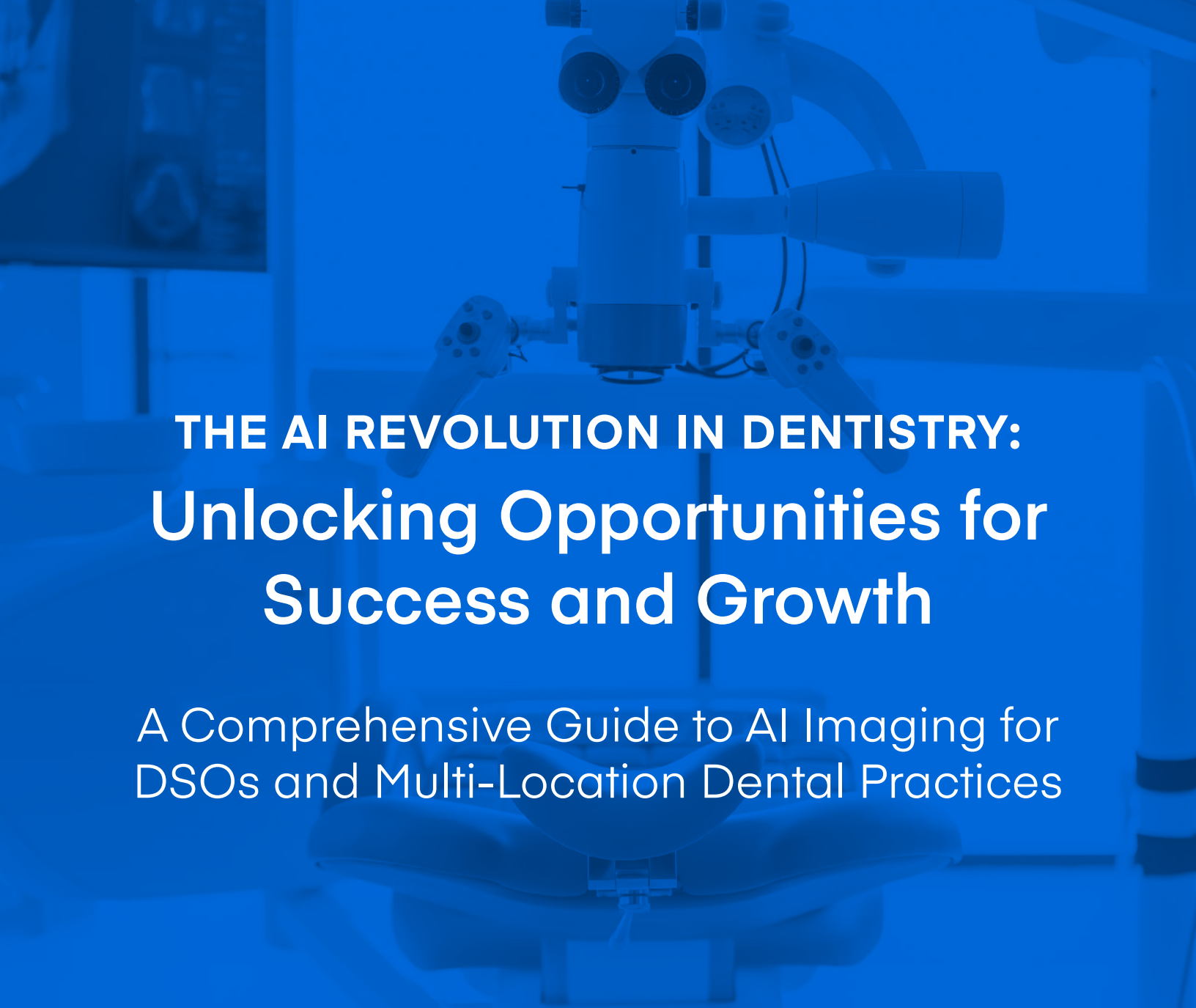


THE AI REVOLUTION IN DENTISTRY:

Unlocking Opportunities for Success and Growth

A Comprehensive Guide to AI Imaging for DSOs and Multi-Location Dental Practices

Seth A. Gibree DMD, FAGD
Senior Director of Clinical Advocacy
HEARTLAND DENTAL

Christopher J. Hedinger
Strategic Accounts Director, Imaging
PLANET DDS

Sayeed Yaqubi
Product Manager
PLANET DDS

planet DDS

Authors

Seth A. Gibree DMD, FAGD
Senior Director of Clinical Advocacy
Heartland Dental

Christopher J. Hedinger
Strategic Accounts Director, Imaging
Planet DDS

Sayeed Yaqubi
Product Manager
Planet DDS

Contents

Introduction 3

History of AI 4

Use Cases for AI in Dentistry 6

5 Practical Benefits with Best Practices for AI Imaging 7

1. Enhanced Diagnostic Accuracy 8
2. Whole Picture Insight 9
3. Consistency Across Clinicians and Treatment Plans 10
4. Increased Case Acceptance 11
5. Improved Efficiency 12

Final Thoughts 13

References 14

Introduction

For better or for worse, artificial intelligence (AI) has become an integral part of our lives, silently altering how we go about our daily lives. AI operates behind the scenes, influencing and transforming our everyday routines from the moment we wake up and even as we sleep. AI is there, quietly enriching our experiences, streamlining our tasks, and shaping our future.

Consider this: when you wake up and grab your smartphone to check the weather, AI algorithms deliver precise forecasts that help you choose what to wear. Your Facebook, Instagram, and Twitter feeds are specifically curated as you sip your morning coffee, giving you ads and stories targeted to your interests due to AI's extensive awareness of your online behavior. When you get in your car, artificial intelligence-powered navigation systems lead you through the maze of roads, customizing your route based on traffic information in real time.

AI touches every part of our lives, from how we buy, interact, and entertain ourselves to medicine, science, and the global economy. AI technologies, particularly in healthcare, are evolving swiftly and making a huge impact. We can do more, faster. Global IT services and consulting company Accenture calls AI a "self-running engine for growth" and estimates that clinical applications could save Americans $150 billion annually by 2026.[1]

AI in dental imaging can strengthen dental practices and help them increase efficiency while providing the best possible treatment to their patients. Yet the dental industry is still in the early adopter stage of embracing the latest AI-driven solutions. A recent survey of dental professionals found that 45.4% of respondents rated their knowledge of AI as poor and 37.1% it as average.[2] There is a great opportunity ahead for the dental industry.

Where innovation and expertise converge, providers can achieve excellence. This guide is for dental providers and dental service organizations (DSOs) who want to leap ahead with a better understanding of AI in imaging.

This guide will cover the following topics:

1. A high-level overview of the history of artificial intelligence in dentistry.
2. AI applications in dentistry and radiography.
3. Practical benefits with best practices for AI imaging.

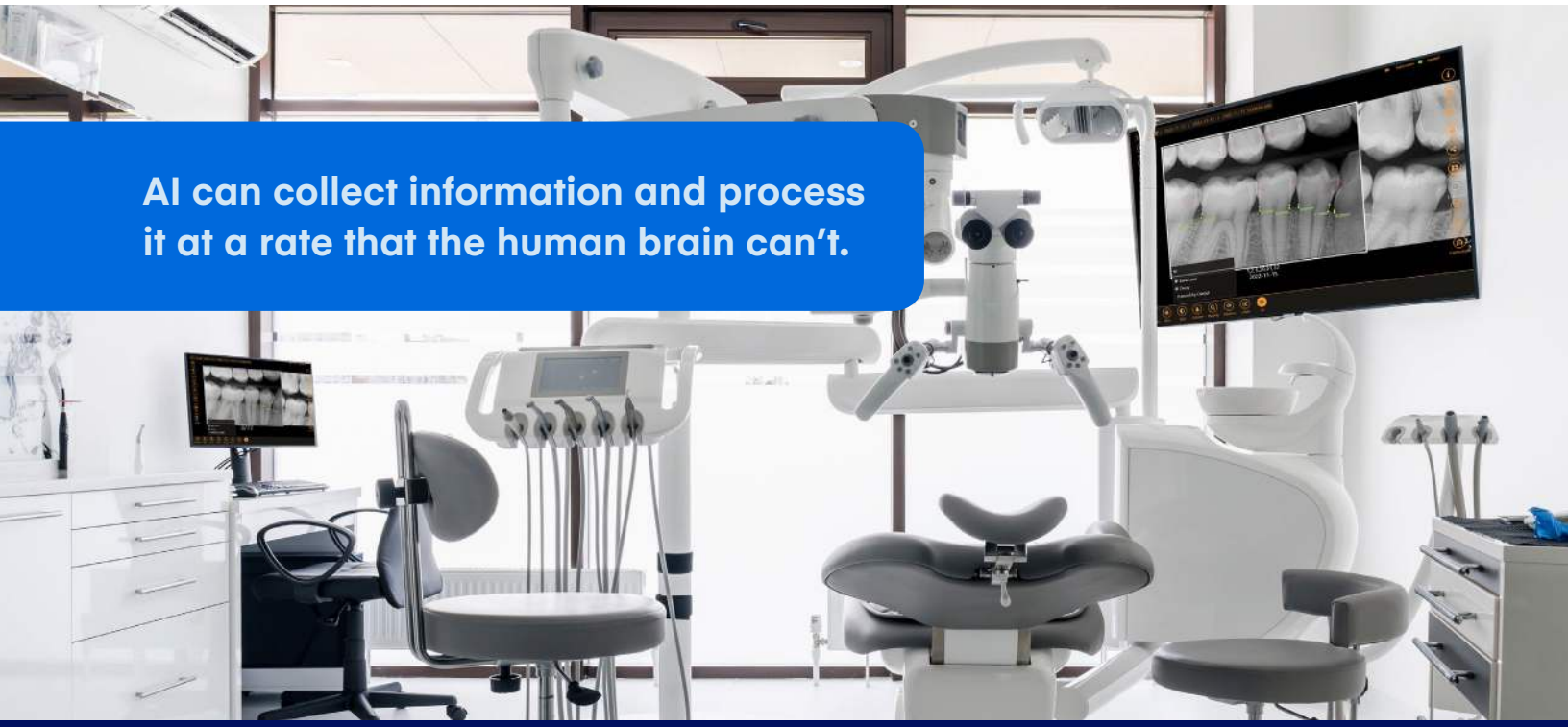
History of AI

The term "AI" is used when a computer imitates analytical functions such as problem-solving and learning that we typically identify with the human brain. AI-powered tools possess remarkable abilities and capacities to identify significant trends within data. Recent discoveries have prompted substantial research around AI technologies to aid clinical decision-making.

Simply put, AI can collect information and process it at a rate that the human brain can't. It can see much more, much faster—all while continuing to learn from the data it receives.

AI has been shown to boost efficiency and precision on par with medical experts in a more timely and cost-effective manner. AI can assess enormous volumes of patient data, free of human error, fatigue, and bias. From X-rays, treatment plans, and clinical notes, in a fraction of the time it takes a human to do so by employing machine learning algorithms.

Regarding FDA approval for AI-enabled products, we are still in the early stages.
The FDA approved the first AI algorithm in 1995, but subsequent growth was gradual over the next two decades. Then research and development accelerated. The FDA cleared over 300 AI and machine learning (ML) applications between 2019 and 2022, with 178 approvals in October 2022. The FDA has now authorized 521 AI/ML-enabled medical devices, 75% of which are for medical imaging.[3]



Thanks to cloud-based software, early advancements in dentistry have now been streamlined into more efficient innovations in recent years. Numerous companies have emerged with FDA-cleared AI technology that supports the identification of dental disease.

These tools are not intended to replace the expertise of a dentist. In all cases, the dentist maintains diagnostic autonomy. Dentists can agree or disagree with findings before making decisions or informing patients. Ultimately, it is still up to the clinician to determine whether to proceed with treatment based on patient risks and factors, including predictive AI interpretation.

Rather, AI imaging tools are meant to help providers create a better patient experience. Imaging tools can assist providers in ensuring that critical findings are not overlooked, reducing false negatives and positives to improve accuracy, and improving preventative therapy at an earlier stage.

The FDA has now authorized 521 AI/ML-enabled medical devices, 75% of which are for medical imaging.

Use Cases for AI in Dentistry

AI in dentistry has a wide range of applications. Group uses include sales and marketing, billing and claims management, cybersecurity, and reporting.[4] As a business tool, AI can automate manual processes and streamline operations.

Clinical use cases for AI include early identification and diagnosis of disease, treatment planning, and even surgical guidance. Although AI/ML-enabled applications are not yet commonplace in the dental business, technology has improved imaging diagnostics, caries detection, radiography and pathology, and electronic recordkeeping.[5]

Various DSOs have quickly identified AI as a value-add.[6] Because of their versatility, economies of scale, and resources, DSOs are uniquely positioned to benefit immensely from widespread AI adoption.

Meanwhile, private practices of all sizes can maximize their impact with AI imaging.

Patients already benefit from trusted medical practitioners' important intuition and years of first-hand knowledge. The average full-time dentist will see 20,000 different patients and hundreds of thousands of photos throughout their career.[7] **Combining first-hand experience with massive volumes of AI data and patterns can yield impressive outcomes.**

Technology developments can improve dental results by reducing problems, increasing patient satisfaction, improving decision-making, and eliminating unnecessary operations. Adoption will continue to expand as more tools gain traction.

Specifically, DSOs and dental practices can use AI to:

- Support general industry standard of care and best practices across offices for the highest quality oral care.
- Improve performance with visualization tools that support patient treatment discussions and professional development with colleagues.
- Quantify practice data and track outcomes that impact operations, strategy, and efficiencies.
- Inform practice affiliation mergers and acquisitions and post-affiliation onboarding.

5 Practical Benefits with Best Practices for AI Imaging

Dental practices are no longer on the fringes, experimenting with AI. Today, they stand at the forefront of innovation, leveraging AI to better enhance their practices and the dental industry.

Here are five ways AI imaging benefits dental practices.

1.

Enhanced Diagnostic Accuracy

Cloud technology has improved the functionality, processing capacities, and storage capabilities of today's practice management systems. In addition, the cloud allows dental practitioners to collaborate and share data in real time, supporting collective perspectives and interdisciplinary consultations. As a result, many offices have embraced secure cloud solutions that integrate with AI imaging. The ability to effortlessly save, store, and retrieve more data allows for comprehensive comparisons and enhances diagnostic accuracy in AI imaging.[8]

Using AI, dental providers can fine-tune sensitivity and specificity on radiographs to strike a balance that mirrors their diagnostic philosophy. This enables them to promptly identify and draw attention to areas that need to be looked at.

AI detection can also reinforce training for new dentists and help them successfully communicate diagnoses to patients, colleagues, as well as insurance providers. It also helps train providers' eyes to notice things that they may otherwise miss when they are in a hurry, tired, or distracted.

AI detection can assist new dentists in reinforcing their training and successfully communicating their diagnoses to patients, colleagues, as well as insurance providers.

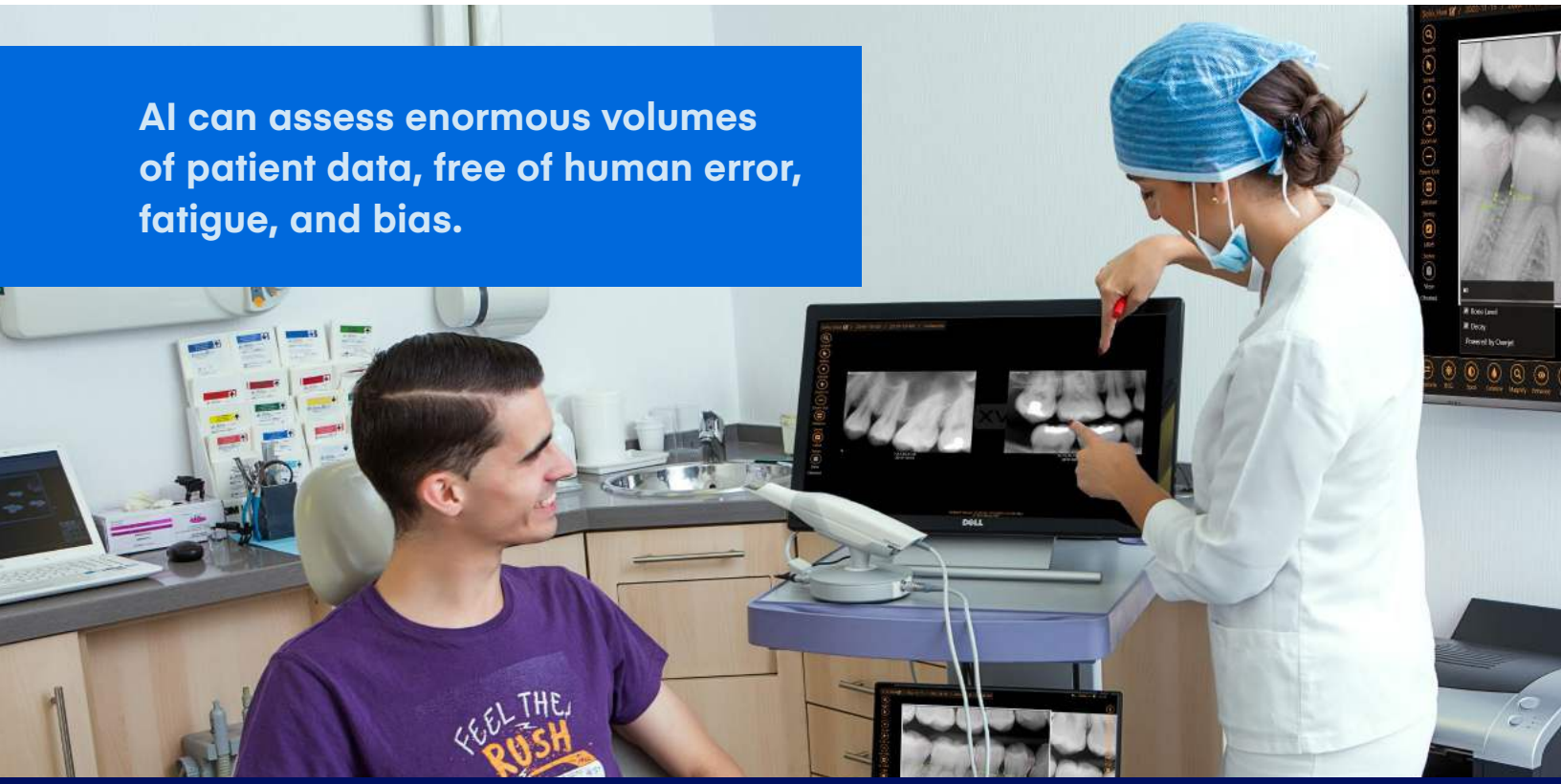
2.

Whole Picture Insight

There's always more to a patient than what you see on an X-ray or on a CBCT or set of photos. Imaging tools powered with AI allow dentists to quickly view AI findings on images. The majority of providers currently rely on full-mouth radiographic series to offer comprehensive diagnostic accuracy. A series of X-rays provide more information for better treatment planning. AI technology can assist users in detecting patterns and connections that are difficult to spot through manual analysis, resulting in more accurate and thorough assessments. AI, for example, can automatically cross-reference patient records with relevant research and recommendations, ensuring that proposed treatments are consistent with the most recent evidence-based practices.

When diagnosing a patient, you want to comprehend the complexities of what's going on, both in the past and present. The ability to accurately measure change in dental disease progression can make treatment decisions more streamlined and accurate. A detailed and complete comprehension of the case with AI can lead to better outcomes and increase patient's awareness.

AI can assess enormous volumes of patient data, free of human error, fatigue, and bias.



3.

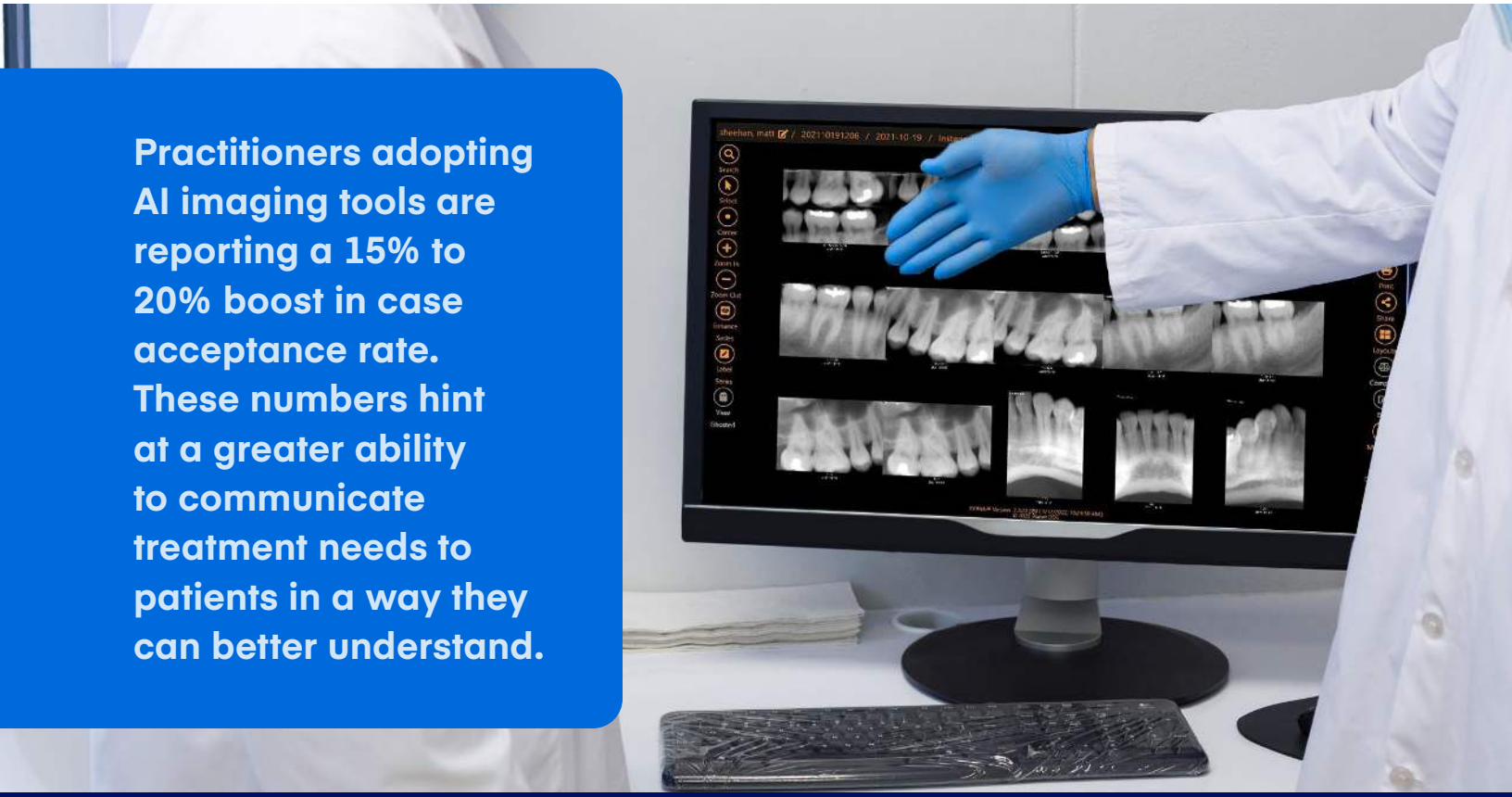
Consistency Across Clinicians and Treatment Plans

Increased consistency is a key advantage of using AI imaging tools in dental offices. Unlike humans, computer programs provide consistent, standardized insights. Whether a practice patient flow is slow, normal, or hectic, AI tools are particularly helpful to assist doctors and their teams in offering their highest level of care to each and every patient. They provide another set of eyes, and they assist dentists in making highly informed decisions, even amidst the challenges of a demanding workday.

In addition, they reduce the influence of confirmation bias to provide true decision support. In this way, AI can be a great tool for making data-driven decisions and enhancing patient care.

Often, a dentist will want to see an X-ray without AI findings. In that case, it's as easy as a button click to turn annotations on and off. There are also general settings that can be adjusted.

Practitioners adopting AI imaging tools are reporting a 15% to 20% boost in case acceptance rate. These numbers hint at a greater ability to communicate treatment needs to patients in a way they can better understand.



4.

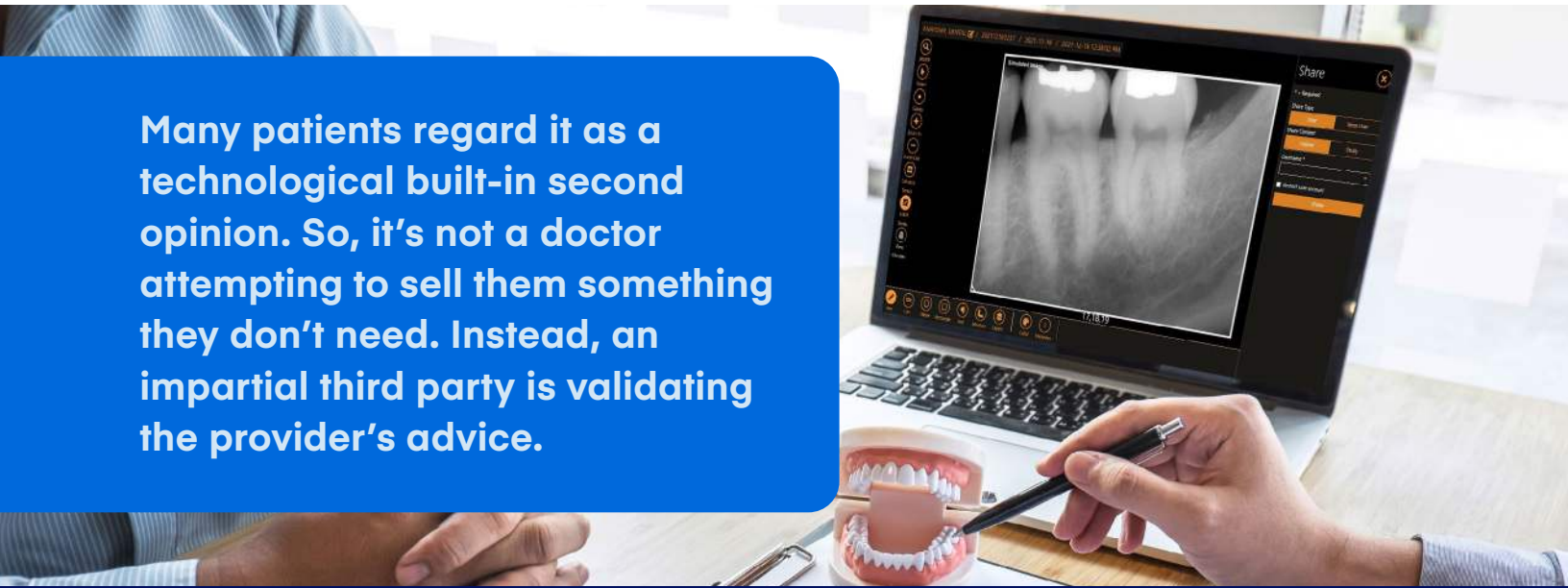
Increased Case Acceptance

A high case acceptance rate is one of the most critical metrics to measure a successful dental practice. According to Levin Group's Annual Practice Survey, data shows that the average within the industry lies between 25-50%.[9] How much care is left on the table as a result of challenges in communication?

Using X-rays with AI overlays allows dentists to communicate with patients in a way that helps them to better understand their condition and needs. AI-analyzed photos can be viewed and shared to highlight problem areas easily.

Practitioners adopting AI imaging tools are reporting a 15% to 20% boost in case acceptance rate. These numbers hint at a greater ability to communicate treatment needs to patients in a way they can better understand. Moreover, many patients regard it as a technological built-in second opinion. So, it's not a doctor attempting to sell them something they don't need. Instead, an impartial third party validates the provider's advice and diagnosis.

However, AI is improving more than just complex procedures. Another area where you can assess the benefits is in preventative care. By utilizing AI algorithms, which evaluate greater levels of gray scales than our eyes can see, clinicians can identify cavities earlier, allowing for greater success with remineralization treatments. When observing smaller cavities earlier, it enhances the ability to treat with fluoride or calcium mineralization products.



Many patients regard it as a technological built-in second opinion. So, it's not a doctor attempting to sell them something they don't need. Instead, an impartial third party is validating the provider's advice.

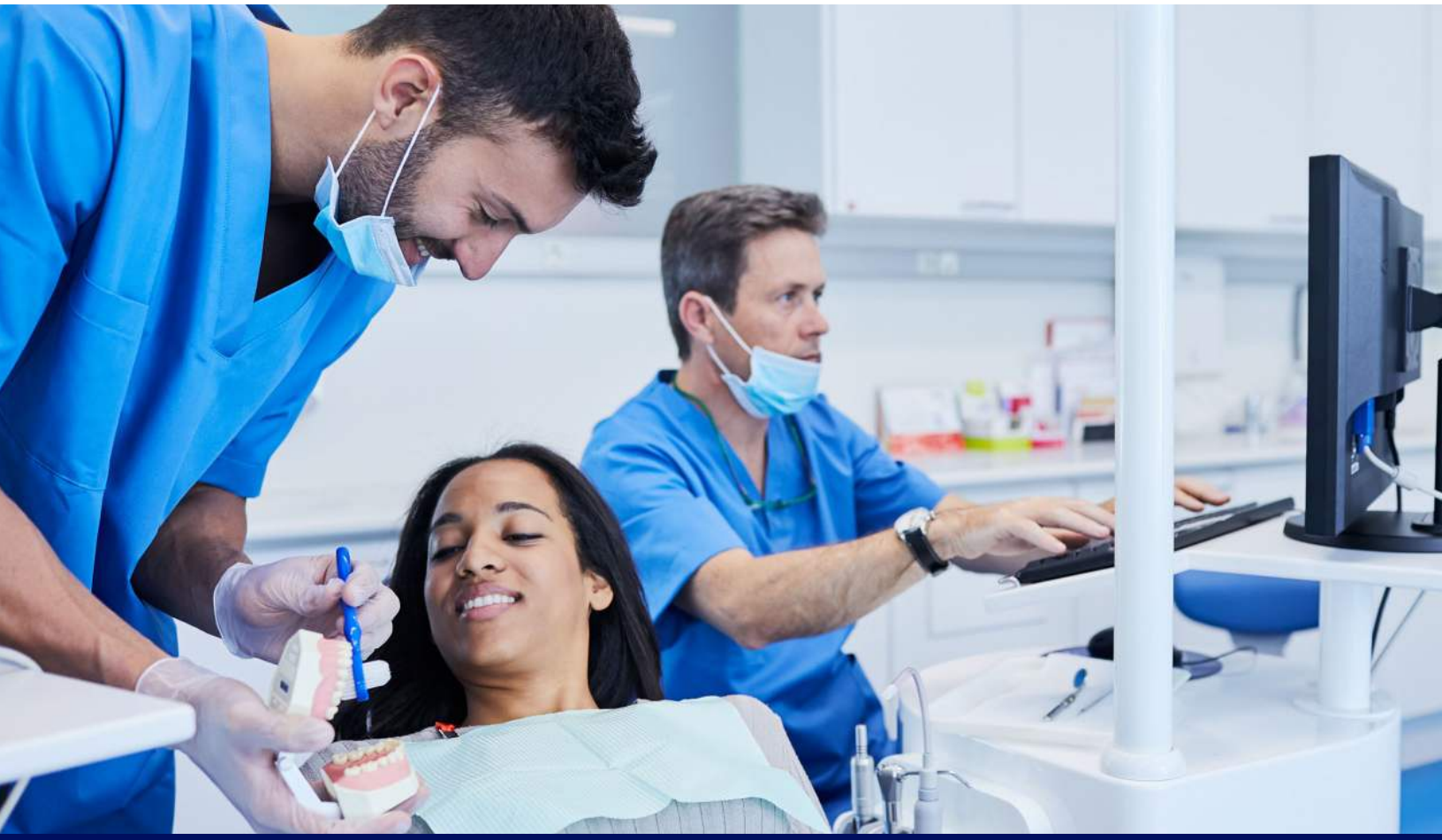
5.

Improved Efficiency

Using AI dental imaging tools can reduce chair time. As a result, practices which use AI tools can be more effective. One study found AI-enhanced delivery of care by as much as 18%.[10]

AI systems can quickly assess, support, communicate, and highlight anomalies, allowing clinicians to concentrate on communication of needs and delivery of care. As a result, clinicians can see patients more efficiently while enhancing workflow and decreasing idle time.

Future AI developments will allow for many more gains in efficiency and accuracy. Today we have an instantaneous feedback loop that allows doctors to maximize their time with their patients. AI integration offers dentists real-time decision support as they study diagnostic images with their patients. This interaction encourages proactive and preventative care and increases trust in the provider.



Final Thoughts

Current advancements undoubtedly offer invaluable decision support and improved levels of patient care. Professionally and personally, AI has evolved into an ever-present force guiding our decisions, predicting our preferences, and influencing daily life. It makes you wonder if someday we'll look back and say, "Remember when we used to do this without AI?" Today's level of technological savviness and advancement is the minimum standard we can expect, and it will only continue to increase in the future.

Nonetheless, with all the benefits and advantages, AI/ML programs raise inherent concerns. Checks and balances are required in programs. And, as with all digital tools, there is an increased awareness of maintaining accuracy standards along with security concerns. As the field of artificial intelligence in dentistry expands, leaders must approach AI implementation with a solid understanding of its capabilities and limitations. AI cannot replace clinical expertise.

AI remains, however, an effective tool. One that leaders can use to propel their practices forward.

To learn more about Planet DDS, visit:

www.planetdds.com

Sources

1. Collier, M. (2020). AI: Healthcare's new nervous system. Accenture. https://www.accenture.com/au-en/insights/health/artificial-intelligence-healthcare

2. Eschert, T., Schwendicke, F., Krois, J., Bohner, J., Vinayahaligam, S., and Henisch, M. (2022). A Survey on the Use of Artificial Intelligence by Clinicians in Dentistry and Oral and Maxillofacial Surgery. National Library of Medicine, National Center of Biotechnology Information, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9412897/

3. US Food and Drug Administration. (2022). Artificial Intelligence and Machine Learning (AI/ML)-Enabled Medical Devices. https://www.fda.gov/medical-devices/software-medical-device-samd/artificial-intelligence-and-machine-learning-aiml-enabled-medical-devices

4. Nazemian, S., Boggs, S. T., Jimenez Ciriaco, E., Abu Shakra, H., Jung, E. Y., Lotfalikhan-Zand, Y. B., Price, J. B., & Bashirelahi, N. (2023). What every dentist needs to know about the use of artificial intelligence in dentistry. General dentistry, 71(3), 23–27. https://pubmed.ncbi.nlm.nih.gov/37083609/

5. Schwendicke, F., Samek, W., & Krois, J. (2020). Artificial Intelligence in Dentistry: Chances and Challenges. Journal of dental research, 99(7), 769–774. https://doi.org/10.1177/0022034520915714

6. Balaban, C. M., Gibree, S. A., Athar, A., Nia, F., Olan, M., Zubiller, M., Inam, W., Kennedy, R., & Faiella, R. A. (2021). AI-Driven Growth of DSOs. Compendium of continuing education in dentistry (Jamesburg, NJ: 1995), 42(3), e5–e9. https://pubmed.ncbi.nlm.nih.gov/33887145/

7. Gibree, S., Hillen, F. (2020). Machine Learning. Dentaltown. https://www.dentaltown.com/magazine/article/8071/machine-learning

8. Eschert, T., Schwendicke, F., Krois, J., Bohner, L., Vinayahalingam, S., & Hanisch, M. (2022). A Survey on the Use of Artificial Intelligence by Clinicians in Dentistry and Oral and Maxillofacial Surgery. Medicine (Kaunas, Lithuania), 58(8), 1059. https://doi.org/10.3390/medicina58081059

9. Levin, R. P. (2015). Research report: Case acceptance. Dental Economics. https://www.dentaleconomics.com/practice/article/16391801/research-report-case-acceptance

10. Planet DDS. (2023). How AI is Transforming Dental Technology in 2023. https://www.planetdds.com/blog/how-ai-is-transforming-dental-technology-in-2023

Planet DDS is the leading provider of cloud-enabled dental software solutions serving over 10,000 practices in North America with over 60,000 users. The company delivers a complete platform of solutions for dental practices, including Denticon Practice Management, Cloud 9 Practice Management, Apteryx XVWeb Cloud Imaging, and Legwork Practice Aquisition. Planet DDS is committed to creating value for its dental practice clients by solving the most urgent challenges facing today's dental practices in North America.