Guideline for major extracorporeal perfusion Background Paper

1. Introduction

PG27(A), first published in 1994, was developed by a committee consisting of representatives of the Australian and New Zealand College of Anaesthetists (ANZCA) and the National Association of Medical Perfusionists of Australia (NAMPA). The document was endorsed by the college and the executive of NAMPA, and co-published.

In 2004 ANZCA published a revised version of PG27(A).

The 2013 version has benefited from substantial input from the Cardiothoracic, Vascular Special Interest Group and NAMPA. Drafts were reviewed and revised by the executive of NAMPA. The revised documents were presented at the 2011 NAMPA annual general meeting. The documents were accepted unanimously at this meeting and no objections were received during subsequent consultation with the wider membership. The executive of NAMPA then recommended further changes to the paragraph on “specific perfusion training” which do not pertain to medical perfusionists currently practising.

Many of the changes from the 2004 guidelines are self-explanatory. Additional comments on some of the changes are provided below.

3. Training and continuing professional development

The phrase "and other medical practitioners" was suggested, so that the requirements apply to all medical practitioners who wish to qualify as perfusionists.

3.1 Perfusion training objectives

Item 3.1.2

The 2004 guidelines did not make it explicit that medical perfusionists should be capable of operating the heart-lung machine. Trainees in medical perfusion must become fully capable of assembling the perfusion equipment, and operating it throughout the surgical procedure, and they must also be able to assemble and operate other circulatory support equipment as needed.

3.2 Perfusion training requirements

A ‘structured training program’ or fellowship program is recommended to ensure that educational objectives are set and achieved and that this is done over a reasonable period of time (see 3.2.2). A detailed curriculum for such a program is beyond the scope of this document although the principles are outlined within this section.

Item 3.2.1

Before commencement of specific training as medical perfusionists, trainees should have in-depth knowledge of the relevant physiology and pharmacology. Item 3.2.1 was added to reflect this. It is not intended that this item be applied retrospectively to currently practising medical perfusionists, a small number of whom do not have such specialist fellowships.

Item 3.2.3

The 2004 guidelines did not specify the number of perfusions that trainees should perform. It is recommended that the number of perfusions performed by trainees be at least 75, with specified levels of supervision. This number of cases should provide adequate training; it should also be feasible to achieve this number in one year of training, such as during a cardiac anaesthesia fellowship year. It is also recommended that some simulation practice be mandated. Simulation does not have to be complicated; most scenarios can be practised by using a wet setup of routine equipment and access to dedicated simulation machines is therefore not essential. Simulation of critical incidents is important because the vast majority of patient perfusions do not present such problems.

Item 3.2.5

Current medical perfusionists should not be expected to meet the training requirements detailed in items 3.2.1 to 3.2.4 inclusive.

3.3 Continuing professional development

Continuing professional development is an essential component of the practice of anaesthesia, and so recommendations on this are included. While cognisant of the principle underlying ANZCA Continuing Professional Development Program, namely that each practitioner should undertake continuing professional development appropriate to their practice, recommendations are provided for those seeking further guidance. Note was taken of similar recommendations by other bodies. These recommendations should support development of a high quality service by ANZCA Fellows and trainees.

Item 3.3.1

It was recommended that the CPD requirements for medical perfusionists be much more detailed and specific than those in the 2004 version of PG27(A). There were difficulties however in obtaining a consensus on the case numbers to be specified.

In an earlier draft, it was proposed that “a whole body perfusion, from commencement to cessation of bypass, should be managed at least 50 times per year; this should include operation of the heart-lung machine”. Further discussions ensued regarding the minimum total number of perfusions per year that should be managed, including a smaller number for which the medical perfusionist should directly operate the heart-lung machine (that is, cases managed/cases directly operated).

A 50/25 option has the value of indicating one perfusion managed per week and one perfusion operated per fortnight. Some medical perfusionists have indicated that they would have difficulty managing more than one case per week, and operating the pump more than once per fortnight, due to surgical lists being specifically rostered, and not having the flexibility to change rostered duties to attend to more cases than usual. There is also the situation in some hospitals where clinical perfusionists attend to many cases, and it may be difficult to access sufficient hands-on practice.

To achieve 50/25 would require some perfusionists to work at least 50 weeks per year, assuming no lists are cancelled. Realistically, most work about 45 to 47 weeks per year in theatre, or less for those with significant academic commitments.

Consequently, NAMPA proposed a 40/20 arrangement. This is a significantly higher number than proposed in the past. This number has been supported by ANZCA representatives.

No perfusion organisations in Australia and other developed countries require more than 40 perfusions per year for maintenance of skills.

Australian and New Zealand College of Perfusionists

The Australian and New Zealand College of Perfusionists requires 40 perfusions per year, as either primary perfusionist or directly supervising a trainee.

American Board of Cardiovascular Perfusion

A certified clinical perfusionist is required to perform a minimum of 40 clinical activities annually. Clinical activities are defined as follows:

1. Bypass, primary
2. Instructor
3. Veno-venous bypass
4. Pump assisted coronary and/or organ perfusion (perfusion-assisted direct coronary artery bypass/isolated limb perfusion)
5. Cardiopulomonary standby
6. Extracorporeal membrane oxygenation
7. Ventricular assist device
8. Documented intraoperative pump standby
9. Bypass, first assistant

The Canadian Society of Clinical Perfusion

The requirements for recertification include 80 clinical cases as primary perfusionist in the two year certification period.

The European Board of Cardiovascular Perfusion

The requirements for recertification include a minimum of 40 cases per year, 30 cases of which have to be extracorporeal circulation in cardiac surgery.

Item 3.3.2

In recognition of the principles of continuing professional development, it is recommended that medical perfusionists maintain knowledge currency and also proficiency in perfusion-specific ‘emergency responses’ as listed. The simulation of these events can be managed in a low-fidelity environment and generally needs only existing equipment. Such simulation should encourage a ‘team’ approach where this is beneficial eg in oxygenator changeout or management of pump head failure.

4. Heart-lung machines for major ECP

Guidelines for the perfusion equipment were included in the 1994 version of PG27(A), but not in the 2004 version. It is believed that equipment guidelines are important and are therefore included in the current version.

Item 4.2.2.4

An oxygen analyser on the inflow gas line is considered important as blenders can fail and deliver an air-only gas mix. The measurement of venous or arterial oxygen saturation, or in-line blood gas analysis, is of course of significant benefit but is unable to identify problems with oxygen delivery before the commencement of CPB.

An earlier draft included content on equipment, based on the 1994 document. To this NAMPA has added information on the following:

Item 4.2.5.2: transmembrane gradient.

Item 4.2.8.4: temperature monitoring.

Item 4.2.8.5: effluent gas monitoring.

Item 4.2.5.2 has been modified because circuit designs vary throughout Australia making routine transmembrane gradient monitoring difficult.

5. Clinical management of major ECP

NAMPA proposed that it should be clearly stated in PG27(A) that perfusion services should only be provided by those with the expertise to do so. Several models for provision of perfusion services operate in Australia. These guidelines aim to be consistent with the model in which a medical perfusionist works with a clinical perfusionist, who may operate the heart-lung machine.

Drug administration to the patient by the anaesthetist remains the responsibility of the anaesthetist unless specifically delegated. The phrase “explicit line of accountability” includes standing orders (as allowed for in New Zealand prescribing law).

Item 5.2.3

It is acknowledged that it may be necessary for the medical perfusionist to leave the theatre briefly during long cases, provided that his or her duties can be delegated to an appropriately trained person, the clinical situation is suitable and the perfusionist remains in the vicinity and immediately contactable.

Item 5.2.3.4 is included to clearly indicate that communication must be effective, appropriate and timely and include the surgeon, perfusionist and anaesthetist. All members of the patient’s care team are relevant as actions taken during CPB can impact on the post-bypass management of the patient by the anaesthetist.

2. Conclusion

The review process has entailed consultation with Australian medical perfusionists (recognising that the perfusion model in New Zealand does not have a role designated as a medical perfusionist). The majority of medical perfusionists are anaesthetists. The guidelines seek improve the overall standards of medical perfusion in Australia.

Contributors to PG27(A)

PG27(A), first published in 1994, was developed by a committee consisting of the following representatives of the Australian and New Zealand College of Anaesthetists (ANZCA) and the National Association of Medical Perfusionists of Australia (NAMPA):

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In addition, the following were consulted:
ANZCA regional and national committees
Faculty of Pain Medicine Board, national and regional committees
ANZCA Safety and Quality Committee
ANZCA Trainee Committee
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