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digital

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opinion
Choosing the right 3D facial scanner for your practice

case report
Precision redefined: A digital end-to-end full-arch rehabilitation

industry news
Getting started with CEREC: Cloud workflow made simple

dti] Dental Tribune International

Dr Scott D. Ganz

Editor-in-Chief

Past is future?

The integration of stereolithography with CT has transformed the way that clinicians visualise and manipulate anatomical structures. Stereolithography, one of the earliest additive manufacturing techniques, builds 3D objects layer by layer by polymerising photosensitive resin with ultraviolet light. When paired with high-resolution CT or CBCT imaging, it enables the creation of accurate physical models of complex biological structures that were once limited to digital reconstructions only. The use of 3D-printed models generated from CT data has had a profound impact across surgery, medical and dental education, and biomedical engineering.

Historically, the use of CT data for physical modelling began in the late 1980s and early 1990s, coinciding with the commercial introduction of stereolithography. Early adopters recognised that CT data could be transformed into 3D surface representations, enabling the fabrication of anatomical models for surgical planning. The process originated with the acquisition of CT images, which provided detailed volumetric datasets of internal anatomy. These datasets represent stacks of axial slices, which can be segmented to isolate organs, bones or pathological structures. By converting these segmented datasets into surface meshes, typically in STL file format, clinicians and engineers can translate medical imaging data into printable objects. Through stereolithography, these digital models are fabricated with high precision, capturing fine morphological details such as cancellous bone patterns or complex vascular geometries. The result is a physical object that faithfully represents patient-specific anatomy.

One of the first influential applications occurred in maxillofacial surgery, in which 3D-printed skull models allowed surgeons to rehearse procedures and design custom implants preoperatively. H.P. Truitt and Leonard Linkow were pioneers in developing and delivering subperiosteal implants decades ago. Today, the use of CT-derived 3D-printed models is widespread and continues to grow, allowing preoperative planning to enable safer and more efficient procedures. Subperiosteal implants are now designed directly from CBCT data, allowing delivery in a single surgical procedure. To fabricate these amazing models, the painstaking task of segmentation used to require manual intervention and took a great deal of time. Today, artificial intelligence fuels advanced bone and tooth segmentation with one or two mouse clicks in record time. It is this amazing technological improvement that has led to a personal innovation, a new surgical guide design for the maxillary arch. The new guide and modern subperiosteal implant designs would not be possible without artificial intelligence segmentation. Please check out this most recent issue of digital to keep current on how technology like this is supporting our work.

Respectfully,
Dr Scott D. Ganz
Editor-in-Chief


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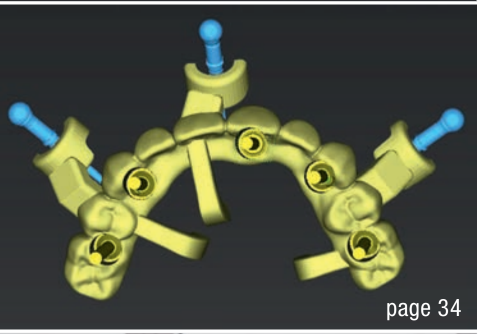
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New FDI report underscores illegal dental practice as a growing global health risk

Dental Tribune International

A comprehensive new survey by FDI World Dental Federation has revealed that illegal dental practice is an escalating global public health threat. The study, involving 49 national dental associations, found that unlicensed and unqualified providers continue to endanger patients worldwide and that weak enforcement and regulatory gaps allow dangerous practices to thrive.

Building upon existing FDI policy, the report exposes the scale and complexity of illegal dentistry—defined as the provision of dental care by individuals who lack proper qualifications, registration or licensing. Reported examples of such practices include beauticians fitting fixed appliances in salons as well as unlicensed persons performing extractions or implant procedures in private homes or informal clinics.

According to FDI, 95% of surveyed countries have laws against illegal dental practice, yet only 49% of the associations surveyed said that they believe those laws are effectively enforced. Fifty-six per cent of the associations identified significant obstacles to enforcement, including insufficient resources, bureaucratic delays, political interference and corruption. A further 58% of associations reported confirmed cases of patient harm, ranging from severe infections to permanent disfigurement and, in extreme cases, life-threatening complications.

The survey found that illegal dentistry often flourishes where access to affordable, qualified care is limited—especially in low- and middle-income countries. Economic hardship, lack of awareness and cultural tolerance were also cited as major contributing factors. While informal care may sometimes emerge to meet community needs, the report warns that it poses unacceptable risks and undermines trust in the profession.

FDI's recommendations urge a global, multilayered response: updated legislation with meaningful penalties, stronger collaboration between dental associations, regulators and law enforcement, and robust data collection to track the problem. FDI also recommends launching public awareness campaigns to educate the public on the importance of consulting qualified providers and to help patients verify providers' credentials.

The report concludes that tackling illegal dental practice requires not just tougher laws but equitable access to safe, affordable dental care. Without decisive action, the profession risks further erosion of public trust and escalating harm to patients. As FDI emphasises, protecting patients begins with ensuring that only qualified, licensed professionals are permitted to practise—anywhere in the world.

Editorial note: The report, titled "Illegal Dental Practice: Results of a Global Survey With National Dental Associations (NDAs)", is available to download at www.fdiworlddental.org.

Study highlights potential and risks of AI tools in dental record-keeping

Dental Tribune International

One of the key promises of artificial intelligence-based (AI-based) tools in dentistry is the expediting of time-consuming tasks. The authoring of electronic health records is one area where AI could enable significant time-savings; however, clinicians must be able to rely on consistent and error-free documentation. According to a team of researchers who tested the accuracy of various AI-based automatic speech recognition (ASR) systems, current systems still require clinical oversight.

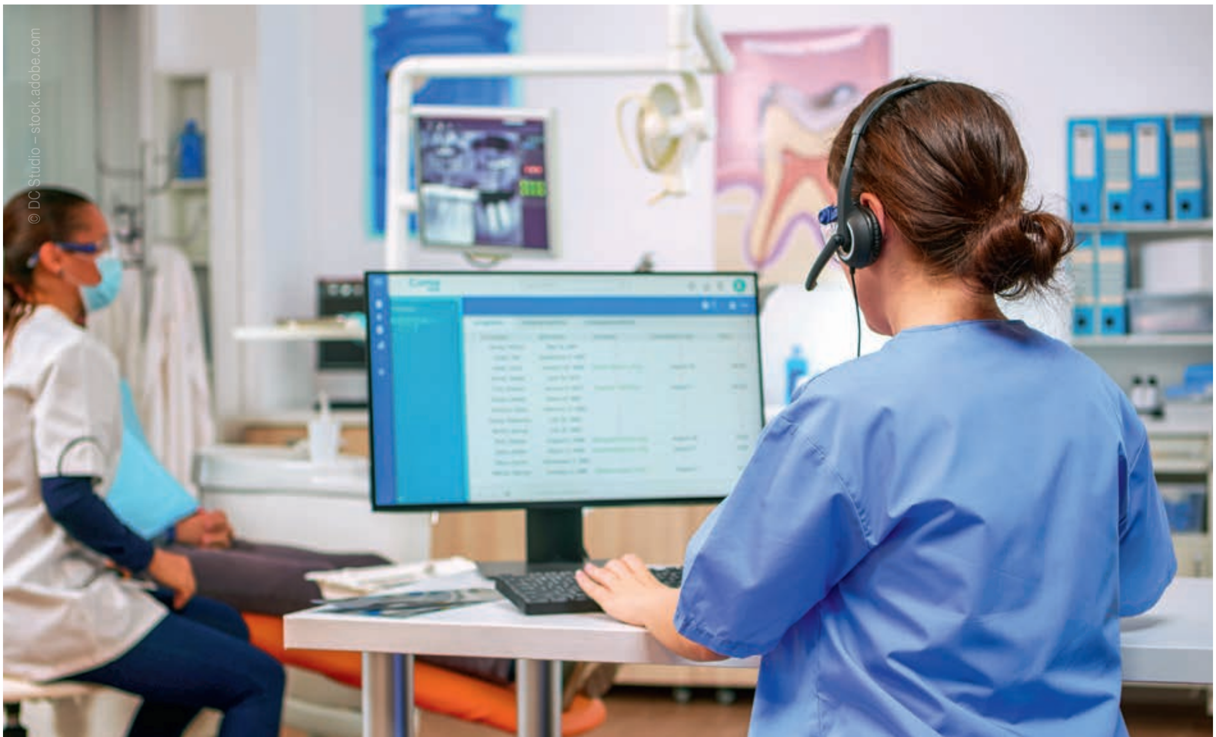
Aiming to assess the lexical, transcriptional and semantic accuracy of ASR tools in clinical settings, the researchers dictated 200 orthodontic clinical records that incorporated a range of technical and dentistry-specific language and used the recordings to test ten ASR systems. Four of the systems were commercially available: Heidi, DigitalTCO, Dragon Medical One and Dragon Professional Anywhere. Another five were application programming interfaces that link different software apps: Amazon, Google, Speechmatics, Whisper and GPT-4o Transcribe. Finally, one coupled the GPT-4o Transcribe app interface with the GPT-4o model used for error correction, called GPT4oTranscribeCorrected.

The researchers found that formatting and minor grammatical errors were common in transcripts generated by all of the systems, as were Class 3 errors, meaning-altering mistakes that had the potential to negatively affect clinical care. Class 3 errors accounted for between 0.21% and 4.15% of the total errors made by the systems. GPT4oTranscribeCorrected generated the fewest Class 3 errors, 2% of its transcripts featuring at least one, and Dragon Medical One generated the most, 66% of its transcripts featuring at least one. Furthermore, the systems had difficulty with many dentistry-specific terms. For example, "Essix" was incorrectly transcribed in 97.5% of instances. Other terms such as "palatally", "mesially" and "buccally" were misinterpreted in most cases as well. The researchers found that speaker accent had only a minor link with errors made and that background noise in the recordings led to poorer performance in all systems tested.

Discussing the results, the researchers outlined the potential of ASR systems to streamline clinical documentation, and they highlighted improvements that could be made to the ASR systems, such as the use of confidence indicators to flag potentially incorrect terms. However, they emphasised that "the most important safeguard is maintaining a 'human-in-the-loop' workflow to verify transcripts, as clinicians move from authors to editors of their notes".

Lead author of the study Dr Ruairi O'Kane, a researcher at the Centre for Craniofacial and Regenerative Biology at King's College London, said in a university press release: "AI speech tools can streamline documentation and improve efficiency, but we must remain vigilant. Even subtle transcription errors can potentially impact patient care."

Editorial note: The study, titled "Transcription accuracy of automatic speech recognition for orthodontic clinical records", was published online on 3 November 2025 in Journal of Dental Research*, ahead of inclusion in an issue.*



Low-dose CBCT and AI planning improve imaging for children with special healthcare needs

Dental Tribune International

New research conducted at Malmö University has found that radiation exposure from dental imaging can be reduced for paediatric patients with special healthcare needs, including those with cleft lip and palate, while maintaining adequate imaging quality. It also developed a new artificial intelligence (AI) tool to improve preoperative planning and thus support more precise, efficient care.

The Faculty of Odontology at Malmö University, a leading centre for dental education and research, presented the new findings on how to optimise radiographic protocols for children and adolescents with special healthcare needs. The work, a doctoral thesis by researcher Dr António Vicente, focused on dose optimisation for patients born prematurely and on those with orofacial clefts, two groups that often require repeated imaging.

Dr Vicente developed and tested a low-dose CBCT protocol for postoperative assessment of children with orofacial clefts and compared it with a standard protocol. "The higher the radiation dose, the better the image quality. But it turned out that the images with a lower radiation dose were of sufficiently high quality to be able to conduct these postoperative assessments," he concluded. Although observers reported somewhat lower confidence in their evaluations when using the low-dose images compared with images obtained with the standard-dose protocol, Dr Vicente's protocol was judged clinically adequate for follow-up.

To streamline planning for alveolar bone grafting, Dr Vicente also developed an AI tool for automated segmentation of the cleft area on CBCT scans. Trained on CBCT scans of unilateral clefts, the AI system was able to delineate the cleft region and estimate bone graft volume with high accuracy, potentially reducing workload and improving consistency in preoperative planning. "This helps to ensure that operations can be performed with greater precision and, in the long run, means better care for these patients," Dr Vicente said.

Another component of the thesis addressed concerns that preterm children may receive higher cumulative radiation doses because of extensive medical imaging early in life. Reviewing dental records from 311 preterm and full-term children and adolescents, Dr Vicente found no significant differences in the number of dental radiographic examinations between the groups. Although dental behaviour management problems during examinations and treatment were more common in the preterm group, this did not translate into poorer dental status or more referrals to paediatric dental specialists.

Editorial note: The thesis, titled Radiographic Examinations in Dental Care for Paediatric Patients With Special Healthcare Needs*, was published by Malmö University Press and defended at the faculty on 24 October 2025.*