Introducing a treatment coordinator: The Bridge to case acceptance

By Lina Craven, UK

You might think that in financially challenging times the last thing you need is a new member of staff. For a practice to thrive and prosper in a difficult financial climate, however, it has to become more efficient, more competitive and more profitable. One way to do that is to introduce a treatment coordinator (TC) into the team or if you already have one then to offer appropriate training. This is a relatively new role to the European market, but in the US, where the role is a central part of many practices, it has proven to dramatically add value to the patient experience, reduce in chair time and increase case acceptance.

The introduction of a well-trained TC will change your entire approach to new patient care, as well as increase profitability. While many practices know how to attract patients, their case acceptance ratio is low. The first contact, first visit and follow-up are the most important elements of the new patient process, yet they frequently represent a wasted opportunity because of a lack of skill, focus, time or all three. In my experience, a major downfall of practitioners is the unwillingness of practitioners to delegate the new patient process to staff, or what we call the TC role. This is often due to a wide range of factors, including the practitioner’s perception that the patient wants communication on his or her treatment to come from the practitioner, the perception that patients pay to see the practitioner with the new patient prior to consultation. This increases case acceptance ratios and, resultantly, increases practice profits.

Consider the time spent by the practitioner with the new patient and calculate how much of that time is non-diagnostic. A TC can often reduce up to 60 per cent of practitioner-patient time. Rather than this being a barrier to patients—which is indeed what many practitioners perceive to be the case—in my experience, patients actually feel much more at ease with the TC and therefore better informed. Doctor time is not always doctor time. As a typical example: if a new patient appointment is 30 minutes, but the clinical part is actually only 15 minutes, there is potentially 15 minutes still available. Think about the impact an additional 15 minutes for every new patient in the appointment diary could have.

A good TC will manage all aspects of the patient journey, from referral to case start, and potentially increase your case starts. He or she is the first point of contact. People buy from people, so the development of a relationship and establishing of rapport between the TC and the new patient are crucial to the success of your conversion from referral to start of treatment. The TC informally chats to the new patient prior to consultation. This helps not only to foster rapport but helps the team to accept the change and gives the practitioner the opportunity to assess any training needs of the TC and to access how remuneration will be affected.

A TC’s tailored and personal approach to care, follow-up and communication with patients fosters trust and increases patient satisfaction and retention.

Filling the role:
An internal solution?

There are no hard and fast rules. It depends upon the size and aspirations of your practice and the qualities of existing members of your team. If you have a team member who fulfills the characteristics of a TC and he or she wants the challenge, then the answer is yes. Keep in mind that you may well need to fill that person’s current position.

Some practices streamline job descriptions allowing them to create the new role without having to hire another staff member. Whether it is a full-time role or not depends upon various factors, including the size of the practice, the number of practitioners, chairs and patients; and the profit aspirations. Many practices implement the role and monitor its progress and impact. This often helps the team to accept the change and gives the practitioner the opportunity to assess any training needs of the TC and to access how remuneration will be affected.

The role of your TC should fit in with your practice’s culture and aspirations for patient care. However, you choose to implement the role, the only guarantee is that you will benefit enormously. Augmenting your team with a well-trained TC can reap tremendous rewards for you, the team and your patients. A TC tailored and personal approach to care, follow-up and communication with patients fosters trust and increases patient satisfaction and retention.
BDA calls for radical action to lower Britain’s sugar intake

By DTI

LONDON, UK: Lately, there have been increasing efforts to curb Britain’s high sugar consumption. Although the British Dental Association (BDA) has welcomed Tesco’s recent announcement that it is banning high-sugar drinks from its shelves, the association has called for action that goes further than “symbolic” concessions and urged government to follow the recommendations of the report by the Scientific Advisory Committee on Nutrition (SACN).

“The BDA welcomes Tesco’s plans echo recent recommendations in the Carbohydrates and Health Report, published by SACN on 17 July, which advises reducing the daily energy intake of sugars from 10 to 5 per cent. The report also recommends that consumption of sugar-sweetened drinks be minimised and of fibre be increased.”

According to the health experts, 5 per cent of daily energy intake is the equivalent of 19 g or five sugar cubes for children aged 4-6, 24 g or six sugar cubes for children aged 7-10, and 30 g or seven sugar cubes for those aged 11 and over, based on average diets.

The SACN’s findings, established by a group of independent experts that advises government on matters relating to diet, nutrition and health, offer the first wide-ranging look at the relationship between sugar consumption and health outcomes in the UK since the 1990s.

“Rare case of amnesia linked to root canal treatment

By DTI

LEICESTER, UK: In March 2005, a 58-year-old British soldier stationed in Germany lost his ability to form new memories after undergoing a regular root canal treatment. To this day, he is unable to remember anything for longer than a few minutes.

“W e have an historic opportunity here to end Britain’s addiction to sugar. The government now has the evidence and a clear duty to send the strongest possible signal to the food industry that added sugar might be helping their sales, its hurting their customers,” Armstrong said.

“The doctors’ first suspicion was that a bad reaction to the anaesthetic had caused a brain haemorrhage. However, they could not find any evidence of injury. Finally, the patient and his family returned to England, where Dr Gerald Burgess, a clinical psychologist from Leicester, took over the case.

According to Burgess, a form of anterograde amnesia would have been the most obvious explanation for the man’s condition. In this case, the hippocampus, the brain region responsible for the consolidation of information from short-term memory to long-term memory, are damaged so that memories can no longer be formed and stored correctly. Yet, the man’s brain scans showed no abnormalities. Thus, another possible explanation would have been a psychogenic illness. Burgess conducted detailed psychiatric assessments in order to determine whether the man had suffered any trauma. However, Burgess found that his patient was emotionally healthy and his wife confirmed that there had not been any traumatic events in the man’s life prior to his dentist visit in 2005.

Burgess continues to research his patient’s rare case of amnesia, currently suspecting that the brain’s synapses might play an important role. Each time a memory is formed and transferred to long-term memory the synapses are rebuilt, which involves the production of new proteins. This protein synthesis might be blocked in the case of Burgess’ patient, keeping his memory intact and he suffered no traumatic events in the man’s life prior to his dentist visit in 2005.

“One of our reasons for writing up this individual’s case was that we had never seen anything like this before in our assessment clinics, and we do not know what to make of it. But felt an honest reporting of the facts as we assessed them was warranted, that perhaps there will be other cases, or people who know more than we do about what might have caused the patient’s amnesia,” Burgess stated.

“The case report by Burgess, titled “Profound anterograde amnesia following routine anesthetic and dental procedure: A new classification of amnesia characterized by intermediate-to-late-stage consolidation failure”, was published online in the Neurocase journal on 15 May 2015.”
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By DTI

HUDDERSFIELD, UK: A University of Huddersfield researcher is harnessing the latest virtual reality technology to help oral and maxillofacial surgical trainees practise complex dental surgeries. His project aims to provide accurate 3D visualisations of human anatomy and surgical procedures using Oculus Rift, a virtual reality head-mounted display.

Indian-born Yeshwanth Pulijala is a qualified dental surgeon. During his training, he was confronted with the problem of poor visualisation of dental procedures in the operating room. Being aware of these shortcomings in surgical training, as well as passionate about 3D design and technology, he relocated to the UK to pursue postgraduate research on the use of advanced technology to improve health care.

During his master’s studies on 3D medical visualisation at the University of Glasgow, Pulijala created a mobile app called SurFace that provides patient education in corrective jaw surgery. This inspired him to explore the potential of virtual reality for surgical education, using Oculus Rift. A commercial version of the device is expected to be released in the first quarter of 2016. However, Pulijala, who is currently studying for a PhD at the University of Huddersfield, was able to obtain the developer version for his research.

Learning through observation and hands-on participation is an important part of the education of surgical trainees, and medical and dental students, according to Pulijala. “During these sessions the trainees learn by observing the procedures in real-time,” he stated. “But the problem is that not everybody can see what is happening. This is especially the case in crowded operating rooms where surgical trainees perform multiple duties. Also in surgeries confined to oral and maxillofacial zone, as the structures are complex and densely enclosed in a confined space, it is very hard to observe and learn. Further, a reduction in surgical training hours is severely affecting the training of surgeons,” Pulijala pointed out.

As a result, he continued, four out of ten surgical trainees are not confident in performing a procedure. Therefore, he is developing a tool that enables them to participate virtually in an operation. His PhD project aims to provide trainee surgeons with close-up, unrestricted 360-degree views of a surgical procedure, yielding the potential to improve surgical training substantially.

“If you are a trainee surgeon, wearing an Oculus Rift, you will see the surgical procedure in an operating room environment and also be able to ‘touch’ the skull of the patient and interact with it,” Pulijala said. He is currently developing the project concept and producing working prototypes. In the longer term, he envisions a system that will enable surgical trainees to practice and perform virtual operations. “But at the moment it is about creating a high-quality visualisation, interacting with the patient’s data and seeing their anatomy in great detail,” he concluded.
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“I do not see how the situation can improve”

An interview with Dr Stefanos Morfis, Greece

Educated in Manchester and a dentist at heart, Dr Stefanos Morfis opened his first practice in Athens five years ago, right at the beginning of the debt crisis in Greece. Five years later, he is selling it owing to the economic circumstances and is planning to register with the General Dental Council in order to start working as a dentist in Britain. Dental Tribune had the opportunity to speak with him recently about the situation of dentists in his home country and the reasons he has chosen to leave.

Dental Tribune: Dr Morfis, with the recent referendum on the austerity measures proposed by the EU and the resignations of Minister of Finance Yanis Varoufakis, the debt crisis in Greece has heated up again. Can you describe what impact the crisis has had on dentistry in your country?

Dr Stefanos Morfis: When one looks back 10–15 years, dentistry actually used to be quite a prosperous business in Greece. Since many dentists received their education in countries like England, Germany or the Netherlands, the level of dentistry was quite high. What we have seen during the last ten years or so is that fewer people are visiting the dentist because of their financial situation and they only go when they are already in pain.

You have to know that, unlike in the UK or other European countries, most dental care here is private. Since many cannot afford treatment in Greece, they travel to other countries, like Macedonia, where they receive cheaper, but lower quality, treatment. Recently, I heard of two patients who died after undergoing a tooth extraction there.

Owing to the lack of money for treatment, caries levels are very high and, although we are fully aware of its benefits, there is very little money for any kind of preventative dentistry. This is only done at university level.

Consumer prices in Greece are soaring owing to the strict regulations. Have prices for dental treatment also gone up?

In contrast to everything else in Greece, prices for dental treatment have actually gone down in the last five years. While one could charge €50 or more for a composite filling in 2003/2004, today there are quite a number of dentists who are performing fillings for just €20.

This trend is facilitated by the majority of patients, who are only looking at price and not at what kind of material is being put in their mouth. Do not ask even me what kind of fillings they use sometimes! But how can one work professionally and ensure quality for patients at these prices?

With having to compete at such low prices, can you actually live on your income as a dentist in Greece?

Ten years ago, our income was almost double what it is now and the cost of living, materials and education were much cheaper. Living in Athens now is like living in London, but with five times less income. That is why many now meet their educational needs online by attending free webinars. What is really troubling is that more and more dentists are being forced to sell their practice for half the price. That includes me. Ironically, my practice will be taken over by a dentist from Britain.

You are planning to work in the UK. When are you going to leave?

In the spring of next year, after now and I want the best for my little son. At 35, I am at the best age to be productive and achieve things in my life. I have always felt a love for the dental profession and therefore want to dedicate my life to it.

The austerity measures will allow Greece to stay in the EU. In your opinion, is there any possibility of the situation improving?

There are positive examples, like Ireland and Portugal who were able to recover from the recession a few years ago. I hope to be proven wrong, but I do not see how the situation can improve in Greece. Politicians come and go, but the people remain the same. If we do not drastically change how things are run in this country, in a few years I guess it will be impossible to recover.

Would you go back if things start to improve?

I would like to, but I think it will be very difficult. I have a family to look after now and want the best for my little son. At 35, I am at the best age to be productive and achieve things in my life. I have always felt a love for the dental profession and therefore want to dedicate my life to it.

Thank you very much for taking the time and all the best for your future.

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Update on dental amalgam guidelines

European Commission recommends use of alternative materials for fillings

By DTI

BRUSSELS, Belgium: Many countries around the world, European countries in particular, have seen a shift away from the use of dental amalgam in oral health care and an increase in the use of alternative materials over the past years. The European Commission recently acknowledged this trend and published an updated version of its opinion on the safety of dental amalgam and alternative restoration materials.

The new document is an update of the 2008 opinion and aims to assess the safety and effectiveness of dental amalgam and current alternative materials by evaluating the latest scientific evidence.

While in 2008 the European Commission and the Scientific Committee on Emerging and Newly Identified Health Risks concluded that both types of material are generally considered safe to use, they now recommend that the choice of material be based on patient characteristics.

The new recommendation is also based on the findings that dental amalgam fillings may cause mercury poisoning in genetically susceptible populations. Some genetic variants appear to impart increased susceptibility to mercury toxicity from dental amalgam.

Studies involving dental health care personnel have indicated that mercury exposure from dental amalgam during placement and removal may cause or contribute to many chronic illnesses, as well as depression, anxiety and suicide. However, exposure of both patients and dental personnel could be minimised by the use of appropriate clinical techniques, the committee stated in its opinion report.

However, current evidence does not preclude the use of either amalgam or alternative materials in dental restorative treatment. The committee acknowledged that there is a need for further research, particularly with regard to neurotoxicity of mercury from dental amalgam and the effect of genetic polymorphisms on mercury toxicity. In addition, the committee concluded that there is a need for the development of new alternative materials with a high degree of biocompatibility.

The full report, titled “The safety of dental amalgam and alternative dental restoration materials for patients and users”, can be accessed on the website of the Scientific Committee on Emerging and Newly Identified Health Risks.

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UK spin-out launches crowdfunding campaign for no-drill tooth repair tech

By DTI

PERTH, UK: Teeth restored without drilling is the dream of almost every dental patient. A new approach developed in Britain that utilises an electrical current to remineralise the tooth promises exactly that. Reminova, the developer of the technology, has now announced the start of an equity crowdfunding campaign for UK and the US in an effort to raise £0.5 million to bring it to market.

It will be the first fundraising campaign of its kind to target shareholders in both countries simultaneously. If reached, the sum will be used to expand the company’s development and operational team and to seek strategic partnerships with dental companies interested in selling the technology. Reminova executives said initial clinical studies are also planned.

Reminova expects a potential market for the device of 700,000 dentists worldwide. In a press note released at the start of the campaign, the company said that individuals who are interested in becoming shareholders will have 60 days to contribute to the project. The minimum investment is £1,000 for those from the UK or Europe and US$5,000 for Americans.

In return, they will help to get rid of drilling in dentistry and transform global dental health.

“With their help and investment, our tooth rebuilding treatment could be available to patients within three years,” predicted Reminova CEO Dr Jeff Wright.

According to Reminova, its technology prepares damaged tooth enamel in such a way that the ions of minerals required to remineralise the tooth, such as calcium and phosphate, can be pushed to the deepest parts of lesions faster. This remineralisation process is stimulated by short electronic pulses emitted by a specially developed instrument, which is estimated to cost less than £10,000 once it enters the market.

“The treatment you can top-up your natural teeth enamel whenever you need, just as you’d service your car when it needs a bit of loving care,” Wright said.

Reminova claims to currently hold or have applied for 17 patents for the technology, which was first presented to the public in 2014 at a King’s College London (KCL) spin-out, the company is based in Perth in Scotland and managed by tooth decay experts, including KCL Professor Nigel Pitts and dental Dr Chris Longbottom.
Ivoclar updates dentists about latest materials and treatment protocols

By DTI

Leicester, UK: For years, the International Centre for Dental Education from Ivoclar Vivadent has been offering dental education and training for dentists and dental technicians in the UK. At its anniversary celebration in June, over 200 came to Leicester to celebrate the Centre’s achievements and update themselves on the latest materials and treatment protocols, such as the company’s IPS e.max system.

Focusing on innovation in dental design, renowned dental technician and Ivoclar Vivadent Global Opinion Leader Oliver Brix from Germany presented a series of case reports involving the materials and ranging from single tooth restorations to full mouth rehabilitations. State-of-the-art protocols and critical steps to ensure long-term success were also presented by Dr Markus Lenhard from Switzerland.

Leading UK experts such as Chris McConnell, Rob Lynock, Alan Casson and Carl Fenwick, further provided live demonstrations to illustrate the revolutions that are taking place in composite dentistry with advanced products, such as the light-curing lab composite SR Nexco Paste, IPS e.max frameworks with the fully automated injection-moulding device Ivobase and the Tetric EvoCeram Bulk Fill system.

In addition to legal, ethical and practical issues surrounding the selection of patients for implants and the placement and management of the peri-implant site presented by dental hygienist Donna Shembri from Huddersfield. Oldham dental technician and Ivoclar Vivadent Opinion Leader John Wibberley addressed the aesthetic and functional needs of the patient when creating restorations, while he explored the principals and materials used in the customising of denture teeth, gingival contouring and gingival staining.

Following this, dental technician Phillip Reddington from Leeds further educated delegates on ‘high-performance polymers’ which are considered as a replacement for materials such as metal and zirconia in framework fabrication and are increasingly used to manufacture hybrid composite/ceramic restorations.

Since 2011, the ICDE has been offering education for dentists in its Leicester premises. Based close to the M1, the facility provides state-of-the-art dental surgery for live demonstrations and a fully equipped lecture theatre that can hold up to 40 participants. A full list of courses and seminars is available at the centre’s website.
Graduation: A minefield for the younger generation of dentists

By Aws Alani, UK

Common reasons for choosing dentistry as a vocation in the UK include having a fulfilling career where, after five hard years invested at dental school, one could be rewarded with a high probability of employment and the opportunity to marry scientific knowledge with practical hand skills to provide for the public, either on an NHS or private basis or both. A-level students have high standards to achieve and maintain to gain admission to undergraduate programmes. Towards the end of their training, young dentists may feel like they are about to enter a minefield on graduation.

In the last year of dental school, those wishing to enter vocational training are pitted against each other, then ranked nationally and allocated a training position according to their performance in that selection process. Whatever happened to being interviewed by a future employer and performing at that more personal, mutual assessment level? It appears that the system is becoming increasingly mechanistic, a conveyor belt if you will, where a college student enters, is educated in a cost-effective manner, one could be rewarded with a fulfilling career where, after falling deeper into debt. As such, the perception by the public and the media may always be more negative than positive, and the government may play on this to squeeze the pips of goodwill out of dentists, even if skills were attained at the undergraduate level, the current NHS system based on units of dental activity (UDA) does not reward those most technically demanding, most rewarding procedures that can improve quality of life, such as saving a molar tooth with endodontics. These time-consuming delicate skills with expensive single-use instruments are rewarded financially at the same level as an extraction.

“...It appears that the system is becoming increasingly mechanistic...”

As such, “defensive dentistry” can override instinctive motivation to treat deserving and unfortunate patients and thereby discharge our wider duty to society.

Further specialist training is seemingly London-centric and expensive. It looks increasingly unlikely that a UK graduate with five years of debt in tuition fees will be able to train and develop comprehensively if he or she desires this without falling deeper into debt. As such, these postgraduate specialist courses are popular among overseas students, whose large fees are welcomed by academic units. Unfortunately, the overall experience and skill set within these shores is likely to decrease as a result of much of this postgraduate effort with a net increase for countries abroad where they will then bring that expertise.

Positive aspects of globalised dental education include the im
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“It looks increasingly unlikely that a UK graduate with five years of debt in tuition fees will be able to afford to train and develop comprehensively...”

A young graduate recently told me about his experiences of applying for jobs. Three people, two of whom were friends, had applied for a position in the North East. The interviewing principal came into the waiting room and said that he was not interviewing, as they all had very similar qualifications and credentials. All he wanted to know was who of the three would take the lowest sterling amount for a UDA.

He promptly gave them three envelopes and asked them to write down the magic number. One applicant wisely got up and left. Two of the friends remained and seemingly agreed to write down the same amount. Unfortunately, the friendship came to a catastrophic end when one applicant broke the pact and wrote a lower amount. He got the job and the principal pocketed the difference. The conscientious and capable, yet unsuccessful, candidate eventually relocated to Australia, the reservoir to which some of our UK talent drains.

When I heard this, my jaw dropped and my heart sank. This story smacks of a profession being squeezed from all sides, resulting in such acts of desperation. Imagine if you will dentistry in the UK as a sand-castle and we dentists each a grain of sand. When building a sand-castle, gently cupping the sand in a supportive way, as opposed to squeezing it tightly, is a more efficient way of dealing with it. Squeezing it too tightly results in grains escaping between the fingers, and by the time one reaches the castle site, there is nothing left in one’s hands, but a few grains. It appears that the hands that are designed to facilitate and accommodate our efforts to treat patients are gripping too forcefully, resulting in frustration and anger. Our young colleagues desperately want to build a career in this difficult and hazardous environment. Spare a thought for them and help if you can.
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“Patients tend to go to court more often nowadays”

An interview with Dr Andy Wolff, Israel

Be it a careless error or a case of misjudgement, even the most experienced practitioner can make a mistake. In fact, statistics indicate that it is likely that every general dentist will be involved in a malpractice suit at some point in his or her career. Israeli-based dentist Dr Andy Wolff has worked as a medical expert in dental malpractice litigation for many years and has seen almost everything, ranging from slight negligence to severe overtreatment. Dental Tribune had the opportunity to speak with him recently about the steady increase in litigation in the field and simple measures that can help prevent many malpractice incidents in the first place.

Dental Tribune: Dr Wolff, you have been a medical expert in dental malpractice litigation for many years now. Why is it so important to increase awareness of this topic?

Dr Andy Wolff: So much literature out there tells dentists how to do things—whether it is placing implants or improving efficacy with the newest technology—but there are no books on how not to do things or, more precisely, what can happen when something has gone wrong. This aspect is no less important, both for the patient affected and for the clinician, who might be facing legal consequences.

Many may think that it is not relevant to them, but every smart physician knows that things occasionally go wrong and no one is immune. By documenting dental malpractice incidents and by talking and writing about these, I aim to raise awareness and therefore help prevent future incidents.

In your experience, what types of malpractice are most common?

There are definitely many cases in which mistakes—cases like this show that mistakes really can happen to anybody.

So expertise does not preclude mistakes, but there are undoubtedly also cases that result from negligence and hubris.

I certainly see many cases in which dentists have carried out a treatment for which they were not qualified. Remember that, in a general practitionerimmergessence, on both sides of the mouth during an implant treatment. That is truly unbelievable, I have seen many cases over the years, but nothing quite like that, an impaired nerve can regain function overtime. However, if it is an exposed nerve, such as the lingual nerve, the damage is generally irreversible, although there are some microsurgery procedures that may improve the situation. Interventions like this, however, carry extremely high risks themselves and might even aggravate the situation.

With the consequence that patients partially lose sensation in the mouth and face.

It is often in the corner of the mouth and can be very disconcerting. Considering these kinds of cases, I believe that dentists have to be more aware of the potential consequences.

Dental Tribune: What are the areas where mistakes are more likely?

It is difficult to provide an exact answer, as the likelihood of mistakes depends on many factors. However, there are certain areas where mistakes are more likely to occur. For example, when performing oral surgery or dental implant procedures, it is crucial to ensure accurate measurements and proper technique. Additionally, the use of improper materials or equipment can also lead to errors.

In another case, a dentist extracted a third molar without the requisite training. He should have referred the patient to a specialist, but he chose to do it himself—possibly because it earned him another US$100 to $200 revenue—without the result that the patient now has to live with chronic pain for the rest of her life.

Can injuries to nerves regain normal function?

Mostly, damage is irreversible. There are exceptions, of course; either if the damage was not too severe or if the nerve was inside a canal. Potentially, an impaired nerve can regain function overtime. However, if it is an exposed nerve, such as the lingual nerve, the damage is generally irreversible, although there are some microsurgery procedures that may improve the situation. Interventions like this, however, carry extremely high risks themselves and might even aggravate the situation.

With the consequence that patients partially lose sensation in the mouth and face.

Yes. Another consequential damage, of which I only recently learnt, is loss of sense of smell. Patients whose sinus has been injured often lose their ability to smell. Sometimes, they may not even realise it initially, because the sinus runs on both sides of the face and the unaffected side often functions normally. Imagine losing your sense of smell completely owing to a defective bilateral sinus lift procedure—that would be a fairly serious impairment of a person’s quality of life.

Have malpractice incidents become more common over the last decades?

I would say so. At least, litigation has increased. Of course, there have always been cases of malpractice, but patients tend to go to court more often nowadays. Perhaps you could call it an “Americanisation” phenomenon. Almost every problem is taken to court, with the result that dentists are paying increasingly higher insurance fees because the treatment risks are so high today.

How common is legal action in dentistry and what is the compensation amount paid compared with other medical disciplines?

It is perhaps comparable to plastic surgery. There are many complaints filed for cases in which the result was not what the patient expected it to be. Compensation payments range from US$10,000 to 100,000, which is much lower than those in other medical disciplines.

Do more cases of overtreatment or cases of error on behalf of the dentist end up in court?

These cases have an almost equal occurrence. Of course, overtreatment leaves the dentist in a bad situation. It raises the question: why he or she treated the patient unnecessarily in the first place and did so poorly in the second, it leaves him or her doubly guilty. If a mistake occurred after a reasonable treatment plan had been formulated, it is comparatively less bad. Sometimes, even a patient dies while undergoing therapy, this does not need to involve a distinct fault of the clinician.

An American dentist was recently charged because his patient died after he extracted 20 teeth in one procedure. I have performed such extensive treatment in the past, it depends on the need for the treatment and how it is done. Probably, that case in the US was the result of a combination of many things: for instance, the dentist act in accordance with state-of-the-art practice? If not, is he at fault. If he did, one has to remember that dentists cannot rise above today’s level of knowledge and technology. Let us say an impaired patient files charges for something that happened to him 20 years ago that would have been preventable with the latest medical treatment. He, of course, may make a claim, but the dentist could not be sued for it if he or she treated the patient according to the best knowledge available at that time.

That is a very important aspect when writing expert reports on dental malpractice: did the dentist act to the best of his or her ability and according to the current knowledge or gross negligence? That is what makes the difference.

What can medical professionals do to protect themselves against legal disputes arising from high-risk procedures they intend to perform?

Patients should not only be warned of the possible consequences of a certain procedure, but also be advised of the alternatives—and one of those alternatives is not proceeding with treatment at all. In my opinion, the patient should always understand both options: the risks of a particular treatment and what could happen if nothing is done. Only then should the patient be asked to sign a declaration of consent.

Unfortunately, the reality is often quite different. Patients are often asked to sign declarations of consent on their way into surgery or while already on the dental chair. Even if they had questions then, there would be no time to answer them properly. Although it should be of major concern for every dentist to thoroughly inform the patient of the risks, as well as alternative treatment methods, before he or she is asked to sign a consent form, I am constantly confronted with the opposite. So, you are saying that consultation should be of similar importance to treatment?

Absolutely. In my opinion, building mutual trust between doctor and patient is key, involving including malpractice and consequential charges. If patients feel that their condition is
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being properly treated, and that money is not the dentist’s first concern, this alone can prevent litigation in many cases. Of course, if a nerve is damaged, there needs to be a settlement of some kind, but if a bridge fails, for example, instead of filing charges the patient will return for further treatment if there is a solid, trust-based relationship.

Time, communication, trust—what else is important when it comes to preventing malpractice?

One more basic rule every dentist should follow is adhering to evidence-based dentistry. This means not performing a certain treatment just because in the dentist’s experience it is considered to be right. External scientific evidence should be implemented. Also, every single finding should be taken into account in determining how to treat the individual patient: diagnosis, radiographs, periodontal analyses, age, health status, literature and so on. Neglecting these related aspects can very likely lead to misconduct.

Neglecting these related aspects can also prevent litigation. Of course, if a nerve is damaged, this alone can prevent litigation in many cases. Of course, if a nerve is damaged, there needs to be a settlement of some kind, but if a bridge fails, for example, instead of filing charges the patient will return for further treatment if there is a solid, trust-based relationship.

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TRENDS & APPLICATIONS

Bilateral mental and labial paraesthesia in a 62-year-old female patient due to bilateral mandibular canal perforation. © Dr Andy Wolff

Do you see basic problems in dentistry that need to change?

Nowadays, we face the problem of “cheap” dentistry. Owing to the amount of competition with the large number of dentists in the market, there are many cases of overtreatment. Cheap dentistry needs to be fast, yet I have documented cases in which patients have returned for retreatment of a simple problem up to 70 times in two years. If you add up the time those patients invest only to have a poor outcome, it is striking. However, it is not possible for there to be elite dental practices solely. For legal purposes, dental treatment does not need to be exquisit. but it has to be reasonable.

Maybe it is a problem of today that patients have increasing expectations regarding the service or technologies their dentist should use. That is certainly part of the same problem. Advertising that promises people a new Hollywood smile in two hours forms the basis of patients’ beliefs or expectations regarding treatment. Dentists should not be tempted to involve themselves in this kind of misguided pressure. Honest communication is key when aiming to avoid disappointing patients.

Measures to prevent malpractice should begin as early as possible, but where should prevention start? Personally, I think legal regulation should be extended, such as specific laws or by-laws concerning the amount of experience and training, for example, required in order to perform certain procedures. Basically, it is just what common sense calls for and everybody will agree with if they think about it. Should one be allowed to place an implant after attending a colleague’s shoulder? No, yet this is often what happens.

A second measure could focus on undergraduate education. Dental schools should devote more time to prevention of lawsuits. This aspect is neglected in the curriculum, although it is an essential part of dentistry. General awareness of the subject needs to be raised and this alone would help prevent mistakes. As I said earlier, mistakes are not always avoidable, but they should at least not arise out of negligence, hubris or greed. Apart from that, there will always be cases of medical malpractice. Dentists are humans too; only he who does nothing makes no mistakes at all.

Thank you very much for the interview.
By Dr Sushil Koirala, Nepal

The demand for cosmetic dentistry is a growing trend globally. Increased media coverage, the availability of free online information and the improved economic status of the general public has led to a dramatic increase in patients’ aesthetic expectations, desires and demands. Today, a glowing, healthy and vibrant smile is no longer the exclusive domain of the rich and famous; hence, many general practitioners are now being forced to incorporate various aesthetic and cosmetic dental treatment modalities into their daily practices to meet the growing demand of patients.

Cosmetic dentistry is a science-based art guided by the desire of the patient. Many young clinicians who plan to incorporate it into their practice are confused about what they and their patients actually wish to achieve. It is to be noted that the treatment modalities of any health care service should be aimed at the establishment of health and the conservation of the human body with its natural function and aesthetics. However, it is worrying to note that the treatment philosophy and techniques adopted by many cosmetic dentists around the world tend towards macro-invasive protocols, and millions of healthy teeth are aggressively prepared each year for the coming generations of children, especially from the middle- to higher-income population, will have fewer decayed teeth and will need less complex restorative dental care as they age. These aggressive treatment modalities will bring about a major shift in the nature of dental services from traditional restorative care to cosmetic and preventive services.

The increased market demand for smile aesthetics among patients is forcing general practitioners of today to incorporate the art and science of cosmetic dentistry into their practice. Cosmetic dentistry is not yet recognised as a separate clinical specialty, like orthodontics, periodontics or paediatric dentistry. Cosmetic dentistry is synonymously linked with multidisciplinary dental care, as its success and failure are related to the patient’s psychology, health, function and aesthetics. Ethical, high standard cosmetic dentistry skill training of clinicians is essential for the increased global market of cosmetic dentistry and its promotion.

It is widely seen that the treatment modalities of contemporary cosmetic dentistry are tending towards more-invasive procedures with an over-utilisation of full crowns, bridges, dentine veneers, and invasive periodontal and aesthetic surgery, while neglecting long-term health, actual aesthetic needs and the characteristics of the patient. These aggressive treatment modalities are indirectly degrading social trust in dentistry, owing to the trend of fulfilling the cosmetic demands of patients without ethical consideration and sufficient scientific background and promoting the “the more you replace, the more you earn” or “more is more” mindset in dentistry.

Changing the professional mindset of the practicing clinicians is an easy task, as it requires a change in the mindset of professionals. In Parts I and II, I explain MiCD, do no harm cosmetic dentistry, based on My Vedic Smile concept, which I have been practicing successfully in Nepal for the last 20 years, and advocating globally since 2009 as the MiCD global mission. It is to be noted that both parts are based on fundamental scientific truth and available evidence, clinical experience and the common sense required in holistic dentistry.

Cosmetic dentistry, a global trend

The prevalence and severity of dental decay have been declining over the last decades in many developed countries, and this trend is shifting towards developing countries as well. With increased media coverage, the availability of free online information, public awareness has fuelled the demand for cosmetic dentistry globally. Now, a glowing, healthy and vibrant smile is no longer the exclusive domain of the rich and famous. The population of beauty- and oral health-conscious people is increasing every year and data from various sources shows that the coming generations of children, especially from the middle- to higher-income population, will have fewer decayed teeth and will need less complex restorative dental care as they age.

The treatment philosophy adopted by the clinic and the professional team members generally guides the overall output of the practice. Minimally invasive cosmetic dentistry (MiCD), a do no harm practice philosophy, has four fundamental components: level of care, quality of operator (dentist), protocol adopted and technology selected, which must all be respected in daily clinical practice. Adopting this holistic medical science practice philosophy is not an easy task, as it requires a change in the mindset of professionals.

Aesthetic versus cosmetic dentistry

The words “aesthetics” and “cosmetic” are viewed as synonyms by many cosmetic dentists. However, it is necessary to understand the core difference in meaning. The Oxford dictionary defines “aesthetics” as “the branch of philosophy which deals with knowledge, especially that which relates to beauty, art, and taste.” Cosmetic dentistry is a separate field of study that focuses on improving a person’s appearance, often involving procedures that go beyond traditional dental care. Aesthetic dentistry, on the other hand, is a branch of dental medicine that focuses on enhancing a person’s overall appearance by improving both their function and appearance. Aesthetic dentistry is a holistic approach that considers the patient’s overall health, lifestyle, and beauty aspirations when designing treatment plans.
with questions of beauty and artistic taste” and “cosmetic as “improving only the appearance of something.”

In dentistry, “aesthetics” explains the fundamental taste of a person concerning beauty, whereas “cosmetic” deals with the superficial or external enhancement of beauty. Therefore, aesthetic dentistry falls under need-based dental service, and is generally guided by the sex, race and age (SRA factors) of the patient. However, cosmetic dentistry, which is influenced by perception, personality and desires (PFD factors), can be categorized as want or demand-based dental service. For example, a patient’s request to replace old amalgam restorations with tooth-coloured restorative materials can be considered an aesthetic requirement or demand. The request of an old woman for pearly white teeth and the ideal smile design is far more than an aesthetic requirement, and must be considered a cosmetic demand or requirement.

In my clinical practice, I divide aesthetic and cosmetic clinical cases into three different categories:

1. Preventive, or support based: treatment prevents or intercepts the diseases, defects, habits and other factors that may adversely affect the existing or the future smile aesthetics of the patient.
2. Naturo-mimetic, or need based: treatment is carried out to restore or mimic the natural aesthetics, bearing the SRA factors of the patient in mind, and the treatment generally enhances the health and function of the oral tissue.
3. Cosmetic, ordeater based: treatment is performed to enhance or supplement the aesthetic components of the smile; hence, the treatment outcome of cosmetic treatment may not be in harmony with the patient’s SRA factors as in nature mimetic dentistry, and cosmetic treatment may not necessarily be beneficial to the health and function of the oral tissue.

**Practice philosophy in dentistry: The mindset**

The majority of dental schools around the world focus on teaching knowledge and skills in dental medicine that are based on contemporary dentistry and science. Dental education does not give due consideration to healthy dental practice philosophy owing to various factors, such as the need to choose a practice philosophy and the domination of business rather than service-oriented dental practice in the global market. However, quality and healthy clinical practice is always a dream of a good clinician, and establishing such practice requires an unbiased vision, learning and serving attitudes, and dedication from the dentist. Dentists need to understand that science and art in dentistry have no meaning if practiced by an unethical person, who does not respect the overall health of the patient. Any scientific advancement in technology has positive and negative sides; hence, if not applied properly, it may adversely affect the profession and may become a threat.

I believe that a clinic or treatment centre must establish its practice philosophy according to its objectives. What a clinician wants and the kind of services he or she wants to deliver to his or her patients guides the clinic. Practically, the practice philosophy in dentistry can be classified into two different categories, depending on the mindset of the operator.

**Patient centered**

Clinicians with this kind of mindset generally have a do no harm dental practice (Fig. 1). Professional honesty and humanity are the fundamental principles of such a practice. Operators with this mindset enjoy sharing their clinical knowledge and skills with their professional friends and junior colleagues to promote patient-centred clinical practice in society. This group of clinicians firmly believes in the word-of-mouth approach to practice marketing and always thinks of the patient long-term health, function and aesthetics. Clinicians practicing do no harm dentistry are generally cheerful, happy and healthy in their professional life.

**Financially focused**

Clinicians with this kind of mindset practice a financially focused dentistry and adopt various kinds of direct marketing approaches to sell their dentistry like commodity in the market rather than a health care service. Practitioners in this group generally achieve a secure financial position quickly; however, it is frequently seen that they develop chronic stress, burnout syndrome, depression, frustration and professional guilt, leading to compromised health and happiness in their professional life.

**Dentistry and professional stress**

Dentistry has long been considered a stressful occupation. Dentists perceive dentistry as being more stressful than other occupations. Dentists have to deal with many significant stressors in their personal and professional lives. There is some evidence to suggest that dentists suffer a high level of occupational related stress.

A study has found that 83% of dentists perceived dentistry as “very stressful” and nearly 60% perceived dentistry as more stressful than other professions. Stress can elicit varying psychological and physiological responses in a person. Professional burn-out is one of the possible consequences of ongoing professional stress. The effect of burn-out, although work related, often will have a negative impact on people’s personal relationships and well being. Hence, dentists need to take care of their staff’s health and focus on professional happiness in daily practice.

**Three-way test: Questions for your conscience**

Cosmetic dentists can make errors in practice in two ways, first owing to a lack of the required professional knowledge and skills, and second owing to a lack of professional honesty and humanity. The first one can be eliminated with good education and proper training, but the second one demands a moral shift in mindset, with a high level of consciousness in professional ethics, attitudes and respect towards the patient long-term health, function and natural beauty.

I apply a simple yet very powerful test to keep myself stress- and guilt-free and within the boundaries of professional ethics, honesty and humanity when preparing my dental treatment plan to my patient. Clinicians can apply the three-way test.
Cosmetic Tribune United Kingdom Edition: 4/2015

Mentioned below just by taking a deep breath and closing their eyes for a moment and analyzing their answers (the true response that comes to mind) with professional honesty and humanity, what is your correct response? And responding po-sitively to all the questions, then it is advisable for you to pro-
to the treatment plan and take up the case if you give negative re-
ponses to the questions, then you should rethink your proposed treat-
manship and reassess your patient’s long-term health, function and aesthetics using a more sensible and less destructive approach to

The three-way test consists of three basic questions:

- Would I use this treatment for a member of my own family in this situation?
- Am I competent enough to take up the case?
- Will the patient be happy with the biological, financial and time costs of the proposed treatment?

I have been using this simple test since my early clinical practice and enjoying every moment of my clinical practice without any mental stress and with more happiness in his or her practice with

The invariance of procedures se-
lodged in cosmetic dentistry depends on the level of smile defect, type of smile design, proposed treatment plan, patient’s psychological complexity and the

In dentistry, it has focused mainly on prevention, remineralisation and minimal dental intervention in caries management and not given enough attention to other oral health prob-
lems. For this reason, I developed the MiCD concept and its treatment pro-
tocol in 2002 to meet the evidence-based minimally invasive philosophy into cosmetic dentistry in the hope that it will help practitioners achieve optimum results in terms of health, function and aesthetics with minimum treatment intervention and optimum patient satisfaction. The MiCD concept and treatment protocol are explained in an article titled “Minimal invasive cosmetic dentistry—Concept and treatment protocol”26 and the current article discus-
son the MiCD core principles (Table 1). MiCD treatment protocol and clinical technique (Fig. 2).

MicD treatment protocol and clinical technique

Minimal invasive dentistry was developed over a decade ago by restorative experts and founded on sound evidence-based principles.27 In dentistry, it has focused mainly on prevention, remineralisation and minimal dental intervention in caries management and not given enough attention to other oral health prob-
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Table I: Aesthetic components and smile design parameters.

<table>
<thead>
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<th>Smile design parameters</th>
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<tr>
<td>Macro aesthetics</td>
<td>Facial profile</td>
</tr>
<tr>
<td>Micro aesthetics</td>
<td>Facial shape</td>
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<tr>
<td>Rejuvenation</td>
<td>Inter-arch line</td>
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<tr>
<td>Recontouring</td>
<td>Angle of smile</td>
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<td>Biochemistry</td>
<td>Alignment</td>
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<td>Smile symmetry</td>
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<td>Visibility</td>
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Table II: The MiCD summary ten.

Aesthetic components in dentistry are divided into three broad groups:

1. macro-aesthetics, 2. mini-aesthetics, and 3. micro-aesthetics.

Each aesthetic group deals with differ-
ent smile aesthetic components (Tab. 1 and Tab. 3) and each component must be harmonized at the end of treatment. According to the smile de-
fect and patient’s desire, there are four different techniques in MiCD to enhance smile aesthetics:

1. Rejuvenation: to rejuvenate in MiCD to enhance smile aesthetics with minor modifications in tooth position, colour and form, also known as the MiCD ABC principles (Fig. 3). Smile aesthetics. Restoration is performed using micro-to-mini invasive treat-
ment options, such as direct restora-
tions, veneers, inlays, onlays and adhesive pontics, depending upon the extent and severity of the smile defects (Figs. 1 & 2).

Table III: Aesthetic components and smile design parameters.

<table>
<thead>
<tr>
<th>Ten areas</th>
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<tr>
<td>Smile</td>
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| 2. Treatment pro-
cess | Simple | Moderate | Complex |
| 3. Proposed treatment | Accepted | Modified |
| 4. Social 
alignment | Improved | Deteriorated |
| 5. Economic category | Personal | Non-personal |
| 6. Biological cost | New | Very Low | Low | High |
| 7. Extremity | Excellent | Good | Fair | Poor |
| 8. Clinical success | Excellent | Good | Fair | Poor |
| 9. Need improvement |

Conclusion

In order to practice no harm cos-
metic dentistry, a clinician requires the desire, passion, dedication and will power to become an honest professional with humanity because honesty and humanity are the pillars of do no harm cosmetic dentistry, since the mind controls all other practice factors. The clinician must understand that honesty and humanity are not scientific like knowledge and skills, which can be learned, improved and passed on. Honesty and humanity are inner qualities of a person and are deeply related to the level of a person’s consciousness, which are generally expressed as habits and attitudes. Therefore, we need to develop these qual-
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Self-evaluation and the realisation of the level of inner happiness that you obtain through your daily profession- al work are vital for understanding and beginning to practice no harm cosmetic dentistry in your practice.

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Introduction: Smile analysis and aesthetic design

Dental facial aesthetics can be defined in three ways.

Traditionally, dental and facial aesthetics have been defined in terms of macro- and micro-elements. Macro-aesthetics encompasses the interrelationships between the face, lips, gingiva, and teeth and the perception that these relationships are pleasing. Micro-aesthetics involves the aesthetics of an individual tooth and the perception that the colour and form are pleasing.

Historically, accepted smile design concepts and smile parameters have helped to design aesthetic treatments. These specific measurements of form, colour, and tooth/aesthetic elements aid in transferring smile design information between the dentist, ceramist, and patient. Aesthetics in dentistry can encompass a broad area—known as the aesthetic zone.

Rufenacht delineated smile analysis into facial aesthetics, dentofacial aesthetics, and dental aesthetics, encompassing the macro- and micro-elements described in the first definition above. Further classification identifies five levels of aesthetics: facial, orofacial, oral, dentogingival, and dental (Tab. I).

Initiating smile analysis: Evaluating facial and orofacial aesthetics

The smile analysis/design process begins at the macro level, examining the patient’s face first, progressing to an evaluation of the individual teeth, and finally moving to material selection considerations. Multiple photographic views (e.g., facial and sagittal) facilitate this analysis.

At the macro level, facial elements are evaluated for form and balance, with an emphasis on how they may be affected by dental treatment. During the macro-analysis, the balance of the facial thirds is examined. If something appears unbalanced in any one of these zones, the face and/or smile will appear unesthetic.

Such evaluations help determine the extent and type of treatment necessary to affect the aesthetic changes desired. Depending on the complexity and uniqueness of a given case, orthodontics could be considered when restorative treatment alone would not produce the desired results (Fig. 3), such as when facial height is an issue and the lower third is affected. In other cases—but not all—restorative treatment could alter the vertical dimension of occlusion to open the bite and enhance aesthetics when a patient presents with relatively even facial thirds (Fig. 3).

Figure 6: Gingival symmetry in relation to the central incisors, lateral incisors and canines is essential to aesthetics. Optimal aesthetics is achieved when the gingival line is relatively horizontal and symmetric on both sides of the midline in relation to the central incisors and lateral incisors.—Fig. 6. The aesthetic ideal from the gingival scallop to the tip of the papilla is 4.5–5 mm.—Fig. 6a. Acceptable width-to-length ratios fall between 70 % and 85 %, with the ideal range between 80 % and 85 %.—Fig. 6b. An acceptable starting point for central incisors is 1 mm in length, with lateral incisors 1.2 mm shorter than the central incisors, and canines 0.5–1 mm shorter than the central incisors for an aesthetic smile display.—Fig. 6c. The canines and other teeth distally located are usually perceived as occupying less space in an esthetically pleasing smile.—Fig. 6d. A general rule for achieving proportionate smile design is that lateral incisors should measure two-thirds of the central incisors and canines four-fifths of the lateral incisors.—Fig. 6e. If feasible, the contact areas can be progressively moved up to the root of the adjacent tooth.—Fig. 6f. Photoshop provides an effective and inexpensive way to design a digital smile with proper patient input. To start creating custom tooth grids, open an image of an attractive smile in Photoshop and create a separate transparent layer.—Fig. 6g. The polygonal lasso tool is an effective way to select the teeth.—Fig. 6h. Click “add a stroke,” then use a two-pixel stroke line (with colour set to black) to trace your selection. Make sure the transparent layer is the active working layer.
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Evaluating oral aesthetics

The dentolabial gingival relationship, which is considered oral aesthetics, has traditionally been the starting point for treatment planning. This process begins by determining the ideal maxillary incisal edge placement (Fig. 4). This is accomplished by understanding the incisal edge position relative to several different landmarks. The following questions can be used to determine the ideal incisal edge position:

- Where in the face should the maxillary incisal edges be placed?
- What is the proper tooth display, both statically and dynamically?
- What is the proper intra- and inter-tooth relationship (e.g., length and size of teeth, arch form)?
- Can the ideal position be achieved with restorative dentistry alone, or is orthodontics needed?

In order to facilitate smile evaluation based on these landmarks, the rule of 4:2:1—which refers to the amount of maxillary central dental display when the lips are at rest—the amount of gingival tissue revealed, and the size of teeth, arch form)?

Dentogingival aesthetics

Gingival margin placement and the scalloped shape, in particular, are well discussed in the literature. As gingival heights are measured, incisors relative to the central incisor, a lateral incisor, and canine in an up/down/up relationship are considered. However, this may create a false perception that the gingival line is incisal to the central incisor. Rather, in most aesthetic tooth relationships, the gingival line of the four incisors is approximately the same line (Fig. 6). With the incisal margin being slightly incisal the gingival line should be relatively parallel to the horizon for the central incisors and the lateral incisors and symmetric on each side of the midline.1 The gingival contours (i.e., gingival scallop) should follow a radiating arch similar to the incisal line. The gingival scallop shapes the teeth and should be between 4 mm and 5 mm (Fig. 7).

Related to normal gingival form is midline placement. Although usually the first issue addressed in smile design, it is not as significant as tooth form, gingival form, tooth shape, or smile line.

Several rules can be applied when considering modifying the midline to create an aesthetic smile design:

- The midline only should be moved to establish an aesthetic intra- and inter-tooth relationship, with the two central incisors being most important.
- The midline only should be moved restoratively up to the root of the adjacent tooth when the midline is within 1 mm of the center of the face, it will be aesthetically pleasing.
- The midline should be vertical when the teeth are in the postrestaurative position.

Evaluating dental aesthetics

Part of evaluating dental aesthetics for smile design is choosing tooth shapes for patients based on their facial characteristics (e.g., long and dolichocephalic, small or brachycephalic). When patients present with a longer face, a tooth with an 80% width-to-length ratio would be more appropriate. The width-to-length ratio most often discussed in the literature is between 75% and 80%, but aesthetic smiles could demonstrate ratios between 70% and 75% or between 80% and 85% (Figs. 8–10).

The length of teeth also affects aesthetics. Maxillary central incisors average between 10 mm and 11 mm in length. According to Mage, the average length of an unworn maxillary central to the cementoenamel junction is slightly over 1 mm.3 The aesthetic zone for central incisor length, according to the authors, is between 10.5 mm and 12 mm, with 11 mm being a good starting point. Lateral incisors are between 11 mm and a maximum of 2 mm shorter than the central incisors, with the canines slightly shorter than the central incisors by between 0.5 mm and 1 mm (Fig. 11).

The inter-tooth relationship, or arch form, involves the golden proportion and position of tooth width. Although it is a good beginning, it does not reflect natural tooth proportions. Natural proportions demonstrate a lateral incisor between 60% and 70% of the width of the central incisor, and this is larger than the golden proportion.4 However, a rule of thumb is that the canine and all teeth distal should be perceived to come very close to and almost touch the lower lip, being no more than 2 mm away.3 These guidelines are somewhat subjective and should be used as a starting point for determining proper incisal edge position.

Creating a digitalsmile designed in Photoshop

Although there are digital smile design services available to dentists for a fee, it is possible to use Photoshop CS5 software (Adobe Systems) to create and demonstrate for patients the proposed smile design treatments. It starts by creating tooth grids—predesigned tooth templates in different width-to-length ratios (e.g., 75% central, 80% central) that can be incorporated into a custom smile design based on patient characteristics. You can create as many different tooth grids as you like with different tooth proportions in the aesthetic zone. Once completed, you will not have to do this step again, as you will save the created tooth grids and use them to create a new desired outline form for the desired teeth.

Follow these recommended steps:

- To begin creating a tooth grid, use a cheek retracted image of an attractive smile as a basis (e.g., one with a 75% width-to-length ratio). Open the image in Photoshop and create a new clear transparent layer on top of the teeth. (Fig. 19). This transparent layer will enable the image to be outlined without the work being embedded into the image.
- Name the layer appropriately and, when prompted to identify your choice of fill, choose “no fill,” since the layer will be transparent, except for the tracing of the tooth grid.
- To begin tracing the tooth grid, activate a selection tool, move to the tool palette, and select either the polygonal lasso tool or the magneto lasso tool. In the authors’ opinion, the polygonal works best.
Once activated, zoom in (Fig. 15) and trace the teeth with the lasso tool.

To create a pencil outline of the tooth, with the transparent layer active, click on the edit menu in the menu bar, in the edit drop-down menu, select “stroke”; choose black for colour, and select a two-pixel stroke pencilline (Fig. 17) which will create a perfect tracing of your selection. Click “OK” to stroke the selected trace (with the lasso selection tool) one tooth at a time and then stroked (Fig. 18) Select and stroke (trace) the teeth to the second premolar (the first molar is acceptable). (Fig. 19). The image should be sized now for easy future use as a smile design.

In the author’s experience, it is best to determine the size of the image to a height of 720 pixels (Fig. 20) by opening up the image size menu and selecting 720 pixels for the height. The width will adjust proportionately.

At this time, the tooth grid tracing can be saved, without the image of the teeth, by double-clicking on the layer of the tooth image. Adobe’s naming “new layer” will appear, click “OK”. This process unlocks the layer of the teeth so it can be removed. Drag the layer of the teeth to the trash, leaving only the layer with the tracing of the teeth (Fig. 21). In the file menu, click “save as” and choose “ps” or “psd” (Photoshop) as the file type. This will preserve the transparency. You do not want to save it as a JPEG, since this would create a white background around the tracing. Name the file appropriately (e.g., “75 % W/L central). By tracing several patients’ teeth that have tooth size and proportion in the aesthetic zone and saving them, you can create a library of tooth grids to custom design new teeth for your patients who require smile designs.

The Photoshop smile design technique

The Photoshop Smile Design (PSD) technique can be done on any image, and images can be combined to show the full face or the lower third with lips on or lips off. This article demonstrates how to perform the technique on the cheek-retracted view.

The first step in the PSD technique is to create a digital conversion of the actual tooth length and width, and to digitally determine the proposed new length and proportion of the teeth.

Determining digital tooth size

To determine digital tooth size, follow these steps:

1. Create a conversion factor by dividing the proposed length developed from the smile analysis by the existing length of the tooth.

2. The patient’s teeth can be measured in the mouth or on the cast (Fig. 22) if the length measures 8.5 mm but needs to be at 11 mm for an aesthetic smile, divide it by 8.5. The conversion factor equals 1.29, a 29.5 % digital increase lengthwise.

3. Open the full arch cheek-retracted view in Photoshop, and zoom in on the central incisor.

4. Select the eyedropper palette. A new menu will appear. Select the ruler tool (Fig. 23).

5. Click and drag the ruler tool from the top to the bottom of the teeth to generate a vertical number, in this case 170 pixels (Fig. 24). Multiply the number of pixels by the conversion factor. In this case, 170 x 1.29 = 219 pixels; 219 pixels is digitally equivalent to 1 mm (Fig. 25). Determine the digital tooth width using the same formula.

6. Create a new layer, leave it transparent, and mark the measurement with the pencil tool (Fig. 26).

7. Applying a new proposed tooth form next, follow these steps:

   A. After performing the smile analysis and digital measurements, choose a custom tooth grid appropriate for the patient. Select a tooth grid based on the width-to-length ratio of the planned teeth (e.g., 80/70/90 or 80/65/75). Open the image of the chosen tooth grid in Photoshop and drag the grid onto the image of the teeth to be smile-designed (Fig. 27).

   B. If the shape of length is deemed inappropriate, press the command button (control button for PC) and “x” to delete and select a suitable choice.

   C. Depending on the original image size, the tooth grid may be proportionally too big or too small. To enlarge or shrink the teeth grid created (with the layer activated), press command (or control) and “z” to bring up the free transform function. While holding the shift key (holding the shift key allows you to transform the object proportionately), click and drag a corner left or right to expand or contract the custom tooth grid.

   D. Adjust the size of the grid so that the outlines of the central incisors have the new proposed length. Move the grid as necessary using the move tool so that the incisal edge of the tooth grid lines up with the new proposed length (Fig. 28).

   E. Areas of the grid can be individually altered using the liquify tool (Fig. 29).

   Digital creating new aesthetic teeth

   Next, follow these suggested steps:

   A. With the new tooth grid layer and the magic wand tool both activated, click on each tooth to select all of the teeth in the grid (Fig. 30).

   B. Expand the selection by two pixels with the lasso tool, and in the menu bar, click “select” then “modify” expand (Fig. 31). Note that the selection better approximates the grid. You can expand the selection or contract as necessary using the same menu.

   C. Activate the layer of the teeth (cheek-retracted view) by clicking on it (Fig. 32). Next, select the liquify filter (you will see a red mask around the shapes of the proposed teeth). The mask creates a digital limit that the teeth cannot be altered beyond. This is similar to creating a mask with tape for painting a shape (Fig. 33).

   D. Use the forward warp tool by clicking on an area of the existing teeth and dragging to mold/shape the tooth into the shape of the new proposed outline form (Fig. 34).

   Repeat this for each tooth. If you make a mistake or do not like something, click command (or control) and “z” to go back to the previous edit (Fig. 35).

   Adjusting tooth brightness

   The following steps are recommended next:

   • Select the whitening tool (dodge tool) to brighten the teeth. In the dodge tool palette, click on “midtones” and set the exposure to approximately 30. Click on the areas of the tooth you want brightened (Figs. 36 & 37).

   • Alternatively, with the teeth selected, you can use the brightness adjustment in the brightness/contrast menu, click “image” adjustments > brightness/contrast.

   Performing the changes on only one side of the mouth allows the patient to compare the new smile design to his/her original teeth before agreeing to treatment.

Create a copy

To save the information you have created for presentation to the patient, follow these tips:

• Go to “file” and select “save as”.

• When the menu appears, click on the “copy” box.

• Name the file at that step.

• Save it as a JPEG file type.

• Signature where you want it saved.

• Click “save”.

A file of the current state of the image will be created in the designated area. You can now continue working on the image and save again at any point you want.

Conclusion

Knowledge of smile design, coupled with new and innovative dental technologies, allows dentists to diagnose, plan, create, and deliver aesthetically pleasing new smiles. Simultaneously, digital dentistry is enabling dentists to provide what patients demand: quick, comfortable, and predictable dental restorations that satisfy their aesthetic needs.
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