AI and Digital Innovation in Dentistry and Oral Health:

Revolutionising Approaches to Care or Just Another Myth?

Friday 15 November 2024

Faculty of Dental Surgery
ROYAL COLLEGE OF SURGEONS OF ENGLAND

Speaker Biographies

Professor Andrew Eder BDS MSc MRD FDS FCGDent FHEA

Course Convener and Introduction: healthcare systems in the UK are overwhelmed. AI and digital technologies have enormous potential to enhance the provision of oral healthcare and improve patient outcomes. With a focus on AI and digital innovation, the Faculty of Dental Surgery has grasped the opportunity to inform and keep colleagues updated on latest developments in this rapidly evolving field. Opinion leaders will come together for a day of thought-provoking discussion on innovation in digital technologies which will have global reach and impact also resulting in the potential to solve problems at scale by improving access to care.

Biography: focused on excellence and innovation in clinical dentistry and dental education, Professor Andrew Eder has provided high quality care for patients with complex oral health needs and contributed to the training of postgraduates and NHS trainees for over thirty years. Andrew is in specialist practice in central London where, as Co-Editor of the BDJ book on Tooth Wear, he has a special interest in caring for patients with worn teeth. He is also Emeritus Professor at the UCL Eastman Dental Institute and formerly Consultant in Restorative Dentistry at UCLH and Pro-Vice-Provost at UCL.

A former elected Board Member of FDS, Andrew is now the FDJ's section lead for AI and Digital Innovation. Through his practice and university experience, Andrew has developed a valuable portfolio of transferable skills enabling him to make a genuine impact by providing high-value consultancy and volunteering support across a wide range of non-executive and charitable roles.

Dr Janak Gunatilleke MBChB MBA MSc

Presentation Summary: **h**ealthcare, oral health and dental care in the UK and beyond are facing numerous challenges. AI has often been positioned as something that can solve many challenges. The interest in AI has increased with technologies such as GenAI and popular tools such as ChatGPT. Where can AI truly help? Why it's not so easy? How can we do things better?

Biography: Dr Janak Gunatilleke Janak is the Head of Health Data and Analytics at KPMG UK. He is a qualified doctor with healthcare operations, technology and consulting experience within large corporate, public sector and start-up environments.

Janak has authored 'AI in Healthcare: unlocking its potential', a book that explores how AI can add value in healthcare, the challenges to successful implementation and how we can do things better. He has an Executive MBA from the University of Cambridge and a Master's in Data Science, Technology and Information from the University of Edinburgh.

Dr Peter Thomas PhD FRCOphth FBCS

Presentation Summary: Ophthalmology is the busiest outpatient specialty in the NHS. Over the past two decades, a relentless rise in demand due to an ageing population has combined with an increasing ability to treat prevalent diseases. This is placing our services under unsustainable pressure. To meet this challenge, we have innovated. Digital transformation now allows us to see, diagnose and manage patients in shopping centres and in their own homes. A patient with an urgent eye problem in London is now able to access a Moorfields ophthalmologist by video consultation in minutes, while ocular imaging modalities that were cutting edge 20 years ago are now available in most opticians on the High Street.

These images are powering a small industry in ophthalmic artificial intelligence which promises, in the near future, to allow patients to receive gold-standard diagnostic expertise

without ever setting foot in a hospital or meeting an ophthalmologist. We are also discovering that AI algorithms aren't limited to diagnosing ocular conditions from retinal scans: the eye is the only place where the central nervous system and vasculature can be imaged directly, and the burgeoning field of oculmoics promises the diagnosis of systemic disorders from images of the eye. The talk will describe how ophthalmology is the canary in the coalmine of digital transformation through AI and other technologies.

Biography: Peter Thomas is the Chief Clinical Information Officer and Director of Digital Development at Moorfields Eye Hospitals. His primary interest is in digital transformation of clinical care, and creation of a hospital environment that can embed and sustain technologically enabled and automated services. To achieve this, he has recently founded the UK's first Department of Digital Medicine. In 2022 he was named as "CCIO of the year" in the annual Digital Health Awards. By clinical training he is a paediatric ophthalmologist. He is the digital/clinical lead for the NHSE eyecare transformation. Prior to medicine Peter undertook his PhD in computational neuroscience at the University of Cambridge and spent time working in research and development at IBM.

Professor Jag Dhanda BSc MFDS FRCS(OMFS) PhD

Course Convenor and Presentation Summary: artificial intelligence will bring about profound changes in the management of our patients in terms of diagnostics and treatments but it will also have a profound role in education and training of future dentists and surgeons. Likewise, extended reality will also have an increasing role to play in education and training. We will discuss how these technologies can be utilised from mapping out training requirements to developing resources that utilise generative AI which will enable scale up and adoption of extended reality techniques in undergraduate and postgraduate surgical and dental curriculum.

Biography: Professor Jag Dhanda is an Oral and Maxillofacial/Head and Neck Surgeon with a subspecialty interest in head and neck oncology and a Professor of Surgery and Extended Reality in Medicine and Surgery. His NHS practice is limited to free tissue transfer for complex head and neck reconstruction and his private practice limited to dental implants.

He has been the successful recipient of three Royal College of Surgeons of England research fellowships (college, board and specialty) and a CRUK fellowship. Professor Dhanda is the founder and clinical lead for Virtual Reality in Medicine and Surgery (VRiMS.net), a free for trainee resource using live streaming and restreaming of cadaveric surgical techniques in virtual reality. He is conducting studies to scientifically evaluate and validate extended reality in medical education in the UK and for global health. VRiMS has released a VR app for basic life support and fire safety training for mandatory training and is the largest XR in medicine and surgery research group in the UK.

His research group is also developing a skin cancer augmented reality app to guide surgeons in diagnosis using AI and surgical techniques for managing facial skin cancer. Professor Dhanda regular travels to low to middle income countries to develop teaching resources using extended reality. His group raises funds to develop innovations for global surgery and donate surgical instruments to rural surgeons, as well as providing training for all of the surgical specialties using extended reality.

Professor Jamshid Dehmeshki BSc MSc PhD

Biography: As an AI-driven research and software engineer with 25+ years of experience, Professor Jamshid Dehmeshki is deeply committed to leveraging artificial intelligence in medicine. He has led pioneering initiatives at the intersection of AI and healthcare, focusing on advancing clinical research, digital platforms, and therapeutics.

His expertise spans designing and delivering complex imaging trials, developing AI-driven diagnostic solutions. In leadership roles as Chief Technology Officer in multiple companies, he has successfully delivered major medical software and diagnostic tools, obtaining FDA approval and CE marking for these innovations and acquiring several patents. As a prolific academic, he has published over 200 scientific research papers and book chapters, specialising in digital health and computer-aided diagnosis systems for various cancers and vascular conditions. Driven by a passion for healthcare innovation, he is dedicated to pushing the boundaries of AI in medicine to shape the future of healthcare delivery.

Professor Andrew Keeling BSc BDS PhD MFGDP FHEA

Presentation Summary: with growing adoption of end-to-end digital workflows in prosthodontics, clinicians should be mindful of how the technologies work and the clinical

implications of their use. This talk will explore digital methods for getting the patient into the computer such as digital impressions, optical face scanning and recording the occlusion. The various uses of AI will be discussed in this context, offering examples of where such technology is certainly helpful, alongside some less well advertised examples which could be considered dubious in clinical merit. The aim is to provide a balanced view of the state of the art in this field.

Biography: Professor Andrew Keeling studied computer science in the early nineties at the University of Bristol (UK) before switching to Dentistry, qualifying in 1999. He worked in full time general practice for a decade before migrating to a full time University position at Leeds School of Dentistry. Over the past 15 years he has built and led the Digital Dentistry Group, with the aim of investigating and developing technological solutions to genuine clinical problems.

Current work is focused on accurately getting the patient into the computer, including 3D scanning, facial scanning and dynamic articulation. A second strand of work involves 3D printing for dental training models and for dentures. Most of the work involves traditional software engineering combined with machine learning, followed by clinical trials. Andy is a Senior Consultant for GC IaG (Switzerland) advising on all aspects of digital dentistry. A spin-out company was recently formed in Leeds to develop various outputs from his academic group and has received around GBP 3 million in funding to date from government grants and other investments. Andy has authored over 50 peer-reviewed academic papers and regularly collaborates with other international groups.

Dr Andrew Dawood BDS MSc MRD RCS FCGDent

Presentation Summary: artificial intelligence (AI) has become an integral part of the innovative digital technologies that are central to our practice of implant dentistry. From diagnosis to planning, in the surgery and in the dental laboratory, the mainstream use of these technologies has transformed the way we provide treatment. Dramatically impacting upon the management of our patients, the application of AI has the potential to enhancing outcome and contribute to a more enjoyable and predictable implant practice.

A creative use of this technology permits innovative approaches to treatment that could never have been previously considered, facilitating treatment in straightforward and complex situations. The aim of this presentation is to show how Artificial Intelligence (AI) can enhance many aspects of the practice of contemporary implant dentistry surgery.

Biography: Dr Andrew Dawood is a Specialist in Restorative Dentistry and Prosthodontics and devotes his time to dental implant surgery at the Dawood and Tanner Dental Practice. He is also an Honorary Consultant at University College Hospital London, and at the Hospital for Sick Children Great Ormond Street, where he provides implant-based reconstructions for

oncology patients. Andrew utilises the latest technology to plan and implement both simple and advanced treatments. He has a particular interest in the implant rehabilitation of patients who have atrophic jaws; particularly those who have suffered implant failure with extensive bone loss. Andrew has a passion for technology and is the founder and Clinical Director of Cavendish Imaging / CT Dent, CBCT imaging centres.

Dr Asif Chatoo BDS FDS MSc MOrth FCGDent

Presentation Summary: in the last two decades, orthodontics has witnessed a rapid evolution in digital technologies. This advancement has brought about a significant revolution in the assessment, treatment, and monitoring of patient care.

The introduction of the digital workflow has made clinical practice more efficient. By integrating patient records, it is now possible to create a 3D model of the patient's problem, enabling a comprehensive approach to treatment and effective multidisciplinary care. AI and digital technology can automate patient care processes, which raises a question about the future role of the clinician.

Biography: Asif Chatoo studied for his degree in dentistry at King's College, University of London. Following this he gained his master's degree in Orthodontics from GKT Dental Institute, London in 2001. He has a keen interest in the multidisciplinary treatment of adult patients and digital technology in orthodontics. He co-founded the first clinic in the UK dedicated to lingual orthodontics in 2005, is Past President of London Dental Fellowship and current President of the European Society of Lingual Orthodontics.

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