While accountability and improvement have been eminent in health care systems for quite some time, there is probably no other time in history when the relevance and importance of these have been more advocated. Learning from our shortcomings and improving our health care system towards better patient care is the goal of clinical governance. I refer to it as the democracy of the health care system, in which all members of the health care team have the right to bring about positive changes.

Accountability and learning from self-criticism forms the basis of clinical governance, which provides the framework for taking all the steps necessary to make the system more patient friendly. It is a cyclical process that once established can help to identify the decisive factors for the quality of patient care. When asked by one of my trainees when the mechanisms of clinical governance ensue in everyday practice, my answer was, “In a patient-centred practice it never stops”. It starts as early as the patient first contacts a practice or a hospital and encompasses the entire healthcare scenario, starting with welcoming and managing a new patient, ensuring his or her safety on our premises and advising him or her about all aspects of treatment. This combination is all about our transparency to the outside world, ensuring that arbiters and our patients can be certain of our quality of care.

More simply put, clinical governance is the umbrella under which we can provide the best care possible for our patients. It is a structural framework that incorporates all pillars of the health care system. There are channels for the health care team, management and patients alike. Particularly for the last, clinical governance provides an environment free from potential hazards. In addition, patients are given a voice in the system through patient feedback, ensuring that if they draw attention to any wrongdoing, lessons are learnt and such mistakes are not repeated.

For our staff and team members, clinical governance ensures that they will be inducted into the system effectively in the beginning and be a part of that system through organisational meetings and their annual appraisals throughout their whole career. This way, they will have the best opportunity to improve their skills and advance their professional development. Moreover, this allows them to better judge their clinical effectiveness and communication skills.

Since training and career development are integral parts of clinical governance, it helps the clinicians to identify their learning needs and plan their continued professional development accordingly. Continuing in this loop, they are able to develop improved awareness about the safety of their work environment, as risk management is one of the basic pillars of clinical governance. Through research and development opportunities, they can also learn new skills and treatment protocols.

Clinical governance is the girdle of an organisation in a health care system: it encompasses all aspects of improved patient care and keeps all involved units in the loop. The management of an organisation can monitor the quality of care provided by it. It can also rate the clinical effectiveness of a particular specialty or clinician. With patient feedback, it can furthermore identify any shortcomings in the system. It will compel the organisation to strive for the professional development of its employees, safeguarding the clinician’s right to develop professionally. The impartiality of the system opens the organisation to scrutiny and maintains the absolute system of checks and balances.

Audit is an indispensable part of clinical governance, as it allows the system to self-analyse and induce changes, if needed, that is, we make improvements and then re-audit. Once this cycle has been initiated, it will become a continuous process of reanalysis and improve-ment. The prime feature of this system is that the whole process is self-sustainable once the system has been implemented. The checks and balances in the system will keep it going and evolving.

The process of clinical governance is quite well established in the Western world, but it is time that this essential system of health care delivery become established in developing economies. After all, it is all about the patients: it is to ensure their continued good care that we study intensely and pursue professional development.
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Infection control in an era of emerging infectious diseases

By AEEDC Dubai 2015 presenter Eve Cuny, USA

More than three decades have passed since the emergence of human immuno-deficiency virus (HIV) as a global pandemic. More than any other infection, it is possible to single out HIV as the primary stimulus for changing infection control practices in dentistry. Prior to the mid-1980s, it was uncommon for dentists and allied professionals to wear gloves during routine dental procedures. Many dental clinics did not use heat sterilisation, and disinfection of surfaces was limited to a cursory wipe with an alcohol-soaked gauze sponge. This was despite our knowledge that hepatitis B virus (HBV) had been spread in clusters in the offices and clinics of infected dentists and that dentists were clearly at occupational risk for acquiring HBV.

Today, many take safe dental care for granted, but there is still reason to remain vigilant in ensuring an infection-free environment for providers and patients. HIV has fortunately proven to be easily controlled in a clinical environment using the same precautions as those effective for preventing the transmission of HBV and hepatitis C virus.1 These standard precautions include the use of personal protective attire, such as gloves, surgical masks, gowns and protective eyewear, in combination with surface cleaning and disinfection, instrument sterilisation, hand hygiene, immunisations and other basic infection control precautions. Sporadic reports of transmission of blood-borne diseases associated with dental care continue, but are most often linked to breaches in the practice of standard precautions.2

Emerging and re-emerging infectious diseases present a real challenge to all health care providers. Three of the more than 50 emerging and re-emerging infectious diseases identified by the Centers for Disease Control and Prevention and the World Health Organization (WHO) include Ebola virus disease (EVD), pandemic influenza and severe acute respiratory syndrome.3,4 These previously rare or unidentiﬁed infectious diseases burst into the headlines in the past several years when they exhibited novel or uncharacteristic transmission patterns.

Concern about emerging infectious diseases arises for several reasons. When faced with a particularly deadly infectious disease such as EVD, which can be spread through contact with an ill patient’s body ﬂuids, health care workers are naturally concerned about how to protect themselves if an ill patient presents to the dental clinic. With diseases such as pandemic inﬂuenza and severe acute respiratory syndrome, which may be spread via inhalation of aerosolised respiratory ﬂuids when a patient coughs or sneezes, the concern is whether standard precautions will be adequate.

In addition to standard precautions, treating patients with these diseases requires the use of transmission-based precautions. These encompass what are referred to as contact, droplet and airborne precautions for diseases with speciﬁc routes of transmission. Transmission-based precautions may include patient isolation, placing a surgical mask on the patient when he or she is around other people, addi-tional protective attire for care providers, and in some cases the use of respirators and negative air pressure in a treatment room. In most cases, patients who are contagious for infections requiring droplet or airborne precautions should not be treated in a traditional dental clinic setting.

Updating a patient’s medical history at each visit will assist dental health professionals in identifying patients who are symptomatic for infectious diseases. Patients with respiratory symptoms, including pro-ductive cough and fever, should have their dental treatment delayed until they are no longer symp-tomatic. Additionally, health care professionals who are symptomatic should refrain from coming to work until they have been free of fever without taking fever-reducing medication for 24 hours.

In most cases, a patient with symptoms as severe as those experi-enced with EVD will not present for dental care and therefore extraor-diinary screening and protection protocols are not recommended. If a pa-tient is suspected of having a highly contagious disease, he or she should be referred to a physician, hospital or public health clinic.

Dental professionals should take action to remain healthy by being vaccinated according to accepted public health guidelines, understanding that the recommendations may differ according to country of residence. Performing hand hygiene procedures at the beginning of the day, before placing and after removing gloves, changing gloves for each patient, wearing a clean mask and gown or laboratory coat, and wearing protective eyewear are all positive actions that help prevent occupational infections. In addition, cleaning and heat sterilisation of all instruments and disinfection of clinical surfaces ensure a safe environment for patients. There is solid evidence that dental care is safe for patients and providers when standard precautions are followed, but patients and dental health care workers are placed at risk when precau-tions are compromised and breaches occur.

Eve Cuny is an associate professor at the Arthur A. Dugoni School of Den-tistry at the University of the Pacific in San Francisco in California in the US. She is also a consultant to the American Dental Association’s Council on Scientiﬁc Affairs and expert re-viewer for the Centers for Disease Control and Prevention. At AEEDC Dubai 2015, she will be presenting two papers discussing infection con-trol in dentistry on Tuesday and Thursday.

References:
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- Outstanding caries diagnosis
- Unsurpassed approximal caries identification
- Visual monitoring at its best
Photo-functionalisation is effective on any implant surface type

An interview with AEEDC Dubai presenter Dr Takahiro Ogawa, US

The photo-energy activation device boasts an optimised combination of ultraviolet lights that effectively remove hydrocarbon from the implant surface, transforming the surface from hydrophobic (water-repelling) to hydrophilic (water-friendly). This change in properties, together with the clean titanium surface, attracts more osteogenic cells. Photo-functionalised titanium surfaces are electrostatically positive and further enhance cell attraction because cells are electro-negative.

All this is intended to make osseointegration of dental implants much better and faster. The aging process of implants degrades hydrophilicity. Can the features of an aged implant surface be fully restored by photo-functionalisation, and does the technology have any limits?

Not at all. A series of studies have indicated that photo-functionalisation is effective on any implant surface type tested whether acid-etched, dual acid-etched, oxidised, sandblasted, nano-fretured or machined surfaces.

The aging process of implants degrades hydrophilicity. Can the features of an aged implant surface be fully restored by photo-functionalisation, and does the technology have any limits?

Has the technique been tested in vivo studies and, if so, what results have you found so far?

According to a number of preclinical studies, the strength of osseointegration can be increased three times by photo-functionalisation at the early healing stage. The bone-implant contact of photofunctionalised implants reached 94.2%, compared with 59–55% achieved with the control implants.

Moreover, it has been found that photo-functionalisation increases the quality of marginal bone formation, as well as improves the outcome of guided bone regeneration, when applied to titanium mesh. Photo-functionalisation also makes implant and abutment surfaces bacteria phobic.

Studies indicate that there are not only short term benefits of photo-functionalisation. Reliability and predictability in function and aesthetics are expected to increase with time, providing clinicians with a new strategy for a better long-term prognosis for dental implants and reducing the risk of peri-implantitis.

You say that photo-functionalisation could become a standard procedure for dental implant therapy. When will that happen, in your opinion?

Dentists in Japan have been using photo-functionalisation for approximately three years. In Europe, pre-marketing of the device has recently started. I believe that other regions will catch up shortly and make this technology a global standard in implant dentistry.

A number of projects are also underway utilising photo-functionalisation in the field of general bone engineering and orthopaedic implants and reconstruction.

Thank you very much for the interview.
Conference programme of AEEDC Dubai 2015

Tuesday, 17 February

09:30 – 10:00 Direct posterior restorations: Guidelines and durability, AEEDC Conference Hall – A
Speaker: Teofilo Ali AlAmri

10:30 – 11:00 The oral pre-participation exam, AEEDC Conference Hall – E
Speaker: Anthony Clough

10:30 – 11:30 Challenges in aesthetic dentistry today, AEEDC Conference Hall – C
Speaker: Andrea Ricci

11:15 – 11:35 Dental injuries in sports: Ice hockey, AEEDC Conference Hall – E
Speaker: Jean Luc Dion

11:15 – 11:55 New trends in aesthetic dentistry: Feasible, teachable, repeatable, AEEDC Conference Hall – B
Speaker: Angelo Putignano

11:50 – 12:10 Timing of occlusal contacts: Get the timing right, everytime!, AEEDC Conference Hall – D
Speaker: Sagar J. Abichandani

12:10 – 12:30 Algorithm for management of oral white lesions, AEEDC Conference Hall – F
Speaker: Jürgen Ervens

11:15 – 12:15 Prevention in restorative dentistry: Is it achievable?, AEEDC Conference Hall – A
Speaker: Colin Murray

11:30 – 12:30 Photofunctionalization: A novel way to optimise implant tissue compatibility, AEEDC Conference Hall – C
Speaker: Takahiro Uygera

11:35 – 12:00 Endodontic considerations in sports injuries, AEEDC Conference Hall – E
Speaker: Mark Parhar

11:55 – 12:35 Critical review of the latest improvements in dental bonding systems, AEEDC Conference Hall – B
Speaker: Lorenzo Breschi

12:00 – 12:25 Management of allopred injuries in elite athletes, AEEDC Conference Hall – F
Speaker: May Al Khudur

13:45 – 14:00 Digital smile design: Deliver more smiles in your practice, AEEDC Conference Hall – D
Speaker: Alain Metz

Current concept and considerations in bisphosphonates-related jaw osteonecrosis, AEEDC Conference Hall – F
Speaker: Nadim Islam

12:15 – 13:15 Innovative approaches for improving oral health and support dental, AEEDC Conference Hall – A
Speaker: Guy Goffin

12:25 – 14:40 Dental injuries and issues in the Paralympic athlete, AEEDC Conference Hall – E
Speaker: Eduardo Tinoco/Justine Mionner

12:30 – 13:15 Root canal treatment and endodontic considerations, AEEDC Conference Hall – B
Speaker: Philippe Sleiman

14:00 – 14:30 Dental caries and oral health attitudes among children: Reflections from Qatar, AEEDC Conference Hall – A
Speaker: Mohammed Sultan Al Darwish

14:00 – 15:00 Treatment in the Deciduous and Permanent Dentition, AEEDC Conference Hall – E
Speaker: Reema Abed Al Ghaithy

15:15 – 15:45 Risk management in endodontics, AEEDC Conference Hall – A
Speaker: Reem Abul Gheit

15:45 – 16:15 The role of the team dentist, AEEDC Conference Hall – E
Speaker: Ray Padilla

16:15 – 16:45 Tooth surface loss – From diagnosis to management: A literature review, AEEDC Conference Hall – A
Speaker: Mohamed Amed El Naklawy

Healthy life & business success, AEEDC Conference Hall – D
Speaker: Ahmed

16:00 – 17:00 Dilemma of nonvital teeth during mixed dentition period – Retain or Remove, AEEDC Conference Hall – B
Speaker: Tarun Walia

16:15 – 17:15 New perspectives in enhancing the implant site and developing the transmucosal contour, AEEDC Conference Hall – C
Speaker: Starros Polekanos

16:30 – 17:30 Wear resistance of dental materials, AEEDC Conference Hall – A
Speaker: Ivan Chakalove

How to build a profitable practice, AEEDC Conference Hall – D
Speaker: Housam Fouladgar

Wednesday, 18 February

9:00 – 09:30 GCC Preventive Dentistry Session: Caries prevention in infants, AEEDC Conference Hall – A
Speaker: Huda Nazar

09:00 – 09:45 Digital dental clinical education: Four years’ experience in a Riyadh college, AEEDC Conference Hall – B
Speaker: Abdullah Al Shammary

09:00 – 10:00 Strategies for craniofacial re-generation, AEEDC Conference Hall – F
Speaker: Charles Steir

09:00 – 10:00 Hybrid Ceramic: A new material for aesthetic CAD/CAM restorations, AEEDC Conference Hall – C
Speaker: Jens Fischer

How to create predictable endodontic canal shapes in your practice, AEEDC Conference Hall – D
Speaker: Peet van der Vyver

09:30 – 09:45 Minimally invasive temoro-mandibular joint and salivary gland surgery, AEEDC Conference Hall – E
Speaker: Gerhard Utzt
as a symptomatic treatment of temporo-mandibular joint disorders, AEEDC Conference Hall – E
Speaker: Ahmed Abdelhamid

10:45 – 11:00
Orthodontic treatment: Combina-
tion of digital dentel stem cell ther-
apy and nanotechnology, AEEDC Conference Hall – F
Speaker: Thimios Mitsatis

10:00 – 11:00
Bioceramic Age: A new era?, AEEDC Conference Hall – A
Speaker: Guillaume Jourquay

Cranial facial growth and implant reconstruction in adults: Observations, consequences and surgical solutions, AEEDC Conference Hall – C
Speaker: Oded Bahat

10:30 – 11:00
Current & future concepts in TMJ management, AEEDC Conference Hall – F
Speaker: Mohamad A. Al-Muharraqi

10:30 – 11:15
The impact on dental education programmes, AEEDC Conference Hall – B
Speaker: David Wray

Direct pulp capping with tri-cali-
cium silicates and pulp regener-
ation, AEEDC Conference Hall – E
Speaker: Jean-Christophe Fricain

10:40 – 10:50
Most recent uses of growth fac-
tors (PRF and MPM) in bone and
tissue: Discussion, AEEDC Conference Hall – C
Speakers: Shiamaa Shihab Ahmed, Hezekiah Mosadomi, Abdullah Al Mashhadani

11:00 – 12:00
A modern dental education model integrating public health into total health, AEEDC Conference Hall – B
Speaker: Jack Dilleberg

Stomatologia today, AEEDC Conference Hall – F
Speaker: Jean-Christophe Fricain

11:15 – 12:15
Less grafts, more implants & same day teeth, AEEDC Conference Hall – A
Speaker: Costa Nicolaoupolous

The role of adhesion in direct and indirect restorative den-
tistry, AEEDC Conference Hall – C
Speaker: Pedroso Ferrasios

FDI World Dental Federation: Towards optimal oral health, AEEDC Conference Hall – E
Speaker: Tim Chung Wong

12:00 – 12:45
The use of social media in oral health promotion and educa-
tion, AEEDC Conference Hall – B
Speaker: Tony Hashemian

Current approaches of oral can-
cer diagnosis, AEEDC Conference Hall – F
Speaker: Ahmed Feki

12:15 – 12:45
Pulp therapy in primary teeth: Treatment options, AEEDC Conference Hall – D
Speaker: Ahmet Cakir

Thursday, 19 February

09:00 – 09:30
Accountability in dental prac-
tice: Clinical governance, AEEDC Conference Hall – B
Speaker: Kashif Hafeez

Case presentation with interac-
tive discussion, AEEDC Conference Hall – C
Speaker: Shokhbor Fotouhi

09:45 – 10:00
Apical surgery or endodontic treat-
ment: Does it really work?, AEEDC Conference Hall – A
Speaker: Petros Yvanoglu

10:30 – 11:00
Management of trauma in adult patients, AEEDC Conference Hall – A
Speaker: Sarvar Nemati

11:15 – 12:00
Anterior ceramic restorations: Dentist-ceramist teamwork to achieve success, AEEDC Conference Hall – B
Speaker: Faisal Surrur, Khayri Aldalati

11:15 – 12:00
Periodontal disease and dia-
betes: A two-way relationship, AEEDC Conference Hall – C
Speaker: Crawford Bain

11:15 – 12:00
The effect of arginine in neutral-
izing biofilm acids, AEEDC Conference Hall – D
Speaker: Roy Abu Faddel

Direct aesthetic provisional ap-
plication: Enabling the artist inside, AEEDC Conference Hall – E
Speaker: Michael A. Apa

11:30 – 12:30
The psychology of success, AEEDC Conference Hall – F
Speaker: Housam Fouad

11:40 – 12:20
Socket preservation in implant dentistry, AEEDC Conference Hall – C
Speaker: Rashed Aleddin

12:00 – 12:45
Digital smile design: Why changing from 2-D to 3-D? AEEDC Conference Hall – D
Speaker: Alain Michel

Delivering clinical perfection: Direct composite restorations, AEEDC Conference Hall – E
Speaker: Nassib Fares

12:20 – 13:00
Pre and per-oral implant tis-
Sual reconstructions in the ante-
rior maxilla, AEEDC Conference Hall – F
Speaker: Baccouche Mohammed Cheddy

14:00 – 14:30
Direct pulp capping: Is it really easy to make?, AEEDC Conference Hall – D
Speaker: Amr Nabil Asker

09:00 – 10:00
Effect of Mandibular Reposi-
tioning Appliances on Inspira-
tory and Expiratory Total Air, AEEDC Conference Hall – D
Speaker: Adil Osman Mageet

09:00 – 11:00
Advanced Aesthetic and Im-
plant Therapies, AEEDC Conference Hall – E
Speaker: Henry Salama, Maurice A. Salama

09:30 – 10:00
Antibiotic abuse, AEEDC Conference Hall – C
Speaker: Naushath Khan

09:30 – 10:15
Fee setting, AEEDC Conference Hall – B
Speaker: Fahad Umar

09:40 – 10:20
Dental erosion and remi-
neralization agents: Myths and reali-
ties, AEEDC Conference Hall – F
Speaker: Sonia Ghoz

10:45 – 10:50
Interactions of mineral trioxide aggregate with the environ-
ment, AEEDC Conference Hall – A
Speaker: Amr Nabil Asker

Direct pulp capping with tri-cali-
cium silicates and pulp regener-
ation, AEEDC Conference Hall – B
Speaker: Michael Dieter

13:30 – 14:30
Aesthetic and functional recon-
struction of complex mandibu-
lar and maxillary defects with pre-
fabricated fibular flap, AEEDC Conference Hall – C
Speaker: Bruno Hauser

Self tissue considerations around teeth and implants, AEEDC Conference Hall – E
Speaker: Korduk Demirel

14:00 – 15:00
Mastering endodontic rotory in-
strumentation and techniques to reach the highest level of suc-
cess, AEEDC Conference Hall – B
Speaker: Roger Rebeiz

Assessment, diagnoses and re-
ferral of orthodontic patients, AEEDC Conference Hall – D
Speaker: Mohammed Almosbah

14:30 – 15:30
Innovatory CAD/CAM tech-
nologies, AEEDC Conference Hall – C
Speaker: Lawrence Brown

14:45 – 15:30
Lasers in dentistry, AEEDC Conference Hall – A

14:45 – 15:30
Periodontal consideration in implant dentistry, AEEDC Conference Hall – E
Speaker: Mohamed Refaat

15:00 – 16:30
Orthodontic management of im-
pacted teeth, AEEDC Conference Hall – D
Speaker: Amr Nabil Asker

15:00 – 15:45
Root canal disinfection: What we know and what we need to know, AEEDC Conference Hall – B
Speaker: Prassana Neelakantan

15:30 – 16:00
Low level laser therapy with a diode laser to support the wound healing after oral surgic-
Al intervections, AEEDC Conference Hall – A
Speaker: Oliver Winand

09:00 – 10:00
Tackling the endo-perio conun-
drum, AEEDC Conference Hall – E
Speaker: Leena Beerev

15:30 – 16:30
Treatment planning session
Speaker: Enrico Steger

15:30 – 17:30
A new era in paediatric den-
tistry, AEEDC Conference Hall – D
Speaker: Naqib Owaisi & Ali Attia

15:45 – 16:30
Apical surgery: Does it really work?, AEEDC Conference Hall – B
Speaker: Mohammad Alfagom Alzama

16:00 – 16:30
3-D bone defect treatment in the aesthetic zone, AEEDC Conference Hall – E
Speaker: Ehab Rashid

16:00 – 16:45
The oral mucosa as a mirror of systemic diseases: How to avoid pitfalls in treatment of the eld-
ery, AEEDC Conference Hall – A
Speaker: Angela Farningham

16:00 – 17:00
The role of endoscopy in dental implant therapy, AEEDC Conference Hall – E
Speaker: Saeid Al Habash

16:45 – 17:30
Future vision of clinical non-in-
vasive modalities in diagnosis of oral squamous cell carci-
noma (OSCC), AEEDC Conference Hall – B
Speaker: Rostis Giannakopoulos

10:00 – 11:00
Beyond conventional alveolar bone grafting, AEEDC Conference Hall – D
Speaker: Sambharam Vackekhdesh Prasad

10:15 – 11:00
Consent in dentistry, AEEDC Conference Hall – B
Speaker: Sumit Parkash

10:20 – 11:10
When orthodontics meets chil-
dren's smiles, AEEDC Conference Hall – F
Speaker: Dina Debaybo

10:30 – 11:00
Most recent uses of growth fac-
tors (PRF and MPM) in bone and soft tissue regeneration, AEEDC Conference Hall – C
Speaker: Ahmad Haim Arroob

10:30 – 11:15
Case presentation with interac-
tive discussion, AEEDC Conference Hall – C
Speaker: Samy Darwish

10:30 – 11:15
Direct aesthetic provisional ap-
plication, AEEDC Conference Hall – D
Speaker: Ahmed Haim Arroob

11:00 – 12:00
Restoration of immediate tooth, AEEDC Conference Hall – D
Speaker: Dina Sbitar

11:45 – 12:30
Periodontal disease and dia-
betes: A two-way relationship, AEEDC Conference Hall – C
Speaker: Crawford Bain
14:00 – 14:45
Aesthetic can range from changing life style to changing the future of a patient, AEEDC Conference Hall – F
Speaker: Abdullah A Faidhi

14:30 – 15:15
Burning mouth syndrome: Is she crazy?, AEEDC Conference Hall – B
Speaker: Nadim Islam

14:45 – 15:30
Managing tooth replacement dilemmas in the aesthetic zone, AEEDC Conference Hall – E
Speaker: Henry Salama, Maurice A. Salama

16:00 – 16:45
Update & review on management of oral & maxillofacial pathology, AEEDC Conference Hall – B
Speaker: Basem Jamal

16:15 – 17:15
All you need to know about teeth whitening, AEEDC Conference Hall – A
Speaker: Randy Essam Shaker

16:45 – 17:30
Management of anxious patients attending oral surgery using intravenous sedation, AEEDC Conference Hall – B
Speaker: Abdel Rahman Mahmoud Tawfik

17:00 – 17:30
Panel of Dental XP Experts: Q&A Session, AEEDC Conference Hall – E

Patient psychology towered endodontic treatment: causes and management, AEEDC Conference Hall – F
Speaker: Abdullah Ali Al Sharif

Times, locations and topics are subject to change. Last update was 23 January 2015.
Cone Beam Computed Tomography: Is dentistry ready for a new standard of care?

Dr Lee M. Whitesides, USA

Since its commercial introduction into dentistry in 2001, cone beam computed tomography (CBCT) has been rapidly evolving into a new standard of care in maxillofacial imaging. In just over a decade, CBCT has exploded onto the dental landscape and permitted dental professionals a degree of three-dimensional (3D) anatomic truth in maxillofacial imaging previously unavailable and unattainable. Like many other new technologies, which have progressed from the extraordinary to the ordinary and thus gained acceptance by professional patients, CBCT has advanced from exceptional use to almost commonplace use in dentistry as cost decreases, access to the technology increases, and potential adverse patient interaction (i.e. radiation exposure) is attenuated. Today, CBCT is seen by many in dentistry as the standard operating procedure for many dental implant, orthognathic, orthodontic, or endodontic cases.

The advancement of CBCT in dentistry has caught the attention of manufacturers of radiologic equipment. In 2001, only one company sold a CBCT system. In 2014 there are at least 20 companies selling CBCT machines and technology. Henry Schein, a leading distributor of dental equipment, has seen CBCT sales expand from 5% of their digital imaging sales to almost 40% of these digital imaging sales in the last five years.

CBCT has also been recognised by general dentists and specialists as a means by which they can separate fact from fiction and distinguish their practices as being on the vanguard of technology in patient care. Today's patients expect their dentists to be up to date with the current way technology is being used. CBCT provides the doctor with a technology, which not only has significant advantages in treating patients but also has a noteworthiness. The influence of an emerging technology, like CBCT, into a new standard of care involves many criteria. These criteria include but are not limited to: court verdicts, expert testimony, literature support, professional guidelines, cost and availability of the technology, reimbursement by third party payers, and multi-specialty use and recognition.

Tennstedt individually, these criteria do not constitute a mandate for any technology as a standard of care. Nor are these the only criteria one may use in determining standard of care. Taken together, these criteria provide strong evidence that CBCT technology has sufficiently evolved to be considered the standard of care in maxillofacial imaging in selected cases to assist the dentist in treatment for patients in need of dental implants, orthognathic surgery, manipulation of difficult impacted teeth, orthodontics, endodontics, and many other facets of dentistry.

The legal perspective

The legal system in the United States is complex and fragmented. No database exists to search verbatim in dental malpractice cases in which CBCT has played an important or pivotal role. For a new technology to become admissible as a standard of care in court, it must pass the Frye test. This standard comes from Frye v. United States which was a 1923 in a case discussing the admissibility of a polygraph test as evidence. The Frye standard maintains that scientific evidence presented to the court must be interpreted by the court as “generally accepted” and expert testimony must be based on scientific methods that are sufficiently established and accepted.

In Frey, the court opined: “Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognised, while the courts will go a long way in admitting experimental testimony derived from a well recognised scientific principle or discovery.” The thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

In many jurisdictions and in Federal court, the Frye standard is superseded by the Daubert standard. The Daubert standard is used by a trial judge to make a preliminary assessment of whether an expert's scientific testimony is based on reasoning or methodology that is scientifically valid and can properly be applied to the facts at issue. Under this standard, the factors that may be considered in determining whether the methodology is valid are:

- theory or technique in question can be and has been tested,
- it has been subjected to peer review and publication,
- there is a known or potential error rate,
- the existence of maintenance standards controlling its operation,
- widespread acceptance within a relevant scientific community.

The theory or technique behind medical grade computed tomography and CBCT has been tested and proven sound over many years of application in the medical and dental arena. The Housefield unit is the widely recognised standard quantitative scale for describing radiodensity and provides doctors with a known standard and error rate in computed tomography. The widespread acceptance of CBCT by the medical and dental community is demonstrated by the ever increasing presence in dental and medical practices of the technology. Additionally, the Intersocietal Accreditation Commission, an accreditation organisation for medical and dental imaging, has developed guidelines and accreditation criteria for 3D CBCT imaging. Thus CBCT appears to have satisfied both the Frye and Daubert criteria for acceptance as a standard of care in technology.

Not to discount the value of CBCT imaging or its ability to successfully satisfy the Frye or Daubert criteria, the absence of CBCT is not de facto evidence of lack of a standard of care imaging. Many patients present to their dentist with uncomplicated cases where traditional two-dimensional radiographic studies are appropriate and provide the dentist with standard of care imaging of the patient. For the more complicated cases, 3D imaging may be employed to provide the dentist with superior anatomic evidence in treatment planning and diagnosis. Three-dimensional imaging with CBCT can also be used in uncomplicated cases, but it may not necessarily be considered as the standard of care for every case in 2014.

Expert testimony

An expert is a person with sufficient minimal qualifications to render an opinion on the subject at hand. Not all experts are created equal, and in fact in three states (Iowa, South Dakota, and New Hampshire) an expert need only be qualified in a related field to offer an opinion. Experts are used by the courts to educate the judge and jury as to what constitutes normal practice. Expert testimony is by definition the opinion of one practitioner. It is an opinion based on fact, evidence, experience, and knowledge which the expert believes to be relevant, valid, and upheld in the scientific community.

When reviewing a case for suspected malpractice the expert examines many things, including, but not limited to: chart notes, radiographic studies, depositions, and professional correspondences. In the last five years, the author has noticed a remarkable increase in the number of cases in which plaintiff and defense attorneys, as well as experts, rely on pre and postprocedure CBCT imaging studies to assist in proving malpractice or defending good practice. Post-treatment radiographic imaging to demonstrate good practice is now new to medicine. In fact in the years preceding Wilk, some of the highest malpractice cases were awarded in cases where post-treatment radiographs played a pivotal role.

Logic would dictate that if plain film radiography and other forms of diagnostic and treatment planning methods and technologies were prevalent and pertinent but of little value in daily practice, then malpractice claims were awarded in cases involving an unfortunate outcome occurred. Additionally, CBCT provides powerful and easily understandable images for layperson jury.

Recognising the value that CBCT adds to a case does not necessarily indicate that CBCT is the standard of care in every case. The decision to obtain a CBCT study before the procedure is determined by the dentist based on his experience and knowledge of the case.

Literature support

For any technology to be considered as a standard of care, a plethora of literature in support for the technology should exist. The literature must discuss the risk and benefits of the technology, its application to patient care, and guidelines and protocols for acceptable use.

To assess the influence of CBCT in the dental literature, the author performed a PubMed literature search in October for the words
cono beam CT, cone beam CT + den-
tal, cone beam CT + dental implants, cone beam CT + orthodontics, cone beam CT + oral surgery, cone beam CT + endodontics in the search line. The results are in Table 1.

Evaluation of Table 1 data clearly shows a significant presence in the literature of articles pertaining to the use of CBCT in the various disciplines in dentistry. The vast majority of literature dis-
covered pertains to addressing the use of CBCT in treatment planning and diagnosis of patients in dental implant therapy, oral and maxillo-
facial surgery, orthodontics, and endodontics. Articles on new appli-
cations of CBCT technology to pa-
tient care were also prevalent in the sample. Some articles ad-
dressed the risk and benefits of CBCT but none denounced CBCT as
harmful to the patient or insignifi-
cant in treatment planning and di-
gnosis. Two similar PubMed re-
views of the literature on CBCT
were performed by authors Alami
et al (Applications of CBCT in den-
tal practice. A review of the litera-
ture. Gen Dent 2012; 60(5): 390–400) and De Vos et al (Cone-
beam computed tomography (CBCT) imaging of the oral and
maxillofacial region: A systematic review of the literature. Int J
Oral Maxillofac Surg 2009; 38: 609–625). Both of these exhaust-
tive articles demonstrate the
pethora of literature addressing
CBCT and its application in the
many disciplines in dentistry.

Professional Guidelines
For a technology such as CBCT to
become a standard of care in den-
tistry, guidelines for its use and ap-
plication in patient care must be es-
tablished by the organisational
bodies of those disciplines in den-
tistry who employ the technology
to treat patients. In dentistry, the
dental practitioners most involved
in the use and application of CBCT
in patient care include general den-
tists, oral and maxillofacial sur-
geons, endodontists, oral and max-
illofacial radiologists, orthodon-
tists, and periodontists.
The American Dental Associa-
tion has over 180,000 licensed den-
tists representing approximately
75 % of dentists in the USA. The
American Dental Association pub-
lished an advisory statement arti-
cle in its principal journal, The
Journal of the American Dental As-
ociation, in August 2012. The arti-
cle discusses the many positive as-
pcts of CBCT, but stops short of
calling CBCT a new standard of
care. Rather, the ADA encourages
the dentist to use CBCT “select-
ively, as an adjunct to conven-
tional radiography.” The ADA fur-
ther recognizes the value and pres-
ence of CBCT by including CBCT-re-
lated courses at its annual
meetings and continuing educa-
tion courses during the year.

The American Association of Oral
and Maxillofacial Surgery
(AAOMS) has over 9,000 members
representing approximately 95 %
of oral and maxillofacial surgeons
practising in the US. Literature ad-
ressing the application of CBCT in oral and maxillofacial surgery has
been around since 2007. The
AAOMS has offered continuing ed-
ucation in the use and application
of CBCT for patient care as far back
as 2011. The AAOMS has worked
with the IAC to develop guidelines
and accreditation criteria for 3-D
CBCT imaging. In a recent survey
of OMFS residency programmes,
87 % of programme directors ac-
knowledge the use of CBCT in pa-
tient care by their residents.
The American Association of En-
dodontists (AAE) and the Amer-
ican Association of Oral and Max-
illofacial Radiologists (AAOMR)
have released a formal position pa-
erg on CBCT. This paper makes
many important points, such as
limiting the field of vision to min-
imise radiation exposure and in-
crease resolution, careful patient
selection in CBCT, and the respon-
sibility of the clinician to interpret
the entire image. The position pa-
ger goes on to declare “the use of
CBCT in endodontics should be lim-
ited to the assessment and treat-
ment of complex conditions.”
The standard of care in dentistry is an evolving concept. It is common to see a gradual step forward in technology rendering the older technologies no longer optimal. As CBCT becomes more accepted, the dentist must be ready to change with it. It is aroun