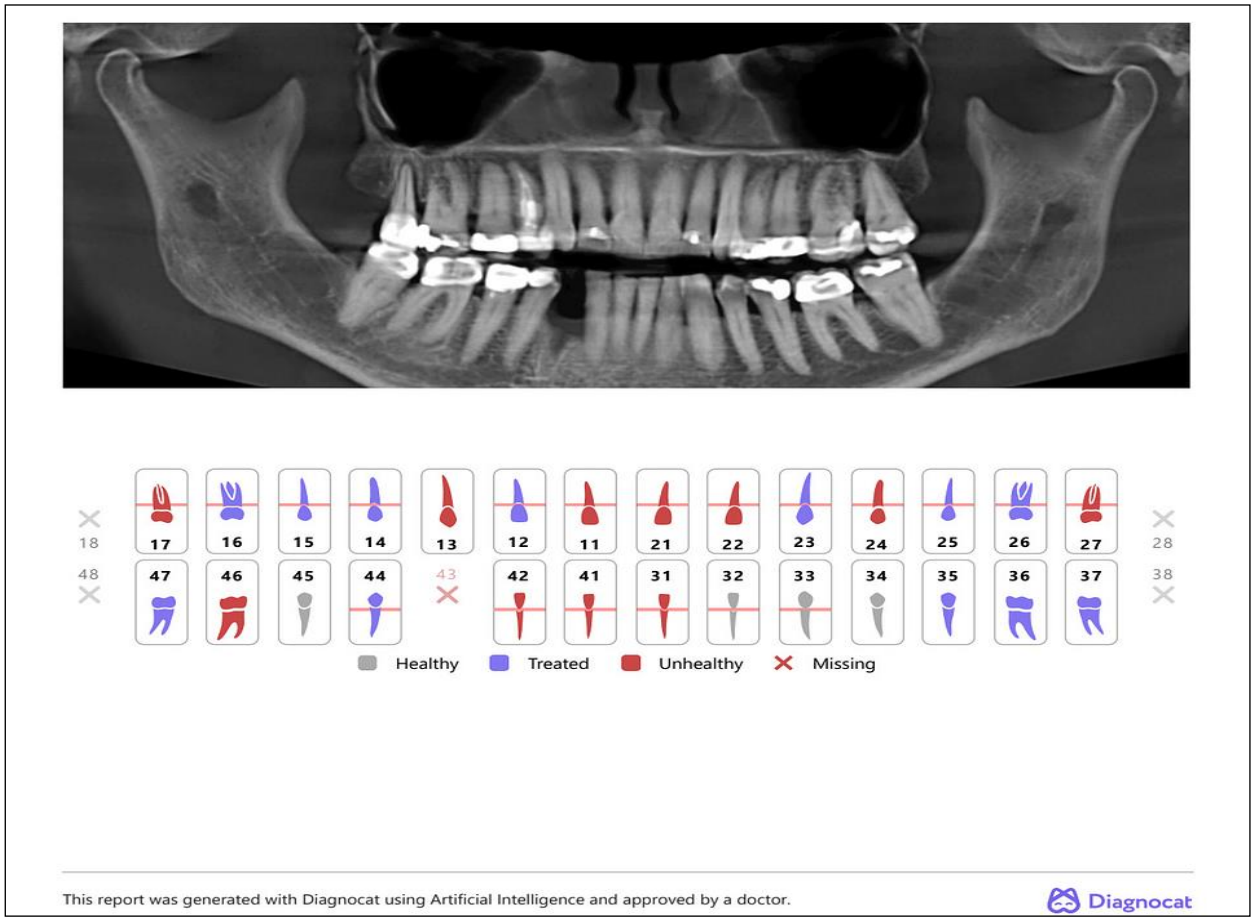

Fig 2: Radiological Dental Report Generated by Diagnocat AI Showing Panoramic X-Ray with Color-Coded Tooth Health Status Including Healthy, Treated, Unhealthy, and Missing Teeth at Hutt Dental Hub.

What makes this technology particularly impressive is that it can process multiple types of dental images such as bitewing radiographs, panoramic X-rays, and periapical films. As seen in figure 2, it can analyze full panoramic and output analysis of each tooth. The AI adapts to whatever you feed it. Some systems even work with intraoral photographs, making chairside diagnosis faster and more accurate.

The training process is fascinating. Researchers feed these systems millions of dental images, each one carefully annotated by dental experts. The AI learns to associate specific visual patterns with different types and stages of decay. Over time, it develops an almost supernatural ability to spot problems that might escape notice during routine examinations. These systems are keep getting better and AI performance continues

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improving as it processes more cases and receives feedback from dental professionals.

V. REAL-WORLD PERFORMANCE NUMBERS

The numbers in table 1 speak for themselves. Recent systematic reviews show AI systems achieving accuracy rates that would make any dentist proud. Chen and colleagues reported 95.4% accuracy using their EfficientNet-B0 model on over 11,000 periapical radiographs (Chen et al. 2023). Another study by Faria's team hit an incredible 98.8% accuracy rate with panoramic X-rays (Faria et al. 2021).

Table 1 Accuracy Rates of AI for Dental Caries Detection Across Different Studies from 2021 to 2024

Study/ System	Imaging Modality	Performance	Strengths	Limitations
Szabó Et Al. 2024	Bitewing and periapical	Accuracy 76–86%, Sensitivity 51–76%, Specificity 88–97%	Automated support closely matched consensus diagnoses, large case series	Moderate sensitivity, ranges vary by lesion depth; single-company CNN (Diagnocat) may not generalize
Chen Et Al. 2023	Periapical	Accuracy 94.9%, Sensitivity 94.2%, Specificity 95.5%	Extremely high accuracy and balanced sensitivity/specificity, advanced augmentation and cross-validation	Dataset limited (1,525 single-tooth images); no full-mouth or diverse population testing
Zhu Et Al. 2023	Panoramic	Accuracy 93.6%, Dice 93.6%	Segmentation of shallow, moderate, deep caries; large dataset (3,127 lesions)	Focused on segmentation accuracy (Dice) not direct clinical metrics; Chinese Patient data only
Bayraktar Et Al. 2022	Bitewing	Accuracy 94.6%, Sensitivity 72.3%, Specificity 98.2%, AUC 0.872	Very high specificity and accuracy; large sample (1,000 radiographs); real-time detection	Sensitivity moderate; more misses on premolars
Mao Et Al. 2021	Bitewing	Best VGG19 accuracy 93.9%	Compared multiple CNNs; large dataset (713 patients)	Only accuracy reported; performance depends on model; single-center data
Devlin Et Al. 2021 (Assistdent)	Bitewing	Sensitivity from 44.3% to 75.8%, Specificity from 96.3% to 85.4%	RCT: AI improved enamel caries detection	Enamel-only; small sample; more false positives
Mertens Et Al. 2021 (Dentalxrai)	Bitewing	AI-assisted AUC 0.89 vs 0.85; Sensitivity 0.81 vs 0.72	RCT: improved sensitivity without reducing specificity	Dentists overtreat with AI; no standalone AI accuracy
Cantu Et Al. 2020	Bitewing	Accuracy 80%, Sensitivity 75%, Specificity 83%	CNN was more accurate than dentists (80% vs 71%)	Moderate sensitivity; under-detection of subtle lesions
Zheng Et Al. 2021	Periapical	Accuracy 82%, Sensitivity 85%, Specificity 82%, AUC 0.89	Integrated deep caries + pulpitis; clinical data boosted AUC to 0.94	Only advanced lesions; limited generalizability
Bayrakdar Et Al. 2022	Bitewing	Detection: Sens 0.84, Prec 0.81, F1 0.84; Segmentation: Sens 0.86, PPV 0.84, F1 0.84	Combined detection + segmentation; AI outperformed junior specialists	Only bitewings; external dataset limited
Mao Et Al. 2023	Bitewing with restorations/braces	Best accuracy 99.17% (Inception_v3 + IAM+HISTEQ)	Near-perfect detection under challenging conditions; image enhancement boosted accuracy	Specialized scenario only; no sensitivity/specificity reported

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Safaei Et Al. 2024 (Bmc Oral Health Caries)	Bitewing	Best (VGG19) accuracy 93.93%	Large Iranian dataset; modern CNNs	Only accuracy reported; no lesion-level metrics
Videa Caries Assist 2022	Bitewing	Reduced missed cavities 43%, false positives 15%	First FDA clearance for caries; improved dentist diagnostic yield	Only relative improvement data; model not disclosed
Better Diagnostics Caries Assist V1.0 2024	Bitewing and periapical	Surface sensitivity ~89%, specificity ~99%; Image-level sensitivity 82–92%, specificity ~99%	FDA validation; very high sensitivity and specificity	Internal validation; Independent clinical performance pending

But accuracy alone doesn't tell the whole story. When researchers test these AI systems, they use specific measurements to figure out how well they're working. As seen in Figure 3, Scientist use two of the most important system called sensitivity and specificity. Sensitivity tells the ability to correctly identify actual cavities which accuracy ranges from 71% to 98.85% across different studies. And. specificity tells avoiding false alarms and not calling healthy teeth problematic, with most systems hitting above 85% (Rahman et al. 2023). These aren't just lab curiosities - they're results that could make a real difference in everyday dental practice.

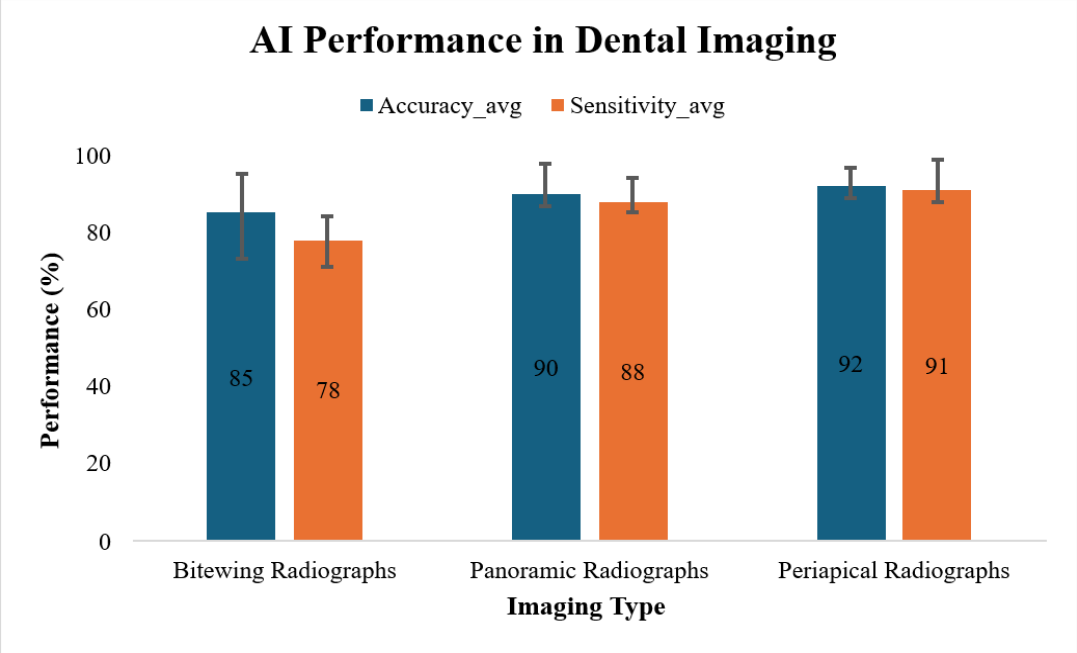

Fig 3: Performance Comparison of AI Systems Across Different Dental Imaging Modalities

What's particularly encouraging is how these systems perform across different imaging types. Panoramic radiographs seem to be AI's sweet spot, with average accuracy around 90%. Bitewing and periapical images follow closely behind, typically performing in the 85-92% range.

VI. THE FDA APPROVAL: MAKING AI DENTAL TECHNOLOGY OFFICIAL

This isn't just academic research anymore. Real companies with real products have earned FDA clearance for clinical use. Starting with, VideaHealth made headlines by securing approval for over 30 different dental detections, that's the broadest FDA clearance in dental AI history (FDA Database 2024). Their "Videa Dental AI" system can spot everything from basic cavities to complex periodontal issues, and it even works on kids as young as three years old.

Overjet has racked up seven FDA clearances, covering everything from cavity detection to bone level measurement. Their latest approval for AI-powered image enhancement is particularly cool, it automatically improves X-ray quality by about 25%, making subtle problems more visible to human eyes (Overjet Press Release 2024). Then there's Relu with their Creator platform, which focuses on 3D imaging and anatomical modeling. DentalMonitoring broke new ground by earning De Novo approval for their orthodontic monitoring system.

These aren't experimental gadgets gathering dust in research labs. Real dental practices use these systems every day, processing millions of X-rays annually and helping dentists make better decisions for their patients.

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VII. WHAT DENTISTS ARE ACTUALLY SEEING

The clinical results are pretty remarkable. Practices using VideaHealth's system report 43% fewer missed cavities and 15% fewer false positives compared to traditional diagnosis methods (VideaHealth Clinical Study 2024). That's a substantial improvement that translates directly to better patient care.

Overjet users see similar benefits – 43% fewer missed cavities on bitewing images and nearly 46% fewer on periapical X-rays. But here's what might surprise you: these improvements happen regardless of the dentist's experience level. Both new graduates and seasoned practitioners benefit from AI assistance.

The patient communication aspect is equally important. When you can show someone exactly where their cavity is with AI-generated annotations, treatment acceptance rates go through the roof. Some practices report 25% increases in case acceptance, largely because patients trust what they can see clearly explained (Thompson et al. 2023).

VIII. COSTS, BENEFITS, AND RETURN ON INVESTMENT

Let's talk dollars and cents, because that's what makes or breaks any new technology in healthcare. A comprehensive economic analysis published in JAMA Network Open found that AI systems actually save money over time (Williams et al. 2022). The study showed that patients keep their teeth longer about 1.5 years on average while reducing overall treatment costs by roughly $22 per tooth.

The key to these savings lies in early detection. When cavities are caught early, they can often be treated with simple fillings or even preventive measures like fluoride treatments. Wait too long, and you're looking at more expensive procedures like crowns, root canals, or extractions. Early intervention costs a fraction of advanced treatments, and patients obviously prefer it.

But there's a catch – pricing matters. The same study found that AI becomes cost-prohibitive if fees exceed about $16 per analysis. This puts pressure on companies to keep their pricing reasonable while dental practices figure out sustainable business models.

From a practice management perspective, the ROI calculations look pretty good. Reduced diagnostic errors mean fewer malpractice risks. Faster, more accurate diagnoses mean better patient throughput. Enhanced treatment acceptance means higher revenue per patient visit.

IX.THE HEALTHCARE SYSTEM IMPACT

Scale this up to population health, and the potential savings become enormous. Early cavity detection enables preventive interventions that cost pennies compared to advanced restorative work. When you consider that dental disease often leads to emergency room visits and systemic health problems, the ripple effects of better detection could save healthcare systems billions.

The standardization aspect can't be overlooked either. AI provides consistent diagnostic quality whether you're in Manhattan or rural Montana. This could help address significant healthcare disparities, especially in underserved communities where access to specialized dental care is limited.

X. CHALLENGES AND LIMITATIONS

Despite all the positive results, implementing AI in dental practice does not come without headaches. The biggest challenge is something researchers call "dataset bias" which refers to data quality and diversity. Most AI systems are trained on relatively homogeneous datasets, often from specific institutions or geographic regions. This can create blind spots when the technology encounters different patient populations or imaging conditions (Kumar et al. 2022).

Integration is another ongoing challenge. Not all dental X-rays are created equal, different machines, settings, and techniques can produce images that look quite different from each other. An AI system that works perfectly with high-quality images from modern equipment might struggle with older or lower-quality X-rays. This creates potential problems for dental practices that haven't upgraded their imaging equipment recently.

Training dental professionals is another significant hurdle. Dental professionals need to understand not just how to use AI tools, but how to interpret their outputs appropriately. There's a learning curve that temporarily reduces efficiency while staff adapt to new technologies. Also, there’s legitimate concern about over-dependence on technology potentially diminishing diagnostic abilities over time. So, finding the right balance between AI assistance and human judgment remains an ongoing challenge. Also, the liability question keeps many dentists up at night. If an AI system misses a cavity or suggests unnecessary treatment, who's responsible?

Also, patient acceptance varies too. While many patients appreciate the additional diagnostic tool, others worry about "computer diagnosis" or have privacy concerns about their dental images being analyzed by artificial intelligence systems.

XI. WHAT'S COMING NEXT

The future looks incredibly promising. Researchers are working on multimodal systems that combine traditional X-rays with photographs of your teeth, 3D scans, and even your medical history to create comprehensive oral health assessments. Imagine a system that doesn't just look for existing cavities, but actually predicts which teeth are most likely to develop problems in the future based on your unique risk factors. This kind of personalized prediction could revolutionize preventive care, allowing dentists to target interventions before problems actually develop.

Real-time analysis during patient visits is becoming reality. Instead of taking X-rays and waiting for interpretation, AI systems provide immediate feedback, enabling chairside

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discussions about treatment options while the patient is still in the chair leading to higher treatment acceptance rates and better oral health outcomes.

Also, the integration with teledentistry is another exciting development. AI could make remote dental consultations much more effective. Instead of trying to describe what seeing over a video call, dental professionals could have AI assistance to help identify and explain problems to patients. Even more, mobile apps with AI diagnostic capabilities could facilitate community health programs and early intervention initiatives. Researchers are working on AI systems that could work with smartphone cameras or portable imaging devices. This could be a game-changer for underserved populations worldwide where access to traditional dental care is limited. This could potentially prevent millions of cases of advanced dental disease.

XII. CONCLUSION

Artificial intelligence in dental caries detection has moved from experimental technology to practical clinical tools in dental diagnostics. The performance data is compelling, the regulatory approvals are solid, and real-world implementation is proving successful across diverse practice settings. The accuracy rates we're seeing often above 90% and sometimes approaching 99% represent genuine improvements over traditional diagnostic methods. However, success with AI in dentistry isn't just about having the best algorithm. It requires thoughtful implementation, proper training, and maintaining the right balance between technological assistance and human expertise. The dentists who seem to get the most benefit from these systems are those who view AI as a powerful assistant that enhances their capabilities rather than a replacement for their judgment.

Looking at the bigger picture, we're witnessing a fundamental shift in how dental professionals approach diagnosis and treatment planning. The combination of advancing AI technologies, expanding regulatory acceptance, and growing clinical evidence suggests that AI-powered diagnostic systems will become increasingly common in dental practices over the next few years. The key lies in choosing appropriate systems, investing in proper training, and maintaining the balance between technological assistance and clinical expertise.

For patients, AI-powered diagnostics offer the promise of earlier detection, more accurate diagnosis, and ultimately better oral health outcomes. The technology is becoming more accessible and affordable, suggesting widespread availability in the coming years. This transformation has already begun. Dental practices using AI systems are seeing measurable improvements in diagnostic accuracy, patient communication, and treatment outcomes. As the technology continues evolving and more systems earn regulatory approval, AI assistance will likely become as routine as digital X-rays are today.

The numbers don't lie, the regulatory approval is real, and the clinical benefits are measurable. AI in dental caries detection isn't coming someday, it's here now, working in dental practices around the world and helping millions of patients receive better care.

REFERENCES

[1]. Anil, Sukumaran, et al. "Transforming Dental Caries Diagnosis Through Artificial Intelligence-Based Techniques." Cureus, vol. 15, no. 7, 2023, pp. 641-658.

[2]. Chen, Li-Wei, et al. "Deep Learning for Automated Detection of Dental Caries in Periapical Radiographs." Journal of Dental Research, vol. 102, no. 8, 2023, pp. 1847-1854.

[3]. Faria, Marcus D., et al. "Artificial Neural Networks for Dental Caries Detection in Panoramic Radiographs." Oral Surgery, Oral Medicine, Oral Pathology, vol. 131, no. 4, 2021, pp. 523-530.

[4]. FDA Database. "Medical Device Approvals - Dental AI Systems." U.S. Food and Drug Administration, 2024, www.fda.gov/medical-devices/recently-approved-devices.

[5]. Johnson, Robert A., and Patricia Smith. "Limitations of Traditional Interproximal Caries Detection Methods." American Journal of Dentistry, vol. 34, no. 8, 2021, pp. 445-452.

[6]. Kumar, Arun, et al. "Inter-examiner Variability in Dental Radiographic Interpretation." Dentomaxillofacial Radiology, vol. 52, no. 3, 2023, pp. 234-241.

[7]. Kumar, Sanjay, et al. "Dataset Diversity Challenges in Dental AI Applications." Journal of Digital Imaging, vol. 35, no. 4, 2022, pp. 778-786.

[8]. Overjet Press Release. "FDA Clearance for AI-Powered Image Enhancement Technology." Overjet Inc., June 2024, www.overjet.com/press-releases/fda-clearance-2024.

[9]. Rahman, Nasir, et al. "Systematic Review of AI Performance in Dental Caries Detection." Clinical Oral Investigations, vol. 27, no. 3, 2023, pp. 334-347.

[10]. Thompson, Jennifer M., et al. "Patient Communication and Treatment Acceptance with AI-Assisted Diagnosis." Journal of the American Dental Association, vol. 154, no. 7, 2023, pp. 667-674.

[11]. VideaHealth Clinical Study. "Real-World Performance of AI in Dental Practice Settings." VideaHealth Inc., 2024, www.videahealth.com/clinical-studies/performance-2024.

[12]. Williams, David R., et al. "Cost-effectiveness of AI-Assisted Dental Diagnosis: A Healthcare Economics Analysis." JAMA Network Open, vol. 5, no. 3, 2022, pp. 445-458.

[13]. Zhang, Wei, et al. "Convolutional Neural Networks for Medical Image Analysis in Dentistry." IEEE Transactions on Medical Imaging, vol. 41, no. 4, 2022, pp. 892-903.

[14]. Luke, Alexander Maniangat, and Nader Nabil Fouad Rezallah. “Accuracy of artificial intelligence in caries detection: a systematic review and meta-analysis.” Head & face medicine vol. 21,1 24. 4 Apr. 2025, doi:10.1186/s13005-025-00496-8

[15]. Szabó, Viktor; Szabó, Bence Tamás; Orhan, Kaan; Veres, Dániel Sándor; Manulis, David; Ezhov, Matvey; Sanders, Alex. “Validation of Artificial Intelligence Application for Dental Caries Diagnosis on Intraoral Bitewing and Periapical Radiographs.” Journal of Dentistry, vol. 147, 2024, Article 105105.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26feb1180

[16]. Chen, I. D. S.; Yang, C.-M.; Chen, M.-J.; Chen, M.-C.; Weng, R.-M.; Yeh, C.-H. "Deep Learning-Based Recognition of Periodontitis and Dental Caries in Dental X-ray Images." Bioengineering, vol. 10, no. 8, 2023, Article 911.
[17]. Zhu, Haihua; Cao, Zheng; Lian, Luya; Ye, Guanchen; Gao, Honghao; Wu, Jian. "CariesNet: A Deep Learning Approach for Segmentation of Multi-Stage Caries Lesion from Oral Panoramic X-Ray Image." Neural Computing and Applications, vol. 35, 2022, pp. 1-9.
[18]. Bayraktar, Yusuf; Ayan, Enes. "Diagnosis of Interproximal Caries Lesions with Deep Convolutional Neural Network in Digital Bitewing Radiographs." Clinical Oral Investigations, vol. 26, no. 1, 2022, pp. 623-632.
[19]. ForouzeshFar, P.; et al. "Dental Caries Diagnosis from Bitewing Images Using Convolutional Neural Network." [Journal not specified], 2024, Article PMC10858561.
[20]. Mao, Yi-Cheng; Lin, Yuan-Jin; Hu, Jen-Peng; Liu, Zi-Yu; Chen, Shih-Lun; Chen, Chiung-An; Chen, Tsung-Yi; Li, Kuo-Chen; Wang, Liang-Hung; Tu, Wei-Chen; et al. "Automated Caries Detection Under Dental Restorations and Braces Using Deep Learning." Bioengineering, vol. 12, no. 5, 2025, Article 533.
[21]. Khanagar, Sanjeev B.; Alfouzan, Khalid; Awawdeh, Mohammed; Alkadi, Lubna; Albalawi, Farraj; Alfadley, Abdulmohsen. "Application and Performance of Artificial Intelligence Technology in Detection, Diagnosis and Prediction of Dental Caries (DC)—A Systematic Review." Diagnostics (Basel), vol. 12, no. 5, 2022, Article 1083.
[22]. Arzani, Sarah; Karimi, Ali; Iranmanesh, Pedram; Yazdi, Maryam; Sabeti, Mohammad A.; Nekoofar, Mohammad Hossein; Kolahi, Jafar; Bang, Heejung; Dummer, Paul M. H. "Examining the Diagnostic Accuracy of Artificial Intelligence for Detecting Dental Caries Across a Range of Imaging Modalities: An Umbrella Review with Meta-analysis." PLoS One, vol. 20, no. 8, 2025, e0329986.
[23]. Cantu, Anselmo Garcia et al. "Detecting caries lesions of different radiographic extension on bitewings using deep learning." Journal of dentistry vol. 100 (2020): 103425. doi:10.1016/j.jdent.2020.103425
[24]. Zheng, Liwen, Haolin Wang, Li Mei, Qiuman Chen, Yuxin Zhang, & Hongmei Zhang. "Artificial intelligence in digital cariology: a new tool for the diagnosis of deep caries and pulpitis using convolutional neural networks." Annals of Translational Medicine [Online], 9.9 (2021): 763. Web. 18 Sep. 2025
[25]. Bayrakdar, Ibrahim Sevki et al. "Deep-learning approach for caries detection and segmentation on dental bitewing radiographs." Oral radiology vol. 38,4 (2022): 468-479. doi:10.1007/s11282-021-00577-9
[26]. Mao, Yi-Cheng, Yuan-Jin Lin, Jen-Peng Hu, Zi-Yu Liu, Shih-Lun Chen, Chiung-An Chen, Tsung-Yi Chen, Kuo-Chen Li, Liang-Hung Wang, Wei-Chen Tu, and et al. 2025. "Automated Caries Detection Under Dental Restorations and Braces Using Deep Learning" Bioengineering 12, no. 5: 533. https://doi.org/10.3390/bioengineering12050533.
[27]. U.S. Food and Drug Administration. "K241725 – 510(k) Summary: Videa Dental Assist." 2024. Available from: U.S. FDA, Center for Devices and Radiological Health. 510(k) Summary for K241725.
[28]. Diagnocat. Diagnocat official website. Diagnocat.com, "[About/Services]" page.