

# NEWS BULLETIN

Australian Dental Association – The professional leader in dentistry

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**MAKING A DIFFERENCE**  
National Volunteer Week  
Dentists are heeding the call

**CONSENT**  
Some common misconceptions

**PHOTOGRAPHY IN DENTISTRY**  
Underrated and under utilised

## In This Issue

- 04** Advocacy  
Fighting the good fight.
- 08** Advocacy  
Oral health front of mind on WOHD  
Australia's *Oral Health Tracker*  
launched.
- 11** Continuous learning  
Why you should add a conference  
to your CPD mix.
- 15** Dental Health Week 2018  
Product and resources to support  
DHW activities.
- 16** Active and employed with  
some unease  
Dentist graduates survey results.
- 18** The Australian Schedule rule  
or health fund business rule?  
Itemising procedures.
- 20** Consent  
Some common misconceptions.
- 32** Universal dental adhesives
- 36** Clinical photography in dentistry  
Improving records, risk management,  
communication and compliance.
- 42** Protecting you at different life  
and career stages  
Can your insurance flex to incorporate  
your growing life?

## Advertising

- 47** Classified advertising

## Cover Story

- 22** Making a difference  
*Give a little, Change a lot.* This month  
volunteering steps into the centre  
ring with National Volunteering Week  
21-27 May.

## Regular

- 01** President's comments
- 06** News
- 26** PharmaAdvice  
So, can I prescribe tramadol?  
A frequently asked question follows  
the up-scheduling of codeine.
- 33** ADA National Library
- 35** Clinical Hints  
February 2018 TEASER answers
- 40** HR  
Casual or part-time?  
Why it is important to distinguish  
between the two.
- 46** Learn. Connect. Network.  
Calendar of dental events.

# Clinical photography in dentistry

## *Improving records, risk management, communication and compliance*

**Photography in dentistry** has generally been underrated and under utilised. However, the advent of digital technology has simplified both the acquisition and management of still images, providing the basis for a useful addition to the way we document our work and communicate with our patients.

Dentistry exists in a complicated social and administrative environment and we need to include those tools that can help us promote and achieve best practice. Today there is an increasing recognition that the ability to pictorially chronicle the procedures and conditions which make up the practice of dentistry is a discrete discipline that can significantly augment the fundamental areas of documentation and communication.

It seems inexplicable that in Australia (unlike New Zealand, the USA and UK) the *Guidelines on Clinical Records* do not include photography. But the good news is that the ADA has been very proactive in this field and, for over a decade through its CPD programs, has provided day courses and webinars for dentists in clinical photography. The Dental Faculty at Sydney University has, since 2013, included a clinical photography segment in its post-graduate implant diploma courses. This year in 2018, for the first time in Australia, the Sydney Faculty has initiated a program for third year DMD students to be introduced to clinical photography.

It is important to recognise that traditional records such as clinical notes, charting, radiographs and models do not show the mouth as we see it through our loupes. This is where good clinical photography fills a huge gap in our records, adding a new level of

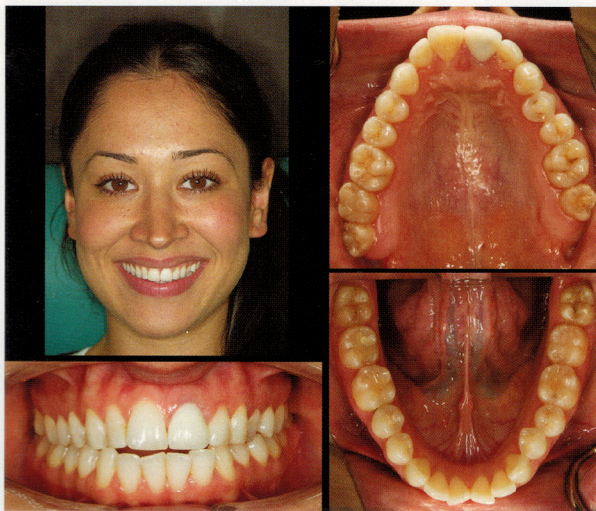


Fig 1. Four standard photographic views providing a comprehensive overview of the mouth and face.

objective evidence and being a time-stamped, real-time view of the moment. Many images are planned such as a series of standardised views for the new patient. In most cases four images: a head shot, anterior view of teeth and both occlusal arches can provide an almost complete visual record of the mouth (Fig 1). However, the capacity to quickly take an opportunistic image during treatment without disturbing the workflow (e.g. fractured tooth) (Fig 2) not only adds evidential support to the clinical notes, but also is a risk-management tool and an educative one. Showing the patient this sort of image during or at the completion of treatment helps the patient own the issue, be involved in the treatment decisions and defuses any sense of exploitation or disaffection.

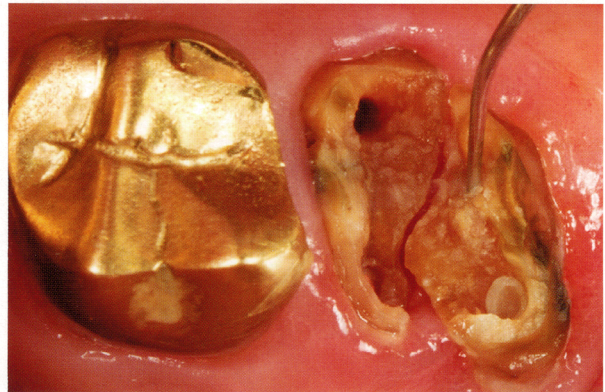


Fig 2. Fractured tooth requiring extraction. The patient wanted an old crown recemented but understood from the photo this was not possible and was prepared to explore not only the extraction but also the prospect of replacement with an implant.

Clinical photography in dentistry is a sibling to digital radiography. Both are examples of biomedical imaging with photography using natural light on an electronic sensor to produce a digital image, whereas radiography uses radiation with the same technology.

Promoting clinical photography in dentistry as a discipline requires a clear framework of purpose, equipment and technique.

### PURPOSE

The goal of clinical photography in dentistry is to improve records, risk management, communication and compliance.

The scope of dental clinical photography should encompass all areas of the mouth and this means a full range of standardised extra-oral and intra-oral views depicting everything from a head to a tooth. As well, the remit involves not only healthy tissues and beautiful teeth, but also the whole spectrum of dental care that dentists deal with every day, including disease, damage, treatment and review (Fig 3).

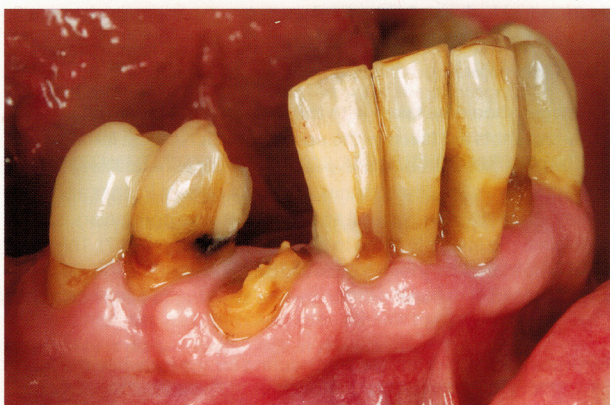


Fig 3. The scope of clinical photography covers the whole spectrum of dental care.

Images can be used for diagnosis, treatment planning and case presentation; medico-legal, risk-management matters and reports; case progress, monitoring and review. The fact that one image can be used for many uses (e.g. records, report, referral, education) and many configurations (an occlusal view can be cropped to a quadrant and to a single tooth) (Fig 4) provides extraordinary versatility with this medium.

Quality clinical photography can also enhance professional communication (e.g. referrals and working with technicians). Most importantly, where the images are of the patient's own mouth, photos can make education comprehensible and empowering, leading to improved patient compliance. This works when the image, in addition to being clear, focused and with true colours, can actually provide context and comparison which are essential for true comprehension. This works best with occlusal and quadrant



Fig 4. One image—many configurations. An occlusal image is cropped or magnified to a quadrant and then to a single tooth without loss of resolution.

views. The popular intra-oral camera (IOC) is an expensive piece of outdated technology with a tiny sensor with minimum megapixels (2-5MP) producing a jumble of highly magnified images that display poor resolution and colour as well as distortion. The IOC provides only a fraction of the scope of clinical photography and although being quick and convenient is unsatisfactory both as an evidential and an educative tool.

### CAMERA EQUIPMENT

Hand-held macro photography in the clinical setting requires specific equipment and accessories to produce images with immediacy, consistency and accuracy.

The camera system should be solely for use in the surgery and because this can be bought from a retail camera shop (and not marketed as an expensive dental item) is actually quite a cheap investment (approx. \$2,500) (Fig 5). A suitable camera body will have a DX or APS-C sensor with a minimum of 20 megapixels. This configuration has been consistent in these cameras for the last 6-8 years indicating a benchmark standard for still photography and thus no necessity to upgrade for the foreseeable future. The 60 mm macro lens is far superior to the traditional 105 mm macro lens being smaller, lighter, easier to focus and most importantly has a greater depth of field range. The close-up flash is either a ring-flash or pair of speedlights. The integration and quality of images is better with components from the same company as the camera body rather than buying cheaper substitutes.

RECOMMENDED CAMERA SYSTEMS		
 <p><b>1.77Kg</b></p> <p>BODY: Nikon D7200 (D7100, D7500) LENS: Nikon AF-S Micro Nikkor 60mm f/2.8G ED FLASH: Nikon Speedlight R1C1</p> <p><b>\$2200-\$3000</b></p>	 <p><b>0.98Kg</b></p> <p>BODY: Olympus OM-D E-M1 MkIII (E-M1) LENS: M.Zuiko 60mm f/2.8G ED Macro FLASH: Metz 15MS-1 Wireless Macro Olympus twin macro flash STF-8</p> <p><b>\$2070-\$3100</b></p>	 <p><b>1.75Kg</b></p> <p>BODY: Canon EOS 7D Mk II (7D) (body) LENS: Canon EF-S 60mm f/2.8 USM Macro FLASH: Canon MR14 EX (II) Ring Lite</p> <p><b>\$2200-\$3200</b></p>
<p><b>CRITERIA</b></p> <ul style="list-style-type: none"> <li style="margin-right: 10px;">● quality of images</li> <li style="margin-right: 10px;">● lightweight</li> <li style="margin-right: 10px;">● value</li> <li style="margin-right: 10px;">● integrated</li> <li style="margin-right: 10px;">● ease of use</li> <li style="margin-right: 10px;">● depth of field</li> <li style="margin-right: 10px;">● special features</li> <li style="margin-right: 10px;">● longevity</li> </ul>		

Fig 5. Recommended camera systems from Nikon, Canon and Olympus.

Only Nikon cameras have a Retouch Menu which allows for optimisation of images in the camera. This includes cropping, straightening and lightening of shadows. Thus there is rarely the need for repeat photos and the uploaded photo is perfect. While all systems take similar quality images, this particular function makes the Nikon the system of choice.

### SETTINGS

Another reason for having a dedicated surgery camera system is that there are a number of parameters that once fixed, never need to be altered. These include single point auto-focus, shutter speed and ISO, spot metering, drive mode, white balance, picture control, and image quality.

The only setting which is altered is the aperture (f/stop) which is opened to f/6 to f/10 for extra-oral shots and closed to f/20 for all intra-oral shots.



Fig 6. The combination of direct and mirror view with a quadrant mirror can clearly show the effects of wear and erosion on the molars.

While it might seem counterintuitive to use manual exposure mode, the use of programmed or auto modes allows the camera to introduce algorithms which change most of the above settings for each photo. In manual exposure mode shutter speed and ISO are fixed allowing only aperture to be altered for either intra- or extra-oral images.

Automatic focusing is far superior to manual focusing in terms of speed and accuracy but only single point focus allows for precise focusing and maximum depth of field range (the formula is 1/3 in front and 2/3 behind the focus point). For example, to take an anterior view of teeth and have the centrals and molars in focus requires firstly a lens capable of decent depth of field range (e.g. 60 mm macro). Using a single point focus on the canine (button half down) then reframing to centre the image, the button is fully depressed producing a perfectly focused image front to back (Fig 1 anterior view).

### ACCESSORIES

Retractors are essential to expose the teeth and tissues for imaging. Individual plastic retractors are recommended for anterior views of teeth and lateral views whereas stainless steel Columbia style retractors are superior for intra-oral shots (occlusal and quadrant views) particularly with large occlusal mirrors.

Rhodium coated glass mirrors provide the best reflective surface and the best available are Drs Eyes. A basic range includes large, medium and small occlusal mirrors, plus standard and tapering quadrant mirrors (Fig 6).

### TECHNIQUE

There are special skill-sets required for this type of hand-held macro photography and the technique involves both teamwork and positioning.

#### The Team

Ideally there are three people in the photographic team – photographer, assistant and patient.

The photographer can be the dentist, hygienist or dental assistant and will usually deglove to take the photo(s). The assistant will remain gloved and firstly suction, then place the mirror and use the triplex to dry the teeth and offset fogging. The patient always holds the retractors.

### Positioning

Positioning involves both the patient and the photographer and is one of the major reasons for poorly oriented images.

All images should be taken with the patient in the dental chair. Extra-oral shots are taken in the upright position but all intra-oral images are taken in the supine position. The upper and lower occlusal images are cornerstones of a set of patient images and clearly visualising the occlusal anatomy of the second molars is only possible if the image is taken in the supine position (Fig 7). This should be mandatory for occlusal images as can be seen in Figures 1,4, and 8 and is the acid test for anyone claiming to have mastered clinical photography.

Particularly for opportunistic shots during treatment while the patient is comfortably in the supine working position, the image can be taken in a few seconds with a quadrant mirror and with no interference to workflow.

With each standard view there is a recurring positional hierarchy for the patient, then the assistant with the mirror and triplex, and finally the photographer who will make adjustments in the position of the camera and him/herself to ensure the subject matter is correctly framed in the viewfinder.

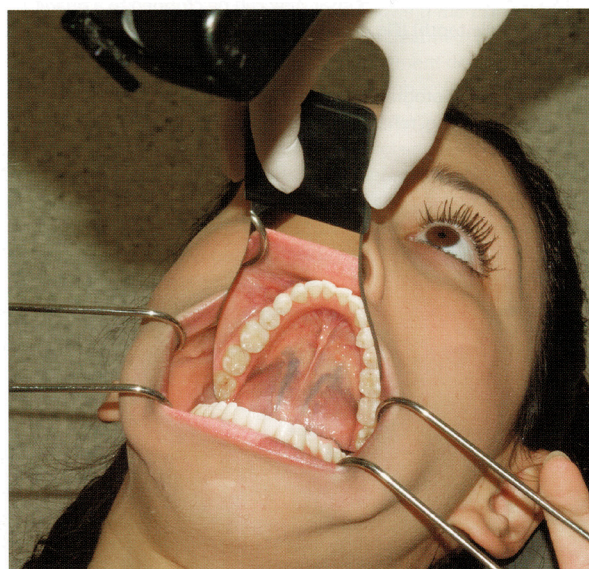


Fig 7. The lower occlusal image taken in the supine position with occlusal mirror and stainless steel retractors.

### DATA MANAGEMENT

The digital workflow sequence should allocate the patient's clinical record as the core repository for all images and the hub for all subsequent activities with the images. As with clinical notes, which should be recorded during or directly after the appointment, clinical images should be uploaded immediately to the patient record.

Clinical images should be imported directly into the digital radiological software as this adds another level of date stamping and also places the photos contiguously and temporally with the patient's X-rays. Subsequently, it is easy to place associated X-rays and photographs on a screen in front of the patient for viewing by dentist and patient (Fig 8).

Images should be JPEGs of the largest size and best quality. Compression with very small JPEGs may compromise and even invalidate the evidential value of the digital file. There is medico-

legal and risk-management merit in considering a dual format (RAW plus JPEG) approach where the JPEG is the uploaded image but the uncompressed RAW and JPEG are archived together from the memory card just in case the format of the photograph is ever challenged.

### COMMUNICATION, EDUCATION AND COMPLIANCE

Clinical photography is a vital but rarely used tool for assisting patients to move from a compromised to a committed status.

The use of the patient's own images can be crucial in educating the patient about their dental needs. The absence of pain in caries and periodontal disease often causes the patient to dispute the assertion that there is disease or damage in the mouth.

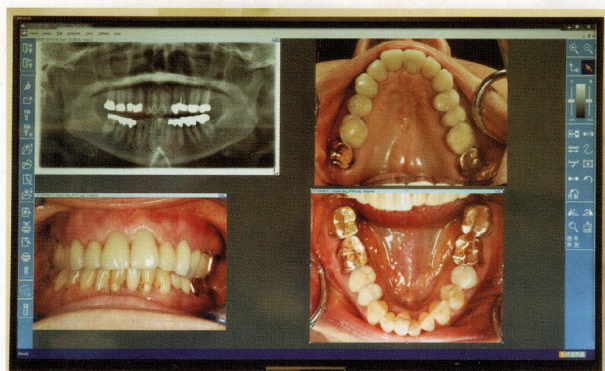


Fig 8. OPG and clinical photographs within the radiological software displayed on a monitor in front of the patient. Useful for both treatment planning and patient education.

One simple and ethical approach to enhance as well as facilitate comprehension and compliance is the combination of descriptive (factual) statements ('you have broken off a piece of tooth') augmented by clinical photographs of the patient (Fig 9). The images will identify, illuminate and validate specific issues in the mouth and will empower and educate patients to recognise their dental issues, take a more collaborative role in decision-making, and ultimately generate greater acceptance of appropriate and high quality dental treatment.

In case progress, before and after images are traditional bookends to treatment. However, intermediate pictures during the procedure can often have enormous educational value for the patient and act as supportive evidence confirming the treatment decisions and status of the teeth (Fig 10).

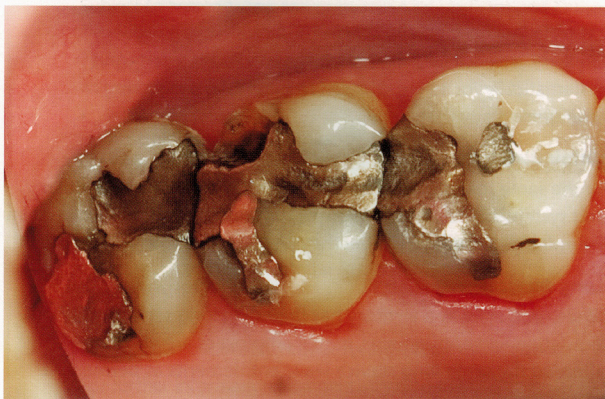


Fig 9. The supportive image validating the statement 'You have broken off a piece of tooth'. In this case, the patient having seen the photo wanted all the amalgams in the molars replaced immediately.



Fig 10. The value of intermediate images taken during the procedure in terms of treatment decisions, risk management and education. In this case, the potential for pulpal issues are clearly identified in the second molar.

### CONCLUSION

It is interesting that when patients make complaints, a high proportion of the negative findings made against dentists highlight inadequate records and failures in communication. These are the two major benefits of utilising photography in dentistry. However, it is not only a matter of taking photographs but ensuring they are of high quality, valid as evidence, enhance risk management, and are useful for education and communication. All of this requires a proper camera system and some expert training. Digital clinical photography has now come of age as a discipline in dentistry and should be part of the armamentarium of all dental professionals who aspire to provide their patients with the best of dental care.

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\*Author of the new textbook *Clinical Photography in Dentistry – A New Perspective* (Quintessence USA 2017). Available in Print and iBook from Henry Schein, Amazon and iBooks.