



Anaesthesiology Training within Australia and New Zealand

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The Australian and New Zealand College of Anaesthetists¹ is responsible for the training of 1,500 resident² anaesthesiologists throughout Australia, New Zealand, Hong Kong, Malaysia and Singapore. The training program is conducted over a minimum of five years and is taught within 174 training hospitals. The training program is primarily practically focused with a strong emphasis on the apprenticeship approach to mastery of applied knowledge, skill development, and enhancement of pertinent abilities. Important theoretical and fundamental knowledge is taught using a modular based framework covering the key aspects of anaesthesiology.

Additional learning occurs during various voluntary residential courses and through a compulsory simulation course. The simulation course specifically focuses on the impact and importance of human factors in the anaesthetic environment, as well as mainstream trauma and high frequency or critical clinical scenarios.

The training program includes two examinations; the first assessing candidate competency in the basic sciences of pharmacology and physiology and the second assessing candidate competency in more applied anaesthesiology. These examinations are supplemented by additional hospital based In-Training Assessments (ITAs), computerised web delivered Self Assessment Tests (SATs), and a Learning Portfolio. The overall aim of the program is to evolve an undifferentiated medical graduate into a competent independent anaesthesiologist.

Key words: Anaesthesiology, Resident training, In-Training Assessments, Self Assessment Tests.

INTRODUCTION

World wide there exist many different training programs to prepare doctors for the speciality of anaesthesiology. Indeed anaesthesiology training may differ significantly between different countries. Yet most highly quality training programs share a common characteristic; a desire to continually evolve and improve. By way of informing contemporary thought and discussion leading to continued evolution of medical training programs, it is often informative to consider the structure, duration and requirements of other training programs. The value of such consideration lies in the opportunity provided to course designers to

identify the benefits and challenges that are faced by each system and to consider how the medical education strategies and techniques compare to their own system. Thus this article describes anaesthesiology training within Australia and New Zealand with the intention that the strategies and techniques described may be of value to all those involved in the design, review and revision of medical courses.

Initial Medical Training

The medical training programs specific to each country have developed over time to meet the medical, healthcare, political, geographical and cultural needs unique to that country. Within Australia and New Zealand medical training typically commences immediately following graduation from senior high school. At this time prospective doctors enter university based medical schools as medical students. Presently there are 17 universities with medical schools in Australia and two in New Zealand. Medical training typically requires five years at university plus an internship. Success to this level allows the granting of an initial medical qualification and the student becomes a doctor. In recent years several universities have permitted

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Fig.1 The typical medical training continuum for anaesthesiology within Australia and New Zealand.

an alternative pathway by which students can obtain an initial medical qualification. This is a graduate entry process whereby university graduates with non-medical degrees may apply to undertake a shortened medical course leading to the granting of an initial medical qualification. Typically this graduate entry process takes four years plus internship. Figure 1 provides an overview of the medical education continuum within anaesthesiology commencing at initial medical training.

Specialist Anaesthesiology Training

Upon obtaining their initial medical qualification, doctors who wish to undertake training to become anaesthesiologists typically complete a minimum of two years of general hospital experience. This experience does not need to be in the area of anaesthesiology and it is often considered beneficial if all, or part, of these two years is spent in a medical area unrelated to anaesthetics. It is believed that such experience outside anaesthesiology may have the benefit of allowing the doctor to bring a broader perspective and wider experience to their studies within anaesthesiology and subsequent practice. Upon successful completion of the required general hospital experience, the doctor then applies to enter the training program of the Australian and New Zealand College of Anaesthetists¹ (ANZCA). Despite the term “anaesthetists” within the name of this organization, ANZCA only trains doctors in the speciality of anaesthesiology. That is, ANZCA does not train nurse practitioners, technicians or other non-medical healthcare professionals.

Acceptance into the training program requires the doctor be accepted into a department of anaesthesia within an ANZCA accredited hospital. ANZCA accredits departments of anaesthesia and, in order to receive ANZCA accreditation, a department must meet the following requirements¹:

- Minimum of two full time equivalent attendant² anaesthesiologists.
- Sufficient full time equivalent attendant anaesthesiologists to provide adequate supervision for the number of residents within the department.

- Suitable study facilities for residents.
- Access to suitable rooms for educational activities, clinical review and quality assurance.
- Regular programs of teaching and quality assurance.
- Adequate library facilities appropriate to anaesthesiology and relevant sub-specialities.
- Ready access to appropriate computer facilities for residents.
- Access to clinical support services appropriate to the role of the hospital.

The Australian and New Zealand College of Anaesthetists

ANZCA is currently responsible for the training of 1,500 resident anaesthesiologists throughout Australia, New Zealand, Hong Kong, Malaysia and Singapore. As the name of this organisation implies ANZCA is the pre-eminent organisation for anaesthesiology training within Australia and New Zealand. However, notable numbers of resident anaesthesiologists also apply to the ANZCA training program from Hong Kong, Singapore and Malaysia. Consequently ANZCA has significant numbers of residents in these countries, even though these countries offer alternative training routes to qualify for practice in anaesthesiology. ANZCA is also currently responsible for the ongoing continuing professional development (CPD) or continuing medical education (CME) of 3,500 qualified anaesthesiologists. Most practice in one of the five countries mentioned above, though a modest number of anaesthesiologists from other countries world wide choose to receive ANZCA CPD or CME.

The ANZCA Training Program

ANZCA training is comprised of a minimum of five years of approved training divided into an initial two years Basic Training followed by three years Advanced Training. Trainees may require longer than five years to complete their training depending on a variety of reasons including individual rate of progress, failure to pass examinations, taking leave, etc. The majority of anaesthesiology training occurs within one of 174 accredited hospitals currently accredited to provide ANZCA training across Australia, New Zealand, Hong Kong, Singapore and Malaysia. The educational curriculum is divided into 12 modules² summarised in Figure 2.

Basic Training

Basic Training requires residents to complete each of

Modules

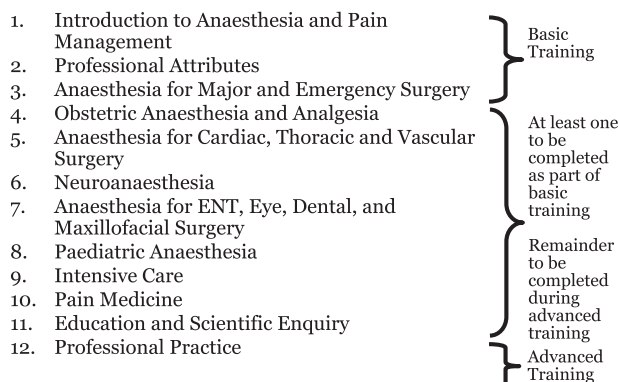


Fig. 2 Summary of the Modularised components of the ANZCA training program.

modules 1 through 3 plus at least one of modules 4 through 10. This flexibility within the training program is necessary to allow for the variety of educational experiences available to the 1,500 residents within any of the 174 hospitals where they may be training. Modules 1, 2 and 3 contain core fundamental knowledge essential to residents early in their exposure to anaesthesiology. Modules 4 through 10 are specific clinical modules which residents undertake as they are rotated through a variety of hospitals where module specific training is available. This is necessary because some of the 174 hospitals do not undertake all of the necessary clinical procedures required within anaesthesiology training. For example, some of these hospitals may not be able to offer experience in module 4 (Obstetric Anaesthesia and Analgesia), module 6 (Neuroanaesthesia) or module 10 (Pain Medicine). Adequate experience within each clinical module is considered essential for residents to graduate from the training program and therefore all residents are rotated through several hospitals during their training. It is permissible for residents to complete more than one clinical module during their Basic Training.

Basic Training also requires residents to complete a web-based Self Assessment Test with a focus on essential non-clinical content pertinent to anaesthesiology practice. This test includes material relating to communication, leadership, management, ethics, etc. An examination in the Basic Sciences must be completed and residents are encouraged to complete a required simulation course. Upon completion of Basic Training, a resident moves forward to commence Advanced Training.

Advanced Training

Advanced Training requires residents to complete those

modules of 4 through 10 that they have not completed during Basic Training, as well as modules 11 and 12. A second web-based Self Assessment Test must be passed which contains additional essential non-clinical content beyond the on-line test completed during Basic Training. In addition to the content of the Basic Training on-line test, this test also includes content relevant to insurance, medico-legal matters and clinical teaching. Residents must pass their final examination, complete a research requirement and a mandatory simulation course (if this course was not completed during Basic Training). These requirements are described in greater detail below.

Assessment

Because of the importance of anaesthesiology within healthcare, assessment forms a major component of anaesthesiology training within Australia and New Zealand. Multiple modes of assessment are used including: examinations, web-based tests, simulation, research, modular based assessment, and in-training assessment.

Examinations³

Residents must pass two examinations during their time in the training program. During Basic Training a two part basic sciences examination focuses upon physiology, including principles of measurement, and pharmacology, including statistics. Residents must pass both parts, though a pass in one part may be carried whilst the second part is obtained. Residents are encouraged to sit both parts concurrently though they may choose to sit each separately. The combined examination is comprised of 150 multiple choice questions (worth 25% of the total score), 16 short answer questions (25% of total) and an oral component (50% of total). During Advanced Training residents must pass a more applied anaesthesiology examination comprised of 150 multiple choice questions (25% of total), 15 short answer questions (15% total), three medical orals (15% total) and nine anaesthetic orals (45% of total).

Prior to each examination a Panel of Examiners is responsible for: choosing the content of the examination; matching the content/competencies to be assessed; matching case selection; ensuring adequacy of content sampled/assessed; and providing a consensus on the content importance, relevance, currency, level of difficulty and required answers. Examination rigor is facilitated through a series of examination workshops for members of the Panel of Examiners. These are compulsory for all new examiners while existing examiners are strongly encouraged to participate. ANZCA has trialed various workshop designs

over the past six years and the current design is for a two day full-time workshop.

Web-Based Tests

Currently ANZCA has four web-based Self Assessment Tests (SATs)

1. Induction Module providing an initial orientation and induction to the training scheme.
2. Introduction to Anaesthesia and Pain Management focusing upon module 1 of the curriculum.
3. Professional Attributes focusing upon module 2 of the curriculum.
4. Professional Practice focusing upon module 12 of the curriculum.

All four tests are available to both residents and attendants. However, the Professional Attributes and Professional Practice tests are mandatory for residents who require a minimum score of 85% to pass each of these. The tests are considered to be an important part of self-assessment training for later independent anaesthesiology practice and residents can apply to sit each SAT after they believe they have mastered the necessary content. Immediate feedback of resident performance is provided both to the resident and to ANZCA³.

Simulation

Residents are required to complete a simulation based course as part of their training. Most residents choose to complete the Effective Management of Anaesthetic Crises (EMAC) course⁴. This is a two and a half day course held at an ANZCA accredited simulation centre. A maximum of 12 residents are permitted on each course with a required 4:1 learner:instructor ratio to optimise quality of instruction. The course focuses upon the application of knowledge and skills to clinical content via full immersion simulation, whole body manikins and a realistic environment. The primary aim of the course is provision of a systematic approach to crises. Core knowledge and skills are taught through case based discussions, skill stations, rehearsals of protocols, drills in simple scenarios, and debriefing aided by video replay. EMAC is comprised of five half day modules:

1. Human performance issues
2. Airway emergencies
3. Anaesthetic emergencies
4. Cardiovascular emergencies
5. Trauma management

Research Requirement⁵

Although ANZCA recognises that few residents will

continue active investigative research work after their training, it is important that attendants have sufficient understanding of research so that they can, at a minimum, evaluate the quality and understand the meaning of relevant scientific literature to determine relevance to their practice. Consequently research forms a major component of module 11 in the ANZCA curriculum (Education and Scientific Enquiry). In addition to questions within the examinations and SATs, resident research ability is also assessed in part by a requirement to complete a research based project. The scope of the project is deliberately expansive so as to cover all potentially relevant interests of residents. This may include clinical investigations or technical applications through to historical and educational issues. Each resident is required to satisfactorily complete one of the following: a case report of interest or clinical significance; a review of a topic relevant to anaesthesiology, intensive care or pain medicine; an individual or collaborative research project; or a report from their conduct of three months full-time research. The research project must be prospectively approved by ANZCA and the resident must have a research supervisor whilst conducting the project.

Modular Assessment

Each module may also require completion of specific assessments. For example, module 1 (Introduction to Anaesthesia and Pain Management) requires residents to be assessed for their ability to check the anaesthetic machine.

In-Training Assessment

Resident performance within the hospital setting is evaluated through a process of In-Training Assessment (ITA) including regular goal setting and feedback interviews. The objectives of the ITA process are to (1) assess and assist with the progress of the resident towards appropriate goals, (2) provide regular feedback to residents, and (3) develop any remedial activities for a resident that may be required³. Components of ITA include formal initial and final goal setting and feedback interviews, various ITA forms, self assessment and a Learning Portfolio. Whereas the ITA forms used by ANZCA are common to many medical education programs, the ANZCA training program places considerable emphasis on resident self assessment and the use of a Learning Portfolio.

Resident Self Assessment

The nature of anaesthesiology as a profession is such that, once qualified, an individual practitioner conducts his

or her practice with little regulation from bodies external to the profession⁶. Thus it falls to the individual attendant to decide what, when and how they update their abilities. Effectiveness of this updating is very much dependent on self-directed and lifelong learning capabilities⁷. Furthermore, although attendants may be subject to informal peer review from colleagues, many, particularly those in small to moderate practices may have little opportunity to assess (or be assessed by) others. Consequently assessing oneself becomes a central skill in maintaining professional competence⁶.

In order for residents “to acquire lifelong learning skills, they must develop the ability to critically evaluate themselves”⁸. One of the key aims of the ANZCA training program is to get the resident to undergo a transition from largely teacher-directed learning to self-directed learning in everyday practice⁹ that they can apply throughout their post training professional practice. Accepting that self-assessment is an essential skill for attendants to develop as part of their training, how good are residents at self-assessment? Several studies^{8,10,11,12} reveal residents to be poor at self-assessment. As with any skill, residents first need to be introduced to the concept of self-assessment and then practiced in the skill before they become sufficiently professionally proficient to incorporate it into their own behaviours⁸. Numerous studies^{13,14,15,16,17} have revealed that the ability of residents to self-assess improves with practice. Importantly it has also been shown that resident self-assessment abilities are consistent over different types of skills and tasks⁷. That is, once residents understand how to self-assess in one aspect of anaesthesiology they can apply that self-assessment across all of the varied aspects of their professional practice. Self-assessment offers the following advantages:

- Places greater responsibility for learning on the resident.
- Motivates the resident to improve knowledge and skills¹⁸.
- Gives participants greater ownership over the evaluation process¹⁹.
- Offers supervisors and other instructors an additional device to study and interpret resident behaviour⁸.
- Can influence the resident’s behaviour so as to increase their compliance with standards^{20,21}.
- Can improve communication between supervisors and residents²².
- Clarifies areas for improvement²³.

Furthermore, the research literature reveals that self-assessment: serves as an aid in professional development¹⁹, enhances self-esteem²³, develops self-awareness²³, and is of paramount importance for continuing professional competence^{6,17,24}, life long learning^{8,25,26}, problem-based

and adult learning activities⁶, and has merit as a measure of non-cognitive abilities associated with clinical performance²⁷.

Learning Portfolio

Another key tool within the ANZCA ITA process is the use of a Learning Portfolio²⁸. This is a detailed inventory maintained by the resident to record learning processes, key events, experiences and progress. Specifically the portfolio shows the resident’s progress as a record of modules completed, clinical experience gained, skills learned and assessments completed. For the purposes of ITA the portfolio:

- Allows the resident to establish and revise learning plans and time management schedules.
- Reminds the resident of the objectives of training and the attributes of an attendant anesthesiologist.
- Documents resident progress through their training program.
- Clarifies areas for improvement.
- Gives greater responsibility to residents for their learning experience.
- Provides an opportunity for reflective learning.
- Provides additional information to supervisors and instructors regarding resident progress and learning.
- Facilitates communication between supervisors and residents.
- Promotes self-directed learning essential for continuing professional development, lifelong learning, and adult learning and PBL activities.

The ultimate purpose of the Learning Portfolio is to assist supervisors and residents plan and implement training while facilitating resident development of critical and reflective learning and practice.

Formal Meetings

Each resident reports directly to a supervisor of training (SOT) within their hospital. In turn, each SOT reports directly to a regional education officer (REO) who is responsible for coordinating training within all hospitals in their region. The REOs then report to ANZCA headquarters. Formal meetings occur between the SOT and each resident at the beginning of the hospital placement (the initial interview) and at the end of the hospital placement (the final interview).

Upon arrival at each new hospital placement the resident provides their SOT with their Learning Portfolio, copies of all their Final ITA forms from previous rotations, and their most recent self-evaluation. These documents form the basis of an initial interview where the SOT and

resident together set appropriate goals for the resident's placement at that hospital. The combination of the SOT and resident setting concordant goals offers numerous powerful advantages²⁹. In the rare instance where the goals of the SOT and resident do not coincide, then SOT goals take precedence because the SOT is most familiar with the resources of their hospital and the requirements of the training program. If the placement is in a hospital or department that is new to the resident, the initial interview forms part of an orientation process. Each SOT is encouraged to contact a resident's prior SOTs to seek additional background information pertinent to resident education.

After six months (or upon completion of the hospital placement for rotations of less than six months duration) each SOT completes an ITA-2 form about the performance of each registrar. This ITA-2 form is completed using information obtained from either an assessment by the three senior attendants best placed to assess resident performance (based upon quantity and quality of their interaction with each resident) or an assessment by a consensus meeting of senior attendants of the department. At this time the resident is also required to complete a self-evaluation. These two evaluations, the ITA-2 form and the resident self-evaluation, form the basis of a final interview. Each completed ITA-2 is fed back to the College via the SOT and REO. The completed ITA forms and self-evaluations are placed in the resident's Learning Portfolio and provided to the SOT at the next hospital placement. In this way a comprehensive picture of the hospital based knowledge, skills and abilities of each resident is assessed and communicated to all key stakeholders involved in the educational

process. The entire ITA process is summarized in Figure 3.

CONCLUSION

The above training program arose out of the specific medical, healthcare, political and cultural needs of anaesthesiology training across Australia and New Zealand as well as some of Hong Kong, Singapore and Malaysia. 1,500 resident anaesthesiologists are currently actively enrolled in the five year ANZCA training program from each of these five countries. The program is administered across 174 hospitals and is primarily practically focused with a strong emphasis on mastery of applied knowledge, skill development, and enhancement of pertinent abilities via an apprenticeship approach. Important theoretical and fundamental knowledge is taught using a curriculum comprised of 10 clinical and two non-clinical modules. The overall aim of the program is to evolve an undifferentiated medical graduate into a competent independent anaesthesiologist.

Additional teaching and learning occurs during various voluntary courses and a compulsory simulation course. The simulation course specifically focuses on the impact and importance of human factors, as well as mainstream trauma and high frequency or critical clinical scenarios. Assessment occurs via multiple modes including examinations, hospital based ITAs, computerised web delivered SATs, and a Learning Portfolio. It is hoped that those involved in medical education may find the above strategies and techniques valuable as they consider future course design, review or revision.

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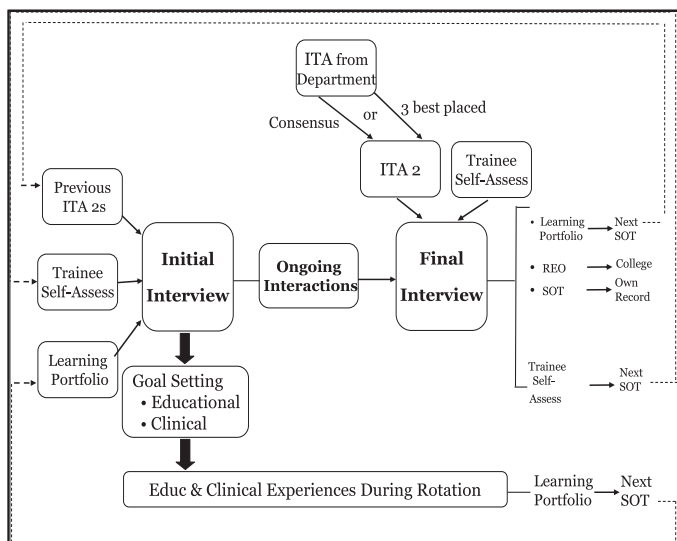


Fig. 3 Summary of the ANZCA in-training assessment process

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¹ Historically Australian and New Zealand anaesthesia arose out of the British system. Hence both Australia and New Zealand often use British terminology. Of particular relevance to this article is the use of the term "anaesthetist" rather than "anaesthesiologist" to describe a medically trained attendant doctor able to practice anaesthesia.

² Within Australia and New Zealand a qualified doctor undertaking training within the ANZCA training program is called a "trainee". This is approximately equal to a "resident" in some other countries. Similarly a qualified anaesthesiologist who has graduated the ANZCA training program is called a "fellow". This is the equivalent of an "attendant" in some countries. The terms resident and attendant are used within this article.

