

viewpoint

The introduction of implant dentistry in the South Pacific Islands of Fiji

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Fiji is a Micronesian island group in the South Pacific Ocean, approximately 2000km from Auckland and about one-third of the way from New Zealand to Hawaii. It has a population of 945,000. It is considered by the World Bank to be a developing country.

Only limited specific information is available about the quality of dental health care in the South Pacific Islands. Overall, though, there is a lack of dentists in the region, as demonstrated by the low dentist-to-population ratio¹. There are currently approximately over 100 dentists and over 60 therapists in Fiji². The Commonwealth Dental Association assesses the dentist-to-population ratio as approximately 1:9,000 in Fiji, which is far fewer than in Australia or New Zealand³. The Fiji National Oral Health Survey showed that 55-64-year-olds had an average of 14 missing teeth, but few wore removable partial dentures, and only 2.6% of the population wore complete dentures⁴.

As in other developing countries, oral health care provision for Fijians operates at both extremes, ranging from a high Western standard of oral health care for a rather small portion of the population in the private sector, to the majority being offered primarily exodontia without restoration in the government service. There are notable inequalities in oral health and inequities in service provision by financial status.

The Fiji School of Medicine (FSM) is the primary provider of formal oral health education in the South Pacific Islands. The School's programmes have been supported by grants from AusAid and other international development agencies, while the quality of education has been monitored by the University of the South Pacific (USP) with the assistance of external examiners from New Zealand and Australia^{5,6}. In 2010, the FSM amalgamated with five other tertiary institutions in Fiji to form the Fiji National University; this will be the conferring body for all bachelors and higher degrees undertaken in the FSM⁷.

In 1945, a four-year dental training program commenced. In 1957, the course was shortened to three years after the exclusion of prosthetics, which became an optional postgraduate course. Dental training ceased in 1985 with the government sending students overseas, primarily to Australia. Upon return, they found the local situation was completely different to what they had learned overseas, and most went back to the developed countries where they had trained.

The current five-year bachelors degree was introduced in 1993. It uses a multi-entry, multi-exit approach, whereby a sequence of educational modules allows for a career path from dental technologist to dental hygienist, dental therapist and (finally) dental surgeon with a university degree. This allows candidates to "step off" and enter the workforce, with the option of re-entry (at the point of exit) after further experience.

To date, however, a certain proportion of Fijian patients demand more comprehensive treatment options—such as dental implants—than those which are locally available. Moreover, dentists in practice are encountering patients who have received such treatments overseas (Mattheos et al, 2009a). This places pressure on dentists who are not sufficiently educated or experienced in dental implant provision and maintenance, although some have attended introductory implant dentistry courses and lectures overseas.

The authors were approached to provide a structured hands-on clinical workshop that would include both knowledge transfer and direct clinical supervision. The latter was considered to be important, because as it is recognised that students who do not perform clinical implant care on live patients are less likely to perform that care in practice (Petropoulos et al, 2006). Ongoing advice and support on implant dentistry to the participants were to be available subsequent to the course. Hence, upon establishing that the endpoint was to make the course participants competent (or at "safe beginner" level) in the delivery of straightforward implant dentistry in their own practising environment, specific learning outcomes were subsequently developed through two complementary workshops and other supporting resources (Willis, 2009).

Competence has been defined by the Commission on Dental Accreditation (2006) as: "The levels of knowledge, skills and values required by the new graduates to begin independent, unsupervised dental practice." Online tools are available to help determine whether a dental implant case is straightforward, using the SAC (Straightforward, Advanced, or Complex) implant case complexity system⁸.

¹ King T. Planning for Oral Health in the Pacific. Commonwealth Dental Association. [Cited 27.11.10]. Available from <http://home.btconnect.com/cda-uk/PacificRegionalMeetingNovember2005Report.pdf>.

² Morse Z, Maimanuku R, Lal S. Dental Education in Fiji. Bull IDEALS 2006 6. [Cited 27.11.10]. Available from <http://www.ideals.ac/members-only/bulletin/>.

³ Kravitz AS. Survey of the dental workforce in the Commonwealth. The Commonwealth Dental Association. [Cited 27.11.10]. Available from <http://home2.btconnect.com/cda-uk/reports/WorkforceSurvey2007.pdf>.

⁴ Fiji Ministry of Health. The Fiji National Oral Health Survey Report 2004. [Cited 27.11.10]. Available from <http://www.health.gov.fj/Oral%20Health/National%20Oral%20Health%20Survey%20Report/cover.html>.

⁵ Australian Agency for International Development. Australia's Aid Program. [Cited 27.11.10]. Available from <http://www.ausaid.gov.au/>.

⁶ The University of the South Pacific. [Cited 27.11.10]. Available from <http://www.usp.ac.fj/>.

⁷ Nailatikau E. The Fiji National University Decree 2009. [Cited 27.11.10]. Available from http://www.paclii.org/fj/promu/promu_dec/fnud2009294

⁸ International Team for Implantsology. The SAC Classification in Implant Dentistry (ISBN: 978-1-85097-188-7) [Cited 27.11.10]. Available from <http://www.iti.org/?a=1&t=0&y=3001&r=0&n=188&i=&c=25&v=page&o=&s=>

The aim of this article is to describe this novel competence-based dental implant educational course and its achievements. The course aims, competencies, structure, materials and participants are described.

Course aims and competencies

It was intended that, after successfully completing the course, the participants would have achieved the following learning aims: be cognisant of the basic sciences relevant to implant dentistry practice; know the principles of design and construction of prosthodontic restorations on dental implants; be able to evaluate the factors required to evaluate successful or failing dental implant therapy; have knowledge of the principles of diagnosis and treatment planning; be aware of situations which cannot successfully be managed with implants in a general dental practice, or which require specialist advice; and be motivated for continued improvement and lifelong learning (Mattheos et al, 2009a).

With the respect to the competencies, after successfully completing this course, the participants should be able to describe and rationalise: the basic sciences relevant to the practice of implant dentistry; diagnosis, treatment planning and treatment sequencing for patients requiring implants; the indications and contra-indications for implant therapy; the need for careful case selection; oral hygiene considerations specific to implant therapy; and the clinical and laboratory procedures necessary for implant placements and prosthetic procedures. Each participant should be competent as a safe beginner at: treating a straight-forward, uncomplicated and low-risk oral implant case; evaluating the success or failure of oral implants; and obtaining an accurate history, performing a comprehensive clinical dental examination (including radiographs) and formulating a workable treatment plan for straightforward oral implant cases. Course participants would also be expected to possess appropriate attitudes, behaviours and skills in the diagnosis and management of a straightforward case in need of rehabilitation with oral implants. Finally, participants should be familiar with the need for constant evaluation of techniques and the application of scientific principles and practice to the resolution of straightforward oral implant cases, as well as familiarity with the role of oral health as an integral part of general well-being, and the need for appropriate control of pre-operative, operative and post-operative pain and anxiety.

Course structure and practical outcomes

The course was intended to be as interactive as possible, with limited passive learning. The techniques included seminars, lectures, group discussions, tutorials, demonstrations on models and simulation practicals on artificial and pig jaws that were followed by authentic clinical sessions in the participants' own operatories. Informal assessment in the workplace was employed by course mentors in order to judge fitness of purpose as defined by the course's learning outcomes (Eaton et al., 2008). The literature was utilised to provide an evidence-based approach during case presentations and group discussions that provided critical thinking to this clinically-based learning.

The first workshop extended over four days (Table 1). The second one took three days (Table 2). The lectures covered the basic sciences of implant dentistry (Table 3). Before the workshops commenced, participants provided the lecturers with details of potential patients. The information provided for this included medical history, dental charts,

digitised radiographs, and intra- and extra-oral photographs. Documents were sent by email and subsequently discussed using the Voice over Internet Protocol (VoIP) of Skype™⁹.

Course materials and documentation

NobelBiocare™ offered an implant training kit with all the necessary hardware needed, including an OsseoSet 200™ and artificial maxillae. A wide selection of tapered implants, healing abutments, cover-screws and abutments was offered for training and patient use.

The Fiji School of Medicine's Department of Dentistry and two private dental surgeries were the main course locations. Modern dental equipment was available in the two private surgeries; these were used for the actual placement and temporary restoration of the implants at the workshop, and consumables were at hand in both surgeries.

Digital photographs and movies, digitised radiographs, standard radiographs and stone models were used at all stages of the course for instructional and documentary purposes. Both Microsoft™ PowerPoint™ and Apple's™ Keynote™ presentation software were used to project lecture content and clinical photographs. Movies were used for further development and review of the clinical sessions, as has been used by Fakhry *et al* (2007).

Clinical cases were presented at the commencement of the course for treatment planning. During the initial phase of the course (before the workshop), many discussions were held via VoIP and occasionally by phone. The same means of communication proved essential during the healing phase of the implants and after the restoration with temporary prostheses.

Course participants

The majority of the participants were recent graduates from the Fiji School of Medicine and dental assistants who acted as "observers". Two participants actually performed the hands-on clinical procedures in their own practices. They had obtained their primary dental qualification in Australia at the University of Adelaide (graduating in the early and mid-1990s) but had not previously placed any implants. These two practitioners were well-established, with more than ten years experience in private general dental practice. All members of the Fiji Dental Association had been invited to attend all lectures.

Course evaluation and appraisal

Communication (both written and verbal) between instructors and course participants was uninhibited, with all participants fluent in English at a native speaker level. Communication with the non-native English-speaking instructors increased once face-to-face contact was established and should not be underestimated for such an endeavour. Communication via VoIP was efficient most of the time, although there were significant interruptions, particularly when a cyclone struck the South Pacific Island group and all activities came to a halt for several days. Furthermore, Internet access proved to be essential for sending high-resolution clinical pictures for discussion and communicating advice while using VoIP at the same time. This technology is referred to as "teledentistry", a field of interest which dates back a decade and continues to gain prominence (Yoshinaga, 2001; Chen et al, 2003; Vandrey et

⁹ Federal Communications Commission. Voice-Over-Internet Protocol. [Cited 3.04.10]. Available from <http://www.fcc.gov/voip/>.

Table 1. General outline of module I of workshop – implant surgery

	Tuesday	Wednesday	Thursday	Friday
Morning session 4 hours	Course introduction	Revision of concepts discussed	Implant surgery demonstration	
	Introductory lecture series	Familiarisation with surgery and equipment Patient case reviews and examination	Implant placements	Post-operative review
Afternoon session 4 hours	Visit and inspect course localities	Implant surgery lecture Pig jaw surgical exercise at FSM		Discussions and planning Future educational and research opportunities

Table 2. General outline of module II of the workshop – implant restoration

	Wednesday	Thursday	Friday
Morning session 4 hours	Review of hardware Clinical review of patients treated in module I	Master impressions and temporisation	Laboratory work check Lecture
	Round table discussions on achievement from module I		Case presentations
Afternoon session 4 hours	Demonstration, discussion impression taking options Lecture Laboratory exercises, temporisation	Tutorial Experiences with implants Free discussions with course participants	Lecture series
	Evening session 2 hours	Evening lectures discussion	Evening lectures with panel discussion

al, 1999; Wheeler, 1999).

The two core participants carried out the clinical treatments, while the remaining students were invited to attend all lectures, the preclinical course and to observe placement and temporary restoration of the implants. Digital photography proved essential for speedy communication and presentations during the course and the two key participants presented their cases in formal sessions to all course attendees and teachers for comments and critical appraisal.

A significant hurdle was becoming familiarised with the specialty equipment that could be shipped to Fiji only shortly before the course. Only a minority of the teachers had access to (and were familiar with) the supplied equipment prior to the course, but the others were able to become well prepared by studying information available on the Internet. It was interesting to observe that, for the specialists, the use of a system with which they were not intimately familiar did not present a major difficulty.

As a result of the course, the “Fiji Team of Implantology” was founded to help achieve one of its aims (for continued improvement and developing lifelong learning behaviour). The group would help communication among both course participants and teachers, as well as being open to other Fijian dentists.

Overview

The use of oral implants in reconstructive dentistry is considered to be one of the most significant developments

in dentistry in the past few decades (Mattheos et al, 2009b). Although implant dentistry was initially undertaken within selected and specialised dental teams at universities or specialist centres, a growing number of clinicians with acquired additional competence are interested in performing both the implant surgery and prosthodontic rehabilitation (De Bruyn et al, 2009). The use of professionals from many different disciplines in our course reflects the fact that implant dentistry now spans many areas and scientific disciplines (Petropoulos et al, 2006). Dental implant therapy has thus opened up a new area of dental education (Donos et al, 2009). There is currently, however, a global discrepancy (both quantitatively and qualitatively) in the approaches towards undergraduate and postgraduate/specialist level education in implant dentistry (Donos et al, 2009; Mattheos et al, 2009b).

Identification of materials needing to be brought in for the two workshops was difficult and very challenging. Some of the workshop providers had been in the country previously in a number of different roles (such as external examiners or visiting surgeons) but not specifically for implant dentistry. It was rather difficult to judge precisely what materials and instruments would be made available (and in what condition) by the supporting supply company before the workshop commenced. Assumptions were thus made that only limited equipment would be available for the first workshop. As with all thorough courses, timetables (Tables 1 and 2) were essential, but more important was adhering to the times set.

Table 3. Overview of topics addressed during the two workshops

Topics covered during the workshops		
Hard- and soft-tissue physiology and pathology	Engineering and technology	Anatomy and radiology
Bone	Implant manufacturers	Mandibular canal
Mucosa	Allograft	Maxillary sinus
Wound healing		Intraoral radiography
Osseo-integration		Panoramic radiography
Guided bone regeneration		CT scans
Implants	Instrumentation	Patient selection
Materials	Manual vs machine	Oral hygiene
Surfaces	Torque control	Bone quantity and quality
Shapes	Osseotomes	Medical history
Placement	Surgical guides	Pain and anxiety control
Single- vs two-stage		
Treatment strategies and sequencing	Surgical considerations	Restoration
Criteria for restoration	Flap design	Suprastructures
Complications	Adjunctive procedures	Temporisation
	Bone grafts	Choice of abutments
	Sinus lifts	Occlusal concepts
	Nerve repositioning	Recall

Owing to the tight timetable this was crucial and did not allow going by the more relaxed “Fiji Time”.

The unique effort in holding a course over several months between October 2007 and May 2008 had achieved three major and distinctive goals, namely: introducing implant dentistry to keen dental service providers in the South Pacific Islands of Fiji; demonstrating to course attendees the surgical and the prosthodontic aspects of implant dentistry; and providing two hands-on clinical workshops in Suva, the Fijian capital.

The course structure which was set in place was unique for a number of reasons. There was non-formal training, assessment and feedback (that is, there was no formal certification but it was deemed to be appropriate for the setting); training and feedback occurred in a variety of learning environments including the clinician’s operatory. Moreover, the course used a variety of teaching methodologies, multinational instructors and mentors with a high demand for collaboration, and was a strategic partnership with the private sector, industry, academic institutions and a national dental association.

The participants were deemed to be competent by the course instructors as safe beginners to manage the implant treatment of straightforward, uncomplicated and low-risk cases. Such competence has been further defined by Mattheos et al (2009c) as “possessing a sound theoretical knowledge and understanding of the subject together with adequate clinical experience to be able to resolve clinical problems encountered, independently, or without assistance and in a professional manner”.

This educational approach is consistent with the shift that is occurring from more traditional disciplined-based teaching systems to more contemporary competence-based education (Donos et al, 2009). Moreover, the interactive nature of the

course provided is well in agreement with the experience of others (Reynolds et al, 2008). Regrettably, there is only a limited number of reports available in the literature which describe similar efforts to develop oral care skills capacity in developing countries (Bhat, 2007). More sophisticated course management tools are in place in developed countries, with all-inclusive software packages such as BlackBoard™, WebCT™ or others in use at many universities (Gwozdek, 2008). With the availability of podcasting or pubcasting, courses such as the one held in Fiji could be enhanced, yet again the question of costs versus benefit arises (Jham et al, 2008)¹⁰.

It is recognised that advances such as those seen in dental implantology do not rapidly permeate educational curricula and it can not be expected that the undergraduate dental curriculum will be able to provide enough knowledge and experience for graduates to be able to completely manage dental implant therapy (Sanz et al, 2009). Another overarching question, however, might be whether it is wise to bring implant dentistry to developing countries. Reflecting, though, on how dental implants can significantly improve the wellbeing of some patients, there is no doubt that this treatment modality ought to have been taught and introduced to Fiji (Lang et al, 2009). Oral diseases resulting in incremental tooth loss and eventual edentulism burden patients in developing countries as elsewhere (Pack, 1998). Additionally, in certain straightforward cases, implant therapy can be a less expensive treatment option (Mattheos et al, 2009c; Lang et al, 2009). It is possible to argue that even small developing countries deserve access to treatment modalities that are offered elsewhere, provided all treatment criteria are met.

¹⁰ SciVee. Making Science Visible. [Cited 3.04.10]. Available from <http://www.scivee.tv/>.

The form, structure and delivery of this course could be deemed as being appropriate to the scientific, professional and financial needs of the participating dentists by providing a direct and personalised delivery of teaching through appropriate supervision and mentorship (Eaton et al, 2008; Mattheos et al, 2009c). At least one of the core participants is now routinely using dental implants. The innovative educational endeavour described here could be applied in many fields of oral health care and education, and we would like to recommend and encourage that the making of such efforts in the Pacific with further support by stakeholders (including industry) from New Zealand and elsewhere.

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