Digital & Conventional

Dental Photography

A Practical Clinical Manual

by

Irfan Ahmad BDS

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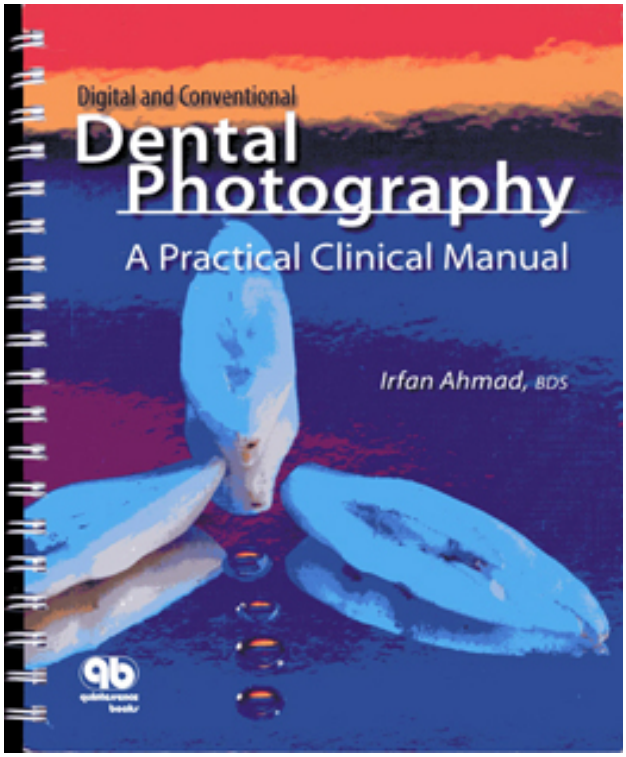

Irfan Ahmad is in love with beautiful women, beautiful fillings and dental aesthetics. His passion for superb photography has helped him to record, study and improve his dental work. Here he shows us how he does it. He is a well recognised and well published author in the field of dental aesthetics.

Great dental photography benefits the education of dentists and their patients. It is invaluable to the process of explanation during giving informed consent for treatment and it bolsters our medico-legal documentation. It is essential for dentist self-education, for communication between dentist and dental laboratory and even between technicians within a dental laboratory.

This book illustrates how to take and present artistic and inspired pictures of teeth, smiles, faces and of dental work and lab work. It focuses on the essentials of photography which are lighting, patient positioning, lenses, exposure, recording of colour and characteristics of recording media (film). The text was assembled when digital SLR cameras were dramatically reducing in price in 2003. It is not about digital cameras or about technicalities of equipment that will be out of date by now or which could be found in one's product manual. The film stock discussed might be still available but will not be used much now. However the principles of choosing between differing image-recording characteristics in film stocks are relevant to the setup of digital cameras which have settings of white balance and colour characteristic.

The book is written by a skilled teacher who presents his concepts in stepwise schematic presentations. The pages are presented in a beautiful, simple consistent format. Sophisticated concepts are presented in small blocks of text with thoughtfully chosen diagrams and photo examples, making an easy read. There is an elaborate system of symbols and icons, like those used in good travel guides.

The book has three main sections. The first covers the technical aspects of photography. These are equipment for lighting and subject setup, angles of illumination, magnification, depth of field, resolution, and aperture. It then deals with the psychological and visual perceptions within photographs. The middle section shows techniques on how to photograph teeth, prostheses and operative procedures. The last section covers image manipulation and presentation.

This book teaches dentists and orthodontists how to show their work to others. We orthodontists have been given our community's most prized possession, our beautiful children to photograph in their prime of youth. Our pictures and our work can appear more impressive than we ever dreamed. But to produce such pictures in all their beauty requires more than reading a camera's manual. The book reveals how to photograph with realism, the way our eyes see things. It shows that we need to think about our picture composition, recording of surface textures, colours, luminescence, translucency and perspective. Details in image quality will strongly impact the viewer. To obtain such image quality requires careful setup and modification of lighting. Light is controlled by positioning, by the use of diffusers and by using reflectors made of mirror or by using cards of white, grey, gold, or silver. Reflectors can be polished to obtain specular reflections or be matte for diffuse reflections. Other variables within our control are brightness of flash, flash-to-subject distance, lens magnification, perspective given by the lens focal length, depth of field, angle of incidence of light - oblique or direct, backlighting and type of light – flash, daylight, tungsten or other.

Seven concepts of close-up photography are discussed. They are:- Magnification, Depth of Field, Exposure Increase Factor (brightness varies with square of closeness), Diffraction which increases unacceptably with f-stops lower than 22, Contrast, where twenty f-stops of brightness are detectable by the human eye, 11 f-stops are recordable on digital media, 6 f-stops are recordable on translucency film but only 4 f-stops can be represented in photographic prints. Contrast is reduced by lens magnifications greater than 1:1. Backlit image display screens and computer monitors display more contrast than reflective surfaces like paper. Resolution is reduced by wide f-stops but increased by high quality of lenses that also give better Image Quality. Perceived image quality depends on many issues. Observer perception is affected by training, education, psychology, tiredness, libido, intoxicating substances, visual acuity, as well

as the inherent details of the object, the distance of the observer from the photographic media being viewed, the “circle of confusion”, meaning the resolving acuity of the optical system together with the representation media). Colour affects image quality. Colour is described as having five modalities relating to:- Reflection off the object, Volume of an object (if light transmits through it), Transmission properties (as light transmits through the object), Aperture (if there is open space around the object), and properties of the Illuminating Light.

The file size of a digital image is determined by the number of picture elements (pixels) used to draw the image times (within each pixel) the number of bits (binary data units) assigned to record the shade (or the gradation of the colour) times the number of primary colours (three). Eight-bit colour means that 2^8 or 256 shades are used to represent the brightness scale of each of the three primary colours. (At least 256 shades of grey are needed for the human eye to visualize an un-interrupted grey scale). The number of bits used by the recording in an un-compressed 8-bit image equals 3x256x(number of)pixels. Convert megabits to megabytes by dividing by 8.

The author discusses the psychology of image presentation. Psychological perception of and presentation of images is affected by the viewer’s short term memory. Short term memory copes best with only 5-9 data at once, which is the most we should put into images used for communication. For an image to impact on the viewer, we need to exclude extraneous items which detract from our message by causing “visual tension”. When remembering or training our minds transfer images from short term memory to long term memory. Long term memory requires repetition of images and requires similarity of related images within a sequence. Our minds recognise similarity within an image sequence by noting standardized lighting, colour, magnification, composition and background in the sequence. This standardization of image composition and background emphasizes the areas of interest or change. “Closure” of an image sequence is effected by comparing before and after. Closure delivers the take home message.

Photographic setups that are used for many clinical dental situations are covered in great detail in the main body of the text. The section begins with the concept of photographic space, the relationship of the photographer to the model or subject, the way the model or subject behaves for the photographer within the personal space of the subject and the photographer-subject relationship. These factors and relationships greatly affect how an image may be captured and are relevant to photography of our patients and of their expressive behaviour, especially their smiles or discomfiture with their dental condition or their happiness with our results. Facial photographs are discussed, showing how the various lighting arrangements using reflectors, diffusers and care with lighting direction, backgrounds and differential focus will capture moods,

highlighting areas of interest. How to highlight enamel textures and striations or dental plaque and gingival stippling is shown. This technique employs lighting from oblique point sources at the sides of the camera, but not from the lens axis. To show deeper enamel features like optical banding, cracks and deeper dentinal colour, the use of diffusers is explained. The chapter delves into some esoteric areas like using of fibre-optics to trans-illuminate teeth and methods to show opalescence or fluorescence of teeth using coloured or filtered light. The section shows many techniques for highlighting specific dental situations or operative procedures, such as crown margins, gingival conditions, caries and pathology. In the majority of these lighting setups the optimal flash configuration uses two flashes at 45 degrees to the axis of the lens with the camera in between. Ring flashes obliterate shadows which are so important for giving our pictures realism and depth, so ring flashes are not recommended except for places where passage of lighting is restricted, like at back teeth. But with newly available, miniature close-up twin flashes positioned close to the front of the lens, even this use of ring flashes might be questionable, but this equipment is not discussed. The closing part of the main section shows the application of all the techniques to laboratory work so as to be able to illustrate plaster models.

Image Management is discussed in the last section of the book. One might say that it is about film and so mostly out of date, but alternatively one might say that we can learn much from our photographic history and development. In 2008 there would be little value in reading about digital systems from four years earlier, so the publisher was wise to leave it out, giving the book lasting value.

The last section covers the presentation of images for communication purposes like lectures or patient presentations. It is extremely well presented with superb images. The author employs Gestalt theory (“the whole is different form the sum of the parts”) and so employs the techniques of proximity, similarity, continuity, and closure for his presentations to patients, colleagues and the community.

The production and use of images in orthodontics is an invaluable tool, and this book will teach you how to improve that skill.

It is beautifully presented, easy and quick to read, interesting in its quirky picture examples, technically excellent, didactically good and so a valuable contribution to our field. I hope you enjoy it as much as I did.

Geoffrey Wexler.