



THE FUTURE OF FULL-ARCH GUIDED SURGERY

THE STATE OF ALL-ON-X IN 2024



A SURVEY-BASED REPORT & MARKET RESEARCH





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INTRODUCTION

WHY ALL-ON-X TREATMENT IS A WIN-WIN SITUATION?

Back in the day, the word “dentures” used to mean one thing and one thing only; that is “removable dentures”. Remember those bulky, artificial-looking teeth submerged in a glass of water on your grandparents’ bedside table? Humans have been donning various forms of makeshift dentures for hundreds of years. You might be familiar with the famous myth about George Washington’s wooden teeth set. While not exactly fashioned out of wood, the first US President did, in fact, sport ugly and pain-inducing dentures made out of ivory and human teeth!

Admittedly, the vast majority of modern dentures do not look so bad that they get mistaken for wooden teeth. We’ve come a long way since then. However, they do come with their fair share of disadvantages for denture wearers because they:

- Have to be taken out before bed
- Look and feel artificial; unnatural
- Can be unstable; either too big or too tight-fitting
- Are not suitable for chewing certain foods
- Can cause soft tissue damage, gum disease and bone resorption
- Break under excessive occlusal loads
- Induce loss of facial muscle support
- Often require denture adhesives and creams
- Need to be remade (or relined) and replaced periodically

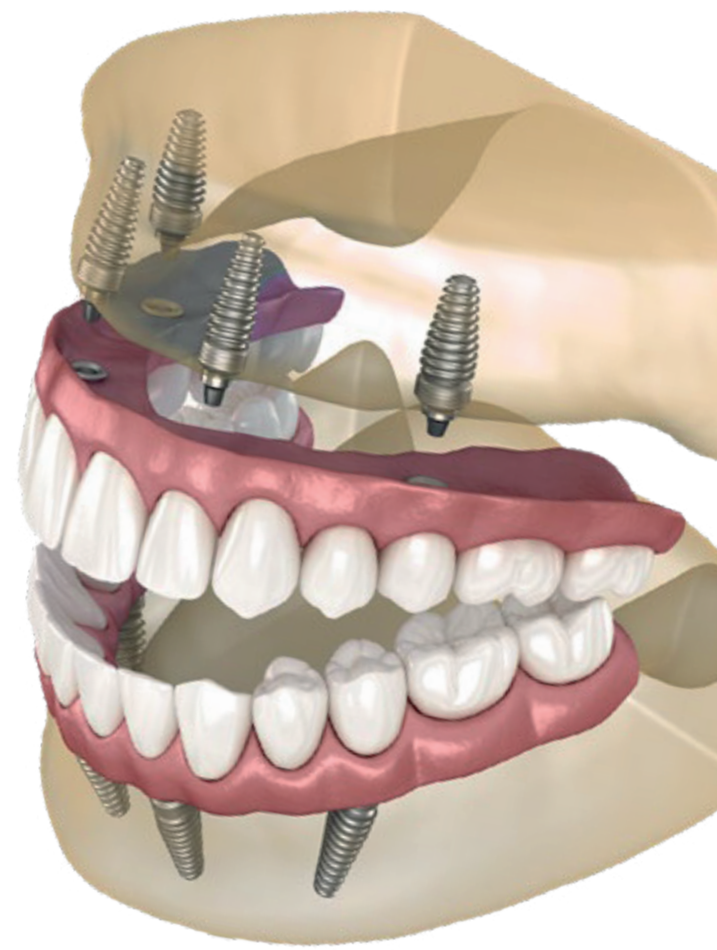
ENTER ALL-ON-X

Following the discovery of osseointegration and titanium biocompatibility by Swedish professor **Per-Ingvar Brånemar**, the first dental implant in the world was successfully placed in 1965. This groundbreaking achievement significantly improved tooth replacement techniques, and as a result, the field of dentistry was never the same again.

During the nineties of the last century, Portuguese professor Paulo Maló was making progress based on Brånemar's work. He managed to come up with a simple but revolutionary concept in which four dental implants placed in the posterior region of the mandible or maxilla, and tilted at a 45° angle, could be placed on the same day of surgery without the need for bone grafting. The first instance of a patient receiving treatment with this innovative technique was in 1998.

This is how the world-famous All-on-4® treatment modality came to be; the rest was history.

In All-on-X, the "All" refers to the full-arch fixed hybrid prosthesis, and the "X" is the number of dental implants that provide support to it. Soon after, more stable options were gradually introduced such as the All-on-6 and the All-on-8 concepts. The number of implants can be as many as each individual case requires for proper support, stability and esthetics. The versatility of this modality makes it a win-win situation for both the patient and the dentist.



WIN FOR THE PATIENT

ALL-ON-X CAN BE LIFE-CHANGING FOR COMPLETELY EDENTULOUS INDIVIDUALS OR THOSE WITH FAILING (FAILING OR TERMINAL) DENTITION.



It dramatically improves the way they go about their everyday lives in terms of oral and overall health, masticatory function, diet, esthetics, social activity and even mental health. Here are some of the benefits:

- **Cost effective:** usually there's no need for bone grafts which can be an added cost.
- **Durable:** it lasts for life with proper maintenance; one-and-done procedure.
- **Quick:** from extraction to implant placement, everything is done in 3-4 hours.

- **Conservative:** can be less invasive than other alternatives.
- **Comfortable:** more compatible than removable dentures.
- **Customizable:** digital planning and smile design provide an ideal bite for every case.
- **Natural esthetics:** lifelike restorative options are available (e.g. FP1, FP2 & FP3).

WIN FOR THE DENTIST

Clinicians who dabble in implant dentistry as well as seasoned specialists can adopt and master All-on-X digital workflow in a relatively short period of time.

Those who do, stand to reap the following benefits of All-on-X:

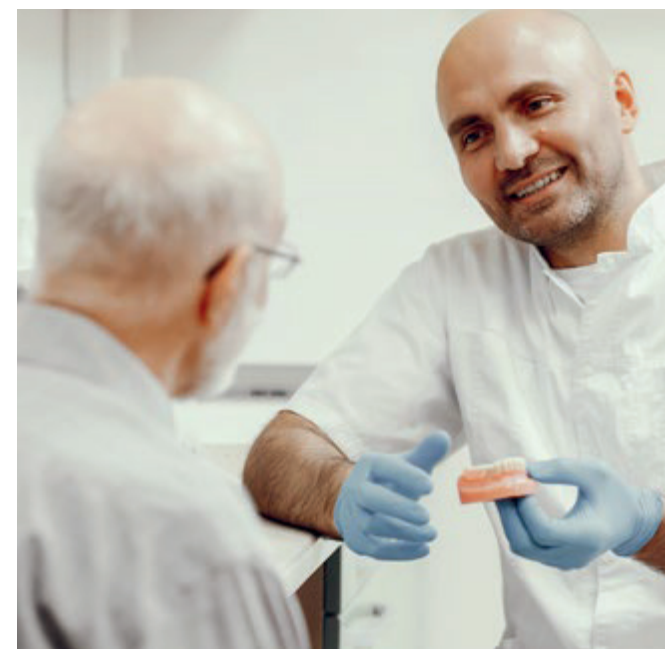
- **Simplicity:** once you master it, the procedure is always the same.
- **Efficiency:** pre-planned, same-day, step-by-step process.
- **Predictability:** you can expect the same results every time.
- **Reproducibility:** consistent treatment outcomes with each case.
- **Immediacy:** immediate loading of implants and prosthesis in just a few hours.
- **Convenience:** completed in one visit, saves your time and the patient's.
- **Profitability:** you get to do more cases in less overall time.
- **High success rate:** implant failure is rare with proper protocols.

However, in order to get the full picture, we must also be wary of some of the problems associated with All-on-X therapy. Some of those issues are due to the quality of the devices themselves, however, most of them can be a result of inadequate care and treatment prior to the procedure. The restorative dentist needs to be deeply involved in the process from planning to installation. Otherwise, All-on-X treatment may be unsuccessful because of device failure, tissue damage, and unnecessary expense for the patient.

It's been reported that first-timers start to feel quite comfortable with the procedure after as little as 10-15 full-arch cases.

Common problems include:

- **Inadequate planning:** regardless of the device quality, not enough consultation between the restorative dentist and the oral surgeon can compromise implant placement.
- **Improper implant placement:** inaccurately placed implants can break or cause bone loss especially in patients with bruxism.
- Poor communication with dental labs.



ALL-ON-X IS ON THE RISE!

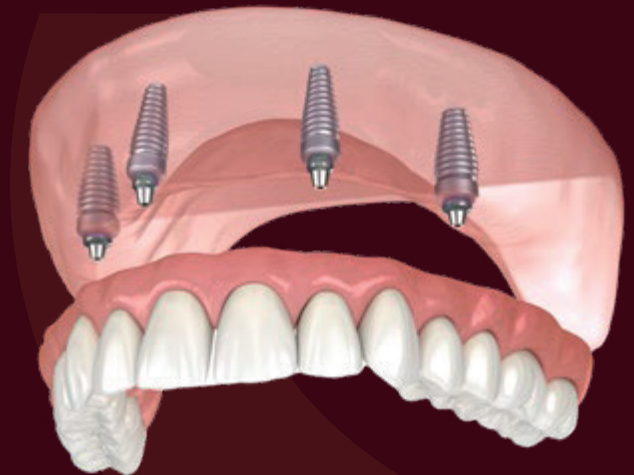
2/3 OF CLINICIANS ARE SEEING MORE ALL-ON-X PATIENTS.

In this report, we're taking a deep dive into the world of digital dentistry and the latest innovations in All-on-X therapy. We have conducted thorough market research and an online survey aimed at dental practitioners. Our goal with this document is to present the results of the survey analysis in order to explore how our findings reflect the current and projected trends in this fascinating area of dentistry. In doing so, we hope to draw an accurate picture of the current state of All-on-X treatment method and extrapolate what the future holds for it.

Our survey showed that more than of clinicians have been seeing more All-on-X patients over the past 5 years. This is significant because almost 60 % of them reported that their patients are specifically asking for this treatment. Since more and more people are eligible and can afford All-on-X prostheses, an increasing number of doctors are also case-selecting for this particular procedure (e.g. 27 % of our survey correspondents).

At first glance, we may assume that because life expectancy is getting higher, it's mostly senior citizens (i.e. above 60 years old) who are getting implant-supported hybrid dentures. Surprisingly, according to our findings, dentists report that around %82 of their All-on-X patients are aged 60 or younger. All signs point to an even bigger surge in this population, which means we're going to see more eligible All-on-X cases from varying age groups.

This will result in an increasing patient in-flow. More cases require more time, so it's safe to say that dental practitioners are not only interested in the quality of such restorations but also the speed at which the procedure can be done. The faster and more efficient the workflow, the more patients they're able to see and the more time they can dedicate to each case. Time, in this case, is literally money!



RECENT INNOVATIONS

Technological advancements in digital dentistry have been making fast, accurate and predictable full-arch rehabilitation surgery with long-term success, a reality. We now have the technical and clinical know-how to take this treatment modality further. With the advent of robotics, artificial intelligence (AI) and machine learning, we have only managed to scratch the surface of what is possible. It's, therefore, crucial for all members of the dental team to stay up-to-date with the latest trends in the field and keep an eye out for future innovations.

Treatment planning, implant placement, and implant-retained restorations have been dramatically changed thanks to digitization. Intraoral scanners (IOS), cone-beam computed tomography (CBCT), 3D implant planning software, and CAD/CAM systems through which surgical guides and temporary as well as final prostheses can be fabricated, are

now considered as standard tools. They are not only essential for optimal long-term esthetics but also for functionality. That is to say, digital planning and guided implant surgery are no longer luxuries saved only for elite practitioners; they have effectively become necessities for implant dentistry and therefore are currently commonly available.

The ever-accelerating evolution of digital applications in dentistry combined with the accessibility of information and training have made it easier for clinicians to adopt such technologies in their practice. That is why manufacturers have been racing to develop a variety of hardware and software products with competitive low costs and more convenient access. Moreover, most branding strategies and privacy policies within the industry have been updated to make importing/exporting files more compatible and integrated with other brands. This systemic integration

comprising digital radiographs, CBCT, extra- and intraoral scanners, design software, and the resulting files (e.g. digital wax-ups, smile design, etc.), has made interdisciplinary treatment planning and prosthetically driven implant placement the standard of care.

In the case of All-on-X, the guided surgery workflow usually comprises the fabrication of a provisional restoration or diagnostic tooth arrangement with desired final prosthesis design, followed by a dual scan. Two CBCT scans are used in a dual scan with six to eight radiographic markers attached to the temporary prosthesis or diagnostic tooth arrangement during CBCT imaging. One scan is taken with the patient wearing the prosthesis, and another scan is taken with the prosthesis alone. The clinician can then merge two sets of CBCT volumetric data in an implant planning software program for subsequent implant planning.

INTRAORAL SCANNERS (IOS)

Acquiring 3D representation of intraoral structures is a cornerstone of digital implant planning and prosthetically-oriented implant placement. The anatomical accuracy of all the captured maxillary and mandibular landmarks can make or break (literally) the final results. To obtain such images, we can use either extraoral laboratory-based scanners from analog impressions/physical models, or IOS (i.e. digital impressions).



The popularity of IOS can be attributed to a number of reasons, among which are:

- Ease and speed of use.
- The ability to rescan faulty spots with no need for remakes.
- Significantly more comfortable patient experience.
- Patient education and case acceptance.
- Scan files can be stored digitally and are easily accessible for future use.

Despite minor differences among various IOS systems, studies indicate that the accuracy of most commonly available IOS is within acceptable limits for clinical use.

2021 witnessed an increasing number of dental practitioners starting to use IOS in their practice. This trend is expected to continue as IOS seems to be the main element driving digitization forward. In our recent survey, 62.5 % of dentists told us they're IOS users [Fig. 1] 35.38 % of those had been using them for 5 years or longer [Fig. 2].

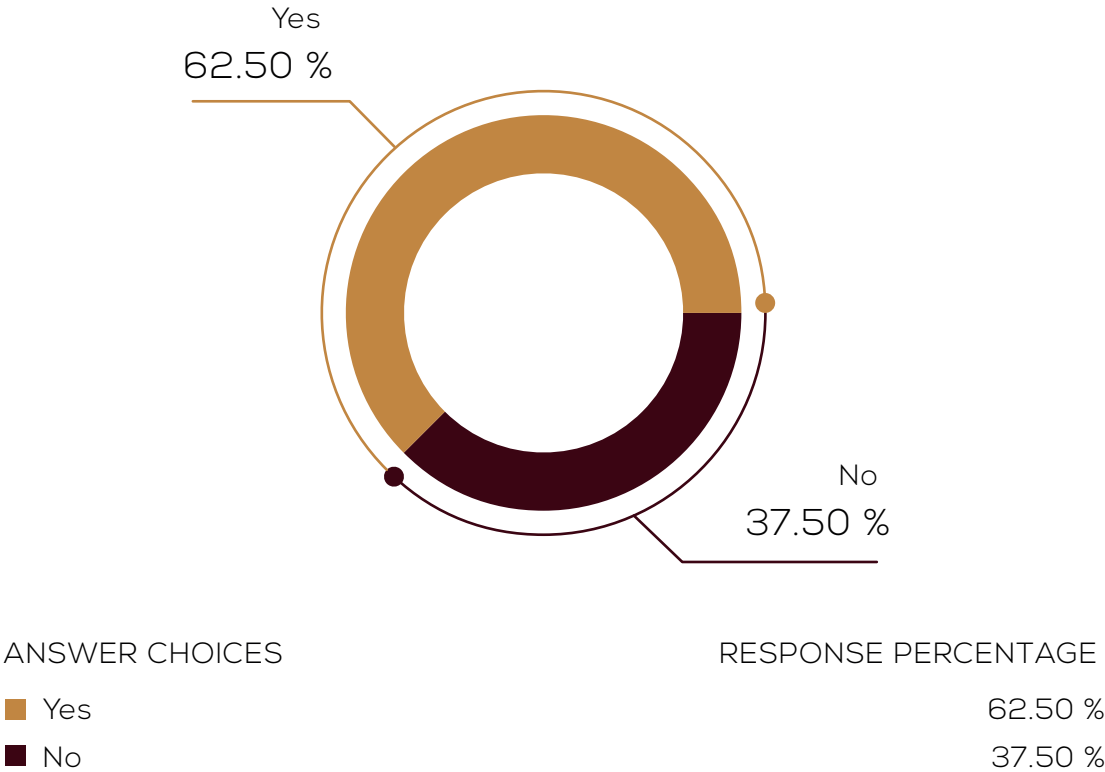
In the coming years, the use of IOS will not be restricted to a mere digital replacement for physical impressions. Workflows can be tweaked to add other treatments such as clear aligners.

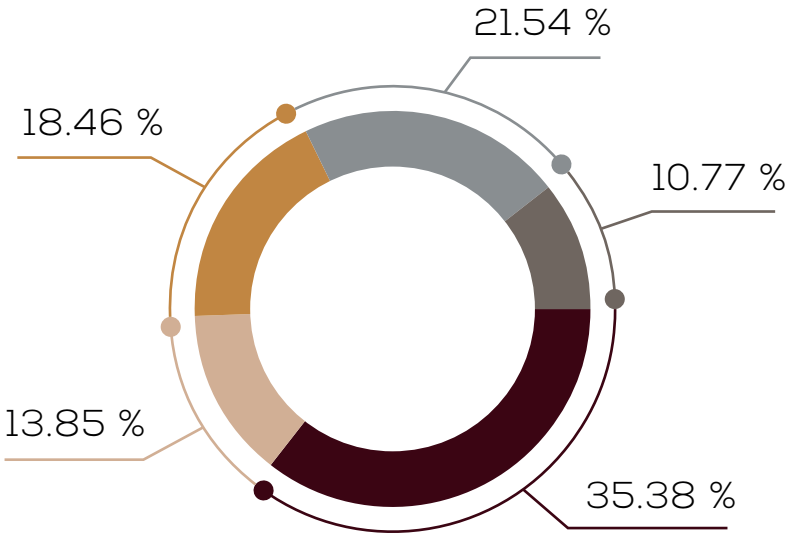
According to our survey, the most popular IOS brands are [Fig. 3]:

- iTero 11.05 %
- TRIOS (3Shape) 9.75 %
- Medit 7.8 %
- Cerec (Dentsply Sirona) 5.2 %
- Carestream 3.25 %
- Primescan (Dentsply Sirona) 2.6 %
- Planmeca 1.3 %
- Other (Dexis, Vscan) 1.3 %

Notably, only around 5 % of our survey participants use IOS for All-on-X [Fig. 4], and almost 58 % seem to prefer physical (i.e. analog) impressions to digital ones [Fig. 5].

Fig. 1
Do you have
an intraoral
scanner in your
practice?





ANSWER CHOICES

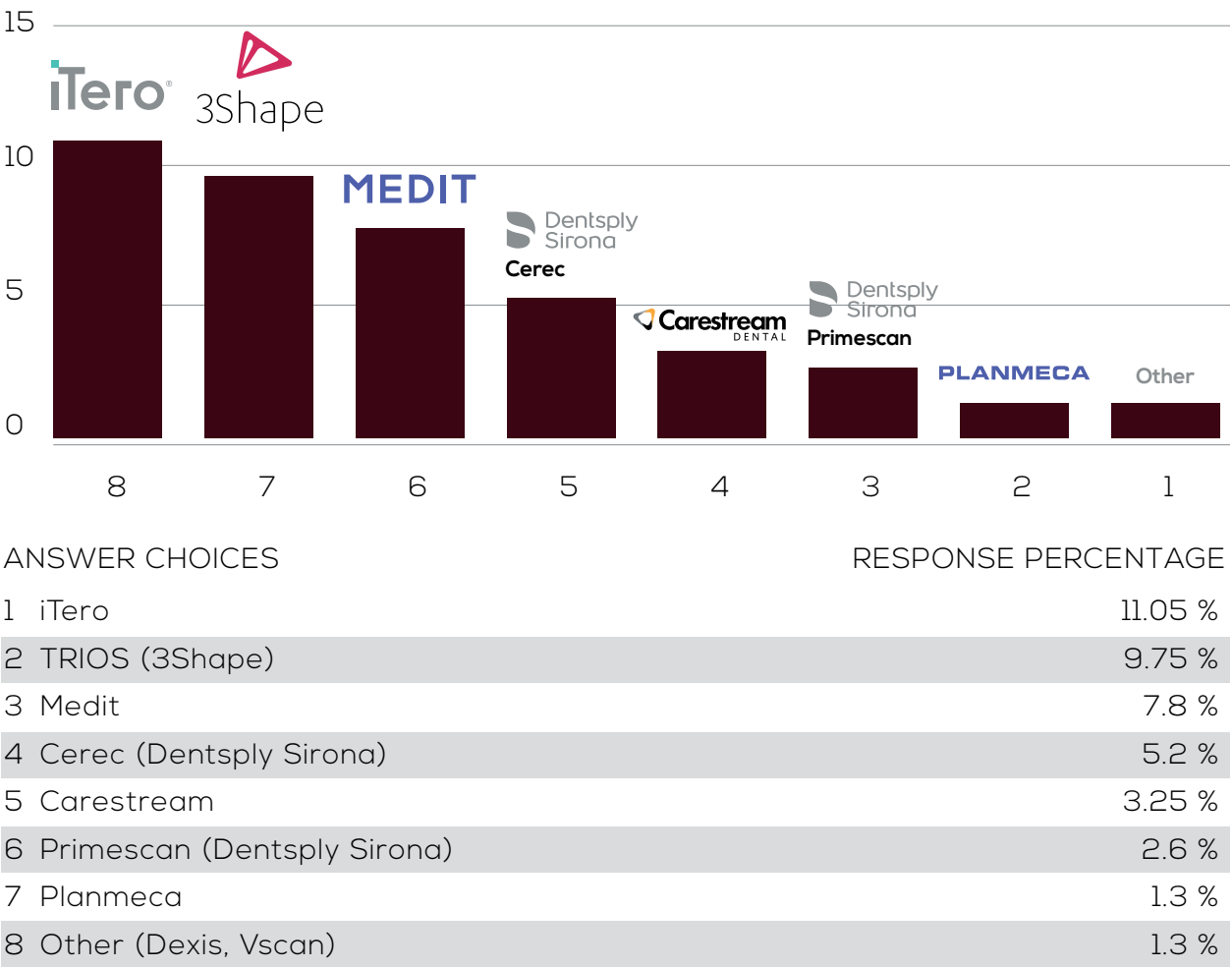
- 5 years or more
- 4 years
- 3-2 years
- 2 years
- Less than 1 year

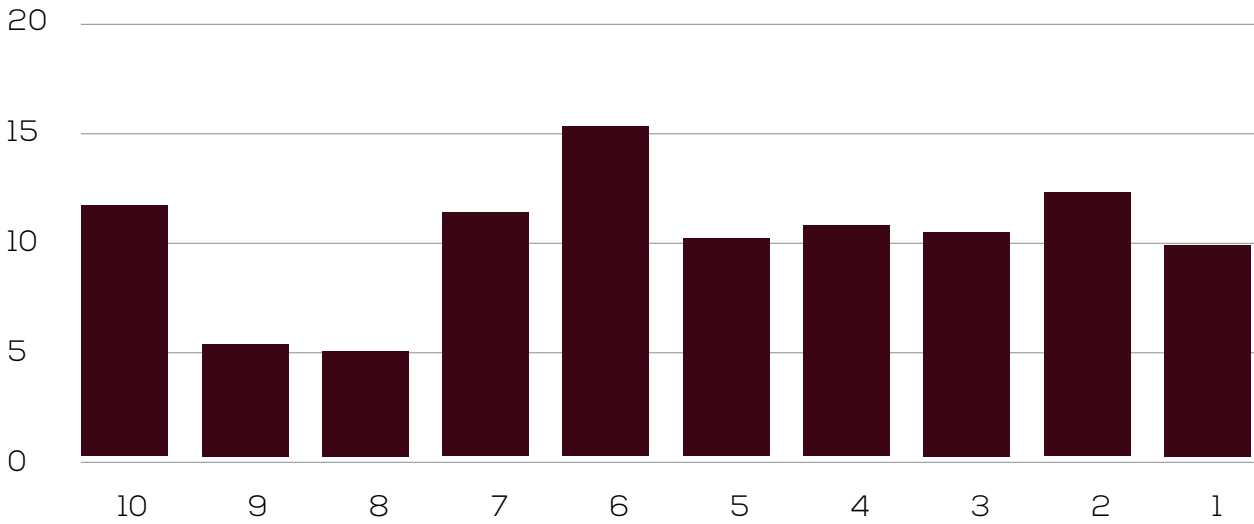
RESPONSE PERCENTAGE

- 35.38 %
- 13.85 %
- 18.46 %
- 21.54 %
- 10.77 %

Fig. 2
How long have you
had an intraoral
scanner in your
practice?

Fig. 3
According to our survey, the most popular IOS brands are:

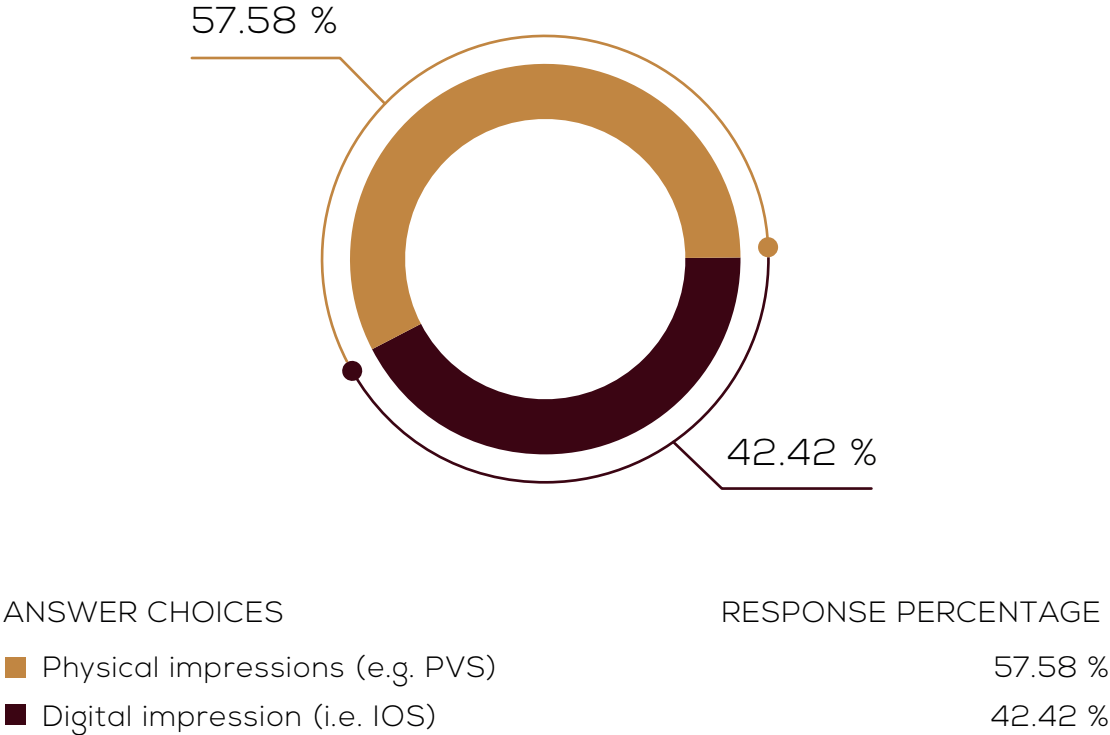




ANSWER CHOICES	RESPONSE PERCENTAGE
1 Implants	11.45 %
2 Removeable prostheses	5.12 %
3 All-on-X restorations	4.82 %
4 Clear aligners	11.14 %
5 Crown & bridge	15.06 %
6 Inlays & onlays	9.94 %
7 Nightguards	10.54 %
8 Veneers	10.24 %
9 Surgical guides	12.05 %
10 Retainers	9.64 %

Fig. 4
Which of the following procedures do you use the intraoral scanner for?

Fig. 5
Generally speaking, which do you prefer when it comes to All-on-X cases?



TREATMENT PLANNING & GUIDE DESIGN SOFTWARE

Intraoral scans, in combination with CBCT imaging, are used to digitally plan and design All-on-X prostheses, which guide the final implant placement.

A wide range of prosthetic restoration design software are available today; most of which require users to purchase a license. However, a number of free alternatives do exist. After finishing the digital wax-up, the design file, usually in STL format, is superimposed onto the CBCT scan for 3D planning. Digital wax-up files provide a significant amount of information and can be used for additional treatment steps, such as mock-ups, provisional and definitive restorations.

Examples of software systems that are capable of integrating and aligning both the DICOM and STL files include:

- **Exoplan** by **Exocad**
- **Implant Studio** by **3Shape**
- **Atomica** by **Atomica**
- **Simplant** by **Dentsply Sirona**
- **NobelClinician** by **Nobel Biocare**

A well-rounded implant planning software is supposed to be able to design tooth- or tissue-supported guides and not be limited to bone-supported guides. Other considerations for choosing an implant planning software include cost, available implant libraries, integration with IOS, additional applications besides implant planning (e.g. bone reduction), and the ability to modify implant and drill protocols.

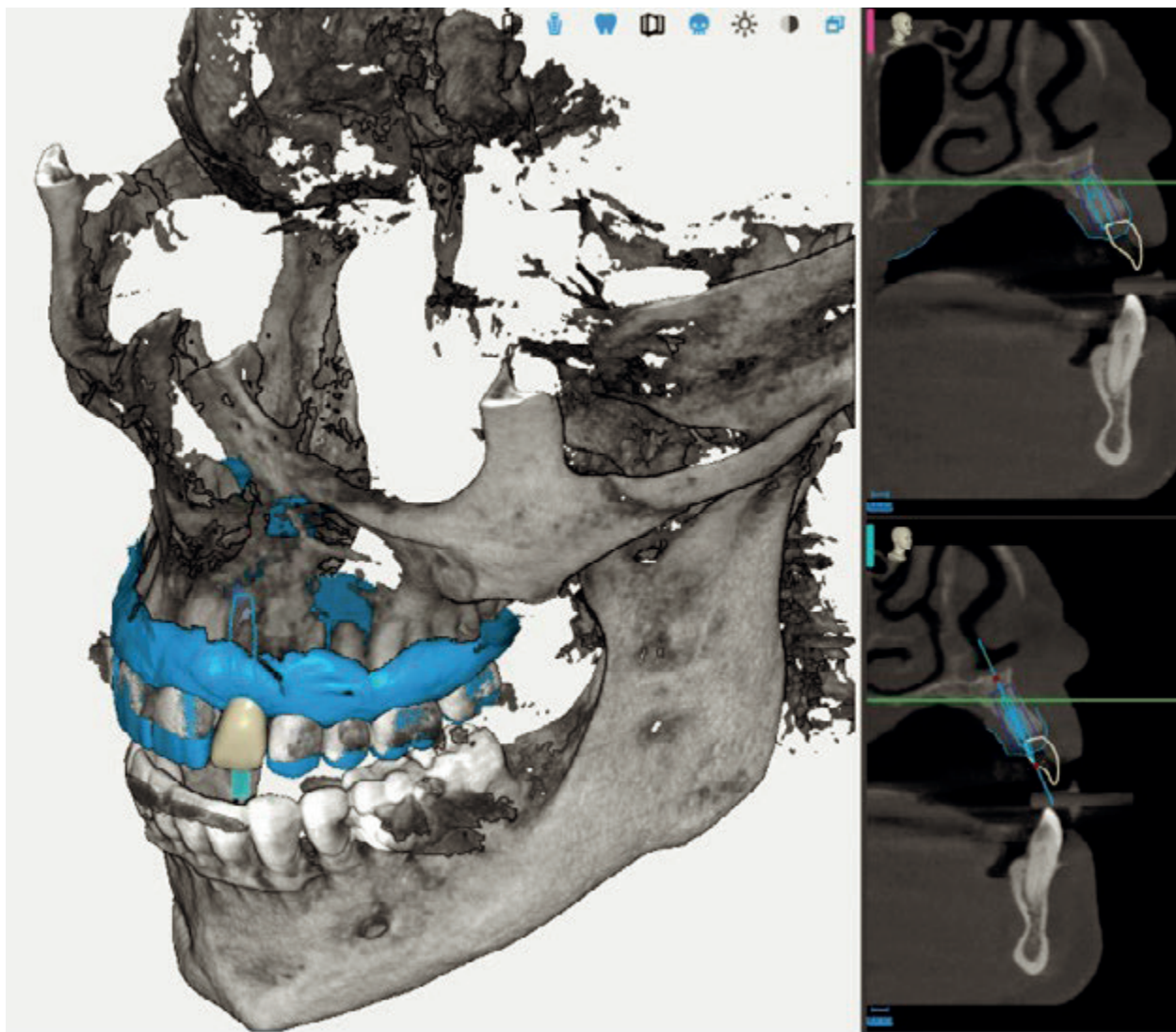
Through STL and DICOM files integration, we're able to determine the following parameters:

- Panoramic curve
- Implant selection
- Surgical guide sleeve size (length and diameter) and height (distance between sleeve and implant platform)



The guide will be fabricated for export, and the final implant positions can be imported back into the software to facilitate fabrication of provisional prostheses. The design files can be saved for making final restorations later on.

The treatment planning phase is one of the most important steps of workflow in All-on-X. To ensure successful treatment outcomes, proper diagnosis should be prioritized. A lot of clinicians haven't received extensive training on evaluation of radiographic images. Many are simply not competent in complex implant planning and interpretation of CBCT images. Additionally, human error due to overwork, carelessness or insufficient experience can occur. Using AI systems in radiographic interpretation can provide many advantages by preventing inaccurate diagnosis, incorrect planning and unnecessary waste of time.



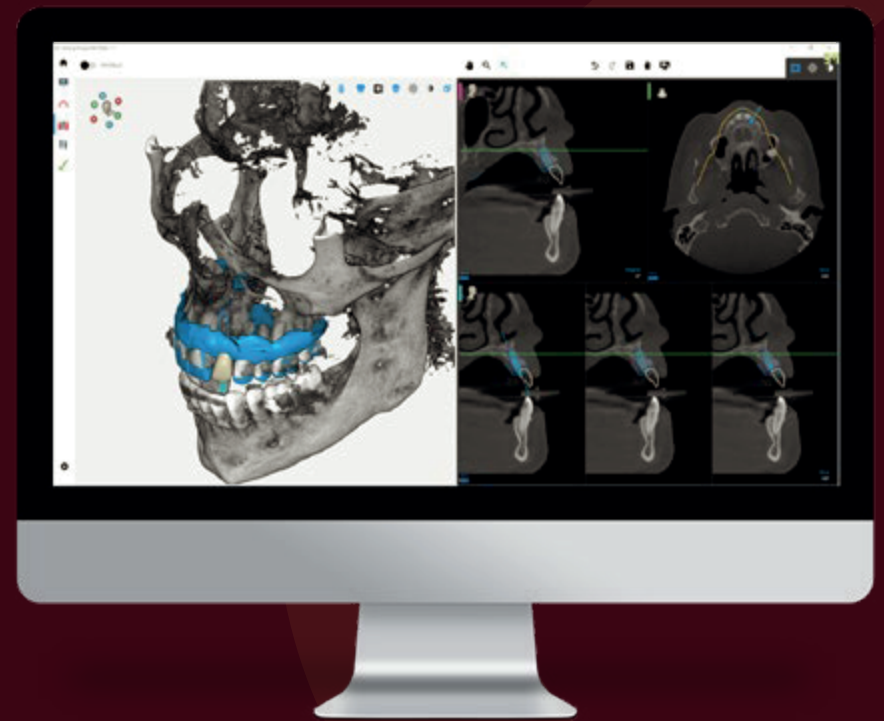
ATOMICA®

A NOTABLE EXAMPLE OF THE NEXT GENERATION OF AI DENTAL SOFTWARE.



With machine learning and deep learning capabilities, AI algorithms draw from a massive database of thousands of cases to accurately predict the surgical model in 3D, reducing human-attributed error. The software also allows instantaneous image acquisition and interpretation through integrating the majority of IOS brands.

<https://atomica.ai/>



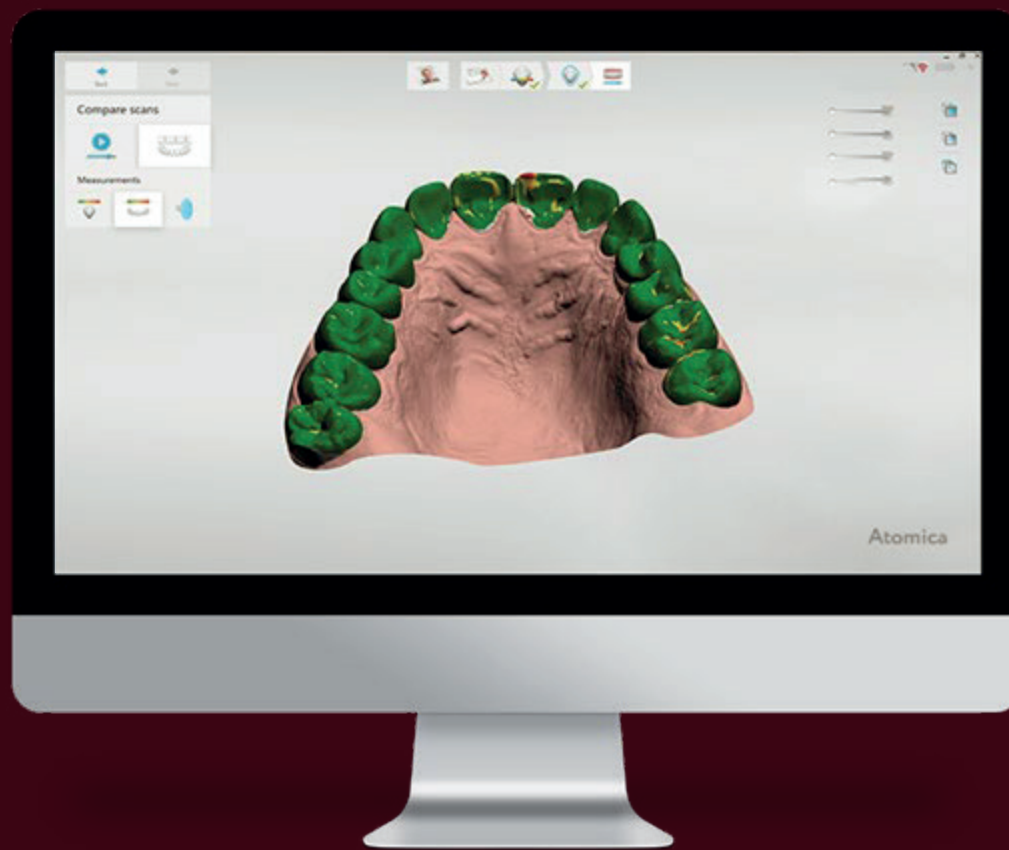
3D PRINTING

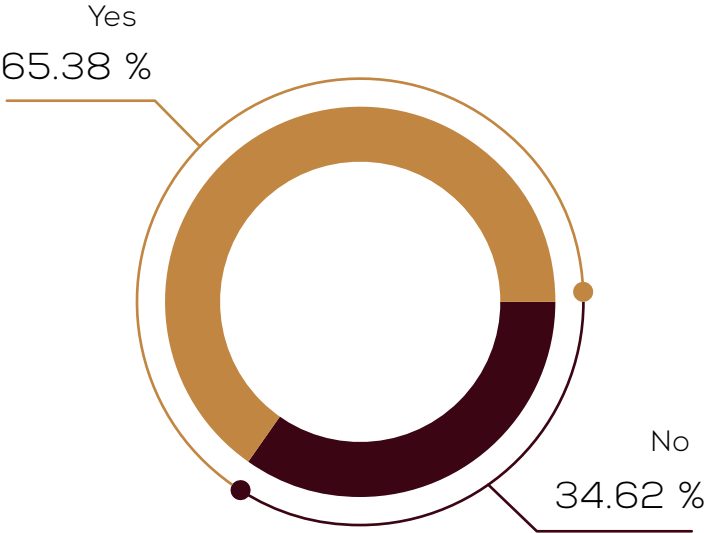
Generally speaking, two fabrication methods of CAD/CAM surgical guides are currently available:

- Additive manufacturing
(e.g. 3D printing)
- Subtractive machining
(e.g. milling)

3D printing has been gaining popularity since there are many different printers and materials which are relatively low cost. Each material has its own printing parameters, which can affect precision and mechanical properties of the printed surgical guides. We've already seen completely 3D-printed All-on-X prostheses.

Our survey showed that while a large percentage (65.38 %) of dental practitioners may have a CBCT scan machine at the office [Fig. 6], more than 75 % of them do not have an in-house 3D printer or milling machine yet [Fig. 8 & 7].





ANSWER CHOICES

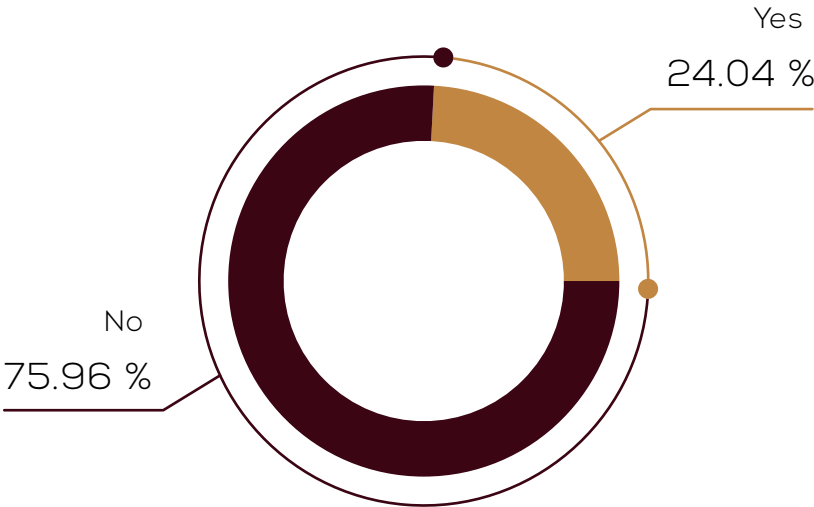
- Yes
- No

RESPONSE PERCENTAGE

- 65.38 %
- 34.62 %

Fig. 6
Do you have
a CBCT scanner
in your practice?

Fig. 7
Do you have a 3D printer in your practice?



ANSWER CHOICES

- Yes
- No

RESPONSE PERCENTAGE

24.04 %
75.96 %

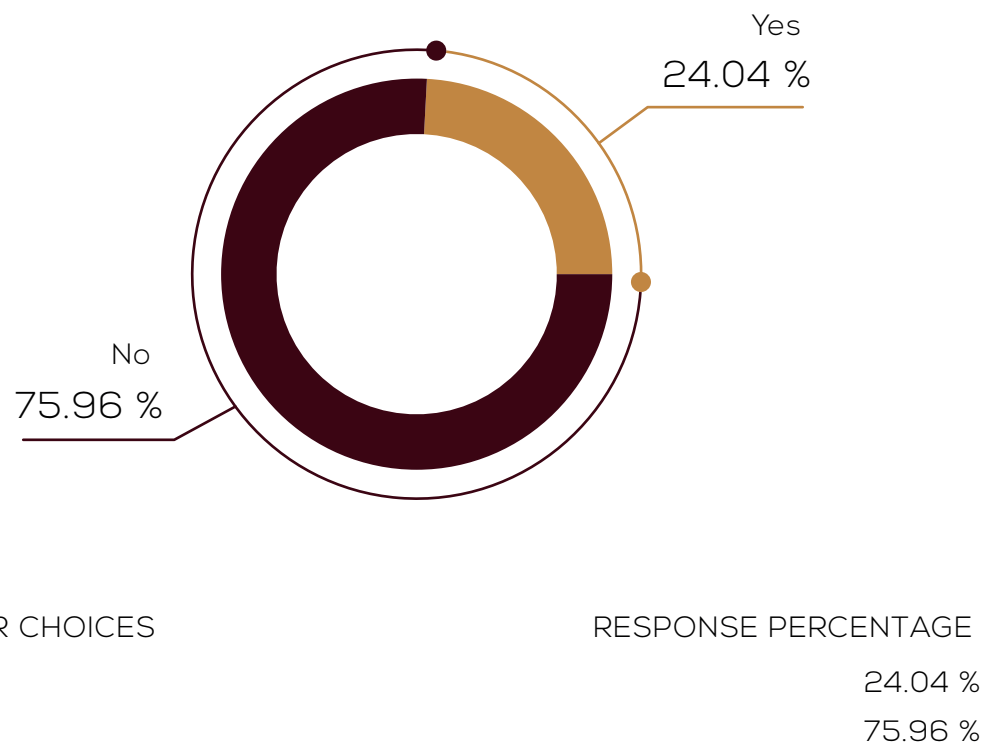


Fig. 8
Do you have
a milling machine
in your practice?

SURGICAL GUIDES

With the introduction of advanced diagnosis and treatment planning, there has been an expansion in the use of stereolithography (3D printing) and CAD/CAM surgical guides, from simple pilot drill templates to more sophisticated fully-guided designs.

Bone reduction guides can be fabricated through a combination of analog and digital methods such as:

- 3D printing a mandible and fabricating the guide directly on the model
- Completely digital workflow via 3D printing or CAD/CAM protocols.

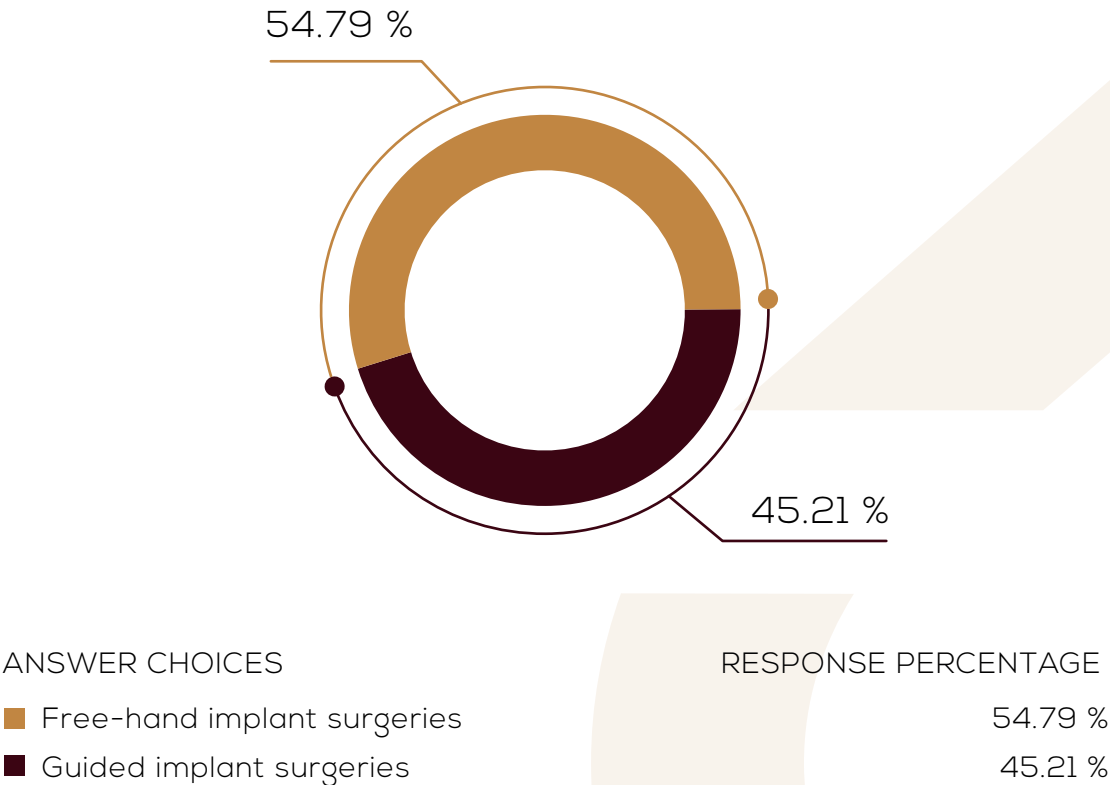
Particular systems require direct bone anchorage for three-dimensional stability which is vital to optimizing accuracy and support. Well-designed All-on-X systems allow same-day implant placement and immediate loading of a temporary prosthesis,

which significantly decreases the overall time of the procedure as well as postoperative complications.

Despite the availability of computer-guided systems, most alveoplasty procedures are still performed using a freehand approach to obtain the required restorative space and desired width of implant-recipient site. The results of our recent survey seem to reflect the same findings with 54.79 % of clinicians reporting doing more freehand surgery than guided surgery [Fig. 9].



Fig. 9
In your practice,
you tend to do
more:



ANATOMIC GUIDE® (by 3Sixty)

THE ANATOMIC GUIDE® IS A REVOLUTIONARY FULL-ARCH GUIDED SURGERY STACKABLE SYSTEM.



At its core, it's a surgical template on top of which other pieces can be stacked by being attached using metal pins through a latch system.

Titanium screws are used to fix the Anatomic Guide® to the facial bone, making it one of the most stable surgical guides for All-on- X. In our survey, clinicians outlined their reasons for choosing to use the Anatomic Guide® for full-arch cases:

- Digital treatment planning is done by fellow dentists, not dental lab technicians.
- 75 % smaller than conventional guides
- Transparent material; enhanced visibility and accessibility.
- Increased cross-arch stability; engages the undercut space.
- Relatively less invasive due to minimal facial flap design; no lingual or palatal flaps.
- Fully-guided drilling protocol with virtually no surgical deviation.
- Dramatically reduced intraoperative time; less than 90 minutes per arch.
- Faster healing time, decreased postoperative pain and swelling.

PROVISIONAL & FINAL PROSTHESES

Nowadays, clinicians and patients have high expectations for full-arch temporary prostheses thanks to the introduction of cutting-edge techniques and materials. CAD/CAM polymethyl methacrylate (PMMA) provisional restorations are now an essential part of our All-on-X arsenal due to their higher quality and superior esthetics.



Milling provisional prostheses from dense (i.e. less porous) PMMA blocks using CAD/CAM ensures substantially more robust, immediate-loading, long-term temporaries that can last for the entire healing period.

Advantages of CAD/CAM PMMA provisional restorations:

- High anatomical accuracy; state-of-the-art procedure.
- Increased resilience; resistance to breakage.
- Superior esthetics; smooth, life-like appearance.
- Unlikely to discolor or wear out.

Additionally, digital shade matching eliminates the subjectivity in color analysis, providing exact color matching for the prosthesis while decreasing chair time.

Examples of digital spectrophotometers include, VITA Easyshade, ShadeScan, and ClearMatch.

In our survey, we asked dental practitioners the following question: "For All-on-X cases, how important would each of the following factors be when considering a new dental lab?".

These were the results:

- 90 % rated "Consistency in Quality" as very important; 7 % as important
- 88 % rated "Fit of the Restorations" as very important; 6 % as important
- 84 % rated "Quality of Restorations" as very important; 11 % as important
- 34 % rated "Turnaround Time" as very important; 51 % as important

You can see more detailed results on Fig. 12 ,11 ,10, and 13.

Fig. 10: Consistency in Quality.

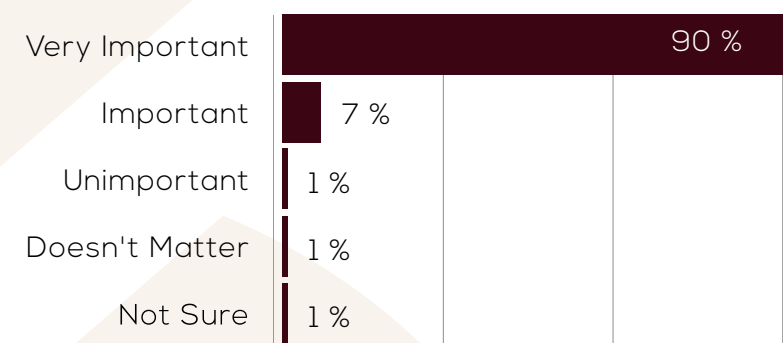


Fig. 11: Fit of Restorations.

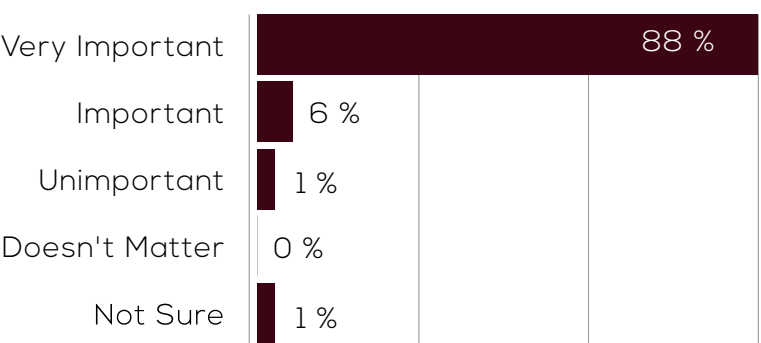


Fig. 12: Quality of Restorations.

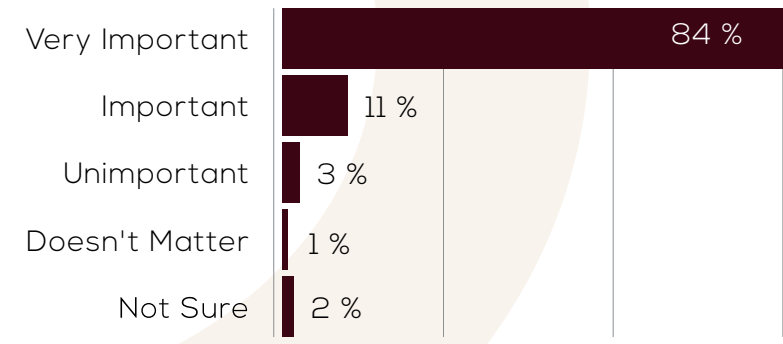
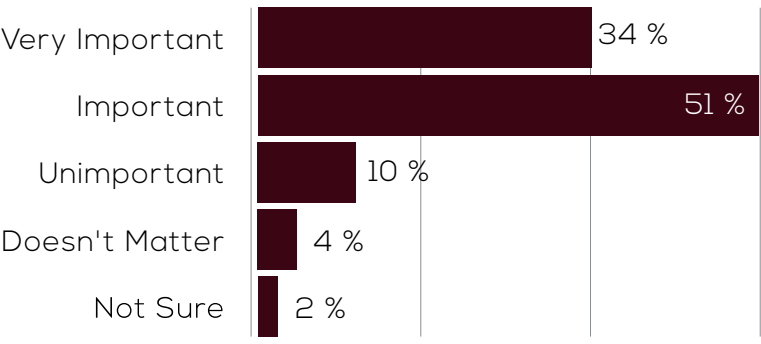


Fig. 13: Turnaround Time.



PROVISIONAL & FINAL PROSTHESES

When our correspondents were asked, “What is the SINGLE most important factor when considering a partnership with a new lab?”, the top 3 factors were [Fig. 14]:

- **“Quality of Restorations”** was rated highest at 35.58 %
- **“Consistency in Quality”** was the second highest at 25.96 %
- **“Fit of Restorations”** was the third most important factor at 15.38 %

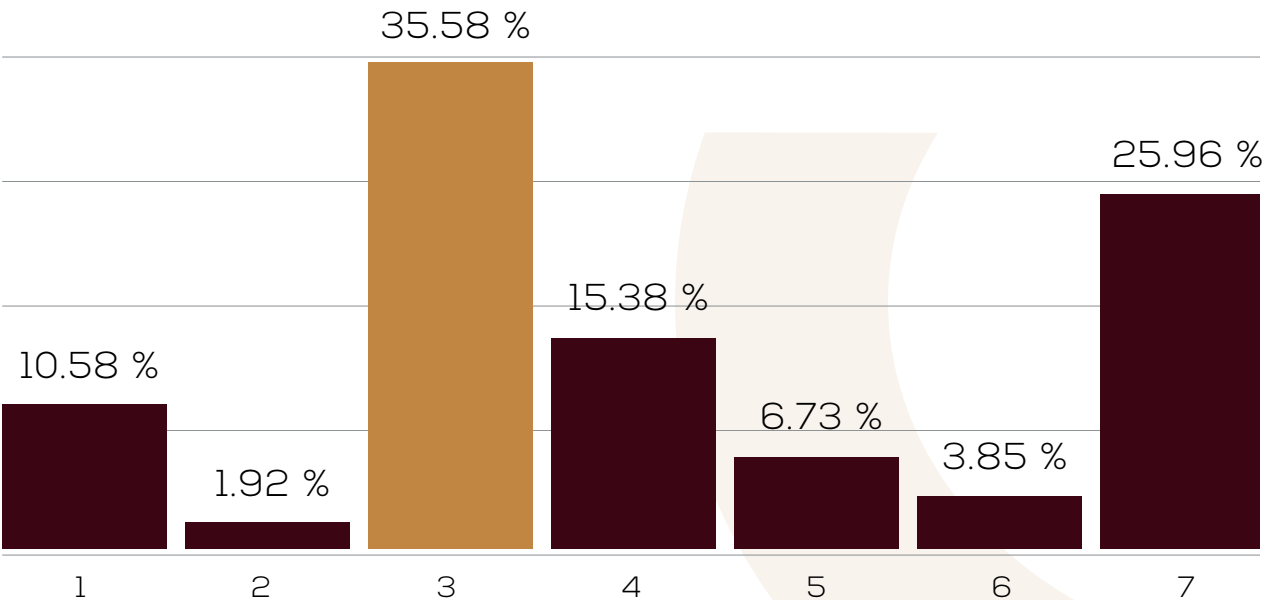
Patients who want “fixed teeth” tend to be more willing to undergo complex, multi-phase treatment procedures, like All-on-X. That said, “immediate” solutions have become popular because most people prefer quicker treatments. Immediate placement and loading protocols are growing twice as

fast as conventional delayed implant procedures. Shorter overall treatment times and less invasive methods are more preferable to the majority of edentulous patients. New protocols lower postoperative complications, pain and swelling, as well as a faster final prosthesis.

Fig. 14

ANSWER CHOICES

- 1 Support/customer support
- 2 Turnaround time
- 3 Quality of restorations
- 4 Fit of the restorations
- 5 Cost of restorations
- 6 Accepts digital impressions
- 7 Consistency in quality



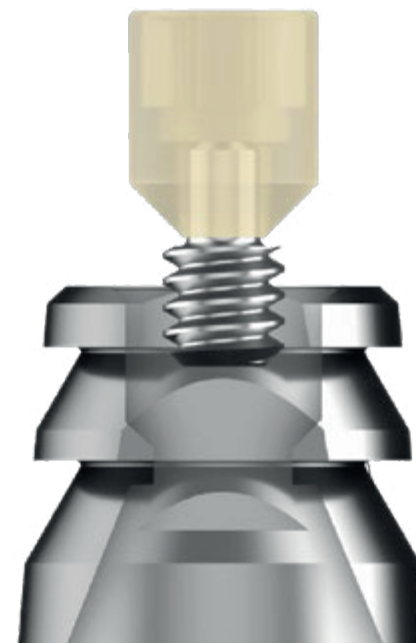
SMART DENTURE CONVERSION (SDC)

This new system by Dr. Brandon Kofford is used to convert a removable appliance to a high-quality implant prosthesis. At the heart of this new technology is a simplified separable fastener which eliminates the need for large holes. In All-on-X, the Ti cylinders aren't always parallel since implants placed in the premolar area need to be tilted posteriorly in order to obtain adequate A/P spread.

This often requires enlarging the holes on the temporary prosthesis which compromises the strength of the restoration and leads to wasted chairtime.

The main advantages of SDC are:

- Increased strength and resistance to fracture thanks to smaller holes.
- Stronger bond: acrylic resin can be used as pick-up material instead of composite without having to worry about it setting too fast.
- Faster conversion time; no need for a lab technician or master model.
- Increased accuracy of bite registration.
- Compatible with most implant brands.



SMILELOC (BY RODO)



The innovative RODO Abutment System, including Smileloc and Smilekey, is basically a heat induction system that fixes and releases PMMA temporary restoration to multi-unit abutments (MUAs). As opposed to screwed-in temporary prostheses, this system provides stronger and faster fixation, with minimal to no bite adjustments.

The main advantages are:

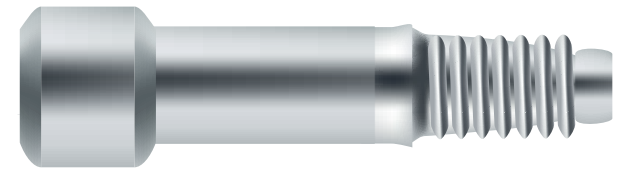
- Ease of use; a first-time user can learn the procedure on models in a matter of minutes. Dental hygienists can perform routine maintenance easily.
- Just one tool is needed; no teflon tape, composites, bonding agent, etc.
- There is neither cement clean-up nor filling up the screw access holes.
- PMMA snaps in place smoothly and doesn't need many adjustments.
- Most of the work of adjusting the PMMA is done extraorally; less discomfort for the patient.
- Relatively faster surgery due to the efficiency of the system.
- PMMA can be used for longer periods of time.

TI-BASELESS SYSTEMS

One of the most vulnerable parts of All-on-X prostheses is the connection between the screw and the MUA. During milling or 3D printing, this small area is prone to chipping or breakage. Dr. Jonathan Abenaim's **Powerball Screw** is a screw designed to eliminate the need for Ti-base with this vulnerability in mind. The screw is rounded, providing gentle force distribution to the body of the screw rather than the threads; where the screw is weakest. It has the ability to be used in Zirconia and PMMA with no Ti-base. Its angle can be corrected up to 20°. The biaxial screw head is robust and cannot be stripped.

Similarly, the **Rosen Screw** designed by Paul S. Rosen, DMD, MS, allows for direct connection to the MUA with no need for Ti-base. It offers the following advantages:

- Hand torque only.
- Never loosens.
- Works on all materials.
- Screw channel doesn't break.



ROBOTIC-ASSISTED GUIDED SURGERY

ROBOT-GUIDED SURGERY IS REVOLUTIONIZING THE FIELD OF IMPLANTOLOGY.



The **Yomi Robot** is the first implant surgery robotic guidance system to be cleared to assist in full-arch implant treatment. Oral surgeons who tried the Yomi All-on-X protocol report reduced procedure time, improved surgical efficiency and accuracy. Other advantages include:

- Efficiency; full-arch surgery can be done in 90 minutes; dual arch in 2.5 hours.
- Flapless approach; minimally invasive surgery that leads to faster recovery.
- No need for surgical guides.
- Unobstructed visibility and access to the surgical site.
- Fully digital workflow.

MARKET TRENDS & PROJECTED GROWTH

ALL-ON-X PROSTHESES HAVE BEEN REPORTED TO BE THE FASTEST-GROWING OVERDENTURE MARKET SEGMENT SINCE 2017.

The segment of the population aged 65 or older has the highest prevalence of complete edentulism. More than 36 million Americans are missing all of their teeth. Among senior citizens, about 23 million are completely edentulous and 12 million are edentulous in one arch. These numbers are expected to double in less than 10 years. The partially edentulous population is predicted to increase to 200 million people.

Not to mention that among existing dentures, 75 % are due for replacement, according to their 7-year life cycle.

With rapid medical advancements, life expectancy for 60+ year-olds can only go up, and with it their expectations of a higher quality of life as well as a more active lifestyle than previous generations. This also happens to be the most affluent population in the country, which means that more and more patients are able to afford better restorations. Conventional overdentures will not be satisfactory for individuals looking for more esthetic and functional restorative options. For all these reasons, All-on-X prostheses have been reported to be the fastest-growing overdenture market segment since 2017.

Our survey showed that more than 2/3 of clinicians have been seeing more All-on-X patients over the past 5 years [Fig. 15].

This is significant because almost 60 % of them reported that their patients are specifically asking for this treatment [Fig. 16]. Since more and more people are eligible and can afford All-on-X prostheses, an increasing number of doctors are also case-selecting for this particular procedure (e.g. 27 % of our survey correspondents) [Fig. 16].

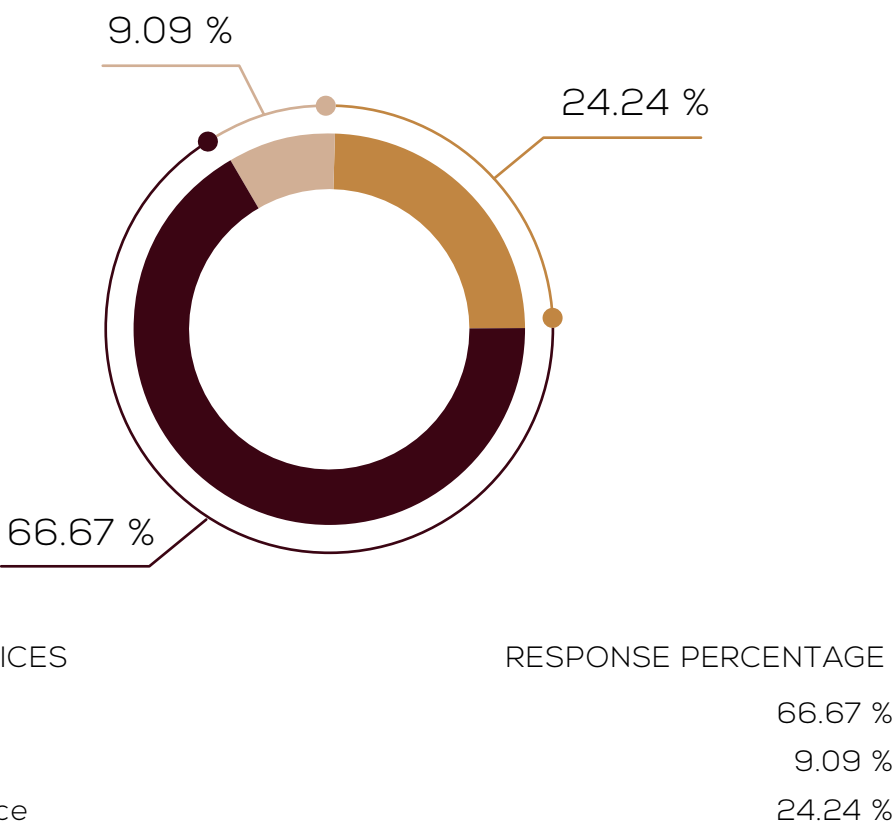
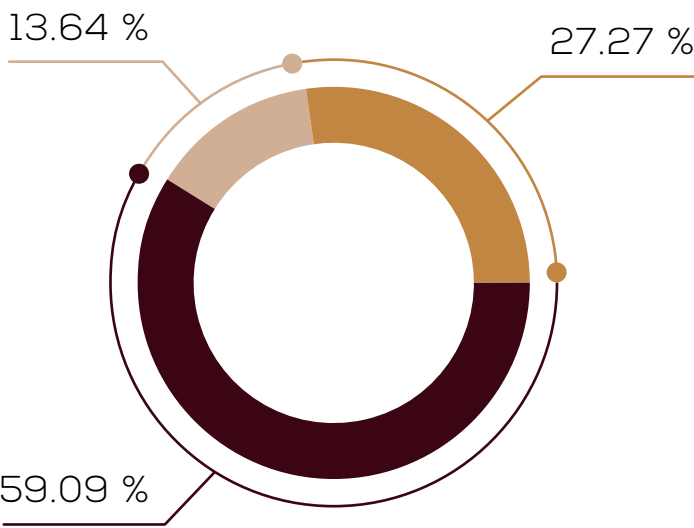


Fig. 15
Thinking back to the past 5 years, are you currently seeing more or less All-on-X patients?

Fig. 16
The reason you're
seeing more
All-on-X patients is:



ANSWER CHOICES	RESPONSE PERCENTAGE
■ More patients are asking for this treatment modality	59.09 %
■ I case-select for this particular treatment modality	27.27 %
■ Other	13.64 %

At first glance, we may assume that because life expectancy is getting higher, it's mostly senior citizens (i.e. above 60 years old) who are getting implant-supported hybrid dentures. Surprisingly, according to our findings, dentists report that around 82 % of their All-on-X patients are aged 60 or younger [Fig 17].

All signs point to an even bigger surge in this population, which means we're going to see more eligible All-on-X cases from various age groups.

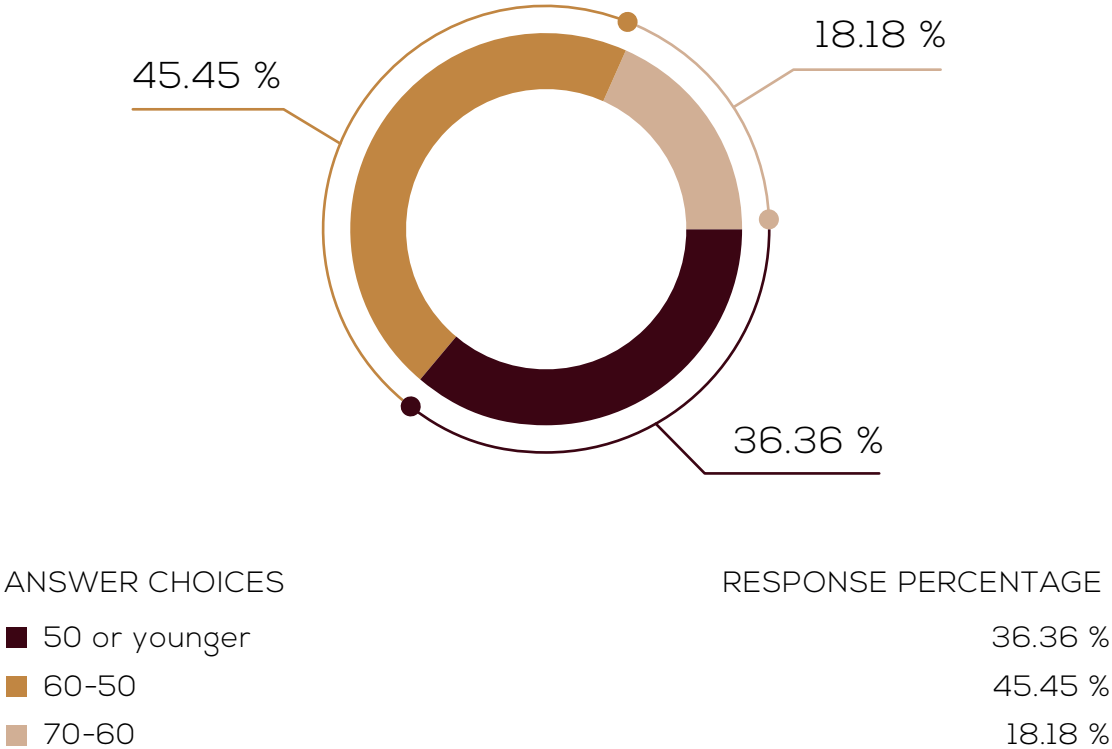


Fig. 17
Which age group do most of your All-on-X patients belong to?

IN 2020, THE US DENTAL IMPLANTS MARKET SIZE WAS VALUED AT OVER \$900 MILLION.

The market is expected to exceed \$1.5 billion by 2027. According to our market research, approximately over 3 million dental implants are placed each year in the United States.

On average, a dentist places 55-60 implants per year. About one third of all

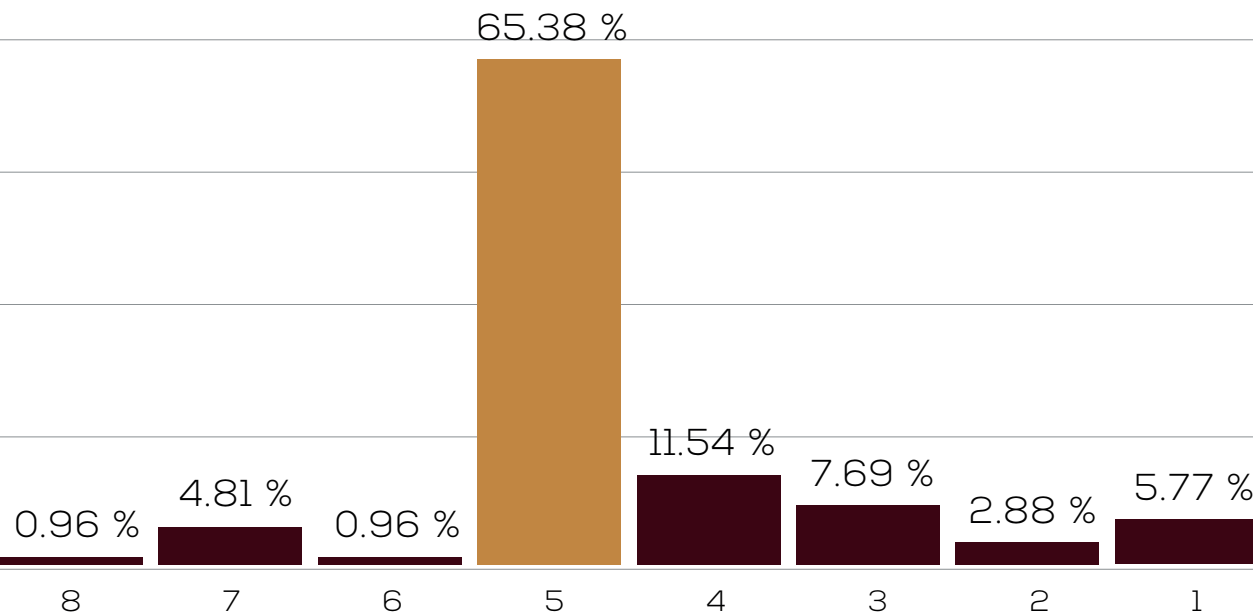
dental implants are placed by general dentists, however, it's projected that the percentage of general practitioners who place implants will grow steadily over the forecast period of 2022-2027.

This is reflected in our recent survey, where 65 % of the correspondents

are general dentists who place implants and are involved in full-arch rehabilitation surgery [Fig. 20 & 19 ,18]. 82.10 % of them also report that they have been seeing more patients coming for implant treatment over the past 5 years [Fig. 21].

Fig. 18 Which of the following best describes your speciality?

- ANSWER CHOICES
- 1 Prosthodontist
 - 2 Periodontist
 - 3 Endodontist
 - 4 General dentist
 - 5 Oral & maxillofacial surgeon
 - 6 Cosmetic/restorative dentist
 - 7 Orthodontist
 - 8 Other



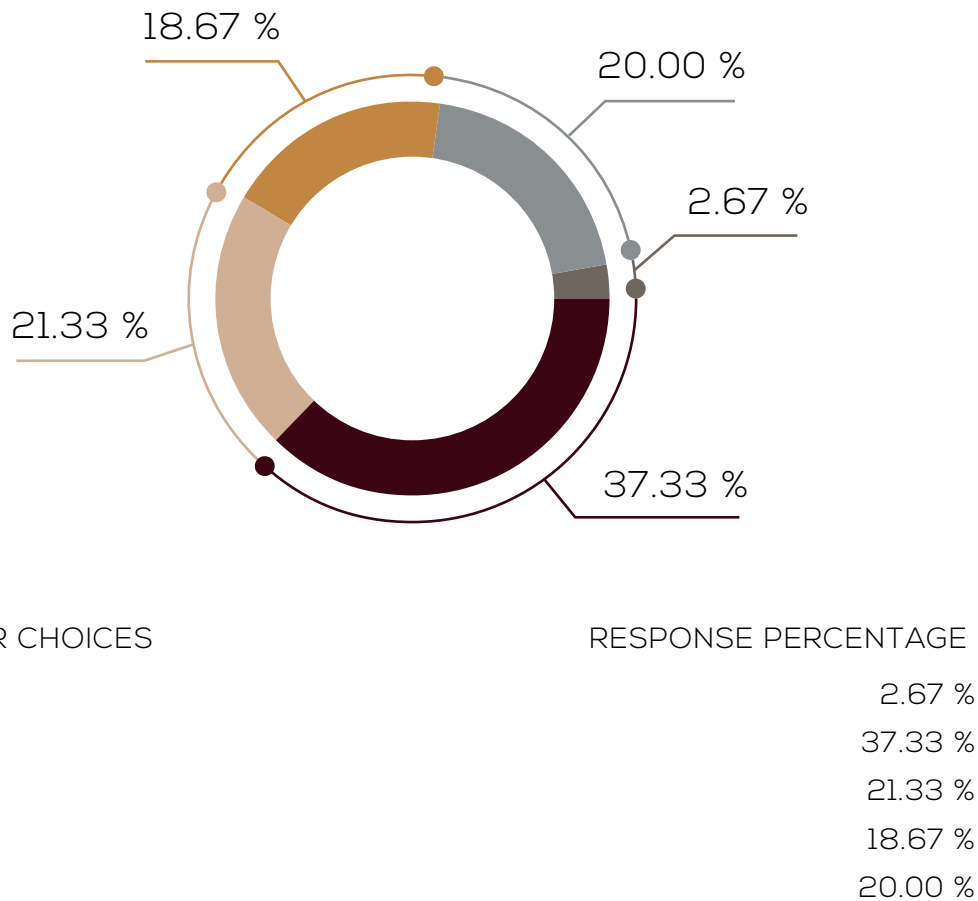
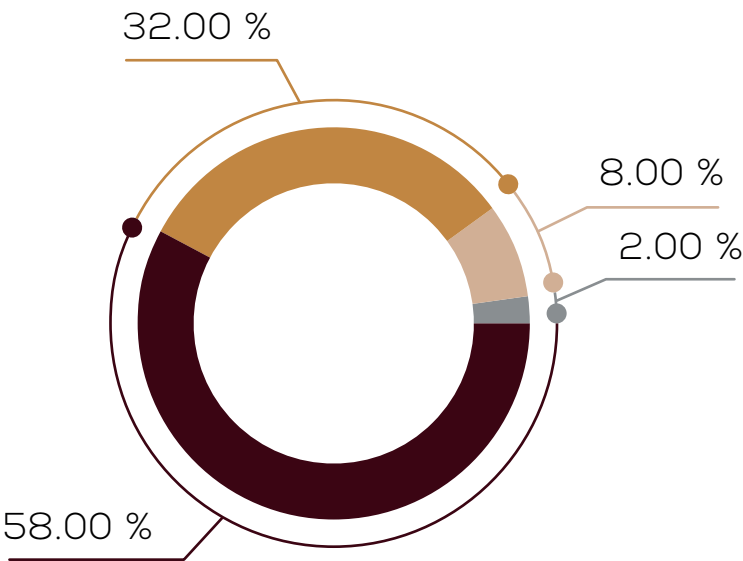


Fig. 19
On average, how many implant cases do you treat per month?

Fig. 20
On average, how many All-on-X (i.e. full-arch rehab) cases do you treat per month?



ANSWER CHOICES

- None
- 4-1
- 8-4
- 12-8

RESPONSE PERCENTAGE

- 32.00 %
- 58.00 %
- 8.00 %
- 2.00 %

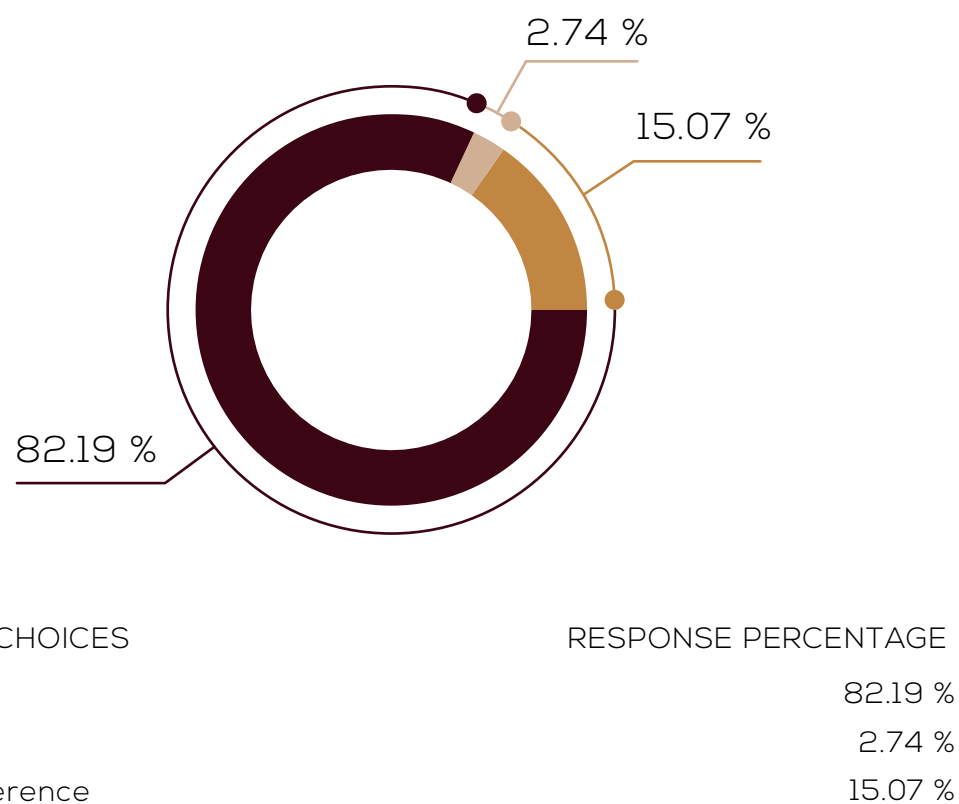
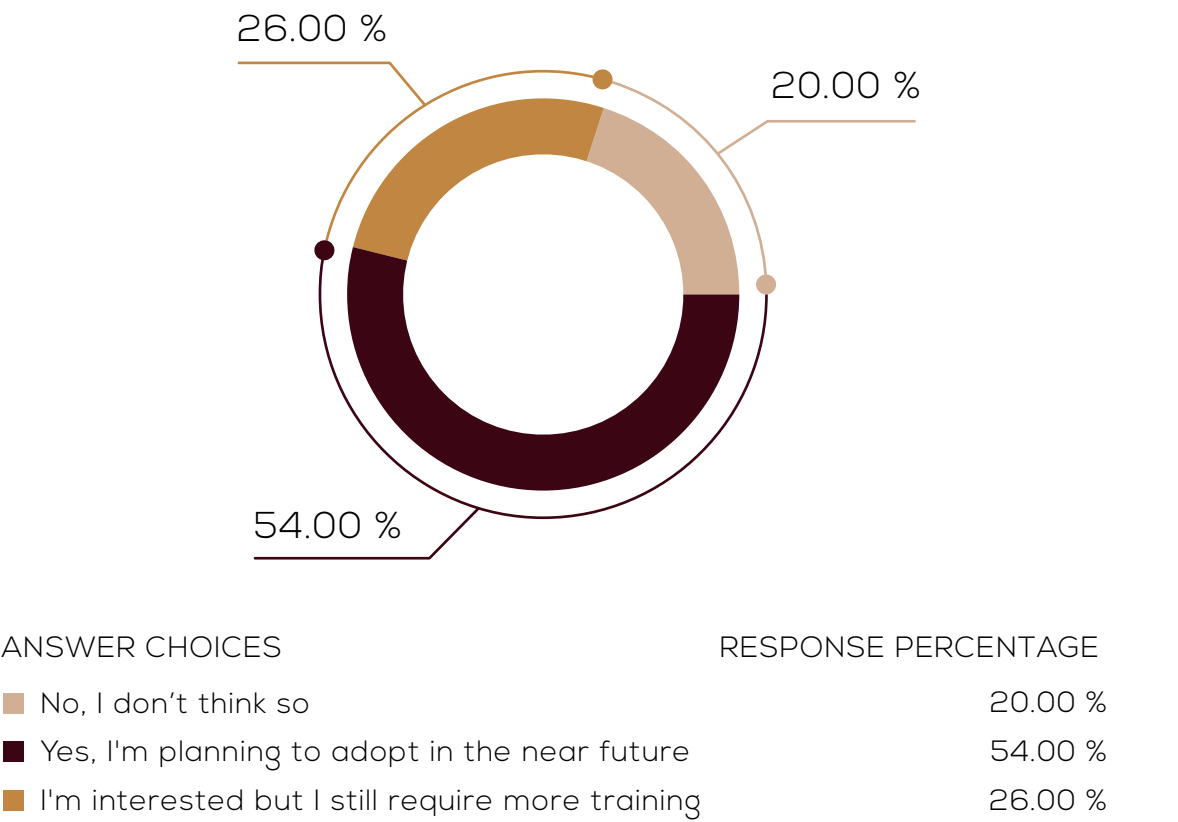


Fig. 21
Thinking back to the past 5 years, are you currently seeing more or less patients coming in for implant treatment?

Fig. 22
Are you
planning to adopt
All-on-X treatment
modality?

Of those who currently don't use the All-on-X modality, more than half (54 %) are planning to adopt it in the near future, and 26 % are interested but require more training [Fig. 22].

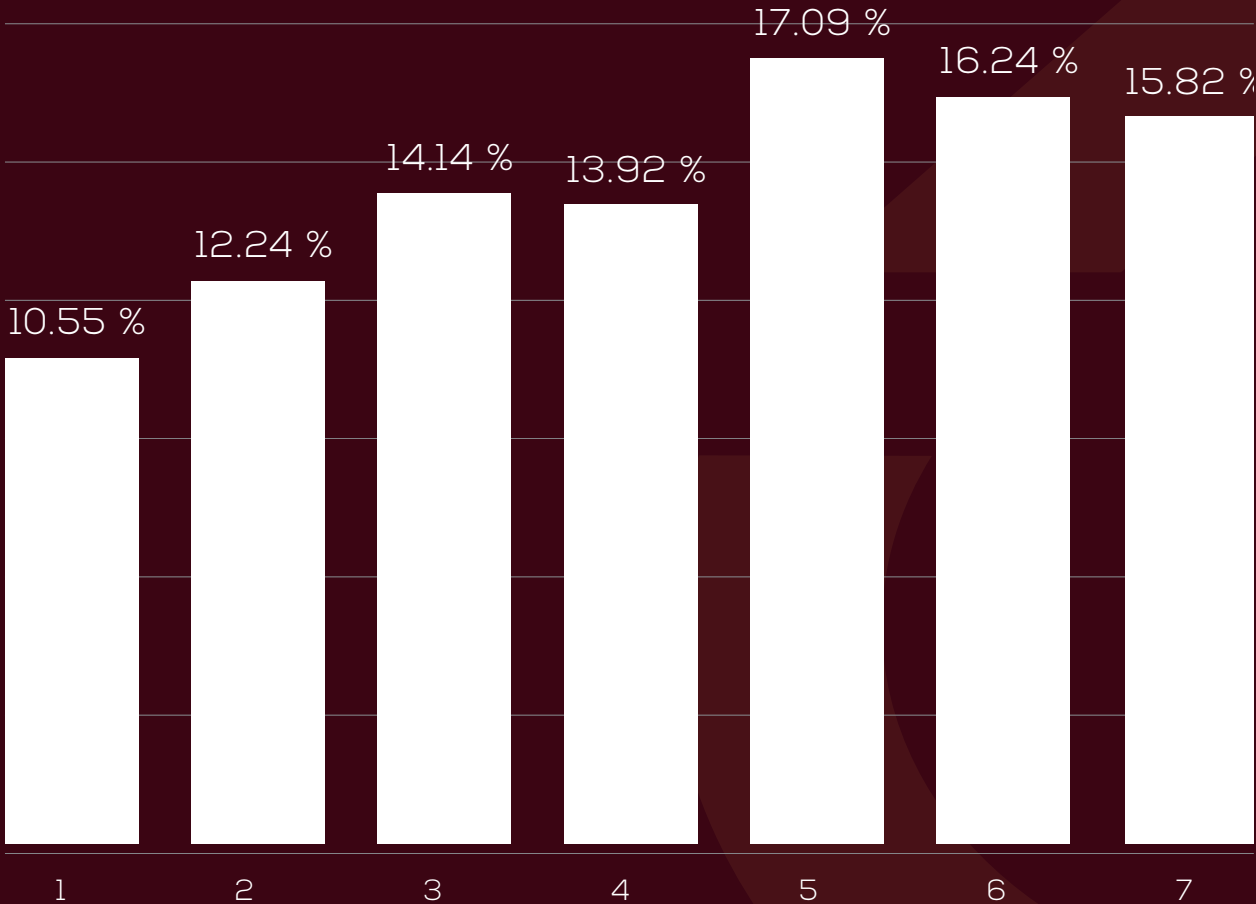


After analyzing the survey results, we managed to identify the following top avenues for growth: “Crown & bridge” seems to be the most commonly provided treatment option, closely followed by “Removable prostheses” and “Implant surgery” [Fig. 23]

Fig. 23 What treatment options do you provide?

ANSWER CHOICES

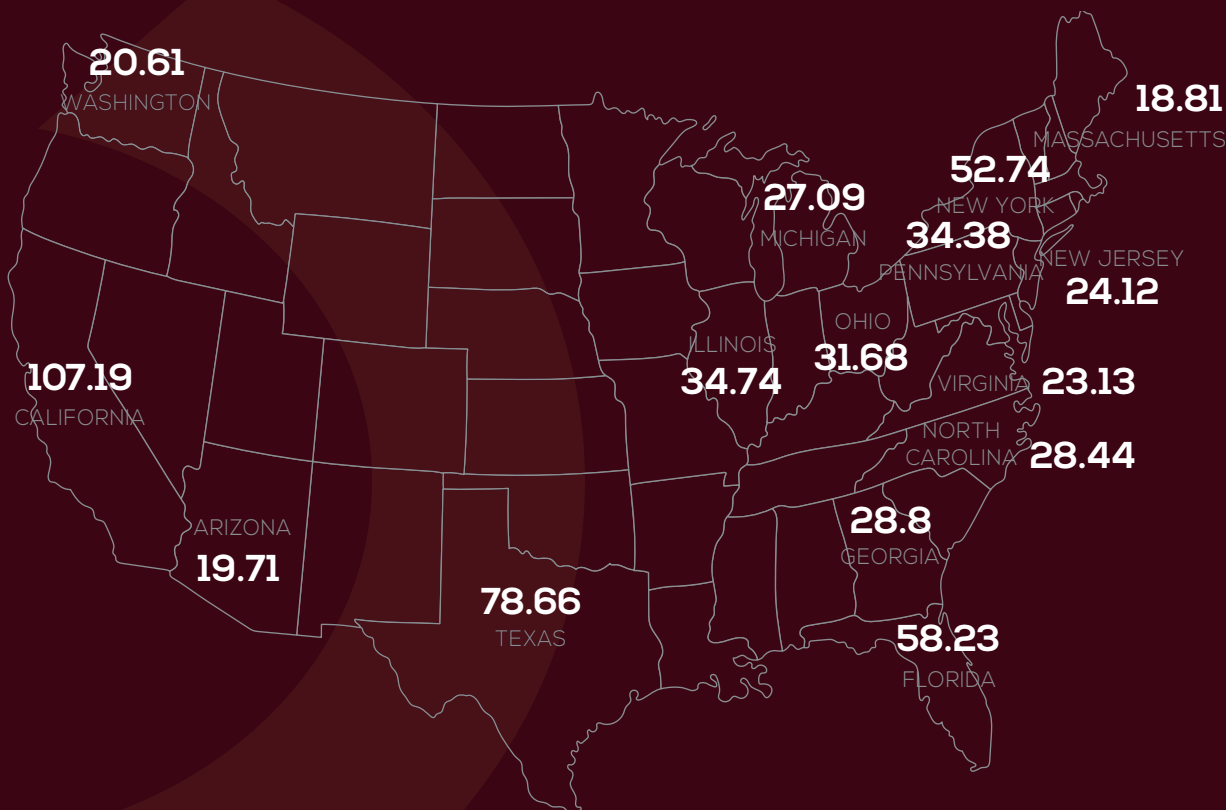
- 1 All-on-X dentures
- 2 Clear aligners
- 3 Veneers
- 4 Root canal
- 5 Crown & bridge
- 6 Removable prosthesis
- 7 Implant surgery



STATE-BY-STATE MARKET ANALYSIS

California is the most populous state in the US accounting for 11.91% of the total population. Texas is second biggest with 8.74% followed by Florida with 6.47% of the population. New York, Illinois, and Pennsylvania constitute 5.38%, 5.86%, and 3.82% of the total population respectively.

US Dental Implant Market Value in 2020 (Million USD)



State	Dental Implant Market Value (Million USD)
1. California	107.19
2. Texas	78.66
3. Florida	58.23
4. New York	52.74
5. Illinois	34.74
6. Pennsylvania	34.38
7. Ohio	31.68
8. Georgia	28.80
9. North Carolina	28.44
10. Michigan	27.09
11. New Jersey	24.12
12. Virginia	23.13
13. Washington	20.61
14. Arizona	19.71
15. Massachusetts	18.81

CONCLUSION

In 2020, the dental market in the US hit \$15.57 billion. The growth is expected to reach \$30.59 billion by 2027, that's a compound annual growth rate of 10.13 % in just 7 years.

The dental industry has proven itself to be virtually recession-proof and even pandemic-proof. This projected growth is due to increased demand which in turn is caused by the following factors:

- Aging population
- Poor oral hygiene
- Smoking habits
- Diabetes
- Preventive and prosthetic dentistry
- Oral and cosmetic surgery
- Advanced dental technology
- Advanced dental procedures

Nowadays, more than ever, patients know what they want. Information is readily available and patients are aware that implants are a safe long-term solution for single tooth replacement as well as full-arch restoration.

On average, US dentists provide one All-on-X treatment per week. All-on-X has been the fastest-growing overdenture treatment option since 2017.

That said, various treatment options are required to be tailored to every patient's unique needs, including their budget.

Immediate placement and loading protocols are growing twice as fast as classic delayed implant procedures. Patients prefer shorter overall treatment times and less invasive treatments. New protocols offer lower postoperative complications, and a quicker path to the final restoration, while cutting down on chair time. When it comes to All-on-X, clinicians who take these trends into consideration stand to gain a significantly higher inflow of new patients.

Since most patients are keen on moving directly from failing dentition to a new fixed implant-supported restoration, dental practices actively compete in offering low-cost All-on-X surgeries. Digital workflows enable the standardization of cases and the use of a wider variety of prosthetic materials.

Digital dentistry is a majorly significant megatrend that enables more dentists to provide more dental implant services by flattening the learning curve.

Booming guided surgery solutions and intraoral scanners within practices facilitate processes and ensure confidence, reliability and precision even for the less trained practitioners. In the very near future, the precise and predictable fully digital workflow

BEING A COMPETENT PRACTITIONER THESE DAYS INVOLVES NOT ONLY A HIGH LEVEL OF CLINICAL SKILL BUT ALSO THE ABILITY TO KEEP UP WITH THE LATEST TECHNOLOGIES AND DIGITAL TRENDS.

will become a standard of care for edentulous patients.

With a steady rise in the number of general practitioners placing implants, the use of guided surgery is experiencing double-digit growth. Practitioners who are willing to embrace integrated treatment planning workflows benefit from higher predictability, more efficient surgical procedures, and maximization of treatment outcomes through a fully digital collaborative approach.

We're now able to break new grounds when it comes to esthetics with the advent of new materials.

Novel PMMA materials provide more natural appearance in All-on-X temporary restorations, which makes it possible for the patients to wear them for longer periods of time if required.

Final 3D-printed All-on-X zirconia prostheses are able to compete with conventional restorations in both form and function. 3D printing technology decreases chair time and costs as it's becoming increasingly popular and affordable

The field of full-arch rehabilitation is undergoing massive and rapid progress. Dental practitioners have to contend with new informed patient

behavior, scientific findings, and evolving technological solutions.

While the overarching megatrend of digitalization is revolutionizing all aspects and steps in the dental treatment workflow, the focus now should be on opening up new venues for further development of clinical skills, increasing efficacy and realizing the full potential of the entire dental team.

Notes

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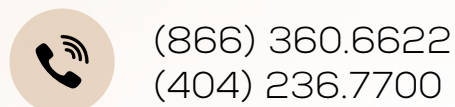
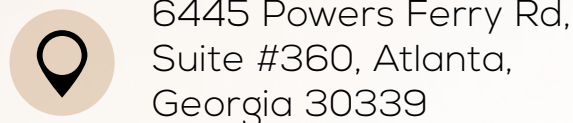
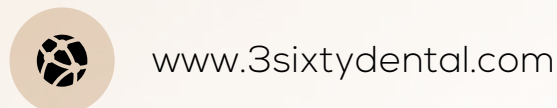
DENTAL TECHNOLOGY: WHAT'S TRENDING IN 2024?



Where we are and where we're going:

- The Current State of All-on-X
- Digital Dentistry Trends
- Recent Innovations in Guided Surgery
- Projected Market Growth

If you have any questions please contact us:



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