

# *A Registrar's Introduction To Cardiac Anaesthesia*

## *A Video Presentation*

*Dr Craig Surtees, M.B., Ch.B. (SA) – Dept. of Anaesthetics, Waikato Hospital, Hamilton, New Zealand  
Producer, director, editor, camerawork, sound engineer & author*

---

**Introduction:** Cardiac anaesthesia (CA) is a rewarding yet challenging sub-speciality. The current ANZCA training module requirements are fifty sessions in CA, often undertaken as a six week block. This area of anaesthetics incorporates a myriad of daunting new concepts, equipment, drugs, technical skills and work flow, vastly different from other areas experienced by registrars in their training. Video, as an educational tool, has been shown to enhance both comprehension and motivation for learning. The author believes that trainees will achieve maximum benefit by viewing this video several times during their cardiac module, in addition to the written guidelines provided by their respective department. It is hoped that this product will give new CA trainees a good knowledge base from which to direct specific questions, perfect the necessary skills and learn about some inter-regional CA practice.

**Background:** Video as an educational tool and Information & Communication Technology (ICT) in general, features in both the educational and medical education literature. It has been shown to “command attention of the viewer and heighten affective arousal toward the subject matter”<sup>1</sup>. Valcke & de Wever evaluated the impact of ICT in medical education and concluded that it enhances presentation, organisation and integration of information<sup>2</sup>. They, however, stressed the importance of prior knowledge (eg anatomy & physiology) and the need for real-life experience for ICT to be effective. A stronger association in the long term memory is created if one represents knowledge in both audio and visual forms<sup>2</sup>. It caters for individual differences in information processing as trainees differ in the way they prefer different types of visual and auditory information. Empirical evidence also suggests that images and animations have a more favourable effect on learning and motivation than textual information<sup>3</sup>. Multimedia can promote “constructivist learning” as described by Mayer. Constructivist learning refers to learning that takes place when learners attempt to make sense of the presented information by creating a logical mental representation<sup>4</sup>. There is evidence that both visual and auditory presentation, *in addition to* textual representation, helps reduce the mental burden since it reduces the complexity<sup>5</sup>. In a study with paediatric post-graduate trainees, Balsev et al. concluded that after being exposed to a video case scenario, statistically significant improvements in data exploration, theory building and evaluation were seen.<sup>6</sup> As observed by Gioia and Bass<sup>7</sup> and cited by Marx et al<sup>8</sup>, students have grown up in an environment dominated by television, movies and

video games and have thus developed learning techniques where understanding is achieved primarily through visual images<sup>7</sup>. As a result, they warn of incongruities between traditional text-based and lecture-based teaching methods, and the current styles of modern students.

The same authors<sup>7</sup> pose the contrary question of whether video is simply discouraging formal learning and promoting bad habits by supporting those learning styles which incorporate passive “consumption of video offerings”<sup>7</sup>. It would seem that printed media offers advantages of allowing the reader to control the rate of learning and to be selective in which information is assimilated. Additionally, it lends itself to re-reading and is a stable source. As described by Kozma, the video medium is “transient, not bound by cognitive constraints of the viewer and progresses whether or not comprehension is achieved.”<sup>9</sup> A “window of cognitive engagement” is described<sup>9</sup>. Huston & Wright<sup>10</sup>, suggest that attention is influenced by how comprehensible a video presentation is, with content in the intermediate range of difficulty yielding the optimum effect.

Marx et al conducted a review of all the relevant evidence to explore video education in a management context, attempt to understand its deficiencies and propose a framework for optimising the use of video while retaining the advantages of traditional print media.<sup>8</sup> They suggest that video can be used optimally for heightening cognitive arousal and increasing responsivity to subsequent content. Furthermore, by instructing the learners to view the video with an educational objective in mind, better attention and comprehension is achieved. They also believe, in accordance with Huston & Wright<sup>10</sup>, that video is a transient medium and that involved, difficult content, is best attained from print media. Marx also cites Hannafin & Hughes<sup>11</sup>, who highlight the important concept of orienting activities. These have been shown to facilitate understanding and include examples such as stating lesson objectives prior to the lesson. Their final proposition includes a meshing of video, with a moderate level of content, with print media to achieve firstly motivation, and then to sustain comprehension.<sup>8</sup>

In an attempt to achieve the optimal effect for a video in CA, the principal investigator has endeavoured to place the above research into context and extrapolate ideas and opinions relevant to the present, taking modern technology into account.

**Methodology:** This project was undertaken from Oct 2006 – June 2007. A literature review was conducted on Medline, Google Scholar and Pubmed databases using the keywords “video education medical multimedia?”. Some useful advice (including consent issues and filming techniques) was gained by consultation with a colleague who had been to film school. Further input was sought from other colleagues who had completed their cardiac module in various centres in Australia and New Zealand. This information proved invaluable in formulating and reformulating an appropriate script and filming directives. Dr Geoff Long, former Head of Cardiac Anaesthesia at Waikato Hospital and practising anaesthetist, was chosen as project supervisor, principle actor and presenter in the video. Locality assessment and permission for the use of WDHB premises was approved by the Director of Anaesthesia, and permission for filming similarly granted by both heads of Cardiac Surgery and Cardiac Anaesthesia. An information leaflet and consent forms for video crediting and release of images for the cast were drafted and final ethics committee approval was granted in Nov 2006.

Liaison with Waikato Hospital’s friendly Visual Communications Department was done at an early stage and the author is indebted to them for their loan of a Hi8 digital video camera, tripod, VGA splitting hardware and surgical op-cam. All editing and sound equipment was that of the principal investigator.

Filming took place from December 2006 in various offices, theatres and residences. Challenges in the process included organisation of a filming schedule without disruption of busy theatre schedules, and simultaneous availability of the principal investigator and members of staff. This was particularly difficult for the filming of the long case in which the video cast of perfusionists, consultants, registrars and technicians, together with the principal investigator and audio-video personnel, had to be in the designated theatre at the correct time, with specific loaned equipment, together with a consented patient, due for the specific type of surgery required for the production. Due to ethics stipulation, two full days of pre-operative consent from the patient was required. Our cardiac patients are only admitted the night prior to surgery, and an information leaflet had to be sent out prior to his admission for this purpose. Audiovisual equipment on loan throughout the eight months of filming was also not continuously available.

The editing process undoubtedly comprised the bulk of the project. Approximately 600 hours were spent producing 60 minutes of video, often requiring layering of up to 14 video and 6 audio tracks as can be seen in FIG 1. Each track comprises many effects settings, compositing, rendering and

tweaks to make the 90000 odd frames (near!) perfect. Video production is such that errors in one frame (or 1/25 of a second) may be noticeable. An interesting component to appreciate is the synchronisation of video transitions with beats of the music, an aspect that is only noticed if done incorrectly. Narration, audio blending, filtering and homogenisation were indeed almost as challenging as video effects. DVD menu, cover and logo design were a final part of the production process, and rendering to cater for both progressive and interlaced video formats used by LCD screens and TV monitors respectively was a necessity, given the intended use of the project. It was decided to make the video with a 4:3 aspect ratio rather than widescreen for similar reasons.

Free use media in the form of animations, images and videos were obtained from the internet, via wikipedia and Google images. Royalty-free music tracks were also acquired. The New Zealand Copyright Act of 1994 (42 & 43) was consulted with reference to the “Fair Dealing” sub-section (see Appendix A). Refilming of some scenes was necessary for optimisation of clips which were not amenable to rigorous editing.

Final consent from the actors was obtained after screening of the sample presentation.

A website was created for information, reference, and constructive feedback. The URL is:

<http://www.cardiac-video.com>

**Conclusion and Intended Use:** The aim of this project is to provide a multilevel tool to achieve BOTH content and motivation. The concept of personalised screening, i.e. watching the video on an individual basis rather than in a group, and allowing access for re-viewing and scanning during the clinical cardiac module removes the restrictive “window of cognitive engagement” that a single continuous screening imposes. This is achieved easier in the DVD format than VHS with the advent of chapter selection and scanning. The view thus *can* control the rate of learning according to his or her needs. A DVD can also be viewed on any personal computer rather than requiring a television monitor. The video needs to cater for both visual and auditory learners, hence repetition of the same information as an on-screen title, subtitling and as audio cues is necessary. Orienting activities (Hannafin & Hughes), have been utilized in the opening segment to highlight the knowledge and skills expected to be gained. After examining the aspects of CA in isolation, the video includes a case review to recapitulate and highlight aspects of work flow and communication otherwise not possible.

### ***Acknowledgements:***

#### Actors

Drs G. Long, A. Munro, S. Robinson, N. Kejriwal,  
R. Ebert, H. Cardwell, P. Singhal, A. Davies

J. van den Berg, B. Roberts, S. Linwood,  
L. van Kalken, M. le Grande, D. Kee, R. Saeniasi,  
J. Silveira, J. Soliven

Mr W – our patient

#### Ancillary Advice & Support

Waikato Hospital Visual Communications Dept  
Director of Anaesthesia – Locality Assessment &  
Approval  
Northern Y Ethics Committee & Te Puna Oranga  
HOD Cardiac Surgery & Cardiac Anaesthesia  
Drs S. Preissler, A. Crowther

#### ***Editing Technical:***

PAL 25 fps, 720 x 576 CCIR 601, 3.4 MB/s  
Apple iMac 24” Core 2 Duo - 2 x 2.16 GHz, 2 GB  
RAM, NVidia 7600 (256 MB), Mac OS X (10.4.8)  
Final Cut Pro 5  
Livetype 2  
The Gimp 2.2  
iDVD 6  
Cooledit Pro 2.0

#### ***References:***

1. Hannafin, M.J. Motivational aspects of lesson orientation during CBI. *Presented at annual meeting of American Educational Research Association, Washington DC.* 1986.
2. Valcke, M. & de Wever, B. Information and communication technologies in higher education: evidence-based practices in medical education. *Medical Teacher*, 2006;28:40-48.
3. Mayer, R.E. *Multimedia Learning*. New York, Cambridge University Press, 2003.
4. Mayer, R.E. Multimedia aids to problem-solving transfer. *Int J Educational Res* 1999;31:611-23.
5. Sweller, J. & Chandler, P. Why some material is difficult to learn. *Cognition and Instruction* 1994;12:185-233
6. Balsev, T. et al *Medical Education* 2005;39:1086-1092.
7. Gioia, D. & Bass, D. Teaching the TV generation: the case for observational learning. *Organisational Behaviour Teaching Review* 1985-1986;10:11-18.
8. Marx, R. & Frost, P. *Journal of Management Development* 1998;17:243.
9. Kozma, R.B. Learning With Media. *Review of Educational Research.* 1991;61:179-211.
10. Huston, A. & Wright, J. Children’s processing of television; the informative functions of formal features, *Children’s Understanding of Television.* Academic Press, New York, NY.
11. Hannafin, M.J. & Hughes, C.W. A framework for incorporating orienting activities in computer-based interactive video. *Instructional Science* 1986;15:239-55.

#### ***Appendix A – “Fair Dealing” and Copyright***

Article from the University of Maryland on Copyright Law and Definition.

<http://www.umuc.edu/library/copy.shtml>

and

<http://www.wikipedia.com> describes copyright law on fair use as applicable to New Zealand.

In New Zealand, fair dealing includes some copying for private study, research, criticism, review, and news reporting. Sections 42 & 43 of the Copyright Act 1994 set out the types that qualify. The criteria are perhaps most similar to those applying in the UK, although commercial research can still count as fair dealing in New Zealand. Incidental copying, while allowed, is not defined as "fair dealing" under the Act. As in Canada, fair dealing is not an infringement of copyright. The factors determining whether copying for research or private study is judged to be fair dealing in New Zealand are its purpose, its effect on the potential market or value of the work copied, the nature of the work, the amount copied in relation to the whole work, and whether or not the work could have been obtained in a reasonable time at an ordinary commercial price.

