# Exploring professional boundaries in anaesthetics

***Report for the National Co-ordinating Centre for NHS Service Delivery and Organisation R & D (NCCSDO)***

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prepared by

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Dr Ruairidh Milne, Senior Lecturer in Public Health: Designed the study, appraised material and expertly reviewed the report.

## *Conflict of interest*

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# *Executive Summary*

## Introduction

In the United Kingdom (UK), anaesthesia is administered only by doctors. In the United States of America (US) and some other European countries, non-physicians also administer or monitor anaesthetics. In many developing nations, non-physicians are the sole anaesthetic practitioners. Worldwide, most non-physician practitioners come from a nursing background.

Currently, the specialty of anaesthesia in the UK is facing a staffing shortage. This has resulted from the expansion of the anaesthetist's role to include not only providing anaesthesia in the operating theatre, but also the running of Intensive Care and High Dependency Units (ICU/HDU), the provision of acute and chronic pain management services, the provision of epidural analgesia for women in labour, and the management of trauma and resuscitation in the Accident and Emergency Department and throughout the hospital. Latterly, restrictions on the working hours of junior doctors (now also to include the provisions of the European Working Time Directive [EWTD]) have decreased both the availability of trainees and the contribution they are permitted to make to the service. Furthermore, many anaesthetic services are required 24 hours a day, and often at short notice.

One way to alleviate the manpower difficulties would be to employ non-physician anaesthetists. This idea has been mooted occasionally in the past ten years or so, but there has been considerable opposition to it in many professional quarters. Some aspects of anaesthetic work, for instance, pre-operative assessment and post-operative pain management, are already commonly undertaken by nurses, but administering anaesthetics is not. There are many perceptions about the relative safety of medical anaesthetists compared with nurse anaesthetists in other countries, and many views about how the role might work in the UK context. However, a systematic appraisal of the available evidence and formal opinion mapping of stakeholders has never been performed.

This study was performed to allow potential practical developments in this area to proceed from a position of evidence.

## Methods

There were three strands to our investigations – systematic review of literature, opinion mapping and case studies. Strands two and three were approved by the necessary Research Ethics Committees.

### 1 *Systematic review of literature, peer reviewed and 'grey' literature.*

Primary evidence of the relative safety, effectiveness and cost-effectiveness of different anaesthetic providers was sought. Other published material provided background information and also contributed to strand two. We searched MEDLINE, CINHAL, HMIC and EMBASE using a broad and inclusive strategy because initial scoping searches had indicated that there was a shortage of literature on this topic. This search was limited to articles published in the UK, US and Europe since 1990, but not limited by publication type or language. In addition to the search of peer-reviewed literature, we also made an extensive search for 'grey' literature. The Internet was a particularly fruitful source of data.

### *2 Opinion mapping*

Opinion mapping was comprised of (a) interviews with individuals and (b) policy statements from stakeholder organisations. Twenty-three interviews were carried out over a seven-month period in 2003. Interviewees were chosen to include both leaders and 'front-line' clinical staff within each professional group likely to be involved in developments in this area. The interviews were carried out either by telephone or face-to-face. All the interviews were conducted by one researcher using a semi-structured questionnaire. We asked 14 stakeholder organisations for their responses to the question: 'What is your organisation's reaction to the idea of non-physician anaesthetists practising in the UK?' We received eleven replies.

### *3 Case studies*

Case studies of sites in the UK which have experimented with extending roles for non-physicians within anaesthetic work in its broader sense. Thirteen possible sites were investigated. Four visits were made over a two-month period in 2003. Data were collected using an eight-point template.

We also convened an expert group of representatives of physician and non-physician organisations, representatives of organisations with an interest in anaesthesia and patient representatives. The expert group's function was to assist in providing links to case study sites, interviewees and published material.

## Results

### *Literature review*

#### Safety

The literature review revealed that there were no recent, high-level studies using clinical outcomes suggesting a significant difference in safety between physician and non-physician anaesthetists. We found only three studies reported within the

date limits for our search. One was an as yet unpublished doctoral thesis reporting a prospective analysis of critical incidents in six Danish hospitals over a period of one year. Overall incident rates were four per cent procedural and seven per cent physiological for specialist physician anaesthetists and between six per cent procedural and seven per cent physiological for nurse anaesthetists (Maaløe 2000). The second study(Hoffman 2002) was a small clinical study using outcomes of transient significance for the patient. No evidence of a difference in adverse events between medical and nurse anaesthetists was found. The third was a retrospective analysis of a large administrative dataset (Silber 2000), which found an association between anaesthetics given by nurse anaesthetists without medical direction and increased risk of death or 'failure to rescue' from complications. Due to the incompleteness of data and absence of information on the cause of death, this work can be regarded as 'hypothesis-generating' at best. We have also analysed three older but frequently cited studies.

### Cost-effectiveness

We found only three studies addressing economic issues. Two focused more on productivity of different provider models. The remaining article used decision analysis to explore the relationship between cost and safety of different models, but its conclusions were limited by the starting assumptions it makes about relative safety.

## *Opinion mapping*

The interviews revealed a wide variation of opinion on the possible introduction of non-physician anaesthetists. We did not attempt to gauge how widely held each view might be in the wider UK anaesthetic communities, but rather aimed to map out lines of argument which might help in understanding the complexities of this issue.

Key themes identified were:

- Opinion is not always divided down professional lines. There is evidence of 'crossover'.
- Individual definitions of what a non-physician role in the UK might entail, and understanding of how non-physician anaesthesia functions in other countries, varied widely. There is much to be learnt from a close, objective examination of professional relationships between nurse anesthetists and anesthesiologists in the US.
- There are tensions across existing boundaries among theatre staff, which are likely to have implications for the development of new roles
- It will not be possible to 'modernise' anaesthesia in isolation. In particular, appropriate matching of available anaesthetic skills to surgical demand implies that surgeons may need to share more widely the responsibility for drawing-up operating lists.
- Although the part played by professional organisations was seen as crucial, there were some misperceptions about views which particular groups might hold. Thus, some organisational policy statements contrasted with

individuals' perceptions of what that organisation's position might be. These would need to be addressed. In particular, the potential role for the Royal College of Anaesthetists in co-ordinating and 'approving' any potential development was highlighted.

Particular themes of relevance to future training schemes were:

- The balance between practical and theoretical instruction
- The importance of individual skills and qualities rather than the profession of origin in selection and practice.
- The suggestion that existing schemes might usefully be adapted for the new role.

## *Case Studies*

No non-physicians were giving anaesthetics in the UK at the time of this study. Thirteen possible sites were explored, of varying relevance to the review questions. The four sites visited were chosen because there was either an extended role for a non-physician in anaesthesia or their training may have some relevance to the project.

These case studies were

1 Training an anaesthetic nurse to perform epidural anaesthesia on the obstetric unit.

2 Training cardiac theatre staff to insert central venous and arterial pressure monitoring lines on anaesthetised patients.

3 Training theatre nurses to make pre-operative assessments of emergency patients and co-ordinate both medical optimisation and theatre scheduling

4 A scheme to train dentists in sedation techniques.

Key issues raised through the case study visits included:

- The importance of personal skills in the project teams and in the candidates for the role. The most valued skills included:
  - the ability to communicate with colleagues and patients
  - motivational skills
  - leadership
  - the ability to manage change effectively
  - 'intelligent thinking' (as opposed to working to a rigid protocol)
- Mutual respect and trust between physicians and non-physicians was key to the development of these projects.
- Motivation for the extended roles centred on staff development, patient care, improving working lives and service delivery.
- The projects we visited succeeded in their work partly because they set achievable aims within a realistic time scale.

## *Comment*

Literature searching revealed little primary evidence on safety, effectiveness and cost-effectiveness of anaesthetic providers. Opinion assumes a greater significance in such an 'evidence-free zone' and documenting this systematically was a key task for the review. In doing this, we have updated and expanded the work of Reilly et al (1996). We cannot comment on how widely the views we have recorded are held. We were also able to report four case studies where nurses, operating department practitioners (ODPs) and dentists had learned to take on aspects of work previously performed by doctors (though not the actual administration of anaesthesia). The experiences of these innovative teams form a valuable resource to guide consideration of the required skills and competencies, possible training approaches and selection of candidates for a non-physician anaesthetist role in the UK. They also contribute to our understanding of the barriers to, and enablers of, change in this area. We would stress, particularly, that as anaesthesia, surgery and theatres are so closely linked, the restructuring of anaesthetic services can only go so far without simultaneous change in related activities.

## *Implications for policy and practice*

We recommend that any practical developments in this field should include simultaneous, rigorous evaluation (using a broad range of robust measures) of clinical process and outcome, as well as indicators relating to activity, access targets and cost. Some of these measures are still in need of development (see 'recommendations for research,' below). Furthermore, theatre information systems as currently structured may not be able to provide the sort of data required and investment may be needed.

Issues that will need to be addressed in any practical test of the new role include:

- Timescales set for development should be realistic and humane. Background preparatory work, curriculum design and recruitment should not be rushed.
- Any change of practice in anaesthesia will have ramifications on other departments, especially theatres and surgical services. The responsibility for making the new role 'work' is thus shared across a number of stakeholders.
- In particular, the introduction of the new role is potentially threatening to the professional status of anaesthetists, surgeons and existing non-medical theatre staff.
- Resistance to the introduction of non-physician anaesthetists may be manifest through concerns over risk and safety. While these concerns are justified to some extent, they also act as a 'surrogate' for unexpressed anxieties about, for instance, job security and professional status.
- Professional registration of the proposed practitioners needs to be resolved. Any new non-physician practitioner will need to be registered with a professional body. If candidates come from existing professional groups, such as nurses or ODPs, it may be possible to maintain this. In the longer

term, it may be preferable to create a completely new professional entity. This will certainly be the case for other recruits – for instance, graduates in non-clinical sciences.

- A clear definition of what might be meant by supervision (both in terms of physical proximity and ratios of medical to non-physician anaesthetists) must be established whenever the new role is discussed.
- The balance between theoretical knowledge/academic aptitude and practical instruction in training needs to be considered. Many of our interviewees felt that high academic standards would disenfranchise many competent and capable potential candidates.
- Linked to this, is the extent to which, in practice, non-physician anaesthetists are driven by protocol or encouraged to think and act independently.
- The extent to which patients' choices of anaesthetic provider can be accommodated, while still maintaining efficiency in the service, needs to be made explicit.

## *Recommendations for research*

Further methodological work is needed on ways of matching anaesthetic skill to surgical demand and ways of managing surgical waiting lists and constructing operating schedules. Work is also needed to establish robust measures of quality in the anaesthetic process, as major outcomes are relatively uncommon.

The relevance of, and methods for, assessing patients' experiences in anaesthesia should also be addressed as, uniquely in healthcare, patients are unconscious for much of their 'experience'.

Evaluating the efficacy of different anaesthetic providers is problematic. Feasible approaches might include rigorous case-control studies and/or focusing on high-risk patients. A national anaesthetic database would also be highly valuable and we recommend a pilot scheme to test this.

Lastly, an accurate and sensitive economic model should be constructed which would allow the economic consequences of the introduction of non-physician anaesthetists in the UK to be modelled.

# *The Report*

## Section 1 Introduction and background

This section will outline the aims and rationale for the project and provide background information.

### *1.1 Members of the Expert Group*

Three expert group meetings were held over the course of the project. Those marked with * attended meetings as representatives of colleagues who were not free to attend.

Those marked ** were invited but unable to attend in person and did not send a representative, but were able to make contributions by e-mail or telephone.

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| Dr David Whitaker* | Council Member, Association of Anaesthetists of Great Britain and Ireland |

## *1.2 Abbreviations and glossary*

### Abbreviations

#### *Organisations*

AAAA American Academy of Anesthesiology Assistants

AAGBI Association of Anaesthetists of Great Britain and Ireland

AANA American Association of Nurse Anesthetists

AODP Association of Operating Department Practitioners

ASA A patient physical status classification devised by the American Society of Anesthesiologists (see glossary below)

ASA American Society of Anesthesiologists

BARNA British Anaesthetic and Recovery Nurses Association

CWP Changing Workforce Programme

DOH Department of Health

EWTD European Working Time Directive

GDC General Dental Council

HCFA Health Committee Finance Administration

Now called

CMMS Centre for Medicare and Medicaid Services

HDU High Dependency Unit

HPC Health Professions Council

ICU Intensive Care Unit

MA Modernisation Agency

NATN National Association of Theatre Nurses

NHS National Health Service

NWW New Ways of Working

OAA Obsteric Anaesthesia Association

RCA Royal College of Anaesthetists

RCN Royal College of Nursing

SDO NHS Service Delivery and Organisational Research and Development Programme

UK United Kingdom

USA/US United States of America

***Job Titles***

AA Anesthesiology Assistant (in USA)

AA Anaesthetic Assistant (in Europe)

AN Anaesthetic Nurse (in Europe)

CRNA Certified Registered Nurse Anesthetist

ODA Operating Department Assistant (former name of ODPs)

ODP Operating Department Practitioner

***Abbreviations peculiar to this report***

CS1 Case study site one

CS2 Case study site two

CS3 Case study site three

CS4 Case study site four

A-K Individuals involved with case study sites

## Glossary

**American Board of Anesthesiology** Formed in 1937 to maintain educational standards, deal with certification and accreditation and published lists of certified practitioners.

**Anaesthesia** Absence of normal sensation, especially pain, as induced by an anaesthetic substance. Anaesthetic induction for medical/surgical purposes may be topical, regional, local or general.

**Analgesia** A decreased or absent sensation of pain.

**Anaesthetist** Used in Europe to refer to a medically qualified practitioner in anaesthetics.

**Anesthetist** Used in North America to describe a non- medically qualified practitioner in anaesthetics

**Anesthesiologist** Used in North America to describe a medically qualified practitioner in anaesthetics

**Anaesthesiologist** Occasionally used in Europe to describe a medically qualified practitioner in anaesthetics.

**Anesthetics** North American spelling of anaesthetics

**Anesthesiology** North American spelling of the medical practice of anaesthesia.

**Anaesthesiology** Occasionally used in Europe to describe the medical practice of Anaesthesia.

**ASA status** A patient physical status classification system devised by the American Society of Anesthesiologists and in common usage. The classification is as follows:

ASA 1 – normal healthy patient

ASA 2 – patient with mild systemic disease

ASA 3 – patient with severe systemic disease

ASA 4 – patient with severe systemic disease which is a constant threat to life

ASA 5 – moribund patient who is not expected to survive without the operation

**Board Certification** On completion of anesthesiology training, anesthesiologists may take a further examination to obtain certification from the American Board of Anesthesiologists.

**Calman Report** Reviewed training of junior doctors in UK (1993). Brought about changes in the length and methods of training.

**Clinical staff** Term to describe personnel with a professional interest in patient care.

**Conscious sedation** "A technique in which the use of a drug or drugs produces a state of depression of the central nervous system enabling treatment to be carried out, but during which verbal contact is maintained throughout the period of sedation. The drugs and techniques used to provide conscious sedation for dental treatment should carry a margin of safety wide enough to render loss of consciousness unlikely."

"The level of sedation must be such that the patient remains conscious, retains protective reflexes and is able to understand and respond to verbal commands." (General Dental Council, May 1999)

**European Working Time Directive** A European Commission treaty adopted in May 2000. This will limit the hours employees are obliged to work to 56 hours per week by July 2004 and 48 hours per week by 2009 (with a possible extension to achieve this to 2012). (www.doh.gov.uk/workingtime/)

**New Deal** This was launched in June 1991 to reduce the contracted hours of junior doctors to maximum of 72. (www.newsrelease-archive.net)

This report will use UK English spellings and terms throughout unless referring to or discussing the practice and terms used in another nation, then the report will use the appropriate term and spelling.

## *1.3 Rationale and aims of the review*

### Why this topic and why now?

#### *Current situation*

Anaesthesia is the largest single hospital specialty and has service delivery requirements not only in operating theatres, but also in intensive care units, high dependency units, accident and emergency, obstetric units and pain clinics. Anaesthetic services are stretched. A shortage of consultants is predicted to continue for the foreseeable future. Current vacancies in anaesthesia are running at an average of 3.5 per cent in England (Department of Health 2003a).

The demand upon anaesthetic services continues to grow and has been heightened by other pressures. The introduction of structured training following the publication of the Calman report in 1993 (Calman 1993) has reduced the service delivery capabilities of junior doctors in training. (See section 1.2). The European Working Time Directive, due to reduce the working hours of all NHS staff to 48 hours per week by 2009, is beginning to constrain traditional working patterns. (RCA 2003) (See section 1.2).

The specialty of anaesthesia has several choices:

- Ration the services it delivers.
- Reduce quality (not a viable or acceptable option in light of the NHS quality agenda).
- Consider alternative ways of working.

One alternative, commonplace in Europe and the USA, is anaesthetic care delivered by non-physicians.

### *Literature in the UK*

The debate on the issues surrounding non-physician anaesthetists has re-surfaced every few years for the past ten years in the UK. The issue was highlighted by the Professional Roles in Anaesthesia Scoping Study in 1996 (Reilly et al 1996), the Audit Commission report in 1997 (Audit Commission 1997), the Professional Roles in Anaesthesia report in 2000 (McKay et al 2000) and the New Ways of Working in Anaesthesia (NWWA) Pilots in 2003. In between these major reports, journal comments and letters have continued to stir interest and fuel debate among both the front-line members and professional leads. Despite the on-going debate, there has been no resolution to the issues of evidence of safety, effectiveness and cost-effectiveness.

### *Opinion*

The 1996 Scoping study (Reilly et al 1996) looked at opinion on the issues of non-physician anaesthesia, and at least one published survey has addressed the front-line opinion since then (Hind 1997). Both of these were at least five years ago and the question remains whether opinion on non-physician anaesthetists at the front-line and leadership levels has shifted.

### *Non-physician roles*

Non-physician roles, and in particular nursing roles, have undergone a radical shift in the past ten years. An increasing number of nursing and non-physician posts enable staff to carry out roles once the preserve of medics. Nurses can now prescribe drugs under group directions and the past few years have witnessed the development of the Nurse Consultant. Other non-physician roles have undergone a shift to multi-skilling and this is particularly true in theatres in the development of the theatre practitioner role.

### *Potential for conflict*

It is clear that the topic of non-physician anaesthetists in the UK has the potential to be a highly emotive one. At first glance, it might appear that opinion on the potential value of such a role is divided along professional lines and this perception may have the potential to generate conflict.

### *Structure*

This report will utilise data from three different strands of evidence:

- Literature review
- Opinion mapping including, interviews and policy statements
- Case studies

The protocol acknowledged that this would be a difficult process. We have combined the information by answering the objectives of the report using all

strands of evidence. Methods, methodological discussion and numerical results tables will be presented separately for each strand of evidence.

## *1.4 Aims of the project*

To explore, through a review of published and unpublished sources, the possible advantages and disadvantages of creating non-physician anaesthetists in the United Kingdom.

### Objectives

1 To map out different models of delivery of anaesthetic care that have been tried out in Europe, North America and in the United Kingdom to date and document how non-physicians are trained within each model.

2 To gather evidence on the safety, effectiveness, cost-effectiveness and other impacts of the various models, including patients' views.

3 To explore barriers to, and possible enablers of, the re-definition of professional roles in anaesthetics in the United Kingdom.

4 To sample opinion on the competencies, skills and knowledge which future UK non-physician practitioners might need and what training schemes might meet these needs.

Note of caution:

This report contains qualitative evidence based on subjective opinion from individuals. We urge those reading this report to consider all aspects of data gathered, the recommendations of the report and the executive summary and not to take any single comment out of context.

## *1.5 Background*

### 1.5.1 UK anaesthesia

Anaesthesia is the single largest hospital specialty in the NHS. Two thirds of all acute patients can expect an anaesthetist to be involved in some way in their care. (Audit Commission 1997) The first UK anaesthetic was given in December 1846. As in other countries, the practice became popular very quickly and physicians were keen to develop techniques and drugs to ensure the best results with the least side-effects. Anaesthesia has, with only a few exceptions due to doctor shortages in the First and Second World Wars (Woollam 2002), always been a physician service in the UK.

Organised physician anaesthesia dates back to the turn of the 20$^{th}$ century. In 1935, a Diploma in anaesthesia was developed and this allowed the specialty to flourish. The creation of the NHS led to the formation of the Faculty of Anaesthetists within the Royal College of Surgeons of England. This was followed by College status in 1988 as a college with the Royal College of Surgeons. By 1992, the granting of a Royal Charter established the Royal College of Anaesthetists (RCA 2003b).

The RCA is charged with maintaining and improving quality of patient care through the regulation of training standards, examinations and continuing professional development for all anaesthetists.

The Association of Anaesthetists of Great Britain and Ireland (AAGBI) is the other main organisation representing the interests of anaesthetists and was established in 1932. This organisation plays a significant role in developing guidelines for clinical practice. Without direct or statutory powers, the AAGBI seeks to: "Improve expertise, training and status of anaesthetists." (AAGBI 2003) The guidelines produced by the Association, which covers all aspects of anaesthetic work, are widely respected.

No non-physicians administer anaesthesia in the UK. Non-physician roles in an anaesthesia team are either that of anaesthetic nurse, recovery practitioner or operating department practitioner. These groups are represented by the National Association of Theatre Nurses (NATN), the British Anaesthetic and Recovery Nurses Association (BARNA) and the Association of Operating Department Practitioners (AODP), as well as the Royal College of Nursing (RCN). Though some inter-professional rivalries have existed between the non-physician organisations, they have, since the mid-1990s had much improved working relationships. The AODP has made formal working links (AODP 2003) with all of these organisations. They are increasingly seeking representation in the creation and development of training programmes and new roles. The non-physician organisations meet in several forums, including the Peri-operative Collaborative, a recently developed forum for discussion of all aspects of peri-operative care. This is a quarterly forum made up of all the non-physician organisations representing staff working in peri-operative care. Physician and non- physician organisations consult over major issues.

In the UK, the National Health Service (NHS) is funded through central government. The NHS is charged to provide care for all through health promotion, the diagnosis and treatment of disease and caring for those with long-term illness or disease. (www.nhs.uk/thenhsexplained/what_is_nhs.asp)

Employees of the NHS are public sector workers and are paid a salary. Salaries are determined by nationally set guidelines. The private sector in the UK is relatively small compared with other European countries and concentrates on providing surgical services for elective procedures (often those which have long NHS waiting lists, e.g. hip replacements, hernia repairs, etc), costly diagnostic services, obstetric and gynaecology services and cosmetic surgery. Emergency care, trauma and ICU are rarely available outside the NHS. NHS consultants are able to work outside the NHS in the growing private sector, and some consultants choose to work solely in the private sector. A handful of companies dominate the private market in the UK and have agreed rates of pay for procedures. Non-physician staff are normally employees of the private healthcare company and are employed on a permanent contract and paid a salary.

NHS hospitals are bound by budgetary limitations and private hospitals are constrained by the need for cost-effectiveness. Both aim to provide cost-effective

care, but within the remit of safety and effectiveness. The NHS is going through a period of rapid reform and modernisation. The present Government is committed to bringing about a modernised service while maintaining the principle of free health care for all citizens. Whilst private health care has increasingly become an option for those with health insurance, the majority of citizens, even those with health insurance, will use the NHS as their first option when requiring medical care.

### *Work of anaesthetists in the UK*

While a significant proportion of an anaesthetist's work takes place in operating theatres, providing anaesthesia and analgesia to patients undergoing surgery, their work extends well beyond theatres. Anaesthetists' work encompasses management of ICU and HDU, obstetric pain relief, chronic and acute pain services, trauma team, pre-operative assessment and optimisation of patients and sedation. They are also involved in resuscitation, teaching, training and research.

### *Current situation in the UK*

Currently anaesthesia in the UK is facing a staffing shortage. For many years, a short fall of training places in the specialty ensured that doctors qualifying as anaesthetists were in great demand. The 1997 Audit commission report (Audit Commission 1997) noted the shortage of adequately trained staff. Training places were increased following this report, but the short fall in consultant anaesthetists is predicted to continue due, in part, to the ongoing increase in consultant posts. This shortage of staff has been exacerbated by other factors at play in the NHS. `Calmanised training' and the New Deal (see section 1.2) for junior doctors has reduced junior doctors' ability to deliver services. Junior doctors in training undergo a longer training period with a reduced commitment to service delivery during this period.

The specialty is popular because it offers a wide range of sub-specialties, the opportunity to be involved in a wide range of experiences in medicine, as well as opportunity for involvement in areas such as chronic and acute pain and obstetrics.

Coupled with the reduction in service delivery, all doctors are to be bound by the restrictions of the European Working Time Directive (EWTD), the first milestone of which was in April 2004. This will limit working hours to 48 per week by 2009 including resident out of hours work (SiMAP judgement) (see section 1.2). All aspects of NHS work are affected by the outputs of the NHS Plan (DOH 2000). The NHS is in the throes of modernisation and this touches all aspects of patient care. The Changing Workforce Programme (CWP), part of the Modernisation Agency (MA), is charged with developing New Ways of Working (NWW) which aims to improve recruitment and retention prospects, develop career paths, and enable conformity to EWTD legislation. The CWP is developing five pilots in anaesthesia across the UK which began in the latter half of 2003. Two of the pilots are to introduce non-UK trained non-physician anaesthetists to work in NHS hospitals for a twelve-month period. The RCA and AAGBI, along with non-

physician professional organisations, have been closely involved in the development of these pilots.

Anaesthesia, as a profession, has some choices to consider in the near future. Staffing shortages, calls for modernisation, the continued development of theatre practitioner roles and the question of non-physician anaesthetists are issues facing the profession at both the front-line and at leadership level.

### 1.5.2 US anesthesia

The development of anaesthesia as a specialty in the US had a different path to that of UK anaesthesia. The very first anaesthetic was administered in Boston in October 1846 and it was from there that news spread to the UK of this revolutionary treatment. Although this first procedure was developed and administered by a doctor, nursing quickly adapted to the new specialty. While many eminent anesthesiologists practiced, supervised and worked in research and management, the day-to-day work of anaesthesia very soon became a nursing role. This perception and the fact that anaesthesia was not recognised as a medical specialty by the American Medical Association until 1937, constrained the development of physician anaesthesia in the United States until after the Second World War. This conflict necessitated a huge increase in the numbers of physician anesthesiologists. After the war, their numbers continued a slow, but steady, rise, and this remained the case until the 1970s, when a combination of factors changed the face of anaesthesia in America. In the late 1960s, medical schools undertook massive Government-sponsored expansion programmes as part of a radical reform of the public health system. At the same time, Medicare and Medicaid (the US Government-led organisations charged with providing medical insurance services) introduced new payment methods for doctor services. This created a financial incentive for new medical graduates to take up residencies in anesthesiology. Potential earnings and the number of practising anesthesiologists have continued to increase to the present day.

The American Society of Anesthesiologists (ASA) was founded in 1905 in the United States. This body represents the interests of anesthesiologists in the US. It develops training programmes and issues guidelines on practice. (ASA 2003;AANA 2003)

Nurse Anesthetists have been established in the US since the 1860s and have been the major providers of anaesthesia care since shortly after their inception. The American Association of Nurse Anesthetists (AANA) was founded in 1931 out of the rapid development in anaesthesia between the wars. The First World War took large numbers of the predominantly male physicians from all specialties either directly into conflict or into dealing with the casualties of war. Predominantly female Certified Registered Nurse Anesthetists (CRNAs) filled the gap and continued to do so throughout the inter-war world.

CRNAs are involved in the delivery of over 60 per cent of all anaesthesia and currently earn approximately 1/3 of the salaries of anesthesiologists (Cromwell and Grumbach 1990 referencing 1986 AANA practice survey, Cromwell 1999). From the post-war period through the health care reforms of the 1970s to the

present day, membership of the AANA has increased at a similar rate to that of the ASA (Martin–Sheridan 1996).

In the 1980s. the ASA sponsored the development of the Anesthesiology Assistant (AA). This role was designed as a dedicated assistant to the anesthesiologist. This practitioner cannot practice without the supervision of an anesthesiologist. (CRNAs can practice under the supervision of any physician and more recently have gained the right to independent billing practice in six States). The AA can only practise in 16 states and the two training colleges only produce 50 graduates per year (www.emory.edu and www.anesthesiaprogram.com) as opposed to the 340 graduates produced by the CRNA training facilities (Cromwell 1999). The American Academy of Anesthesiology Assistants (AAAA), in conjunction with the ASA, is campaigning to increase the number of states in which the Anesthesiology Assistants can practise. The number of States where AAs have practice rights has recently risen from eight to 16.

#### *Current situation in the US*

Although many anesthesiolgists, AAs and CRNAs work in successful collaborations across the US, utilising a variety of workforce models, there exists a palpable tension between the professions. In general, anesthesiologists are self-employed and undertake contracts with hospitals to provide a service. Anesthesiologists commonly organise themselves into group practices made up of purely anesthesiologists or of anesthesiologists employing CRNAs and/or AAs (in States where their practice is permitted). Changes in billing arrangements have meant that the once lucrative anesthesiology practices, where physician anesthesiologists supervise CRNAs and AAs in teams, are now less profitable. Employment changes have understandably led to increased tension. This has been intensified by the CRNAs push for independent practice. Where this has become a reality, CRNAs and anesthesiologists are finding themselves in direct competition for work. Tensions over financial payments and independent practice have become manifest as questions of provider safety, training and effectiveness are raised. The issues of finance, competition and safety are blurred. Both professional organisations spend a significant proportion of their energies on promoting the uniqueness of their own profession, sometimes at the expense of their colleagues. This rivalry has spread to AAs, who supported by the ASA aim to expand the geographical range of their practice. This is opposed by CRNAs.

The drive by the Centres for Medicare and Medicaid Services to develop more cost-effective care through the Medicaid/Medicare system can only intensify the current tensions over financial re-imbursement and independent practice.

### 1.5.3 European anaesthesia

In Europe, anaesthetic services have developed in different ways in various countries - “for reasons which may never be fully elucidated” - (Vickers 2002), but primarily motivated by a shortage of physician anaesthetists. Across half the nations of the EU, Nurse Anaesthetists (NAs) or Anaesthesia Assistants (AAs) work under the supervision of physician anaesthetists. In the Netherlands, NAs work supervised by an anaesthetist to a ratio of 2:1. In Scandinavian countries,

the ratio is often much higher for low risk "routine" cases. Other European nations have AAs who work as dedicated assistants to the anaesthetists on a 1:1 basis.

In Scandinavia, non-physician anaesthetists have been practising for about sixty years. Within the specialty, anaesthetists and anaesthetic nurses developed in tandem. In common with many other European countries, there was a scarcity of anaesthetists, especially to service rural communities and therefore the service was supplemented by training non-physicians to work under the supervision of physician anaesthetists.

In most of Europe, both the anaesthetists and nurse anaesthetists are employed by the hospital in which they work. Staff are normally salaried, that is, paid for the hours worked rather than the number of procedures performed. NAs earned roughly half that paid to consultant anaesthetists.

The professional organisations representing physicians and nurses in Scandinavia are the Scandinavian Association of Anaesthesia and Intensive Care (SSAI) and Anaesthesia Association with the General Assembly of Nurses. Information on the professional organisations across Europe has been difficult to obtain.

The International Federation of Nurse Anesthetists has a high profile across Europe. It has produced guidelines for training and practice and acts as a focus for discussion on the role across the globe.

| **Countries with non-physician anaesthetists** | **Countries without non-physician anaesthetists** |
|---|---|
| Austria | Italy |
| Denmark | United Kingdom |
| Sweden | Finland |
| The Netherlands | Ireland |
| Germany (11/16 Länden) | Greece |
| France | Belgium |
| Luxembourg | Spain |
| Norway (non EU) | |
| Switzerland (non EU) | |

www.europa.eu/

***Current situation***

European healthcare varies from nation to nation, but in general EU states have a combination of Government-funded and insurance-funded health care. For example, in the Netherlands, individuals have to pay the first 1000€ of any acute care treatment which will normally be covered by private health insurance. Any care over that amount is covered by taxation. In France, there is a private and a

public health care system. Those with sufficient insurance use the former. Similar combinations of systems exist across the EU member states.

### 1.5.4 International anaesthesia

Across the developing world, non-physician anaesthesia is often the only kind of anaesthesia available. Shortages of medically trained professionals means that the specialty is often the preserve of nurses and they can work either under the supervision of a surgeon or other medically trained individual or entirely independently. In developing and the least developed countries, between 65-85 per cent of anaesthesia in rural areas is administered by non-physician anaesthetists working alone (McAuliffe and Henry 1998). In the developed world, non-physician anaesthesia is practised, as mentioned in Europe and America, but noticeably not in Australasia, South America and Canada.

### 1.5.5 The process of anaesthesia

This section describes a typical process for a patient undergoing general anaesthesia in the UK. It is written from the anaesthetist's point of view. A slightly different and complementary perspective can be gained from the patient information leaflets about anaesthesia (Anaesthesia Explained, You and Your Anaesthetic and other leaflets about specific operations and techniques) recently prepared by patient representatives and anaesthetists together in a national project. These are available at www.youranaesthetic.info.

The 'patient journey' in anaesthesia within the hospital begins on the ward.

While is it common for nurses, especially on day case wards, to gather information from patients about their general health, medication, allergies and so on, UK anaesthetists prefer to visit the patient themselves on the ward before the start of the operating list. The pre-operative visit has a number of functions:

1 A social courtesy to allow anaesthetist and patient to meet.

2 To allow the anaesthetist to make his/her own assessment of the patient's medical condition, the risks posed by anaesthesia and surgery and any action necessary. For instance, further medical treatment may be desirable, even if it means postponing the procedure in the interests of optimising the patient's condition. (This would be distinct from postponement for organisational reasons such as lack of operating time, staff or facilities.)

3 To inform patients about anaesthesia and anaesthetists. The Department of Health's consent initiative (Department of Health 2001) stipulates that information about anaesthesia should be made available to patients well in advance of the actual day of admission to hospital. This would usually be in printed form, but the opportunity to ask questions of the anaesthetist who is to give the anaesthetic is vital.

4 To allow patients to consider the various options for their care before, during and after anaesthesia – for instance, to discuss methods of post-operative pain relief.

5 To maintain patient safety. Personal knowledge and identification of the patient and their proposed procedure is an important safeguard against operating on the wrong patient, or the wrong site of the right patient.

6 To prescribe pre-medicant drugs, for instance, to make patients less anxious or dampen down stomach acidity.

7 Less obviously, there is a professional agenda operating here too. In the past, the first contact between anaesthetist and patient was often in the anaesthetic room. Furthermore, anaesthesia (along with laboratory-based branches of medicine) is said to have had a reputation among other medical specialties as being suitable for doctors who were capable, but lacking in interpersonal skills. Whether this was ever true is open to question, but anaesthetists now set great store by their personableness, and communication skills are assessed in the practical examinations for the Fellowship of the Royal College of Anaesthetists diploma. Such skills are useful in mainstream anaesthetic practice, but are also essential for those working in intensive care and pain outpatient clinics. The pre-operative visit has become almost an 'article of faith' in modern anaesthetic practice.

The amount of preparation a patient needs varies but all patients who are going to receive general anaesthesia are fasted for some time (at least 8 hours for solids and 2 hours for clear fluids). This fasting relates to a major safety concern for anaesthetists. As the state of anaesthesia by definition means that the patient's protective reflexes are lost, it is possible for the contents of the stomach to rise up the gullet and find their way into the patient's lungs, causing lung damage ('aspiration pneumonitis'). Fasting and, in high risk cases, antacid pre-medication as described above, help reduce this risk.

When the operating list has reached a suitable point, the patient is sent for to come to theatre. Patients may walk (especially common in the day case setting) or be transferred on a trolley. Sometimes their own ward bed will be used - most often in the case of major operations where it is more comfortable for them to return straight into it from the operating table than be nursed on a trolley. The patient is brought into the anaesthetic room, which is a separate ante-room next to the operating theatre itself. This provides a quiet room where the patient can be anaesthetised and prepared for the operation while the operating theatre is cleaned and the necessary equipment prepared for the next operation. There are no anaesthetic rooms in North American hospitals and anaesthesia is induced in the operating room itself. While the efficiency of the two systems has not been formally tested (practice has simply developed), it seems plausible that the anaesthetic room aids smooth running of theatres by allowing patients to be held there for a few minutes, if necessary, until the anaesthetist has handed over the care of the previous patient to the recovery staff.

Each anaesthetic room and operating theatre has an anaesthetic machine. These vary in design and complexity (more modern ones have integrated monitoring functions and display screens into the machine) but essentially provide a means of controlling and administering the flow of oxygen and anaesthetic gases to the patient. The gas supply reaches the patient through tubing with a mask attached to the end. The machine has a bag connected to this tubing to allow the

anaesthetist to help, or if necessary take over, the patient's breathing. Most machines have a mechanical ventilator to perform this function for longer periods. The machine and ancillary equipment are checked at the beginning of each operating session (AAGBI 1997). Before the patient arrives, the necessary drugs are drawn up into syringes and labelled, and the equipment required is prepared and checked by the anaesthetist's assistant (usually an operating department practitioner (ODP) but may be an anaesthetic nurse).

When the patient arrives, accompanied by a nurse from the ward, the anaesthetic assistant and ward nurse together check the patient's consent form and other details. Monitoring equipment is applied (AAGBI 2000). Typically, this involves measuring blood pressure (via a cuff on the patient's arm), the electrical activity of the heart (the electrocardiogram or ECG, sensed by three 'sticky dot' electrodes on the patient's chest) and the oxygen saturation in the blood using a pulse oximeter (a peg-like sensor is placed on the patient's finger). Baseline readings are obtained. Usually, an intravenous cannula is put into a vein and secured. The procedure is different for children, who are usually accompanied by their parents. Anaesthetic cream is used on the child's hand to reduce the pain of cannula insertion, and monitoring is often not applied until the child is anaesthetised. It is more common to use anaesthetic gases to put the child to sleep (inhalational induction) than it is for adults. In this case, the cannula is inserted when induction is complete.

Often, patients are asked to breathe pure oxygen from the mask described above just before and during the injection of the anaesthetic. Once the injections are given, the effect of the anaesthetic starts. Along with unconsciousness comes muscle relaxation. Round the jaw and throat this can lead to partial or complete obstruction of the patient's airway, and this must be relieved by the anaesthetist, either by repositioning the patient's head and neck or by the insertion of an appropriate airway device. Some short operations can be performed using a face-mask alone, often with a small curved oral airway, but this means that the anaesthetist must stay next to the patient to hold the mask on. While an endotracheal tube can be inserted into the patient's windpipe, it is most common to use a laryngeal mask airway (a soft mask and tube device that fits in the patient's throat and keeps the patient's airway unobstructed). An in-line carbon dioxide monitor allows electronic monitoring of breathing which supplements the anaesthetist's clinical observation of the patient during the operation.

Extra monitoring devices (temperature, urinary catheter, direct measurement of arterial or jugular venous pressures, etc) are used when appropriate for the patient's condition and the complexity of the operation. Additional local anaesthetic injections for post-operative pain relief can also be performed at this stage.

Anaesthetics are available in two formulations – as gases (vapours) and injections (intravenous anaesthetics). The most commonly used anaesthetic technique is to induce anaesthesia intravenously, then maintain it with anaesthetic gases. However, it is quite possible to maintain anaesthesia with continuous infusions of intravenous agents. This is called total intravenous

anaesthesia (TIVA), although the patient will still need oxygen even in the absence of anaesthetic gases. Alternatively, anaesthesia can be induced by asking the patient to breathe the anaesthetic gases through the mask. This inhalational induction is often used for children.

All commonly used anaesthetics tend to reduce the rate and strength of breathing. They also tend to 'relax' the heart and cardiovascular system and a fall in blood pressure is usual. These physiological effects are expected and largely predictable, though in elderly and unstable patients (eg, large blood loss), the effects are more pronounced. Although a guide dose is calculated on the basis of the patient's body weight, this must be modified according to the factors above. Even then it is necessary to constantly modify and 'fine-tune' the depth of anaesthesia, both on induction and throughout the surgical procedure, in response to the varying degrees of stimulation at different points in the operation. Anaesthetised patients also tend to cool down and if the operation is lengthy or the patient is particularly exposed, warming devices are used to maintain normal body temperature.

Once the patient is satisfactorily anaesthetised, they are taken through into the operating theatre and prepared for surgery by repositioning, as necessary, and antiseptic cleaning of the operation site. Once the operation starts, the anaesthetist's time is divided between:

- Observing the patient directly.
- Watching the electronic monitors.
- Adjusting the depth of anaesthesia by administering drugs as necessary.
- Giving blood and other fluids as required.
- Keeping records and writing prescriptions for post-operative drugs and fluids.

Some operations require more specialist skills. At the end of the operation, administration of the anaesthetic stops and the patient gradually regains consciousness. This can take some time, depending on the length of the operation. The patient is transferred to the recovery room within the theatre suite where trained non-medical staff take over the patient's care (AAGBI 2002). They are able to manage the airway, detect anaesthetic and surgical complications as they arise and seek help with managing them. The anaesthetist retains overall responsibility until the patient is fit for discharge back to the ward. Patients should be fully conscious, alert and co-operative, comfortable and have normal body temperature. There should be no residual instability of respiration or circulation and no immediate surgical complications. Most patients stay about 30 minutes in the recovery room, but some may need to be there for a few hours. Long and complex operations, or patients in poor pre-operative health, may be best cared for on a high dependency unit (HDU) or Intensive Care Unit (ICU). The choice depends on the level of physiological support the patient will need, but arrangements are usually made pre-operatively if a bed in one of these areas is required.

## 1.5.6 The relationship between surgical and anaesthetic service provision in UK hospitals

### *Planned (routine) surgery*

In the United Kingdom, patients are referred by their general practitioner to a consultant surgeon, who typically arranges an appointment to see the patient in the outpatient clinic. The time between referral and consultation varies. For urgent work (eg, suspected cancer cases) this should only be a few weeks. If an operation is thought helpful, the patient's name will be placed on the waiting list. Some operations, eg, vasectomy in healthy people, are deemed suitable for 'direct access surgery'. This cuts out the outpatient consultation as the surgeon lists the patient for surgery on receipt of the initial referral letter.

Practices for managing waiting lists vary. In some hospital Trusts where there are two or more surgeons in the same specialty, initial referrals may be re-directed to the surgeon with the shortest waiting time for outpatient consultation or the shortest waiting time from consultation to admission for surgery. This practice may be acceptable for many procedures, patients and general practitioners, but cannot be applicable to all. Increasingly, too, the lists of patients waiting for surgery (which used to be held by individual consultants' secretaries) are kept centrally by waiting list clerks. At one time, the secretary, in conjunction with the surgeon, would put together operating lists depending on factors such as length of operation, degree of urgency, length of time on the waiting list, availability of specialised surgical or anaesthetic staff or equipment, etc. Now, it is not uncommon for surgeons to operate on one anothers' patients, at least for straightforward, non-specialist procedures.

The patients are contacted by letter about two weeks before their proposed operation date inviting them to attend for surgery. Once the composition of the list is confirmed, typed copies of the list are prepared and circulated to surgical wards, operating theatres and the anaesthetic department in advance. This is usually the day before the list is due to take place, but may be further in advance, especially for larger or more complex procedures. While communication between surgical and anaesthetic departments is generally good, breakdowns do occur. If operations have to be postponed (for organisational rather than medical reasons) on the day of surgery, then this is recorded in the hospital's activity figures. Furthermore, Trusts are obliged to give a guaranteed date for further surgery within a specified time – typically four weeks – of the cancellation.

Anaesthetic departments typically have a weekly rota matching anaesthetic skill to surgical demand. In most UK hospitals, consultant anaesthetists cover the same operating lists each week, whereas trainees may have a more flexible working pattern. There is usually a designated consultant with overall responsibility for this rota, the post usually rotating through members of the consultant body every two to three years. The rota is put together from a week to four weeks in advance, and has to balance the needs of providing anaesthesia for surgery with the other demands on anaesthetists' professional skills (described in section 1.7.5 above), as well as accommodating annual, study and other leave within the department and maintaining training opportunities for

junior anaesthetists. This can be complicated, but even well-planned rotas can founder when last-minute sickness, communication problems or emergency cases requiring particular specialist anaesthetic skills occur.

The tendency for consultant surgeons and anaesthetists to work together week-in, week-out is thought by many to foster a special relationship of mutual trust and support that acts in the patient's interest. Any advantages of having more flexibility among consultant staff in their weekly working patterns should be balanced against the possible damage done to this relationship between the surgeon and anaesthetist.

It is also possible to speculate on whether constantly changing working patterns might make anaesthesia less attractive as a career choice for UK physicians.

### *Emergency surgery and out-of-hours cover for other areas of the hospital*

Out of normal working hours, theatre activity is much reduced. Whereas in the day most theatres in a suite will be in use, typically only one or two are used out-of-hours. Efficiency is reduced by lower numbers of staff (which typically means longer turn-round times between operations) and by less experienced surgical and anaesthetic personnel. While these personnel are generally safe, they do tend to work more carefully and hence more slowly than their more experienced colleagues. This tends to increase total time spent per case. Anaesthetists may also have other responsibilities – for instance, attending cardiac arrests elsewhere in the hospital. Although they would not be able to attend while they were caring for an anaesthetised patient, they could go in between cases, adding further to delays.

The National Confidential Enquiry into Perioperative Deaths (NCEPOD 2001) currently describes four categories of surgical urgency:

**Emergency**: Immediate life-saving operation, resuscitation simultaneous with surgical treatment (eg, major injuries from road traffic accident, ruptured aortic aneurysm). Operation within one hour.

**Urgent**: Operation as soon as possible after resuscitation (eg, irreducible hernia, intestinal obstruction, major fractures). Operation within 24 hours.

**Scheduled**: An early operation but not immediately life-saving (eg, malignancy) Operation usually within three weeks.

**Elective**: Operation at a time to suit both patient and surgeon (eg, cholecystectomy, joint replacement)

Most operations performed out of normal working hours are not emergencies in the sense defined above, but fall into the 'urgent' category. Most are orthopaedic and general surgical operations. Some cases are routine procedures performed out-of-hours for a variety of reasons. For instance, a surgeon may wish to perform a particular operation on a particular patient, but it is not possible to accommodate them onto a routine operating list. Alternatively, routine lists may overrun their allotted time and, faced with the choice of postponement or

continuing regardless, surgeons may opt to carry on. This is often possible but means that, as theatre staff cannot be deployed elsewhere, there may be a 'knock-on' effect elsewhere. Increasingly, too, Trusts are scheduling routine operating lists in the evening and at weekends to increase theatre utilisation. This would imply a separate group of staff from those involved with the 'emergency' theatre.

Over the past fifteen years, largely on the recommendations of NCEPOD, there have been many changes in the way out-of-hours operating is handled. It was recognised that patient outcomes were poorer if operations were performed late at night on inadequately prepared patients by inexperienced/unsupervised trainees. All these potential risk factors have been addressed since this was first highlighted in 1987 (NCEPOD 2001). In particular, operating on patients who are not `clinically urgent' late into the night is now discouraged. Many Trusts now have a theatre dedicated to, and available for, urgent operations 24 hours a day, with scheduled sessions with surgical and anaesthetic cover during normal working hours. Many also have so-called 'trauma' lists within normal working hours, where the urgent orthopaedic procedures are accommodated. In such hospitals, it is only immediately life- or limb-threatening surgery that is performed after midnight.

Anaesthetic staffing out of hours depends on size and location of hospitals, but typically has one or more resident trainee anaesthetists, with specified consultants available for telephone advice or direct assistance if required. A medium-sized district general hospital might have one trainee assigned to theatre work, with another assigned to the Intensive Care Unit. Until recently, one of these might provide anaesthetic services to the obstetric unit. Since the hours and intensity of trainee doctors' hours has come under scrutiny in the past ten years, this has become less common. Intensive work patterns mean that trainees must work partial or even full shifts to keep their work periods within specified limits. As both the Intensive Care and obstetric units can be busy during all 24 hours of the day, it is usually necessary in larger hospitals to cover each with a separate anaesthetist. However, as the EWTD is applied to the work of trainee doctors, it is becoming clear that shift working patterns will often mean fewer daytime training opportunities.

From this brief description of anaesthetic work, it is clear that the volume and intensity of the work depends on other groups and specialities. While out-of-hours theatre work may be lessening in some places, the 24-hour demands of Intensive Care and obstetrics persists. As the hospital workload is at best stable and usually increasing, it is clear that if existing staff are to work fewer hours or less intensively (as restrictions on working time imply) then more staff will be needed, although other measures may also contribute to the solution.

### 1.5.7 Assessing effectiveness, quality and safety

Anaesthesia is different from other branches of medicine in two main respects. First, it is not therapeutic in itself, but instead enables other interventions to take place. The outcome of the procedure thus depends on the net effect of many

individual components of peri-operative care. As well as anaesthesia, this includes surgical and nursing expertise and general facilities within the hospital. Not only can it be difficult to disentangle the contribution of the various contributors, but it is also possible that deficiencies in one area of care can be masked by relative excellence in others (and vice versa). Secondly, is the way anaesthesia discourse is dominated by the related issues of risk and safety. This holds true both for professionals and for patients (Smith 2003).

### *Anaesthesia as a model of practice*

The operating theatre environment has less in common with mainstream clinical medicine than with high-technology industries, such as aviation and nuclear power, and is characterised by high dynamism, uncertainty, time pressure, ill-formed problems, complex human-machine interactions and risk (Woods 1988). The 'uncertainty' involved in anaesthetic practice comes from a number of sources. Surgical patients differ in terms of their state of health, the challenges they pose for technical procedures (such as airway management and intravenous cannulation) and their responses to the drugs given and the procedure performed. Furthermore, although anaesthetists make use of electronic monitoring devices to give them more information about the anaesthetised patient, there is uncertainty in how to interpret the signals and relate them to patient information from other sources. Fully reliable monitors of depth of anaesthesia are not available. Minor aberrations in the progress of the anaesthetic (such as variations in pulse rate, blood pressure, oxygen saturation and other measurements) are very common and do not necessarily denote that anything is wrong with the patient (Davies 1995). This is reflected in a critical incident scoring system, which describes the degree of permanence of the harm caused to the patient (Lack 1990)

| **Salisbury Critical Incident Severity Score (from Lack 1990)** |
|---|
| 1 Transient abnormality unnoticed by patient |
| 2 Transient abnormality with full recovery |
| 3 Potentially permanent but not disabling damage (eg, chipped tooth) |
| 4 Potentially permanent disabling damage (eg, hypoxic brain damage) |
| 5 Death |

It has been suggested that the practice of anaesthesia calls for two virtues – compassion towards patients and respect for co-workers – and four abilities – comprehension of facts, grasp of concepts, manual skill and quick response (Gravenstein 1988). The model of practice embodied by anaesthesia - where the practitioner responds to moment-by-moment changes in the patient's condition by adjusting drugs, ventilation, fluids and so on – does not lend itself to explicit 'evidence-based' approaches. First, it is impossible to gather the sort of high-level evidence (randomised controlled trials) to determine the best course of action at the countless decision points during the course of an anaesthetic. Secondly, effectiveness is well established in that if the correct dose of anaesthetic is given into the correct place (either by inhalation or intravenous

injection depending on technique) then it will work. Consequently, anaesthetists tend to focus less on issues of effectiveness and more on safety.

### *Conceptualising risk*

Although anaesthesia brings the ability to carry out surgery and other procedures painlessly and safely, this benefit has to be weighed against the potential risks. Patients consider anaesthesia to be especially risky, and often worry more about the anaesthetic than the surgery it enables (Adams 2001). Although figures are available for individual anaesthetic risks (see below) the exact numerical incidence of a risk is overlain by how it is perceived. Although serious persistent risks are uncommon, they are magnified by what risk psychologists refer to as 'fright factors' (Bogardus 1999). Risks that are unwillingly undergone, whose consequences happen immediately, and whose effects are permanent and untreatable, are particularly dreaded. The most feared anaesthetic risks – death, brain damage and paralysis – show these features. Anaesthetists, on the other hand, could be said to show a cultural pre-occupation with safety right from the beginning of their training and throughout their professional lives (Markham and Smith 2003).

### *Quality and safety in anaesthesia*

There are thus many facets to quality in anaesthesia, and priorities will vary according to who is making the assessment. Clearly, avoiding complications and problems is important from all perspectives but quality care must encompass more than just safety. From the surgeon's point of view, operating conditions and rapid turnaround time between cases ('anaesthetic time') are important. Hospital managers may be interested in matters of efficiency but also in how patients' concerns are addressed – avoiding complaints, for instance.

Anaesthetists' own definitions of quality do tend to focus on safety first and foremost and the term 'quality of care'. A survey of 56 anaesthesiologists in the United States (Macario 1999a) asked respondents to rate unwanted outcomes by frequency of occurrence and importance to avoid in day case surgery. The five most highly rated items were (1) pain at the site of operation post-operatively (2) nausea (3) vomiting (4) pre-operative anxiety and (5) discomfort from insertion of an intravenous cannula. However, these are context-specific in that the outcomes deemed most important to avoid overall (though generally much less frequent) were death, unintentional awareness under general anaesthesia, peripheral nerve injury and dental injury.

### *Patients' perceptions of quality*

Patients and their carers may have other views and these can be systematically sought. However, the model of patient involvement currently promoted (NHS Plan 2000) is based on one of partnership in the management of chronic illness, which is less applicable to the short-term contact with anaesthetists. There is also a logical problem with referring to participation in the context of general anaesthesia as the patient is unconscious. Other factors, such as friendliness while the patient is still awake, may be more important (Tarazi 1998). The

patient focus groups in Whitty's study (Whitty 1996) highlighted the importance of anaesthetists' interpersonal skills in reassuring patients, the importance of pre-operative information, post-operative explanation and reassurance when side effects occurred, and the influence of patients' past experiences on current expectations of anaesthesia. Further work from Macario's group complemented the Delphi process of expert anaesthesiologists by presenting a number of side-effect related scenarios to patients and inviting them to rank them. Patients rated from most undesirable to least undesirable (in order): vomiting, gagging on the tracheal tube, incisional pain, nausea, recall without pain, residual weakness, shivering, sore throat, and somnolence. (Macario 1999b) Simply asking patients whether they are satisfied or not is unrevealing: the methodology of measuring patient satisfaction in anaesthesia was reviewed recently (Fung 1998).

### *Where do the risks come from?*

Analyses of peri-operative risk usually consider risks from three main components: surgery, anaesthesia and patient disease (Fleisher 2002). Patient disease is the most powerful influence on peri-operative mortality: the sicker patients are before surgery, the smaller their chance of survival. Other patient factors may play a part in overall risk of complications. For instance, a recent randomised controlled trial of pre-operative abstinence from cigarette smoking demonstrated a substantial reduction in post-operative complications in those patients who gave up smoking (Møller 2002).

The difficulty of determining the relative contributions of the three elements should not be underestimated. One useful principle is that the likelihood of anaesthetic-related complications falls the greater the time elapsed since anaesthesia (Bechtoldt 1981).

### *Quantifying risk*

A major factor in determining the incidence of various anaesthetic-related risks is finding the denominator over which the complication should be expressed. There are also gaps in knowledge. Estimates of probabilities are usually based on frequency of occurrence in previously published studies. Accuracy requires large sample sizes for the rarest hazards and estimates may be misleading because of variations in setting (type of institution or patients) or because data are too old to apply to modern anaesthesia. For instance, in a recent review the mortality risk from pulmonary aspiration under general anaesthesia ranged in seven international studies from 1 in 45 454 in Sweden to 1 in 240 483 in South Africa, while the British study demonstrated a mortality risk of 1 in 84 839. (Engelhardt 1999).

Anaesthetists have attempted to predict outcomes using numerical scores. The American Society of Anesthesiologists' physical status classification (ASA grade) is one of the commonest 'shorthand' numerical descriptions of a patient's general condition (ASA 1963).

| **American Society of Anesthesiologists' (ASA) physical status classification** |
|---|
| 1 A normal healthy patient |
| 2 A patient with a mild systemic disease |
| 3 A patient with a severe systemic disease that limits activity, but is not incapacitating |
| 4 A patient with an incapacitating systemic disease that is a constant threat to life |
| 5 A moribund patient not expected to survive 24 hours with or without operation |
| (In the event of an emergency operation, the number is preceded by an E) |

The ASA classification is used extensively worldwide and appears to be an objective measure. However, there is considerable disagreement between raters (Owens 1978, Haynes 1995) but its simplicity and ubiquity have overcome such difficulties.

Although the classification was never intended to be an estimate of operative risk, it has nevertheless become conceptualised as such within anaesthetic practice. Formal testing does seem to support the idea that physical status classification, especially Grade 4, predicts post-operative outcome (Wolters 1996). Note that this is not risk of anaesthetic-related complications or death, only overall outcome. The higher risk of death or complications carried by a patient in grade 4, for instance, can far outweigh that of the anaesthetic in a post-operative death. Nevertheless, a high-risk patient does not exclude the possibility of an anaesthetic complication. It could also be argued that sicker patients are also less likely to withstand even minor aberrations from normal physiological functioning and so will fare worse than a previously healthy individual if an adverse occurrence develops.

More specific risk indices have been developed. Best known is the cardiac risk index developed by Goldman (Goldman 1977) to predict the risk of death and cardiovascular complications in non-cardiac surgical procedures, later modified by Detsky (Detsky 1988). Others have tried to predict the development of pulmonary complications, one of the most frequent causes of peri-operative morbidity and mortality in all types of surgery (for instance, Brooks-Brunn 1997) but these appear to have been less successful. It also appears that such predictive systems are most reliable when the patient population is homogeneous (for instance, vascular surgical patients). The Goldman index has been combined with the ASA score and the researchers suggested that combining the scores increases the accuracy of prediction of peri-operative (again, total and not simply anaesthetic) mortality (Prause 1997).

### *Outcome measures*

**Death** This outcome is easy to define. However, the main difficulty is separating the contributions of the three components listed above as they are often

interrelated. The example given by Abenstein and Warner (Abenstein and Warner 1996) is that of a patient undergoing coronary artery bypass grafting: 'If, during the procedure, the patient's heart becomes ischaemic and, in spite of intensive medical effort, the patient dies on the operating table, it may be virtually impossible to identify the exact cause of death. Did the anaesthetic, surgery or the patient's underlying disease contribute most to the ischaemia that led to the patient's death?' This judgment is often made in large inquiries by a panel of expert assessors (Gray et al 1998).

Furthermore, valid comparisons of death rate need adjustment for case mix, disease severity and comorbidity (Silber 1992) and this is not always performed.

It has also been suggested (Papper 1964) that there is also a natural, baseline death rate in the general population, the risk being highest for those who have existing disease, and consequently a proportion of deaths previously attributed to anaesthetic factors could be considered inevitable during the peri-operative period. This is borne out by clinical experience of unexpected deaths in previously asymptomatic patients who received apparently satisfactory care.

Cardiac arrest. Studies using this outcome are difficult to compare because (1) the definition of cardiac arrest varies (2) some studies exclude certain types of cardiac arrest, e.g. on coronary care units and (3) the population of patients and types of setting vary too. (Abenstein 1996)

**Unplanned admission to ICU/HDU** This is used as a surrogate marker of unanticipated problems during surgery. It is easily recognised from hospital case notes or administrative databases, but without further analysis, the reason for admission cannot be determined.

**Delayed hospital discharge** The data to identify this outcome may be routinely available on hospital information systems.

**Failure to rescue from complications** This was developed by Silber (Silber1992). The risk of complications occurring during anaesthesia varies. The rate will depend on patient factors as above, and possibly the skill of the anaesthetist as the ability to prevent complications occurring, or recognise them promptly as they develop, is likely to be related to experience. It is impossible to quantify complications that never occurred because they were prevented. The unadjusted adverse occurrence rate is thus of limited value. A more productive approach is to derive the 'failure to rescue rate,' which is the number of deaths in patients who experienced an adverse occurrence divided by the number of patients who experienced an adverse occurrence. The justification for this is that the ability to manage adverse occurrences is a measure of provider skill. This measure was not developed specifically for anaesthesia, but has since been applied to it (Silber 2000, 2002).

**Permanently disabling complications** Permanent neurological disability: paraplegia, brain damage.

**Temporary side effects** Unintentional awareness, post-operative pain, nausea and vomiting, sore throat, headache after spinal and epidural anaesthesia, bruising at cannulation sites, dental damage, and nerve damage.

### *Process measures*

Granted that many of the most important outcomes are relatively rare, an alternative approach is to focus instead on measures of anaesthetic process. Process measures can be sensitive indicators of the quality of care and are easily measured and easily interpreted (Crombie and Davies 1998). Perhaps most importantly, adjustment for case-mix is less crucial than for outcome assessment. However, there are two potential problems. First, if the approach is to be valid, the processes of care must be known to link with desirable outcomes. This is not proven and has to be assumed. Secondly, the choice of process measures and the way in which they are assessed is less clear-cut than for outcomes.

| ***Possible process measures in anaesthetic care*** |
|---|
| General: checking of anaesthetic machines and equipment, infection control, electrical safety etc |
| Procedure-specific: e.g. identifying the steps necessary for safe performance of a particular technical procedure, for instance epidural anaesthesia (Sivarajan 1982) |
| Surrogate measures: of care e.g. completion and accuracy of anaesthetic record charts |
| Analysis of failure rates at technical procedures e.g. cusum analysis (Kestin 1995) |
| Observation of anaesthetists at work: allows assessment of performance as a whole in a realistic setting. Can be in workplace by systematic observation (Greaves 2000) or more general impressions (Pope et al 2003). Can also be performed on anaesthetic simulators (Gaba 1998, Glavin 2003) |

### *Existing methods of enquiry*

**Closed-claims studies** There are many studies of closed-claim incidents in anaesthesia (for instance, Caplan 1990, Tinker 1989, Larson 2001). Although individual cases can be instructive, the lack of reliable denominator data may limit estimates of frequency. Often, too, data analysis is more descriptive than explanatory and inferences about quality of care in general anaesthetic practice must be made with caution.

**Sentinel events** Critical incident reporting has a long history in anaesthesia. This is dealt with in detail elsewhere (Davies 1995, Derrington 1994, Webb 1993). This approach to quality control is promising, but depends partly on the willingness of individuals to report incidents. There can also be difficulties deciding what is critical and what is not.

**National Confidential Enquiries** There are two well-established enquiries in the United Kingdom. The National Confidential Enquiry into Peri-operative Deaths (Gray 1998) began on a regional basis in the late 1980s and has since been extended nationally. Anaesthetists, surgeons and pathologists collaborate to

study details of peri-operative deaths in the hope of identifying correctable, contributory factors. Such approaches, though worthwhile, are essentially retrospective, uncontrolled studies and as Lunn (one of the initiators of the Enquiry) pointed out, derive 'lessons' from a small number of patients on the assumption that the care received by those who died was similar to those who survived, which may not necessarily be true (Lunn 1998). Anaesthesia also features in the Confidential Enquiries into Maternal Death (RCOG 2001). This enterprise makes similar assumptions to NCEPOD. However, both benefit from having good denominator data.

**Databases** An alternative to studying a sample of a given population is to try to collect data on as large a proportion as possible. High quality clinical databases are promising (Black 2002) but at present there is no large UK general anaesthetic database.

**Epidemiological work** This has yielded much information on incidence of specific risks and complications (eg, Pedersen 1994) but is not always able to explain associations.

Analysis of administrative datasets (USA) can also be performed, but these are usually collected for financial purposes. These records often carry a large amount of clinical information, but are limited by the fact that they do not represent complete datasets. Records of patients who have experienced an adverse event may well be absent as bills are often not submitted for these patients.

# Section 2 Methods and summaries

This chapter will in turn:

1 Outline the methodologies of the three strands of research
- Literature review
- Opinion mapping
- Policy statements
- Interviews
- Case studies

2 Discuss methodological issues

3 Summarise results from each data source

## *2.1 Literature Review*

The literature review will evaluate the impact of anaesthetic delivery by non-physician anaesthetists

### 2.1.1 Methods

#### *Background*

Following a search of the Cochrane Library and MEDLINE we were unable to identify any previous systematic review of evidence on this subject. The entire Cochrane Library was searched using a combination of keywords 'non-physician' and 'anesthesia' and the term 'nurse anesthetist' (using both United Kingdom and USA spellings). These terms resulted in a total of 57 hits. Of these, three studies on NHS EED were cost studies (not economic evaluations) of anaesthetic care (Dexter 2001, Fagerlund 1998, Pisetsky 1998) while two other studies looked at extended non-physician roles, these were not specifically in anaesthesia (Wallace 1998, Farr 1998). Extended role is a role where a non-physician undertook duties not associated with their normal job role. This can often involve carrying out duties commonly practiced by medically trained personnel.

#### *Aims (see section 1.4)*

1 To map out different models of delivery of anaesthetic care which have been tried out in Europe, North America and in the United Kingdom to date and document how non-physicians are trained within each model.
2 To gather evidence on the safety, effectiveness, cost-effectiveness and other impacts of the various models, including patients' views.
3 To explore barriers to, and possible enablers of, the redefinition of professional roles in anaesthetics in the United Kingdom.
4 To sample opinion on the competencies, skills and knowledge which future UK non-physician practitioners might need and what training schemes might meet these needs.

The literature review primarily aims to answer the aims in question 2, but also provided data for aims 1, 3 and 4.

***Inclusion criteria***

Patients: Patients undergoing surgery or other procedures under anaesthesia.

Intervention: Anaesthesia delivery by different models.

Outcomes: *Primary* - effectiveness, cost-effectiveness, safety.

*Secondary* - patient perceptions, stakeholder perceptions, training issues, education.

Study design: All.

Exclusions: None.

Restrictions: All searches will be limited, by year of publication, from 1990 - March 2003[1].Limit to United Kingdom, North America and Europe (European Union as in 2002 plus Norway and Switzerland). Including all European languages.

***Databases and Internet***

We searched the MEDLINE, CINAHL, EMBASE and HMIC databases. These searches were carried out using Silverplatter software and Reference Manager gateway. In addition, we carried out a search of 'grey' literature through databases, personal contact and Internet searches.

The 'grey' databases used were ZETOC, CLIP database (on-line clinical improvements), Northern Light database and FADE (North West Grey Literature Service). Searches using Internet search engines (Google and Ask Jeeves) were employed. The authors of key literature from all sources were contacted to obtain further relevant literature, if available.

## 2.1.2 Searching the databases

***Searching for terms***

Scoping searches were carried out on all four peer-reviewed literature databases using the key words 'anesthesia', 'non-physician' and 'nurse anesthetist' in both UK and non-UK spellings. This provided articles from which a wider list of descriptor terms could be compiled. Descriptor terms were systematically cross-referenced to ensure that no area of potential interest was omitted and that no duplication of terms was used. This referencing had to be repeated for each of the four databases as they all operate different referencing systems. A search

string for each of the databases was derived from these cross-referenced descriptor terms.

For the grey databases, a scoping search was carried out on each to determine which keywords would provide results. Ultimately, these databases were searched using the keywords 'anesthesia' and 'non-physician' and 'nurse anesthetist'.

Similar, scoping searches using Google and Ask Jeeves engines were carried out to determine which were the best terms for use. Again, 'anesthesia', 'non-physician' and 'nurse anesthetist' provided the best results.

***Review search***

Our aim was to carry out one large search that encompassed all areas of interest. Scoping searches were carried out on HMIC, CINHAL, MEDLINE and EMBASE. Again, the keywords 'anesthesia' and 'non-physician' and 'nurse anesthetist' were used to assess the volume of literature available. Both UK English and non-UK English language spellings were employed. The scoping study highlighted a shortage of literature on this topic. As a result, we decided to focus our literature search on sensitivity rather than precision. Sensitivity is the proportion of articles identified by a search strategy as a percentage of all relevant articles on that topic. Highly sensitive strategies tend to have low levels of precision. (Khan et al 2001)

Using the articles retrieved in the scoping study as a reference, a thorough search of the indexes and thesauri of the databases revealed the terms that can be used in relation to this topic. (HMIC does not have a thesaurus of descriptor terms so these were deduced through knowledge of the thesauri of the other databases. HMIC's terms did, of course, have slightly different definitions, but these were tested through trial searches.) The differences between articles published in the UK and other countries were considered.

The majority of search terms used were category headings (called MESH, descriptor or subject headings). Additional terms were used to refine the search and ensure that all articles were captured.

English spellings in UK published journals differ from English in non-UK journals. To overcome this problem, additional terms for text and title words were searched to capture all possible articles (see search protocol Appendix 10). To ensure a comprehensive strategy, text word searches were carried out for the headline terms. Less important terms were only searched in titles.

Wild cards (denoted by an asterix *) were used to capture spellings in both UK and non-UK journals (eg, an*esthetics would capture both the UK English spelling and the non-UK English spelling). HMIC was the only database to be searched that has category terms with UK English spellings. It proved useful, in some cases, to search on the precise UK English spelling. Truncation was used to capture text words with a common root (eg, anesthe* would capture anesthesiology, anesthesia, anesthetist, etc).

Also, there exists a difference in job titles, clinical and administrative terms between the United Kingdom and the rest of Europe and North America. For example, in the United Kingdom, the term anaesthetist usually refers to a medically qualified doctor, whereas in North America and Europe, it is more commonly used to describe a Nurse Anesthetist. Additional terms were added on text and title words for UK job titles and terms that are not included in the category headings.

#### *Additional searching*

While the project proposal suggested hand-searching journals for additional material, it was decided by the authors that that the time might be better spent accessing other forms of information, ie, the Internet, personal contacts and professional associations. In addition, we carried out a brief search of the databases informed by the database search. A list of the top five journals and authors was compiled to provide additional terms with which to search the database. Citation referencing was carried out on the most relevant articles.

#### *Update search*

An update search was carried out in the first week of March 2003 to capture any articles published since the search was initially carried out. The reviewers had agreed that articles published after this date would not be included. The article by Pine et al published in April 2003 was felt to be significant enough to warrant inclusion in a separate review of articles published outside the time frame of the review.

### 2.1.3 Selection process

#### *Stage one of selection process*

Since the aim of the search was sensitivity rather than precision, it was inevitable that the results of the search would turn-up far more 'hits' than relevant articles. The references retrieved were imported to Reference Manager software.

Two reviewers independently screened the references for relevant articles. Each reviewer created a list of potential inclusions and exclusions. These were compared and a unified list of potentially relevant articles was produced. Any disagreements (25) were resolved between the reviewers by discussion. A third party was not required to settle any disagreements over inclusions/exclusions at this stage. In general, both reviewers erred on the side of caution at this stage for fear of excluding a potentially relevant article. If both reviewers designated a reference to be excluded, it was permanently excluded from the study. Reasons for exclusion at this stage and numbers in each category are included in Table 1 in the results below.

***Stage two of selection process***

Full text articles were ordered to enable assessment for study inclusion (see results below). Six articles were unavailable in a full text format and these are listed in Appendix 11 with details of the measures taken to obtain these articles.

The data extraction forms designed by the Health Evidence Bulletin, Wales (Weightman 2001) (see Appendix 13) were used to assist with summarising data and categorising into exclusions and inclusions. Due to the narrative nature and to the variety of publication types, it was impractical to design a data collection form for this review. Instead each reviewer summarised the key points from each article.

The reviewers met to discuss the retrieved articles. If both reviewers designated an article as an inclusion the article was included for the final review. Those articles that were designated as probable inclusions were discussed between the reviewers. Articles classed as exclusions by both reviewers were discussed to clarify the reasons for exclusion in each case.

Articles excluded at this stage included a large number of closed claim studies that both reviewers chose to exclude. Although there was a lack of high quality and heterogeneous evidence to answer question 2 of our aims, we felt that it was important to tighten the inclusion criteria by adding the need for a denominator.

Once a decision had been made regarding inclusion, each reviewer re-read the included articles, made necessary additions and amendments to the original data extraction forms and then the two extractions were combined to create a summary of data. These summaries are in place of more formal data extraction forms. Citation referencing was then carried out on the included articles. Many of the publications referenced the same handful of articles, perhaps exacerbating the lack of literature. The most commonly referenced articles (Forrest 1980 and Becholdt 1981), which were not retrieved by the original literature search, were published before 1990. The reviewers made the decision to order these articles so that a fuller understanding of the background to effectiveness and safety studies could be gleaned. While these will not be included in the actual literature review they are included in a separate section on literature from outside the time frame of the review.

***Meta analysis***

If studies containing numerical or heterogeneous results had been retrieved by the searches, we would have hoped to carry out a meta-analysis of the data. This was not the case, and a narrative review of the literature was carried out.

## 2.1.4 Methodological discussion

The scoping searches indicated that there was a shortage of high-level evidence on provider-effectiveness, safety and cost-effectiveness. This indication was borne out by the review searches. The reviewers set the search criteria as wide as possible to ensure that all literature on this topic was captured. Following

citation referencing, author referencing and discussion with our expert group, we are confident that all the primary studies on this topic are included in the review. The review also aimed to capture information on barriers to and enablers of the introduction of non-physician anaesthesia in the UK, future skills and competencies of non-physician anaesthetists and models of care as practiced in Europe, US and UK. The wide scope of the search enabled us to capture all the most relevant articles on this topic. Where two or more articles covered the same subject area we chose to include the most recent or most referenced article.

At the first and second stage we excluded a large of number of articles. Table 2 below outlines the reasons for the unsuitability of those articles excluded at stage one. A table detailing the reasons for excluding articles at this stage is to be found in Appendix 12. The search uncovered a large number of closed claim studies, which we excluded at this stage. We felt that even those that provided information on relative provider safety were not valid, due to the methodological limitations of the studies.

In the process of citation referencing, the reviewers noticed that two articles were reappearing in many of citation lists. These were Becholdt (1981) and Forrest (1980). These articles were obtained as it seemed that they were vital to the understanding of the other literature. On studying these two articles, and with the late publication of Pine et al (2003) the reviewers felt that it was necessary to include these three pieces of primary research in the review. They are reviewed separately (section 3.1.1.2).

### 2.1.5 Results

Literature searching and selection process is summarised in Figure 1, the QUOROM diagram (see page 66).

#### *Stage one of selection process*

A total of 1073 references were retrieved from the four databases. 25 references were selected as inclusions or possible inclusions by only one of the two reviewers. These were discussed in detail by the reviewers and a consensus was reached on which references to include in the next stage. One hundred and seven were categorised as inclusions at this stage. There were ten included references that appeared in more than one database.

Articles were excluded because the abstracts clearly indicated that the article would not answer the research question. The categories below are the types of articles excluded. Since we did not impose any methodological filter on the search, no articles were excluded for methodological reasons.

**Table 1 Table of reasons for exclusion at the first stage**

| Type of article | Number |
|---|---|
| Clinical/educational/history | 422 |
| Conference proceedings | 3 |
| Roles | 17 |
| Association news | 10 |
| Audit | 3 |
| Literary review | 1 |
| Careers | 16 |
| Finance, management and planning | 66 |
| Comment | 58 |
| Duplicates (in other database searches) | 58 |
| Guidelines | 31 |
| Workforce issues | 88 |
| National/local issues | 52 |
| Not anaesthesia | 66 |
| Outside geographic limits | 30 |
| Nurse/patient relations | 6 |
| Politics | 39 |
| **Total** | 966 |

**Table 2 Table of results from database searches.**

| Database | No. of hits | No. of references for further study | % Yield |
|---|---|---|---|
| HMIC | 8 | 6 | 75% |
| Cinhal | 377 | 33 | 8.7% |
| Embase | 79 | 16 | 20.2% |
| Medline | 634 | 52 | 8.2% |

***Second stage***

Citation and 'grey 'references were added at this stage (n=45). Of the 152 articles, (107 from databases and 45 citation and 'grey' references), 74 were

excluded by the reviewers and 78 remained in the review. Articles excluded at second stage (with reasons) are listed in Appendix 12.

***Final inclusions***

Included articles (n=78) are listed by publication type in Table 3. In this Table, shaded references denote inclusion in review of primary data on safety, effectiveness and cost effectiveness.

**Table 3**

| | Author (date) | Context | Study type | Findings | Source of literature | Answers aim number |
|---|---|---|---|---|---|---|
| 1 | Audit Commission (1997) | UK | Primary research | Recommends pilot studies into non-physician anaesthetists. How best to free up valuable consultant time. | Grey | 1,3,4 |
| 2 | Cromwell (1990) | US | Primary economic research Survey 529 replies =80%. | Increased productivity by 20% if MDAs supervise CRNAs. | Database | 2 |
| 3 | Cromwell and Snyder (2000) | US | Primary economic research | Alternate models of care and costs. 1:2 ratio cheapest. Manager feelings. | Database | 2 |
| 4 | Fagerlund (1998) | US | Primary economic research | Nurse anaesthetists have high internal rate of return on their investment in education, as does the taxpayer. | Referenc-ing | 4 |
| 5 | Fassett and Calmes(1995) | US | Primary research 358 of 377 (95%) anaesthetic procedures at one site. | 1:2 ratio. High levels of medical direction may not be necessary. | Database | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | Glance (2000) | US | Primary research | Assumptions vital to useful results.<br>Consensus opinion cited.<br>Intermediate model most cost effective.<br>Low risk cases could inc ratios. | Database | 1,2 |
| 7 | Hind (1997) | UK | Primary research<br>5168 nurses 5 depts, 61% replied. | 5% nurses for the role<br>45 % against. More higher grade nurses in favour. Role development?<br>Would nurses want roles that doctors not want?<br>Pros and cons listed. | Database | 3 |
| 8 | Hoffman et al (2002) | US | Primary research<br>1000 prospective, 2198 retrospec-tive patients undergo-ing BMTT. | 9% minor adverse event. 1.9% major adverse event<br>ASA status, provider type and age were not significantly related to the adverse event. Chronic illness in child leads to 2.78 odds of adverse event compared to child with no illness. | Database | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 9 | Maaloe (2000) | Europe | Primary research | Specialist doctors had a lower rate of adverse incident than trainee doctors. Trained nurses had lower rate than specialists, but this perhaps because of less complex cases. No differences between rates of failed or difficult spinal blocks between specialist and trainee doctors. | Grey literature | 2 |
| 10 | McAuliffe and Henry (1998) | Global | Primary research | UN survey on nurse anaesthesia. Over 100 countries utilise NAs. 2/3 of all countries regardless of stage of economic development, use NAs carrying out all the critical tasks of anaesthesia. | Database | 1 |
| 11 | McKay et al (2000) | UK | Primary research<br>Qualitative. | Demonstrated that non-physicians can be trained to effectively carry out some of the roles traditionally carried out by physicians eg pre-admission assessment, crash teams, etc. | Grey | 1 ,3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12 | Silber (2000) | US | Primary research.<br>194,430 directed cases, 23,010 undirected cases from HCFA billing records for elderly patients in Pennsylvania between 1991-4 undergoing surgical or orthopaedic procedures. | Outcomes: Death rate within 30 days, complication rates, failure to rescue.<br>Adjusted odds ratio for failure to rescue and death were increased when care not directed by anesthesiologist. 2.5 excess deaths per 1000 patients and 6.9 excess failures to rescue per 1000 patients. No increase in odds ratio of complications. | Referencing | 2 |
| 13 | Silber (1992) | US | Primary research. 5972 patients over age of 65 from 531 hospitals between 1985-6. HCFA billing data. | Death rate associated with patient and hospital characteristics. Adverse event rate associated with patient characteristics. Failure to rescue rate associated with hospital characteristics (provider type) | Referencing | 2 |
| 14 | Silber (1995) | US | Primary research.<br>16,673 patients undergoing CABG between 1991-2. Data from MedisGroup National Comparative Databases | Complication rate and mortality rate data provide conflicting information. Complication rates should not be used to judge quality of care in CABG. Difficult to make an inference that a specific hospital characteristic has a particular influence. | Referencing | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | Torgersen and Chamings (1994) | US | Primary research | Hierarchical relationships within healthcare decision making. Has an influence on education and development of anaesthesia. Emphasise need to repair working relationships. | Database | 3 |
| 17 | Waugaman and Lohrer (2000) | US | Primary research | Issue for recruitment and retention and training. | Database | 4 |
| 18 | Wren(2001) | US | Primary research<br>Qualitative | Education and training perceptions. Reveals 3 stages of learning and development. | Database | 4 |

Primary studies from outside initial time frame.

| | **Author (date)** | **Context** | **Study type** | **Findings** | **Source of literature** | **Answers aim number** |
|---|---|---|---|---|---|---|
| 19 | Pine et al (2003) | US | Primary research | 22 states 1995-7, 404,194 patients. | Grey | 2 |
| 20 | Becholdt (1980) | US | Primary research | North Carolina, 1969-76<br>c. 2 000 000 anaesthetics<br>900 perioperative deaths. | Referencing | 2 |
| 21 | Forrest (1981) | US | Primary research | 16 United States hospitals, mid 1970s 8 564. | Referencing | 2 |

| | Author (date) | Context | Study type | Findings | Source of literature | Answ-ers aim numb-er |
|---|---|---|---|---|---|---|
| 22 | Abenstein and Warner (1996) | US | Secondary research | 1. Re-imbursement<br>2. Patient outcomes by provider,<br>3. Costs and competition<br>4. Describes anaesthesia practice types.<br>5. Article modified from report to Minnesota legislature. | Database | 1,2,3,4 |
| 23 | AANA - Quality Care in anesthesia | US | Secondary research | Review of literature on effectiveness and safety of CRNAs. | Grey | 2,3 |
| 24 | Cooper et al (1998) | US | Secondary research | Review of practice surveys<br>1. Practice varies.<br>2. Some have high level of autonomy.<br>3. Licensed care.<br>4. Market dynamics.<br>5. Increase in non- physician clinicians. | Database | 1,3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 25 | Gunn (1996) | US | Secondary research | Relative costs of training professional groups. Cost-effectiveness issues summarised – ratios from billing requirements<br>Suggests ratio of 1:3 or 4. | Database | 2,3,4 |
| 26 | Richardson et al (1998) | UK | Secondary research | Skill mix changes may result in service enhancement rather than substitution. Few quality studies exist and negligible generalisability to UK. Recommends that anaesthesia study could be carried out. | Database | 3 |
| 27 | Smallman (2002) | US | Secondary research | Sedation for children can be provided safely as long as guidelines are adhered to. | Database | ?2 |
| 28 | AANA – Scope and Standards for practice (1980 & 2002) | US | Guidelines/ Policy | Guidelines for CRNA practice. | Grey | 1 |
| 29 | ASA - Organisation of an Anesthesia Dept(1982 amended 1994) | US | Guidelines/ Policy | Guidelines for the operation of anaesthesia department. | Grey | 1,4 |
| 30 | ASA – Anesthesia Care Team (1982 amended 2001) | US | Guidelines/ Policy | Guidelines for operation of care team. | Grey | 1,4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 31 | Baird (aagbi) | UK | Guidelines/ Policy | 1. Dedicated assistants for anaesthetists.<br>2. Idea of anaesthesia team.<br>3. Physician only service. | Database | 1,3 |
| 32 | Caulk and Ouellette (2000) | Global | Guidelines/ Policy | History of IFNA<br>Policies and guidelines | Database | 1 |
| 33 | RCA et al (2002b) | UK | Report | Draft report of visit to USA, Netherlands and Sweden by RCA and CWP. Illustrates models of care, practice guidelines and training programmes. | Grey | 1,4 |
| 34 | IFNA (1999) | Global | Guidelines/ Policy | Guidelines for starting a new program and sample curriculum. | Grey | 1,4 |
| 35 | IFNA | Global | Guidelines/ Policy | Educational Standards in Nurse anaesthesia. | Grey | 4 |
| 36 | Poll (1994) | Europe | Guidelines / Policy | Summary of European standards in monitoring in anaesthesia. | Database | 4 |
| 37 | Reilly et al (1996) | UK | Guidelines/ Policy | Encourages national over view.<br>Highlights areas for change<br>Survey illustrated negative/confused attitudes towards nurse anaesthetist role. | Database | 1,3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 38 | Vickers (2000) | Europe | Guidelines/ Policy | Unlikely to cost less if use supervised non-physician anaesthetists. Makes the point that monitoring long uneventful anaesthesia may not be the best use of highly trained individuals' time. | Database | 3 |
| 39 | Vickers (2002) | Europe | Perspectives, Guidelines/ Policy | European perspective on non-physician anaesthetists anaesthetic assistants. | Referencing | 1,3 |
| 40 | Bacon et al (2002) | US | Perspectives | Summary of anesthesiologist and anesthetist history in US. Discussion of conflicts and future direction for anesthesiologists. | Referencing | 1,3 |
| 41 | Bettin (2001) | US | Perspectives | Maintain consistent message.<br>Leadership Plan. | Database | 3 |
| 42 | Biddle (1994) | US | Perspectives | Critical thinking<br>Explicit and tacit skills. | Database | 4 |
| 43 | Cromwell (1999) | US | Perspectives | 1. Supply > demand.<br>2. Cost of CRNAs.<br>3. Medics change interest, international graduate.<br>4. Alternate payment methods. | Database | 3 |

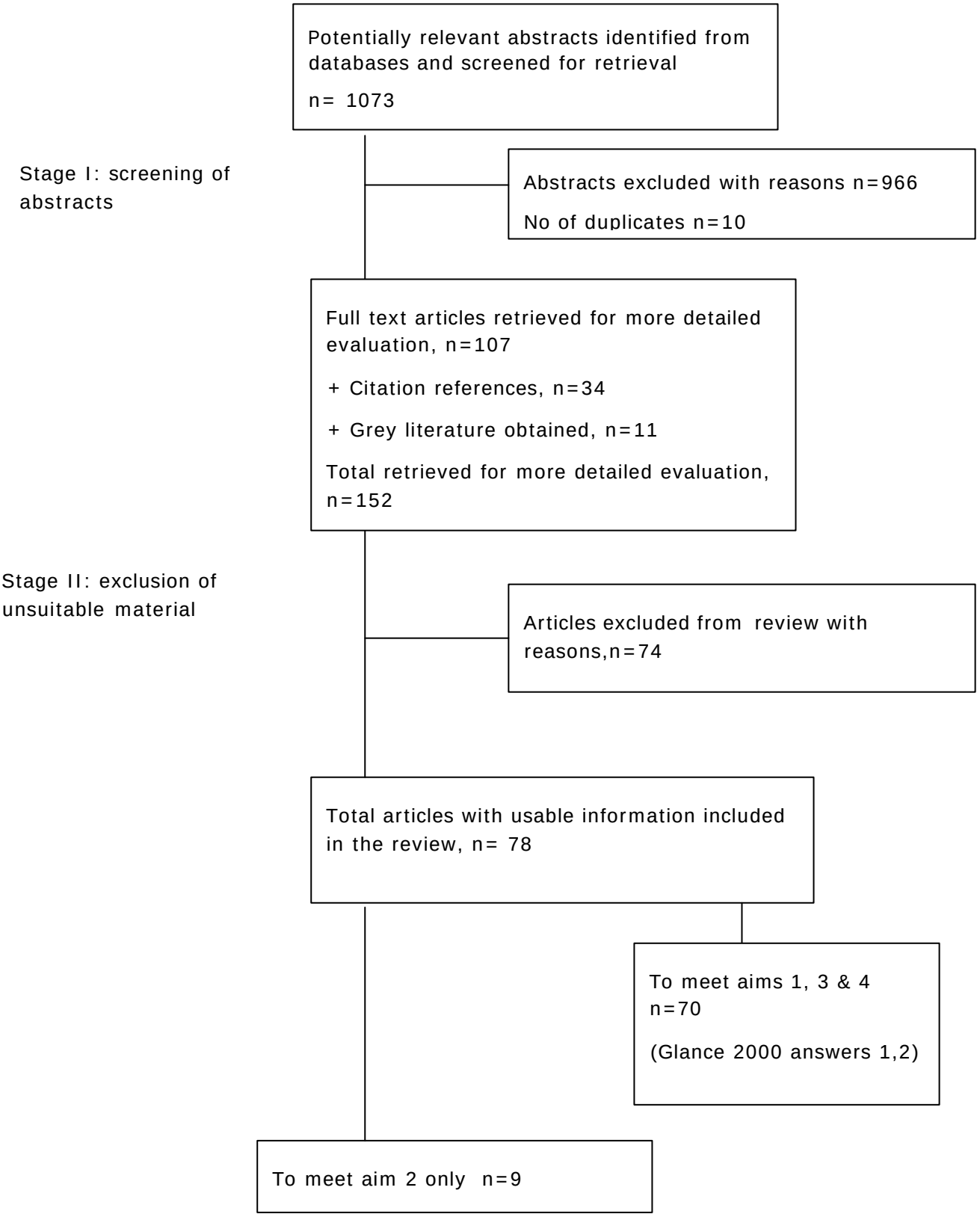
| | | | | | | |
|---|---|---|---|---|---|---|
| 44 | Gunn (1998) | US | Perspectives | Comparison between CRNA and MDA education. Summary of educational milestones for both groups. Emphasise that AANA favours approach that nurses and doctors have different but equal qualities | Database | 4 |
| 45 | Kizer and Norby (1998) | US | Perceptions | Barriers for non-physician practitioners.<br>1. Lack of clarity of role.<br>2. Lack of understanding of credentials.<br>3. Lack of uniformity of credentials.<br>4. Non acceptance by physicians and management.<br>5. Rigid administration policies Re-imbursement issues. | Database | 4 |
| 46 | MacKenzie ( 2000) | US | Perceptions | Workforce models and training.<br>Comment on Silber (2000). | Database | 1,3,4 |
| 47 | McGarvey et al (2000) | UK | Perceptions | History of UK operating theatre practice, development of ODP role. Highlights lack of GB literature and poses challenges for future. | Database | 1,3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 48 | Martin-Sheridan and Wing (1996) | US | Perspectives | 1. Critique of Abenstein et al (1996).<br>2. CRNA organisations are not linked.<br>3. Conclusions about ACTs flawed.<br>4. Flawed cost study. | Databases | 3 |
| 49 | Vickers (1995) | UK | Perspectives | Acknowledges that some anaesthetists find some of their work boring.<br>Suggests not using "nursing" banner for staff. | Referencing | 3 |
| 50 | Wicker (1997) | UK | Perceptions | Current UK roles in operating theatre. Development of practitioner role. Training and registration issues between nurses and ODPs still an issue. | Database | 1,3 |
| 51 | Zambricki (1996) | US | Comment | Reply article to Abenstein et al (1996). Data on anesthesiologist and CRNA numbers and relationship to anaesthesia related death. Data on education and monitoring. | Database | 3 |
| 52 | Castledine (1998) | UK | Comment | Discussion of audit commission report.<br>Devaluation of nursing<br>core competencies.<br>Shared power. | Database | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 53 | Castledine (1999) | UK | Comment | Discussion of scoping study. Questions development of technical nursing role. | Database | 3 |
| 54 | Longnecker(1996) | US | Comment (Editorial) | Workforce demands. Uses Silber (1992) to illustrate influence of provider skills mix. | Referencing | 3 |
| 55 | Plehn (2001) | US | Comment | Anesthesiologists need to maintain professionalism in conflicts. | Referencing | 3 |
| 56 | Rorie (1996) | US | Comment | Comment in relation to Abenstein et al (1996). | Database | 3 |
| 57 | Van Aken(2000) | Europe | Comment (Editorial) | Advocates anaesthesiologist supervision for all cases, but indicates that as long as there is no evidence of reduction of quality of care there is no argument against delegation. | Database | 3 |
| 58 | Wise (1998) | UK | Comment | Response to audit commission report. Urge action on pilot studies. | Referencing | 3 |
| 59 | Abenstein (1997- J-AANA) | US | Letter | Response to Zambricki article re 1996 article. | Database | 3 |
| 60 | Abenstein et al (1996 – AnesthAnal) | US | Letter | Reply to letters re 1996 article. | Referencing | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 61 | Arrowsmith et al | UK | Letter | Response to audit commission report. | Referencing | 3 |
| 62 | Biddle (2000) | US | Letter | Response to Glance (2000). | Database | 3 |
| 63 | Feiss (2001) | Europe | Letter | Response to Vickers (2001). | Databases | 3 |
| 64 | Gaba (1996) | US | Letter | Response to Abenstein et al (1996). | Referencing | 3 |
| 65 | Gentili (2001) | Europe | Letter | Response to Vickers (2001). | Referencing | 3 |
| 66 | Glance (2000) | US | Letter | Reply to letters (2000). | Referencing | 3 |
| 67 | Hanna (1996) | US | Letter | Response to Abenstein et al (1996). | Database | 3 |
| 68 | Hatch (1999) | UK | Letter | Reply to letters. | Referencing | 3 |
| 69 | Kremer (1996) | US | Letter | Response to Abenstein et al (1996). | Database | 3 |
| 70 | Lassner (2000) | Europe | Letter | Reponse to Vickers. | Referencing | 3 |
| 71 | MacKenzie(1999) | UK | Letter | Response to Sury et al (1999.) | Referencing | 3 |
| 72 | McBrien et al (1999) | UK | Letter | Response to Sury et al (1999). | Database | 3 |
| 73 | Martin-Sheridan (2000) | US | Letter | Response to Glance (2000). | Database | 3 |
| 74 | Miller (1996) | US | Editorial | Introduction to Abenstein and Warner. | Referencing | 3 |
| 75 | Peronnet (2001) | Europe | Letter | Response to Vickers (2001). | Referencing | 3 |
| 76 | Robinson (1998) | UK | Letter | Response to audit commission report. | Referencing | 3 |
| 77 | Smith (1998) | UK | Letter | Response to audit commission report. | Database | 3 |
| 78 | Stoeling (1996) | US | Letter | Response to Abenstein et al (1996). | Database | 3 |

***Figure 1: QUOROM diagram***



## *2.2 Case Studies*

### 2.2.1 Methods

The project protocol states:

"Our initial impression is that there are only a small number of sites which have experimented formally with extending non-medical roles in anaesthesia. The accuracy of this perception will be tested when the review begins and we are able to draw fully on the experience and contacts of the Expert Group."

#### *Aims of case studies*

1 To investigate why this innovation came about.

2 To describe the role .

3 To investigate how this innovation was implemented and to look at how and why it has evolved in the years since its inception.

4 To investigate the training for this role and how it was devised.

5 To gather evidence and opinion on whether the innovation has been successful.

6 To gather evidence on its effectiveness, cost-effectiveness and safety.

7 To ascertain whether lessons from case study experiences could be applicable to non-physician anaesthetists.

8 To gather opinion on non-physician anaesthetists in the light of case study experiences of extending non-physician roles in anaesthesia.

#### *Methods*

The Expert Group and professional contacts were contacted in the first six weeks of the project to elicit information regarding potential case study sites. The project researcher joined internet discussion groups to publicise the project and call for information. Making contact with potential case study sites was as difficult as the initial protocol had suggested.

The relevance of the potential case study sites was judged by the following criteria:

- Was the extended role undertaking part of anaesthetists' work?
- Was this innovation new? Had it been done before?
- If the innovation is not new, are there lessons to be learned?
- Was the extended role still taking place?
- If the extended role had ended, did documentation regarding the project exist?
- Was the site prepared to be involved?

#### *Sites visited*

Four case study sites were visited by the researcher. Each of the visits took no more than one working day. Some were shorter as it was impossible on those

visits to shadow the staff at work because of ethical restrictions or clinical case load on the day. Staff key to the development, implementation and training for each of the extended roles were interviewed initially using informal questioning. A semi-structured questionnaire was used to provide information for the opinion mapping (see Appendices 1, 3 and 9). At each site, a tour of the working environment was undertaken and, where possible, some time was spent talking with staff not directly involved with the developments. Interviews were either taped or detailed notes were taken. In addition, case study sites were asked to provide any written documentation they had relating to the extended role. This included such items as peer-reviewed literature, training manuals, project proposals, job descriptions, person specifications and power point presentations. Internet resources were utilised to provide information on populations and the hospitals themselves.

Following the visits, a draft report was compiled immediately after the visit and each site received a copy on which they were asked to comment and where necessary to provide clarification.

The aims of the case study investigations outlined above were an ideal and could not be applied to every case study. Some sites were at a very early stage in developing a role and others had been in place for up to ten years.

In total, contact was made with 13 sites/individuals (see Appendix 6). Only four of these sites were visited. Initial contact was made with each site by either e-mail or telephone. Following this, the researcher had an in-depth discussion with the project lead. Documents relating to any existing training programmes, evaluations and project proposals were requested for further study. Following discussions with the lead for the project and the Expert Group, the final case study visits were decided upon.

***Case Studies not visited***

Those case study investigations which we did not visit, based on the criteria listed earlier, are documented in Appendix 6. Telephone conversations and email discussions were carried out. For some of these cases we are limited to describing the type of innovation, why the change was suggested and, if it exists, a brief assessment of the effectiveness, safety and acceptability.

We would have very much liked to have written more about those projects which failed to complete. We had two problems in achieving this. First, some of the projects were sometime in the past. Individual members of staff involved had moved on and taken their knowledge of events with them. While we made attempts to contact these individuals, they either did not have the required information or were no longer connected with the hospitals. Also, the time elapsed meant that a bias of memory may have occurred. Secondly, more recent projects had to be handled with sensitivity. The perception of failure is a delicate issue and some individuals were not willing to contribute or were fearful of causing offence to others if they did. We gained as much information from each project as was possible,

### 2.2.2 Discussion of methodology

The project assembled the Expert Group with the aim of using their detailed knowledge of the field of anaesthesia to identify sites where extended roles for non-physicians were taking place. The Expert Group provided a number of contacts. Two of these were links to site visits. The other contacts provided information about further potential contacts or sites where innovation had been considered, but not taken up, or stopped before changes were introduced. The search for relevant case studies proved challenging on three levels. First, there is, despite the wealth of modernisation projects currently taking place in the NHS, very little innovation in non-physician anaesthesia. However, we feel that we have been as thorough as possible. Since the start of this project, the NWW anaesthesia pilots have been approved.

Secondly, the project encountered a degree of resistance to talk about issues concerning non-physician or non-anaesthetist anaesthesia. While the majority of individuals and organisations contacted proved helpful, there were some more reticent about involvement. This was particularly notable in some of the sites we did not visit because the projects had not been completed or had ended after the pilot.

Thirdly, we were frustrated by the number of dead ends we encountered, sometimes at the end of a number of contacts. While the visits and investigations we did carry out were valuable, locating even those proved difficult.

Toward the end of the project, we gained access to the Connections database. This database, developed as part of the National Knowledge Service, details reports, contacts and information about modernisation projects across the UK. Having searched the database in retrospect for the sites located, only one project was listed. This database is still developing and likely to be a valuable resource in the future.

We are confident that those interviewed gave honest and frank accounts of their work and that the questioning enabled this process. We are also confident that the written studies are a fair reflection of the innovations. All case studies were given the opportunity to comment on the written reports before inclusion in the final report.

### 2.2.3 Results – case studies

**Table 5**

| | Location | Description | Visit / no visit - reason | Contact through? |
|---|---|---|---|---|
| 1 | Midlands Hospital | Peri-operative Emergency Practitioner | Visit – relevant to extended roles in anaesthesia | Expert group |
| 2 | E. Midlands Hospital | Obstetric Anaesthetic | Visit – relevant to extended roles in | Funders |

| | | | | |
|---|---|---|---|---|
| | | Assistant | anaesthesia | |
| 3 | Thames Valley Hospital | Extended non-physician role in cardiac theatres | Visit – relevant to extended role in anaesthesia | Internet discussion group |
| 4 | Hospital in London | Dental sedation | Visit –relevance re: training and skills and competencies | Expert group |
| 5 | Hospital in E. Scotland | Extubation of paediatric patients | No visit – extended role planned but did not happen | Expert group |
| 6 | SE England Hospital | Pre-operative Assessment | No visit - extended role planned but did not happen | Personal contact |
| 7 | Midlands Hospital | ODPs on cardiac arrest team | No visit – extended role planned but did not happen. Alternative development not relevant to anaesthesia. | Personal contact |
| 8 | Defence Medical Services | Query armed forces practice. | No visit – armed forces practices the same as NHS | Funders |
| 9 | Any location | Query if non-physician anaesthesia in UK | No visit – unable to find any examples | |
| 10 | Hospital in London | 'Sedo-anaesthesia' | No visit – not relevant | Funders |
| 11 | Thames Valley hospital | Extended roles on cardiac arrest teams | No visit –unable to arrange visit in time scale | Literature review |
| 12 | Anglia Hospital | Venous cannulation and endotracheal intubation by non-physicians | No visit – extended role ended and documentation unavailable | Literature review |
| 13 | Hospital in London | Peri-operative Practitioner | No visit – focus on surgical work | Personal contacts |

## 2.3 Opinion mapping

Opinion mapping was comprised of two strands of research: interviews with stakeholders in anaesthesia and policy statements from professional and managerial organisations with an interest in anaesthesia.

### 2.3.1 Methods – interviews

#### *Piloting*

With reference to the project protocol, a pilot questionnaire was devised which was comprised of semi-structured questions along with a table of statements to be scaled and potentially provide some quantitative data.

Subjects for the pilot interview were chosen because of either their knowledge of the topic area or of research in clinical practice. Following three pilot interviews, it became apparent that the interview questions, with a few minor alterations in wording, provided answers to the research questions and allowed individuals the chance to express opinions without interference from the researcher. Also the semi-structured question gave opportunity for the interviewee to express opinions not anticipated by the interviewer. More structured or quantitative methods would have eliminated this possibility. The scaling of data was abandoned because the study group would not have been large enough to provide any meaningful results in the light of the pilot group's tendency to scale all variables at the maximum, scaling tables would be difficult to communicate over the telephone and: *`It is meaningless to produce measurements or qualifications of phenomena whose dynamics are not yet understood. " (Voysey 1975)'*

This comment is supported by one of the pilot interviews. In the pilot interviews each participant was asked to rate attributes and skills required for non-physician anaesthetists. All attributes were rated 10/10 as all were considered to be essential. This kind of quantitative data could not provide the depth of insight which we required about the relative attributes.

#### *Rationale*

The intention of the interviews strategy was to capture the spread of opinions on the issue of non-physician anaesthetists rather than quantify how widely each view might be held.

A semi-structured interview technique was employed because it was felt that such an approach allowed participants to express their views and if necessary allow them:

*`To raise issues which had not been anticipated by the researcher" (Denzin 1970,*).

A more formalised set of questions would exclude this possibility. (For interview questionnaire, information and consent forms see Appendices 1, 2 and 8).

#### *Candidates*

The candidates were selected from two major groups. Individuals who represented the major anaesthetic medical and nursing groups along with those representing NHS agencies and patient groups made up one group. The people in this group were asked to express their own opinions as leaders in their field. These opinions might not be necessarily those of the organisation they

represent, but would be coloured by their involvement. We selected this group of candidates because it was felt that they, as individuals, were leaders in their field and many had an in-depth knowledge of this topic. The opinions from this stakeholder (leader) group were juxtaposed with the view expressed by individuals working in anaesthesia with no official connections to organisations. The group comprised of individuals, in some cases, had a more limited knowledge of the details of how non-physicians work in the US and Europe. However, their views in relation to how such a role might be received and implemented in the UK provided a grounded perspective on theatre practice in the UK and a contrast to "official" views. All members of this group were experienced and senior in their work areas. They were selected because their considerable experience – up to 40 years - in the NHS would enable them to express a perspective on the implications of such changes and how they might be acceptable to the NHS.

In addition, interviews were carried out as part of the case study visits. These were of a more limited scope in that only one or two key individuals involved as leaders from each case study site were interviewed. A modified questionnaire was used for interviews at case study sites to capture views on how their particular innovation might inform any future developments in non-physician anaesthesia (see Appendices 3 and 9). Only one person was interviewed from each of the case studies where a visit did not take place. These individuals were questioned using the standard questionnaire.

Interviews were carried out either in person (n =12) or by telephone (n=11). The mode of interview was dictated mainly by geography, though the researcher did travel to conduct several of the stakeholder interviews. Not surprisingly, the interviews which were carried out in person, on average, lasted longer. This does not necessarily reflect the value of the content, simply that human interaction face-to-face will commonly lengthen conversations. Interviewees did not see the questionnaire in advance (with the exception of four members of the Expert Group).

All the interviews were transcribed and forwarded to the interviewees for accuracy of reporting before analysis commenced. Interviewees were given the opportunity to withdraw any statements at this stage if they chose, but were reminded that all comments would be anonymous. Two interviewees made amendments or withdrew specific statements of opinion on receiving the transcription of their interview.

The selection of interviewer also has relevance in this instance. The authors were aware of a perceived professional boundary in opinion on this topic between physician and non-physician. While it was useful to have a researcher/author without a clinical background throughout the project, it became particularly important in carrying out the interviews (and to a lesser extent with the case studies). The sensitivity of the issue was such that interviewees and case study participants commonly enquired of the clinical background of the interviewer and even went as far as to ask: `*What side are you on?*' Having a neutral interviewer facilitated frank interviews.

***Iteration***

The interviews took place over a seven-month period. During this time the researcher developed knowledge of the topic and could anticipate the possible responses of interviewees. Occasionally, an interviewee might err and the temptation would be to assist them with their train of thought. The researcher recognised this possibility to insert bias and took positive steps to avoid interjecting in conversation.

The process of interviewing was not altered over this time period. The piloting of the questionnaires allowed for adequate opportunity to alter the questionnaire and interview approach. In the cause of uniformity, all subsequent interviews followed this pattern.

***Analysis***

Transcribed interviews were kept on file until the last of the interviews took place. At the end of this period, printed copies of all the interviews were assembled. The interviewer re-read all the interviews and made a list of recurring themes. These themes were not restricted to those which came directly from the questioning. Thus a series of themes in addition to those anticipated emerged. The themes were then assigned a colour code and the printed comments were coded appropriately. The interviews were then re-read by theme, ensuring that all comments had been appropriately coded and no comment had been taken out of context. The comments were then ordered into two documents, one which addressed questions of barriers and enablers and one which addressed skills and competencies.

An initial attempt was made to contrast views on a particular theme and professional role. This proved unworkable as an opposing view had not always been expressed to every theme or by professional role. A decision was made to order the statements by theme, introducing contrast where available.

## 2.3.2 Methodological discussion - interviews

The researcher experienced problems with arranging interviews with some clinical staff. The 30-60 minutes required to carry out the interview was, on occasion, too long for clinical staff to take out of their working day. Several interviews took place under the condition that the interviewee may have to leave to deal with a clinical event. Some of these interviews took place in or adjacent to clinical areas to enable staff to participate. This was sometimes not an ideal environment because of distractions and noise. The need for quiet was emphasised by the researcher, but this occasionally had to be sacrificed to ensure the involvement of a particular individual. This was a problem with all clinical professionals, but in particular with anaesthetists. Though several attempts were made to fix a session with two consultants, it proved impossible because of clinical and administrative commitments. The problems with identifying research time were exacerbated by the fact that many of those who the project most keenly wished to interview had commitments beyond clinical work. For example, many were involved in the organisation and management of

professional organisations, policy making forums, education, etc. The "stakeholder leader" group were crucial to the mapping of opinion, but despite the enthusiasm of many for the project, securing the time of some proved more difficult than expected.

Three groups of candidates for interview were included in the review: front line workers in peri-operative care representing all professional groups; individuals involved with innovation in peri-operative care; and individuals working in peri-operative care and having a leading role representing their particular professional group. Each of the professional organisations was asked to put forward a candidate for interview. The interviewees from the peri-operative innovation group were all contacted through the search for case study sites in the UK. Leaders of the innovations were nominated by the project teams for participation in the interview. Front line staff were recruited through personal contact with the researcher throughout the year. In particular, the researcher targeted experienced staff that had often had many job roles over a considerable period of time. Many of these staff had experience of working abroad, some with non-physician anaesthetists.

All interviewees were given the opportunity to view the transcript before its inclusion in the report. Interviewees were asked to complete any missing words/passages from the transcription and confirm that they were still happy for the interview to be included in the project. Two interviewees replied asking for sections of the transcript to be removed. This reflects the highly sensitive nature of the topic under discussion. All interviewees were guaranteed anonymity during the interviews and through the consent process. The ethical approval for this project was granted on the grounds of participant anonymity.

### 2.3.3 Results - interviews

In total 23 interviews were carried out. Twenty six people were approached. No-one refused to be involved in the project. One individual did feel that a colleague might be a better candidate and forwarded the request to them. Two candidates were unable to set a date for their interview within the timescale.

The table below is intended as guidance for readers to assess the validity of the comments made by the interviewees. We wish to avoid direct identification of interviewee's job and experience as we feel that within the field of anaesthesia it would be possible to identify individual interviewees and hence breach confidentiality. This point was discussed and agreed on by the Expert Group.

Some individuals have training in more than one medical specialty or are working in one area but have trained in another. The numbers detailed overleaf will not add up to the total number of interviewees.

**Table 6**

| | | Average number of years experience of NHS |
|---|---|---|
| Number of interviewees with nurse training | 9 | 19.2 years |
| Number of interviewees with ODP training | 4 | 21.75 years |
| Number of interviewees with medical training (non anaesthesia) | 2 | 25.5 years |
| Number of interviewees with training in anaesthesia | 9 | 15.6 years |
| Number of interviewees working in management | 6 | 20.8 years |
| Number of interviewees working in other areas (including education and modernisation) | 8 | 19.25 years |

## Policy statements

### 2.3.4 Methods - policy statements

A comprehensive list of stakeholder organisations was compiled with the assistance of the Expert Group. Each of these stakeholder organisations was asked to provide a policy statement on this issue (Appendix 5). Fourteen organisations and agencies were approached by a combination of formal letter, e-mail and telephone contacts. Once informal contact was established, all the organisations received a formal letter to request their involvement, stating what was required of them and a deadline for a response of the end of June 2003. Stakeholders were asked to consider the following statement and formulate a response:

`*What is your organisation's reaction to the possibility of a non-physician anaesthetist role being developed and implemented in the UK?*'

All organisations were informed that their statement would be included in the final report of this study.

### 2.3.5 Methodological discussion

The project purposely posed this open question with the intention that it would allow the respondent the widest possible scope for response. Submitted policy statements varied in length from a few paragraphs to a two full pages of text.

The project originally set a June deadline for submission of policy statements. However, due to staffing changes at several organisations, it proved necessary to extend this deadline to the middle of September. We felt that it was more

important to allow key stakeholder organisations the opportunity to make their representation to the project than to rigidly stick to the deadlines.

### 2.3.6 Results

Eleven organisations replied. One organisation made reference to existing statements of policy, but the remaining 10 submitted an original statement (see Appendix 5 for full text of statements).

In total, three reminder letters were sent to organisations. A total of three organisations did not reply to the formal request to make a contribution to the project.

## *2.4 Ethical approval*

We obtained ethical approval for this project under the 'no local researcher' guidelines from the Multidisciplinary Research and Ethics Committee. All interviewees and case study contributors consented to their involvement in writing having read the appropriate information sheets (see Appendices 1-3). Following transcription of interviews and the writing of case studies, all contributors were asked to confirm that they were happy with the contents of the document. In addition, the research and ethical committee at each case study site we visited were contacted and approval for the visit was sought and obtained before the visits took place. Honorary contracts were arranged and, if the researcher was likely to be in patient areas shadowing staff, patient information leaflets were drawn up. This proved to be unnecessary.

# Section 3. Results and comments

This chapter will present the evidence from our research which answers the four review questions. These are:

- To gather evidence on the safety, effectiveness, cost-effectiveness and other impacts of the various models, including patients' views
- To map out different models of delivery of anaesthetic care which have been tried out in Europe, North America and in the United Kingdom to date and document how non-physicians are trained within each model
- To explore barriers to, and possible enablers of, the redefinition of professional roles in anaesthetics in the United Kingdom
- To sample opinion on the competencies, skills and knowledge which future UK non-physician practitioners might need and what training schemes might meet these needs.

This chapter will also comment on our findings.

## *3.1 Effectiveness, safety and cost-effectiveness*

### 3.1.1 Literature review

The literature review was designed to yield two types of material. First, we sought peer-reviewed publications reporting primary research addressing the relative safety, effectiveness and cost-effectiveness of physician and non-physician anaesthetic providers in the various models. Secondly, we sought other publication types within scientific and professional publications, including 'grey' literature. While this yielded initially a substantial amount of potential material, it was invaluable in providing written statements of opinion, correspondence in response to primary research and background perspectives. While the second strand of literature searching has informed the entire review, specifically the first strand, dealing with primary research reports, is presented here. We have included three articles published outside the date limits in our search strategy. The justification for this is in the 'comment' section below.

#### *Effectiveness and safety*

#### *Effectiveness*

We found no reports comparing the effectiveness of different providers. While this may be disappointing it is not surprising. As noted in section 1.7.7, if an anaesthetic is given in the appropriate dose in the correct manner it is effective. So at the most basic level, the effectiveness of anaesthesia is not in doubt. Naturally, there are variations between practitioners in some types of anaesthesia – for instance, spinal and epidural anaesthetics and other local anaesthetic injections – but by and large the evaluative focus within the anaesthetic community is on safety. A fuller discussion of possible side-effects and other adverse outcomes is given in section 1.5.7.

### *Safety*

The six studies are summarised in Tables 5a & 5b

We found no strong evidence of significant differences in critical incidents or death between different provider types in modern anaesthetic practice. In our view, if there is a difference, it is unlikely to be substantial.

### *Patients' views*

We found no reports of patients' views on different anaesthetic providers.

**Table 5a Summary table of studies addressing relative safety of different anaesthetic providers**

| Study | Methodology | Setting | Number of patients | Outcome measure(s) | Potential limiting factors |
|---|---|---|---|---|---|
| Silber 2000 | Analysis of administrative (billing) information | Pennsyl-vania, 1991-4 | 217 440 | Death, complications and 'failure to rescue' from complications. | Death reflects overall mortality. No information on causes of death. Omitted variable bias possible. |
| Hoff-man 2000 | Observational clinical study in simple paediatric ENT surgery | US tertiary care children's hospital | 1 000 (studied prospect-ively) | Adverse events during anaesthesia and recovery. | Small study. No outcome measures of long-term significance. Self-reporting. |
| Maaløe 2000 | Prospective observational clinical study | Six Danish hospitals of various types and sizes | 64 401 | Critical incidents during anaesthesia. | Self-reporting of incidents by anaesthetic providers. |

**Table 5b Summary table of studies from outside initial search limits addressing relative safety of different anaesthetic providers**

| Study | Methodology | Setting | Number of patients | Outcome measure(s) | Potential limiting factors |
|---|---|---|---|---|---|
| Forrest 1980 | Analysis of data from Stanford study of institutional differences in surgical care | 16 United States hospitals, mid 1970s | 8 564 | Death | Omitted variable bias possible. Groups distinguished at hospital, rather than individual provider level. |
| Bechtoldt 1981 | Prospective case series. | North Carolina, 1969-76 | c. 2 000 000 anaesthetics<br>900 peri-operative deaths | Death | Under-reporting of deaths. Definition of 'anaesthetic-related'. Assessors' judgement. |
| Pine 2003 | Analysis of administrative (billing) information | 22 states in USA, 1995-7 | 404 194 | Overall peri-operative mortality | Some potential cases excluded (incomplete data). No information on contribution of anaesthetic provider to deaths. |

When discussing publications published in the USA we will use non–UK spellings, otherwise we will use the UK spellings.

**Maaløe (2000)** is an unpublished PhD thesis which studied untoward critical incidents in anaesthesia at six Danish hospitals between May 1996 and April 1997. The aim of the study was to describe incidents in relation to anaesthesia and their relation to study population, anaesthetic techniques, the anaesthetic provider and the type of surgery. A total of 64,401 anaesthetic procedures were recorded. The incidents were reported on a two-part form. The first part, completed by the anesthetist/anesthesiologist, contained patient data and the second part recorded any incident and was completed by the member of staff who witnessed the incident (anaesthetist/anaesthesiologist/ recovery nurse). Incidents which were recorded by the anaesthetic monitoring equipment were recorded automatically. Incidents were classified as procedural or physiological. Physiological incidents were defined as incidents related to predefined adverse physiological reactions to anaesthesia, eg,. hypotension (a 50 per cent decrease of systolic arterial pressure), laryngospasm, allergy or cardiac arrest. Procedural incidents were defined as anaesthetic procedures where more than two attempts were required, or where the procedure failed altogether. These included oesophageal intubation, unintentional extubation, residual muscle relaxation and breathing system disconnection.

In this study, nurses maintained 88.3 per cent of all anaesthetics and doctors maintained 11 per cent (in 0.7 per cent of cases the provider was not reported). Incident rates for the different providers are shown in the Figure 2. The highest rate of incidents was seen in anaesthetics given by inexperienced doctors (11 per

cent procedural incidents and 6 per cent physiological incidents). The lowest rate was for specialist doctors (4 and 7 per cent) and the rate for trained nurses fell in between (6 and 7 per cent).

The author acknowledges that comparison across provider types, that is, nurses, inexperienced doctors and specialist doctors, might not be a reasonable comparison as the most seriously ill patient, or most complex cases, are likely to be dealt with by the most senior members of staff.

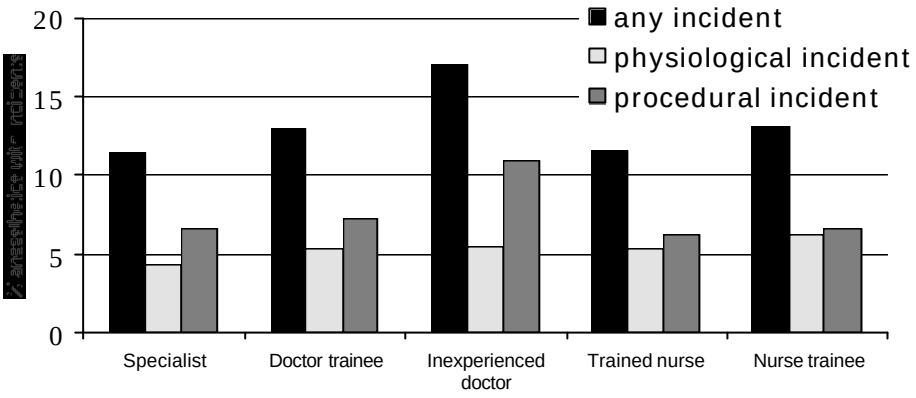



**Fig 2 Educational level of anaesthetists and incident rates.**

*Reproduced with permission from Maaløe (2000)*

**Hoffman et al (2002)** is an uncontrolled, non-randomised observational study of short-term anesthetic complications of typanostomy tube (grommet) placement in children carried out between November 1998 and March 2000. The study considered 3198 consecutive patients with either re-current acute or chronic otitis media at one children's hospital in Virginia, USA. One thousand patients were studied prospectively and 2198 retrospectively through medical records. Data from the prospective arm only are included in analysis. Anesthesia was provided by either specialist paediatric anesthesiologists, residents, nurse anesthetists or students. All were supervised by the paediatric anaesthesiology specialists. The authors do not specify the level of supervision. The study aimed to determine the incidence of major and minor adverse events during the procedure in relation to ASA physical status (see Glossary section 1.2), age of patient, level of staff expertise and present of concurrent medical conditions. Events were classified as 'major' or 'minor', but this is very much from an anesthesia provider's perspective. Major adverse events were classed as laryngospasm, bradycardia, stridor, decreased oxygen saturation greater than 10 per cent of baseline (unadjusted) and dysrhythmia. Minor adverse events were upper airway obstruction (transient loss of tongue and pharyngeal muscle tone), recovery longer than 30 minutes, emesis and persistent agitation in the recovery room.

One hundred and four (8.8 per cent) of children had an adverse event; 1.9 per cent had a major adverse event. Some 1.1 per cent had more than one adverse event. All the patients were discharged home on the same day as the procedure

(so none of these events were of long-term significance), none were admitted as in-patients and there were no deaths.

Results were analysed by provider type. The study found no evidence of a difference in adverse event rates between anesthesiologists and nurse anesthetists. The study did find that there was an increased occurrence of agitation when anesthesia was administered by a resident as compared with administration by a specialist anesthesiologist (relative risk 2.3, 95 per cent confidence interval 1.28-4.12; *p*=.006). There was no relationship between residents and major adverse events.

Overall the study concluded that :`Anesthesia provider type was not a significant predictor of the occurrence of an adverse event.' While this is true, the adverse events sought are not of long-term significance for patients (see Salisbury classification of critical incidents, section 1.5.7).

The authors acknowledge that both agitation and prolonged recovery from anesthesia are subjective measures, however they relied on the experience of the anesthesia providers and recovery room nurses to record their findings. These two minor adverse events were the most common in the study (agitation, 57/104 and prolonged recovery, 27/104)

**Silber et al (2000)** compared outcomes of patients whose care was either performed or directed by an anesthesiologist with care which was performed by residents or Certified Registered Nurse Anesthetists (CRNAs) without medical direction. Records of 217,440 patients dating from between 1991 and 1994 were selected from Medicare billing records for the state of Pennsylvania, USA. Elderly patients who underwent a general surgical or orthopaedic procedure at one of 245 hospitals were included. Direction or medical involvement in care was defined by reference to the billing records. 23,010 were defined as undirected and 194,430 were defined as medically performed or directed. As well as death and complication rates, the authors use the 'failure to rescue' rate, as defined by death within 30 days in those whom either a complication developed or died without a recorded complication (see section 1.5.7). The authors list 41 complications, including a number of complications which are not necessarily caused by, or remediable by, the anesthesia provider. A complex series of adjustments were made for known confounding factors. Causes of death were not available and this study cannot therefore define the proportion of anesthetic-related deaths directly. Overall surgical mortality (as also used by Pine 2003 below) is given.

Undirected cases were more likely to have taken place in hospitals with lower technology ratings and which were less likely to teach residents. Undirected cases took place on average in institutions with 72.7 per cent of anesthesia providers in possession of board certification (see Glossary section 1.2). In directed cases this figure was 74.7 per cent (p=0.0001).

**Table 6 Unadjusted outcomes for undirected and directed cases**

| | Directed % | Undirected % |
|---|---|---|
| Death rate | 3.41 | 4.53 |
| Complication rate | 41.15 | 47.87 |
| Failure to rescue rate | 8.18 | 9.32 |

The unadjusted death rate was 3.41 per cent for directed patients and 4.53 per cent for undirected patients (see Table 6, above). The odds ratio for complications showed no significant difference between undirected and directed care. When the figures are adjusted for patient and hospital characteristics, the authors suggest that undirected cases were associated with greater death (odds ratio 1.08, $p<0.04$) and failure to rescue rates, (OR 1.10, $p<0.01$) rates. This equates to 2.5 excess deaths per 1000 patients and 6.9 excess deaths per 1000 complications in undirected cases.

Silber et al (2000) concludes that undirected anesthesia increases the likelihood of a 'failure to rescue' by 6.9 deaths per 1000 complications. However, the study has limitations in its methodology. It has been pointed out (Fleisher 2002) that such studies can be regarded at best as hypothesis-generating and the association found here, if valid, cannot be interpreted as causal. For instance, only 8,873 of the 23,010 undirected cases were billed for anesthesia and therefore only this number have any record of which provider administered the anesthesia, leaving 14,137 patients in the undirected group who had no such record. The study assumes that because no bill was submitted that the case must be undirected care. A further complication is that it is quite possible for cases to be supervised by physician anesthesiologists but undirected (see 'supervision and direction' in comment section below).

Simply classifying cases on the basis of direction (the term used for billing purposes) implies that undirected cases do not involve a physician, which may not be the case. Also, the study acknowledges the fact that bills are unlikely to be submitted for patients where errors have been made or if the patient died. Both these factors weigh against the undirected group. Furthermore, 34 per cent of patients were admitted as emergencies, which will tend to make death more likely in either group. An overall mortality of 3.41 per cent is substantially higher than the figures given by Pine 2003 for elective surgery (the riskiest operation had a mortality rate of 1.2 Per cent).

***Primary studies outside the initial search limits***

We limited the searching for the systematic review of primary literature to articles from 1990 to March 2003. Initially, it was felt that studies dating from before 1990 would have limited relevance because of the changes which have taken place in the specialty of anesthesia such as new techniques, better anaesthetic agents and the introduction of sophisticated monitoring equipment. As mentioned, there is very little primary, high quality evidence on provider safety in anaesthesia and we have included two earlier articles in our review

because they are frequently cited (and mis-interpreted) by more recent work and thus are of continuing relevance to the topic. The articles by Forrest and Becholdt were identified through citation lists in more recent articles. Pine et al's article was published in April 2003, just outside the end of our search limit date of March.

**Forrest (1980)** compared anesthetic care delivered in hospitals staffed mainly by anesthesiologists (Group 1) and nurse anesthetists (Group 2). Data were collected from 16 of the 17 hospitals involved in the Stanford Center for Health Care Research intensive study. Data on 8593 patients undergoing one of 15 surgical procedures were collected prospectively by trained staff, usually nurses, over 10 months during 1973-4. Patients were assigned a weighting based on stage of disease, and probability of developing a post-operative mortality or morbidity. Group 1 included 5159 patients who were treated in hospitals with primarily anesthesiologists and 3405 patients who were treated in hospitals with primarily nurse anesthetists (Group 2). Each actual outcome was compared to the outcome predicted from the patient's pre-operative health status and the operation performed.

The study found that in Group 1 there was a net difference of approximately one less death than predicted (the group had been subdivided into anesthesiologist only and anesthesiologist primarily) and that Group 2 had no more deaths than predicted. Forrest uses several statistical methods to analyse the data from his study. In one method (indirect standardised mortality ratios) a difference in favour of hospitals where patients were anesthetised by nurse anesthetists was found. When Bayes adjusted mortality rate was used, the difference in rates changed in favour of hospitals where anesthesiologists deliver care. Group 1 had better standardised outcomes for the scales weighted for death and intermediate outcomes. Group 2 had better standardised outcomes for the scales weighted for complications. There were however, no statistically significant differences in any of these analyses. A $p < 0.05$ or above implies a statistical significance. Forrest concludes that: `Using conservative statistical methods, we concluded that there were no significant differences in outcomes between the two groups of hospitals defined by provider type.'

The article makes no mention of the proportions of nurse anesthestists /anesthesiologists in these hospitals, nor of the tasks performed by each group. Neither does it mention whether the provider groups were working together (see 'supervision and direction' in the comment section below).

**Becholdt (1981)** report is a case series of 900 deaths from more than two million anesthetics in the state of North Carolina between 1969 and 1976. Of the 900 deaths, 90 were judged to be anesthesia related to a certain extent. Patients' names were obtained from death certificates sent from the Medical Examiner's office (which from 1971 had to be informed of any operative deaths) or from the Bureau of Vital Statistics. If on initial review the death appeared to have been related to anesthesia, a questionnaire was sent to the administrator of the anesthetic. Should the anesthesia provider have felt that anesthesia was implicated, or if the accounts of the event suggested it was, all information was brought before the study committee. The study collected information on the type

of anesthesia used, location of delivery, anesthesia provider (trainees, both medical and nursing were classified according to their supervisor), time of death, surgical procedure and patient risk (ASA status). The study placed no limitations on time of death, surgical procedure or patient risk including whether the surgical procedure was an emergency.

The author concluded, after the anesthetic death had been divided by provider type (nurse anesthetist only, anesthesiologist only and anesthesiologist and CRNA working together) that the likelihood of adverse incidents were "rather similar" by provider. CRNA alone accounted for about half of the anaesthetic related deaths, but also delivered about half the anesthetics. Becholdt's data suggested that anesthesiologists and CRNAs working together have a lower rate of anesthesia related death (1:28,166) as compared with anesthesiologist only (1:24,500) and nurse anesthetist only (1:20,723). Becholdt did not draw any specific conclusion from these figures except to reiterate that overall the rate was 'about 1:24,000' across provider types.

The author admits that the study is limited by incomplete data sets and the reliance of the anesthesia provider to complete a questionnaire. The author accepts the interplay between risk factors of surgery, patient status and the anesthesia and accepts that in most of the 90 cases the anesthetic was a significant factor to the death, but patient disease and surgical procedure also played a role.

**Pine et al (2003)** This large administrative dataset analysis began with 586 422 patient records selected from Medicare databases for 22 states in the USA between 1995 and 1997. Patients were selected if they were admitted for one of eight surgical procedures. The patients also had to be resident in the state where the operation was performed, undergo the operation within two days of admission and have an appropriate diagnosis for the procedure. The type of anesthesia provider was obtained from part B of the Medicare bill. If no provider code was present, the case was coded as an emergency or if the case was carried out at a hospital which had carried less that 15 similar procedures in the three years of the study, the patient data was excluded. Thirty-one percent of the initial number of patients were excluded before the data were analysed.

In a manner similar to Silber 2000, clinical risk adjustment models were derived by the application of step wise logistic regression models to statistically significant risk factors including number of beds, number of patients, number of operations, and teaching hospital status (obtained from the 1997 American Hospital Association annual survey database). Hospitals were categorised by location, as well as technological sophistication. Bootstrapping techniques were used to ensure applicability to range of observed data. Data were also risk adjusted in terms of patient's predicted mortality rates.

Of the 404 194 cases included in the study, anesthesia care was provided by anesthesiologists alone in 33.2 per cent of cases, by anesthesia care teams in 58.6 per cent and CRNAs alone in 8.2 per cent. Mortality range for patients was between 0.11 per cent for mastectomies and 1.2 per cent of cholecystectomies. The average mortality was 0.38 per cent. The study reports that the risk

adjusted mortality rates by anesthesia provider showed “no significant differences” (see Table 7).

The article acknowledges the methodological failures of previous studies and outlines how it has attempted to overcome these problems. The authors conclude that there is no significant difference in overall peri-operative mortality between anesthetic provider types, while acknowledging that their data source did not allow them to identify whether the death was anesthesia related or not.

**Table 7 Risk adjusted mortality rates by type of anesthesia provider**

| Type* | AA | CRNA | Team | No. of Hospitals | Cases per hosp-ital | No. of cases | Dead | Predic-ted dead | Observ-ed Rate (%) | Predict-ed Rate (%) | O/P |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **All cases** | | | | | | | | | | | |
| A1 | 1 | | | 95 | 313 | 29,718 | 121 | 115.4 | 0.41 | 0.39 | 1.049 |
| A2 | | 1 | | 191 | 71 | 13,592 | 61 | 68.0 | 0.45 | 0.50 | 0.897 |
| A3 | | | 1 | 25 | 333 | 8,330 | 24 | 28.9 | 0.29 | 0.35 | 0.830 |
| B | 1 | 1 | | 112 | 203 | 22,770 | 94 | 92.8 | 0.41 | 0.41 | 1.013 |
| C1 | 1 | | 1 | 574 | 457 | 262,289 | 978 | 982.0 | 0.37 | 0.37 | 0.996 |
| C2 | | 1 | 1 | 9 | 94 | 844 | 4 | 3.2 | 0.47 | 0.38 | 1.250 |
| D | 1 | 1 | 1 | 171 | 390 | 66,651 | 269 | 260.8 | 0.40 | 0.39 | 1.031 |
| Total | | | | 1,177 | 343 | 404,194 | 1,551 | 1,551.0 | 0.38 | 0.38 | 1.000 |
| Anesthe- | | | | | | | | | | | |
| siologist | | | | | | | | | | | |
| only | | | | | | | | | | | |
| A1 | 1 | | | 95 | 313 | 29,718 | 121 | 115.4 | 0.41 | 0.39 | 1.049 |
| B | 1 | 1 | | 112 | 107 | 11,970 | 52 | 50.1 | 0.43 | 0.42 | 1.037 |
| C1 | 1 | | 1 | 574 | 127 | 73,046 | 323 | 325.6 | 0.44 | 0.45 | 0.992 |
| D | 1 | 1 | 1 | 171 | 115 | 19,601 | 108 | 90.5 | 0.55 | 0.46 | 1.194 |
| Total | | | | 952 | 141 | 134,335 | 604 | 581.6 | 0.45 | 0.43 | 1.039 |
| CRNA only | | | | | | | | | | | |
| A2 | | 1 | | 191 | 71 | 13,592 | 61 | 68.0 | 0.45 | 0.50 | 0.897 |
| B | 1 | 1 | | 112 | 96 | 10,800 | 42 | 42.6 | 0.39 | 0.39 | 0.985 |
| C2 | | 1 | 1 | 9 | 18 | 164 | 2 | 0.9 | 1.22 | 0.55 | 2.222 |
| D | 1 | 1 | 1 | 171 | 50 | 8,595 | 46 | 35.0 | 0.54 | 0.41 | 1.316 |
| Total | | | | 483 | 69 | 33,151 | 151 | 146.5 | 0.46 | 0.44 | 1.031 |
| Anesthe- | | | | | | | | | | | |
| sia care | | | | | | | | | | | |
| team | | | | | | | | | | | |
| A3 | | | 1 | 25 | 333 | 8,330 | 24 | 28.9 | 0.29 | 0.35 | 0.830 |
| C1 | 1 | | 1 | 574 | 330 | 189,243 | 655 | 656.3 | 0.35 | 0.35 | 0.998 |
| C2 | | 1 | 1 | 9 | 76 | 680 | 2 | 2.3 | 0.29 | 0.34 | 0.870 |
| D | 1 | 1 | 1 | 171 | 225 | 38,455 | 115 | 135.4 | 0.30 | 0.35 | 0.849 |
| Total | | | | 779 | 325 | 236,708 | 796 | 822.9 | 0.34 | 0.35 | 0.967 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| * Key to types | | | | | | | | | | | |
| A1 = Anesthesiologist as sole provider | | | | | | C1 = Anesthesiologist alone and team care | | | | | |
| A2 = CRNA as sole provider | | | | | | C2 = CRNA alone and team care | | | | | |
| A3 = Team as sole provider | | | | | | D = Both types of solo providers and team care | | | | | |
| B = Both anesthesiologist and CRNA, each working alone | | | | | | | | | | | |
| AA indicates anesthesiologist alone | O/P, observed/ predicted ration | | CRNA, Certified Registered Nurse Anesthetist | | | | | | | | |

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### *Cost-effectiveness*

We found only three original investigations relating to 'cost-effectiveness' of the different models of care. Strictly speaking, they deal with productivity rather than cost-effectiveness as they do not have results by outcome per cost. Furthermore, as relative safety of different providers is not established, it is necessary to make assumptions to guide the economic modelling.

**Cromwell and Rosenbach (1990)** conducted a survey in the USA to estimate the change in productivity levels with increased delegation of anesthesia tasks to CRNAs. The data came from a 1986 study where 656 anesthesiologists were randomly selected from the American Medical Association Masterfile database, contacted by post and asked to provide data on anesthesia procedures. A total of 514 members responded with complete data. The 656 were also asked to take part in telephone interviews. In all, 529 were interviewed. The remaining 127 were lost to the survey.

The survey revealed that an anesthesiologist might be expected to yield just less than one 'anesthesia hour' per hour at work, that is, the time spent giving or supervising the administration of anesthesia. The number of anesthesia hours per shift depends on the amount of time spent in supervising CRNAs or in performing other activities such as administration or research.

The lack of variation between revenues per hour and per shift hour suggests that complexity of cases does not play a part in per shift productivity. Also "high complexity per operation hour does not guarantee high overall revenues per shift".

The study also found that solo anesthesiologists see 3.7 patients per shift and supervising anesthesiologists see between 5.3 and 6.5 patients per shift. The authors also highlight `*a strong positive correlation… between productivity and CRNA involvement.'*. Cromwell and Rosenbach argue that anesthesiologists working along side CRNAs can produce a maximum productivity gain of 63 per cent. The survey showed an overall productivity gain of 20 per cent. Cromwell and Rosenbach argue that fewer anesthesiologists not more would make anesthesia provision more cost effective. The trend in the US at the time of the survey was to hire more anesthesiologists. The authors attribute this trend to the difficulties of the billing system, general physician "distaste" for hiring physician extenders and a reluctance to manage and supervise large practices. This may no longer be as valid as managed care has tended to drive down anesthesia costs.

**Cromwell and Snyder (2000)** documented changes in payments systems in the US hospital system and looked at cost-effectiveness models to combat these changes. Changes in the way that payers (Medicare/Medicaid and private insurance) are negotiating payment contracts will have a direct affect on cost-effectiveness of anesthesia services. Payers are discussing moves either to a global payment for procedures, which would include a cost for anesthesia, or demanding a discount in the anaesthesia portion of the bill.

The paper considers four 'case study' hospitals though does not specify what data were gathered (other than referring to interviews with anesthesiologists and surgeons), nor how they were collected. The four hospitals were:

- A large urban teaching hospital with 1:2 anesthesiologists:CRNA supervision with anesthesiologists also supervising student nurse anesthetists, residents and fellows.
- A large non-teaching hospital with 1:4 supervision ratio.
- A smaller urban non-teaching hospital where CRNAs and anesthesiologist worked without supervision, but had a `floater' anesthesiologist to assist, deal with emergencies and cover breaks, etc.
- A small rural hospital where CRNAs and anesthesiologist worked without supervision and either a CRNA or anesthesiologist `floated.'

The study illustrates that team arrangements can include a wide variation in caseloads. Cost analysis for the case studies was carried out using Klein's 1997 model. This model assumes 10 000 anesthetic procedures over 230 provider working days. The all-anesthesiologist, non-teaching model was graded as 100 per cent of cost.
The study suggested that the most cost-effective model was the non-teaching hospital with a supervision ration of 1:2. This had a relative cost of 56 per cent, closely followed by the 1:4 ratio at a non-teaching hospital with a relative cost of 59 per cent.

The authors also argue that the relative training costs of anesthesiologist and CRNAs mean that CRNAs are more cost-effective.

The authors are presumably referring to data they have collected when they suggest strong support for the CRNAs from the surgeons who felt that the nurses' talents were underused. Likewise, hospital managers, clinical directors of anaesthesia services, surgeons and other senior staff were: `*all convinced that "team" anesthesia was cost-effective and gave them an advantage over the competition "* and that a move to anesthesiologist solo practice was: `*a step in the wrong direction.'*

The authors encourage cost-effective thinking in managers to enable them to face the newly competitive environment. This study was part funded by the American Association of Nurse Anesthetists.

**Glance (2000)** used a decision tree model to compare the cost-effectiveness of five anesthesia care team models:

1 Physician only (anesthesiologist)

2 Anesthesia Care Team (ACT) where anesthesiologists anesthetise high risk patients and CRNAs supervised on a ratio of 2:1 anesthetise all others.

3 ACT where physicians provide care for high risk patients, intermediate risk patients are anesthetised by supervised CRNAs on a ratio of 2:1 and low risk patients by CRNAs supervised on 4:1 ratio.

4 As for 3, but with low risk patients anesthetised by CRNAs supervised on 8:1 ratio.

5 Anesthesiologists anesthetise all high risk patients and all intermediate and low risk patients are anesthetised by unsupervised CRNAs.

In his introduction Glance correctly states that: `*There are no outcome studies which definitively support the superiority of physician versus non-physician anesthesia providers'* and goes on to assume that anesthesiologists working alone were more likely to have better patient outcomes. He refers to an earlier paper by Silber (Silber 1992) which found an inverse relationship between the number of board certified anesthesiologists in a hospital and the `failure-to-rescue' rate for a number of surgical complication (used also in Silber 2000). He also draws on Longnecker (1993) to create the assumption that: `*a CRNA working alone would have twice the mortality of a non board certified anaesthesiologist* five *times that of solo anesthesiologists or ACTs with ratios of 1:2 or 1:4.'* From this assumption, the decision analysis model is created. It is of course necessary to make such assumptions for such an economic analysis, but this crucial piece of information is not contained in the study's abstract. Thus the casual reader could take the findings at face value.

The study recommends that high risk patients are treated by anesthesiologist alone, intermediate risk patients by ACT with a ratio of 1:2 and low risk by ACT with a ratio of 1:4. A 1:4 ratio was not felt to be cost-effective for intermediate risk patients. Glance also asserts that anesthesiologist alone would not be cost-effective for all cases. The author states that while physicians generally feel that patient outcomes are better when an anesthesiologist is involved in the care, he acknowledges that: `*the evidence supporting this position consists mainly of expert opinion and poorly controlled studies.*' Glance acknowledges that his findings must be qualified by the lack of outcome data.

Glance's assumptions about provider safety were criticised by Biddle (2000) and in particular what Biddle saw as the violation `*of a number of the foundations of science including the failure to minimize researcher bias.'* Biddle (2000) also criticised the use of Silber (1992) failure to rescue measure, which Biddle felt was "insensitive".

Martin-Sheridan (2000) also rebukes Glance's findings arguing that the study misrepresents Silber's findings.

### 3.1.2 Comment

***Poverty of evidence***

Despite broad search criteria, and having extended the search to include articles from outside our original time frame, we have retrieved nine articles which go some way to answering question two of our research, that is, evidence on effectiveness, cost-effectiveness and safety of non-physician anaesthetists. From an original number of database hits of 1073, plus citation referencing and `grey' literature searches, this is a small residual number considering that non-physician anaesthesia has been practised in Europe and US for many years. The quality of the literature was of a relatively low level. There were no randomised controlled trials or case controlled trials. On searching through the citation

references, we found that the same handful of articles was referenced by many of the articles. These included Becholdt (1981), Forrest (1980), Cromwell (1990) and Silber (2000) along with other opinion pieces such as Abenstein and Warner (1996). Figure 3 (p97)shows how these articles are referenced in the literature we uncovered. It is not unreasonable to describe this field as an 'evidence-free zone'.

***Difficulties in ascribing causation to anaesthesia***

The combination of anaesthesia, surgery and all the other components that make up the 'package' of peri-operative care makes disentangling the influence of each individual aspect problematic. This was reviewed more thoroughly in section 1.5.7. All the studies described under 'safety' share this potential pitfall. Some are more prone to it than others, as they deal with overall mortality (Pine 2003, Silber 2000) rather than anaesthetic-related mortality. Bechtoldt (1981) attempts to classify deaths as '*anesthesia related'* but, as the author himself acknowledges, there is scope for interpretation in this judgement which may limit the usefulness of the figures. Incident studies such as that by Maaløe (2000), where a predetermined list of anaesthetic-related complications is used as outcomes, may be easier to ascribe to the actions and omissions of the anaesthetists involved.

***Over-citation and misinterpretation***

One benefit of our expanded literature search was the retrieval of opinion pieces, letters and comments in response to key articles. While these do not help us directly to address effectiveness, cost-effectiveness and safety, they do provide a valuable insight into the tensions within US anesthesia. The majority of the literature retrieved was from the US, particularly the opinion, comments and letters. Only ten pieces of literature from the European continent (not UK) are included in the review. Considering that non-physician anaesthesia has been practised in some parts of Europe for over forty years, this is perhaps surprising. It seems that the literature has been generated as a direct result of the professional conflict which exists in the US. Many of the articles are clearly partisan and, in the case of those in favour of nurse anesthetists, published in the American Association of Nurse Anaesthetists' journal. Abenstein and Warner (1996) was published in the prestigious journal Anesthesia and Analgesia despite the editor's acknowledgement of the authors' biases (Miller 1996).

Some articles (including Abenstein and Warner (1996), Silber (1992) and Silber (1995)) are frequently cited as evidence on the issue of nurse versus physician differences in provider safety, but contain no such evidence. Abenstein and Warner (1996) is an abridged version of a report by the authors for the Minnesota state legislature. It contains no new primary data on the relative safety or cost-effectiveness of the nurses or anesthesiologists, but its authors nevertheless conclude that the 'anesthesia care team' is the safest model of anaesthesia administration. The report was commissioned as a study of anesthesia practice to include anesthesiologist and nurse anesthetist practice. As well as describing practice models and training for CRNAs, anesthesiologists and

Anesthesiology Assistants (AAs) (see Glossary section 1.2), the article also reviews evidence on provider safety.

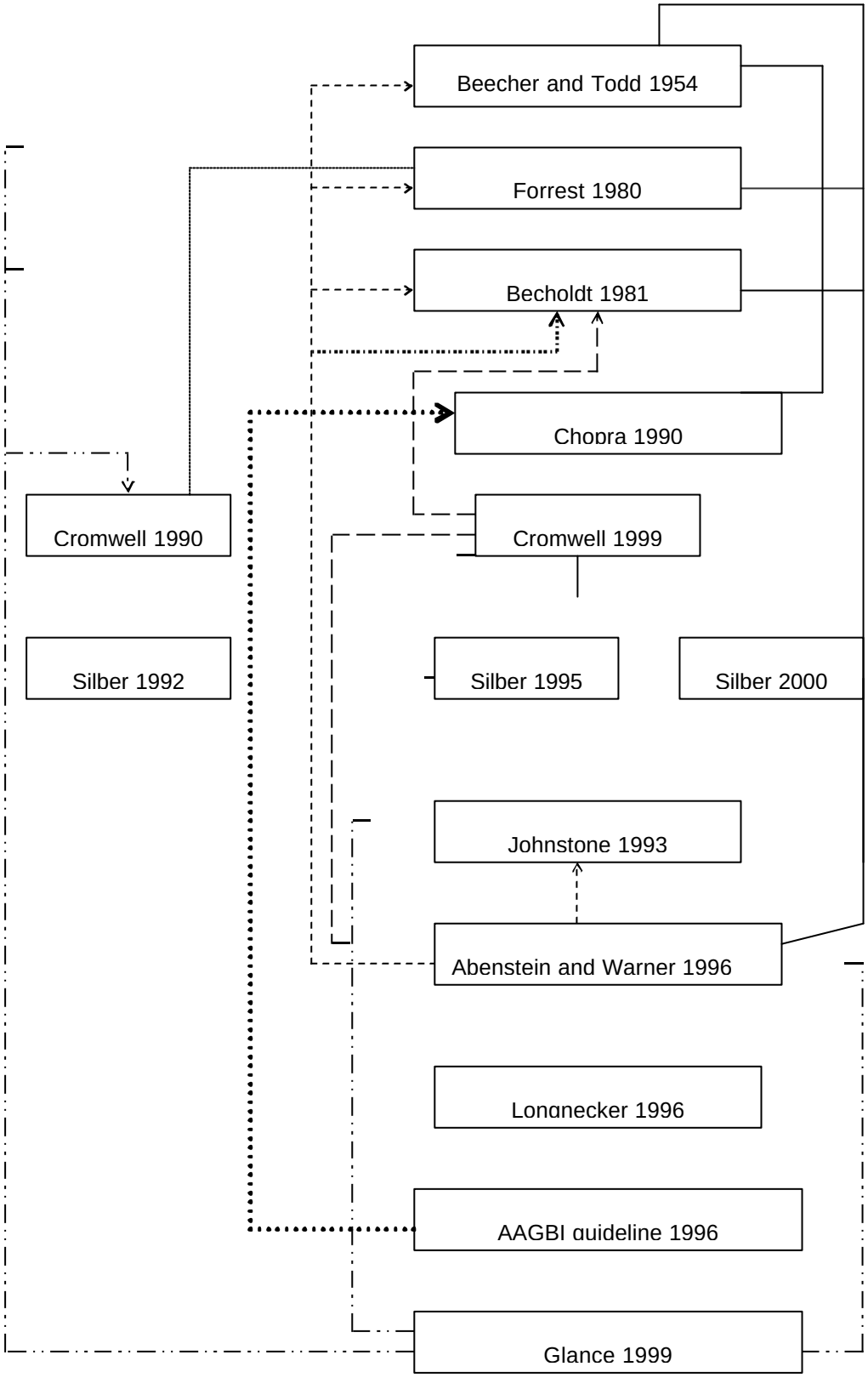


**Figure 3 Cross referencing of articles in literature review**

Abenstein and Warner use a table from Forrest's paper to comment that Forrest's study shows a higher incident rate for nurse anesthetists. Abenstein and Warner's article, though acknowledging Forrest's original conclusion, places a greater emphasis on the higher than predicted adverse events for nurse anesthetists. Referring to Becholdt (1981), Abenstein and Warner's paper makes a cause and effect connection between the increase in the number of practising anesthesiologists and a national reduction in anesthesia-related deaths between 1940 and 1996. (The number of deaths is in inverse proportion to the increasing number of board-certified anesthesiologists.) This is not supported by any additional evidence in the article. Elsewhere in the paper, the authors use data from Becholdt (1981) and Forrest (1980) to back up their claim that: `*the increase in the number of physicians engaged in the practice of anesthesiology is primarily responsible for the dramatic improvement in perioperative outcomes.'*

Abenstein and Warner draw conclusions from Becholdt (1981) and Forrest (1980) that were not drawn by the original authors. Abenstein and Warner were heavily criticised in the post publication correspondence for this error. However, the Abenstein and Warner article is still cited as evidence of the relative safety, effectiveness and cost-effectiveness of anaesthesia provider types (Silber 2000, Glance 1999).

Silber (1992) aimed to discover if the same factors which predict overall mortality after surgery can be used to predict adverse events (complications) which may lead to hospital re-admission or death. Silber argues that patient specific variables including age, severity of illness on admission and medical history were important predictors of adverse occurrence.

He states in relation to anesthesia care that: `*Anesthesia board certification was associated with a significantly reduced relative risk of failure.'*

However, this finding is restricted to physician anesthesiologists and contains no data on CRNAs. Furthermore, the association found is at the level of individual hospitals, not individual practitioners. The paper has, however, been cited as evidence to support the notion that anaesthesia given by physicians is safer than that given by nurses.

### *Supervision and direction*

These two terms have the potential to cause confusion as their interpretation in some of the studies depends on appreciating the nuances of meaning. Each of these terms has three dimensions. The first is the physical proximity of the supervisor to the supervised practitioner. The second is the degree and nature of the interaction between them. The third is related to numerical ratios – how many practitioners the supervisor supervises simultaneously. Naturally all three are inter-related, as for instance, the more people are being supervised, the less likely that the supervisor will be in the same room as the supervised practitioners.

In the UK, as there are currently no non-physician anaesthetists, supervision applies only to postgraduate medical trainees in anaesthesia. Levels of supervision for these circumstances have been defined by the Royal College of

Anaesthetists (RCA 2003). Supervision falls into two categories: direct and indirect. Where a trainee is being directly supervised, the supervisor should be actually with the trainee or can be present within seconds. Indirect supervision falls into two subcategories: local, where the supervisor is on the same geographical site, is immediately available for advice and is able to be with the trainee within ten minutes of being called; and distant, where the supervisor is again available rapidly for advice but is off the hospital site and is separated from the trainee by over ten minutes. The maximum time or distance separation permitted will depend on the trainee's grade, the nature of the clinical work, local geography and traffic conditions. Attendance within 30 minutes, or a travelling distance of less than ten miles, are usual.

As trainees become more experienced, more remote working is considered increasingly acceptable. This is both practical (in that it allows greater flexibility in meeting service needs) and educational (in that trainees appear to need periods of independent working at all stages of their career to allow the incorporation of new knowledge and skills into their personal practice 'routines' ,Smith et al 2003 ). At these later stages, supervision ratios of 2:1 or 3:1 are possible. In practice these are often informal arrangements whereby a consultant working in the theatre suite may be contacted to discuss potentially difficult cases in advance or if problems occur unexpectedly. These recommendations appear to have two functions. First, they aim to maintain safety and quality of care for the patient. Secondly, they try to create a protective educational environment for the trainee.

As described above, in the US, supervision suggests a relationship between anesthesiologists on the one hand and nurse anesthetists (CRNAs) on the other, although a smaller number of anesthetic assistants (AAs) are also in practice. Here, the nature of supervision is highly variable, as outlined below in the section 'The anaesthesia care team.' As qualified CRNAs are capable and, in many States, legally permitted to practice independently, it must be asked how much contact actually needs to take place between anesthesiologist and nurse. A greater degree of autonomous working is implied in Cromwell's definition (Cromwell 1999) where: *'supervision is where an anesthesiologist is in charge of five or more patients'*

Anesthesiologists cannot charge for each of these patients individually, but instead have to charge for the whole session as a hospital service. In contrast, the definition of `medical direction' is important because it sets out the conditions under which the anesthesiologist can bill for services to each individual patient (see Table 8, below).

**Table 8**

**TEFRA conditions of payment for 'medical direction'**

| The anaesthesiologists billing for the medical direction of a CRNA must: |
|---|
| 1 Perform the preoperative assessment. |
| 2 Prescribe the anesthesia plan. |
| 3 Participate in the demanding parts of the anesthetic (including induction and emergence). |
| 4 Make frequent checks during the course of the anesthetic. |
| 5 Remain physically available. |
| 6 Not personally administer concurrent anesthetics. |
| 7 Provide indicated postoperative care. |

These definitions have more to do with financial factors than clinical standards. These were established by the Tax Equity and Fiscal Responsibility Act (TEFRA) 1982 and are only applicable for supervision ratios of up to 1:4. This appears to be why the ratio of 1:4 seems to be favoured in the United States.

If one accepts that non-physician practitioners require some manner of supervision, then it is easy to become enmeshed in debates over numerical supervision ratios (Gunn 1996). The most important factors here are clinical (Fassett 1995). Whether or not Silber's findings on the difference in outcome when anesthesiologists direct anaesthetic care are reliable (Silber 2000), we should bear in mind that patients and surgical procedures vary in risk and complexity. A pragmatic approach would see closer involvement (expressed in all three of the dimensions above) of the most experienced anaesthetic staff from whatever professional background in the care of the most challenging patients.

***The anaesthesia care team' (ACT)***

This phrase features commonly both in peer-reviewed publications and professional organisations' policy statements. However, the one term can denote very different structures and carry different implications depending on context. There appear to be a number of reasons for espousing one version or another of this rather slippery concept.

The American Society of Anesthesiologists' definition is:

`*Anesthesiology is a recognized specialty of medicine … Certain aspects of anesthesia care may be delegated to other properly trained and credentialed professionals. These professionals, medically directed* by the anesthesiologist, comprise the Anesthesia Care Team.' ASA (2001)

Drawing on experience from the US, Cromwell (Cromwell 2000) made the distinction between collaboration and mere co-existence of different anaesthesia providers within the same hospital. While a hospital may have on its staff 20 anesthesiologists and 40 CRNAs, this does not imply a supervision ratio of 1:2.

Simple overall provider ratios say little about how the two providers work together. There will be a spectrum of interaction. At one extreme, nurses and anesthesiologists could work independently of each other. This is rare. Most commonly, a CRNA performs 'hands-on' management of anaesthesia from induction to emergence while the anesthesiologist assists at key stages of the procedure and remains available throughout. In some departments, however, the association between the providers is looser in the sense that CRNAs are solely responsible for their own cases, with no anesthesiologist involvement unless the CRNA requests it. This is referred to as a consultative or collaborative relationship.

Abenstein and Warner (Abenstein and Warner 1996) have a slightly broader definition of the anaesthesia care team:

*'The anesthetic is administered by a resident or non-physician anesthetist (anesthesiologists' assistant, nurse anesthetist or student nurse anesthetist) under the medical direction of an anesthesiologist. In these practices, one or more physicians are present at critical periods during the procedure.'*

The apparent intention here is to persuade the reader that the anesthesia care team (ACT) is the preferred model of care. This statement deserves careful analysis. Note that the authors mention the possibility of more than one physician being present at critical times during the anaesthetic. This may happen occasionally but would certainly not be common. They also distinguish the ACT from a so-called 'hybrid' practice, where some anaesthetics are administered by an anesthesiologists and the remainder by the ACT. This of course enables anesthesiologists to personally give anaesthetics to patients with complex medical problems. Evidence notwithstanding, to make the recommendation that they do – that anaesthesia care teams are safest – would be compatible with the objective of the professional anesthesiologist's associations in the US, which was (and is) to ensure that CRNAs do not practise anaesthesia independently of anesthesiologists.

In the UK, the Association of Anaesthetists issued a document entitled 'The Anaesthesia Team' in 1998, some two years after their policy statement `Anaesthesia in Great Britain and Ireland: A Physician Only Service' and a few months after the publication of the UK Audit Commission's report into anaesthesia, `Anaesthesia under Examination.' The Anaesthesia Team reiterates the Association's 1996 view that only doctors should give anaesthetics, but makes suggestions as to how anaesthetic nurses and ODPs in theatre could perform other tasks such as pre-operative screening, anaesthesia assessment and post-operative pain management. The similarity to the American phrase 'the anaesthesia care team' is likely to have been co-incidental but it is important to distinguish the implications of the two expressions. At that time, the Association of Anaesthetists would not have advocated extension of the roles of non-medical staff to give anaesthetics.

## *3.2 Individual roles and models of care*

### Sources of material

There was a wealth of information on models of care to be found in traditionally indexed literature and on the Internet concerning US and UK models of care. UK data came from sources such as the Royal College of Anaesthetists (RCA), the Association of Anaesthetists of Great Britain and Ireland (AAGBI), the National Association of Theatre Nurses (NATN) and the Royal College of Nurses (RCN) websites and published material. Additional material, such as job descriptions, theatre guidelines and local training programmes, was obtained through personal contacts. US data was sourced through literature (Abenstein and Warner 1996), the American Society of Anesthesiologists (ASA), the American Association of Nurse Anesthetists (AANA) and the American Academy of Anesthesiology Assistants (AAAA) websites and the websites of the training institutions. In addition, the AANA provided the reviewers with details on training and accreditation of CRNAs.

Information on European models of care was harder to uncover. European websites which we found (eg, www.SSAI.org) did not contain the information we required in English. Unlike the US, non-physician anaesthetists in Europe apparently do not feel the need to express their professional identities so publicly. We were, however, able to uncover general information on guidelines (Poll 1994, Vickers 2000).

The review did have the RCA/CWP report (RCA et al 2002b) which reported on visits to Holland and Sweden investigating models of care in those countries. Without access to that report, it might have been necessary to undertake a visit to those countries ourselves.

### 3.2.1 USA individual roles and models of care

#### *USA models of care*

There are several models of care prevalent in the US:

**Physician only** In this model the anesthesiologist works alone and is solely responsible for the delivery of anesthetic care. This is more common on the West Coast and particularly in certain parts of California.

**The CRNA only** In this model the Certified Registered Nurse Anesthetist (CRNA) (see Glossary section 1.2 ) is in charge of anesthetic delivery. This is common in States which are predominantly rural and CRNAs tend to work alone in areas where it is impossible to recruit anesthesiologists. The CRNA is under the supervision of a physician, though this is not necessarily an anesthesiologist and may well be by the surgeon carrying out the procedure. No state specifies that the supervisor must be an anesthesiologist. The level of supervision varies from the physician being in the same room and immediately available to provide assistance to being available to call on for assistance. States may now apply to allow CRNAs to bill for their services without having a physician supervisor. Six

States have taken this option and several more are in consultation to do so. This is proving to be a lengthy process and in reality independent practice is constrained by local and state laws and currently only in Iowa do CRNAs have truly independent practice. (American Association of Nurse Anesthetists, 2002),

**Anesthesia Care Team (ACT)** In this model a non-physician anesthetist (or resident) is supervised in the administration and maintenance of anesthesia. The anesthesiologist is usually present to assist and direct the induction and emergence of anesthesia. All members of the team will administer anesthesia to patients with all ASA grades and for the full spectrum of surgical procedures. The composition of the team varies. (see section on the anaesthesia care team, above).

**Mixed model** In this model some anaesthetics are administered by the anesthesiologist, often for the most severely ill patients (ASA grades 4 and 5) or major surgery. The rest of the anesthetics will be administered by non-physician anaesthetists or residents under the supervision of a anesthesiologist. Again, the anesthesiologist would normally be present for the induction and emergence of anaesthesia. In States where Anesthesiology Assistants (AAs, see Glossary section 1.2) are permitted to practice, they will work along side CRNAs and residents in ACT and mixed models.

(Abenstein and Warner 1996, MacKenzie 2000, RCA et al 2002b)

### *Supervision ratios*

Ratios for physician supervision in ACT and mixed model practice vary between 1:8 and 1:2, depending on the level of experience of the practitioners involved and the clinical case load. However, a ratio of 1:4 is rarely exceeded as this is the maximum ratio for which anesthesiologists can claim Medicare/Medicaid re-imbursement for supervision duties. (see section on supervision and direction, above).

### *Definition of Nurse Anesthetists*

Nurse Anesthetists are registered nurses. Before applying to a CRNA course, they must have at least one year's post registration experience in acute care. Many candidates come from a critical care background. Qualification involves a full-time course lasting between 27 and 36 months which leads to a Master's degree. Student CRNAs pay tuition fees of $40,000. They can then expect a starting salary of $50,000 per annum rising to $100,000 + per annum for experienced staff. At the end of period of training they may take a certification examination, which allows them to use the title `Certified Registered Nurse Anesthetist.' CRNAs are licensed to practice in all states. Once practising, to remain on the register of CRNAs, practitioners must go through re-certification biennially. CRNAs can, like physicians, develop a specialisation in anesthesia for particular surgical procedures, eg, paediatric, cardiac, neuro-surgery. CRNAs who go on to specialise often work in an ACT. (American Association of Nurse Anesthetists, 2002).

The AANA states that CRNA scope of practice includes, but is not limited to:

- Performing and documenting a pre-anesthetic assessment and evaluation of the patient.
- Developing and implementing an anaesthetic plan.
- Initiating the anesthetic technique, which may include general, regional, local and sedation.
- Selecting applying and inserting appropriate non-invasive and invasive monitoring modalities for continuous evaluation of the patient's physical status.
- Selecting, obtaining and administering the anesthetics, adjuvant and accessory drugs and fluids necessary to manage the anaesthetic.
- Managing the patient's airway and pulmonary status using current practice modalities.
- Facilitating emergence and recovery from anesthesia by selecting, obtaining, ordering and administering medications, fluids and ventilatory support.
- Discharging the patient from post-anesthesia care area and providing post-anesthesia follow-up evaluation and care.
- Implementing acute and chronic pain modalities.
- Responding to emergency situations by providing airway management, administration of emergency fluids and drugs and using basic or advanced cardiac life support techniques. (American Association of Nurse Anesthetists ,2002),

***Definition of Anesthesia Assistants***

These practitioners do not necessarily have a nursing qualification as a pre-requisite. Most commonly, trainees come from a science background, though humanities graduates have been accepted in small numbers to the training programmes. The intention of developing the role of AAs, just over thirty years ago, was to create a more technically orientated assistant to the anesthesiologist. They undertake a training programme of between two and two and a half years, similar in style to that of physician assistants, at one of two institutions, Emory University, Atlanta or Cape Western University, Ohio. AAs graduate with a Masters degree and can take a national examination. AAs pay their own tuition fees of approximately $43,000 and can earn up to $63000 in their first year as a qualified AA. The qualified AA is only allowed to practice in 16 States in the USA. AAs work under the direct supervision of an anesthesiologist (not any physician) and their work is mainly confined to the operating theatre. AAs must maintain continuing professional development (CPD) for 40 credits per two years and be re-certified by examination every six years. The goal of the American Academy of Anesthesiologists' Assistants (AAAA) is to change regulations so that anesthesiologists can hire and direct AA as well as CRNAs in any State. They are supported in this by the American Society of Anesthesiologists (ASA).

AAs are commonly hired with identical job descriptions to CRNAs. At least one of the eight States that permits AAs to practise insists that their supervision ratios do not exceed 2:1. ( AAAA 2003, MacKenzie 2000).

The AAAA has developed the following guidelines on their scope of practice:

- AAs administer anesthesia under the supervision of an anesthesiologist.
- AAs may introduce themselves as Anesthesiologists' Assistant, but not as physician or physician assistant.
- AAs may perform initial Cardio Pulmonary Resuscitation /Advanced Life Support in emergency situations until the supervising anesthesiologist is summoned.
- AAs establish a comprehensive patient database to assist in anesthetic planning. AAs may order appropriate pre-operative evaluations and pre-medications after consultation with the anesthesiologist, who is then responsible for these orders.
- AAs may initiate mulitparameter monitoring prior to anesthesia or in other acute care settings. AAs may manipulate and interpret data from central venous, pulmonary artery and intracranial catheters and other monitors or devices that are indicated.
- AAs administer the prescribed anesthetic with particular care to the cardiovascular, respiratory and metabolic health of the patient.
- AAs utilise advanced treatment modalities, including but not limited to, advanced airway interventions and intubation of the trachea, starting and adjusting doses of vasoactive infusions, administering vasoactive and anesthetic drugs, administering blood and any other treatment modalities that are prescribed by the supervising anesthesiologist.
- AAs will summon the supervising anesthesiologist for the induction of anesthesia, for extubation of the trachea, for consultation during unexpected or adverse perioperative events or at any other time when the prescribed anesthetic deviates significantly from its expected course.
- AAs assist in the post-operative management of patients by managing ventilatory support and acute pain management in conjunction with existing protocols or the attending anesthesiologist.
- AAs recognise that the choice of anesthetic drugs and techniques are prescribed by the attending anesthesiologist pre-operatively. Exceptions exist when standard orders for a given situation exist or when life threatening situations arise requiring the use of standard therapeutic or resuscitation techniques until the attending anesthesiologist arrives or is consulted by telephone.
- The anesthetic prescription may consist of a verbal discussion between the AA and the supervising anesthesiologist; in this instance the anesthetic record is considered to reflect the anesthetic prescription in the absence of other notations in the medical record.
- The supervising anesthesiologist will remain at all times immediately available in the operating area.

- The AA may engage in teaching and research functions as deemed appropriate by the supervising anesthesiologist.

***Anesthesiologists***

Training for anesthesiology in the US consists of four years undergraduate education, (this is recommended but not mandatory) four years in medical school and four further years specialist training as a resident. Medical education, like virtually all higher education, is paid for by the individual. In addition to this, many who choose anesthesiology as a specialty will under take another year's experience in another field of medicine or research. Other than this one-year experience only 13 per cent of anesthesiology trainees undertake training in other specialties (unpublished survey, University of Minnesota and Mayo Graduate School 1995, cited in Abenstein and Warner 1996). At the end of the residency, successful individuals are awarded a certificate of clinical competency and may then apply for Board Certification with the American Board of Anesthesiology. Most attending anesthesiologists (equivalent of UK consultant grade) have board certification. It is generally considered a desirable qualification to obtain. Silber (1992) put forward evidence to suggest that there is a direct relationship between Board Certification and patient outcome.

Practices of Board Certified Anesthesiologists (From Booklet of information. Hartford, CT. American Board of Anesthesiolgists. Cited in Abenstein and Warner 1996) are listed below:

- The assessment and preparation of patients for anesthesia.
- The provision of insensibility to pain during surgical, obstetric, therapeutic, and diagnostic procedures; the medical management of patients so affected.
- The monitoring and restoration of homeostasis during the perioperative period, as well as in the critically ill, injured or otherwise seriously ill patient.
- The diagnosis and treatment of acute and chronic pain syndromes.
- The clinical management and teaching of cardiac and pulmonary resuscitation.
- The evaluation of respiratory function and application of respiratory therapy.
- The supervision, teaching and evaluation of performance of both medical and paramedical personnel involved in anaesthesia, respiratory and critical care.
- The conduct of research at the clinical and basic science levels to explain and improve the care of patients.
- The administrative involvement in hospitals, medical schools and out-patients facilities necessary to implement these responsibilities.

The US model of care also contains an Anaesthesia Technician who prepares the anaesthetic room, checks equipment and assists the anaesthesia provider.

### 3.2.2 UK individual roles and models of care

At present in the UK there are no non-physicians giving anaesthetics. The theatre team is made up of a specialist anaesthetist, possibly a junior doctor in training, a surgeon and theatre practitioners covering the roles of dedicated assistant to the anaesthetist, recovery, scrub and circulating (see Appendix 18).The theatre practitioner may have initially trained as an operating department practitioner or as a nurse.

All anaesthetics are prescribed and administered by a qualified doctor, therefore there will be a qualified specialist anaesthetist assigned to every operating theatre. For an anaesthetic to take place it is recommended (AAGBI 1998) that there should be a qualified member of staff to assist the anaesthetist and a member of staff to monitor patients whilst in recovery.

#### *Operating Department Practitioners*

Operating Department Practitioners (ODPs) (known as Operating Department Assistants [ODAs] before 1988) have developed out of 50 years of assistance for the anaesthetist. In 1988, the AAGBI recommended that the then ODA became the dedicated assistant to the anaesthetist. Their role in anaesthetics centres is providing technical and practical support to the anaesthetist. Their work can also include assisting the surgeon and working in the recovery room.

Since 2002, ODP training has been at Diploma level. The step up to diploma level was considered necessary, in part, to facilitate registration with the Health Professions Council. Previously, training was carried out to NVQ level 3 and prior to 1988, to City and Guilds level. Degree level courses have recently become available for qualified practitioners who wish to develop their skills and knowledge with a view to career progression.

Training consists of gaining a trainee place at a hospital which has an attachment to one of the 14 training institutions across the UK. Training lasts for two years and is made up of theoretical teaching carried out at the educational institute and practical training in the work place. Training sites have a dedicated ODP trainer on site to co-ordinate training and act as mentor and supervisor to the trainees. This is not a mandatory requirement but, to qualify as a training site the hospital must provide a local supervisor for trainees, mentorship, assessment and a mechanism for assessing the assessors. These tasks are usually given to an ODP trainer.

Qualification is based on examination and an assessment of practical competencies. Registration for ODPs is technically voluntary but virtually all employers insist that their ODPs have registration with the Association of Operating Department Practitioners (AODP). The formal registration of ODPs is likely to be settled within the next year. (See section 1.5.1)

#### *Anaesthetic Nurses*

To work as a nurse in theatre, it is not necessary to have undergone any specialist training other than the nursing degree and experience as a student. To

qualify as a nurse in the UK, one must complete a three-year degree level course and be registered with the Nursing and Midwifery Council (NMC). To be employed specifically as an anaesthetic nurse, a postgraduate course must be completed. While the courses vary in focus and content, all are accredited and take approximately one year to complete as a part-time endeavour. Similarly, to work in recovery it is recommended that post basic training is undertaken. These post-qualification courses are open to both qualified nurses and ODPs.

### *Theatre Practitioners*

Within UK operating theatre departments there is a variation in working practices, terms and conditions and professional origins of theatre staff. Most Trusts are now aiming for a theatre practitioner role in which ODPs, theatre, and anaesthetic nurses can interchange roles and duties. This allows greater flexibility in terms of rostering staff and, it is felt, generate greater job satisfaction in terms of providing a more varied work pattern.

**Duties of Theatre Practitioners** This list of duties was compiled from current job descriptions collected from across the country.

*Communication*

- Liaise with staff to undertake main day to day tasks.
- Liaise with anaesthetists and surgeons regarding operative surgery.

*Cleaning*

- Carry out cleaning duties.
- Maintain cleaning equipment.
- Monitor quality of cleaning.

*Patient Care*

- Plan patient care.
- Scrub for cases.
- Support unqualified staff and higher grades.

*Equipment*

- Ensure equipment is available and in working order.
- Organise trolley and bed places.
- Stock ordering and control.

*Clinical*

- Prepare equipment for lists.
- Perform scrub / circulating /anaesthetic duties.
- Direct (holistic) patient care.
- Identify problems – either deal with or report to senior.

- Check patients in to theatres.

More senior staff are involved in budgetary responsibilities, developing policies, teaching and supervision of trainee and junior grades, and rostering staff.

***Anaesthetists***

Anaesthetists administer anaesthetics in the UK. Anaesthetists duties include:

- Pre-operative assessments of patients.
- Developing an anaesthetic plan for the patient which will include giving the drugs to be used for anaesthesia and analgesia.
- Administer anaesthetic agents and analgesia.
- Monitor the patient's status during anaesthesia and adjust drugs as necessary.
- Intubate and insert invasive monitoring.
- Carry out emergence from anaesthesia.
- Monitor patients through recovery.
- Liaise with recovery staff regarding patient needs in recovery.
- Carry out post–operative visits as necessary.

Outside operating theatres anaesthetists are involved in:

- The management of intensive care units.
- The management of high dependency units.
- Acute and chronic pain services.
- Obstetric analgesia and anaesthesia
    a) Trauma team
    b) Sedation services
    c) Training of junior doctors
    d) Research

For grades of medical staff in the UK (see Appendix 19)

***Training for anaesthetists***

To qualify as a doctor, undergraduates must complete a five-year course, followed by one year as pre-registration House Officer to gain full General Medical Council (GMC) registration. Doctors may then apply for a three-year Senior House Officer (SHO) training place. These posts are based regionally and doctors would be expected to move between hospitals every six or 12 months. It is common for trainee doctors to do six monthly jobs in several specialities before deciding to undertake a particular training scheme. Following SHO training, candidates can compete for a Specialist Registrar (SpR) training post. This training lasts five years. The postgraduate diploma fellow of the Royal College of Anaesthetists (FRCA) is a two-part examination. The first part usually takes about two years of training in anaesthetics and is normally required for

promotion to the SpR grade. The second part is commonly taken in the first or second years as an SpR. Three attempts are permitted to pass each of the examinations. The training programme is designed, monitored and assessed by the RCA. During SpR training, doctors may undertake training in a number of sub-specialties, eg, paediatrics, obstetrics or ICU. There is regular appraisal and assessment of trainees' progress by the RITA (Record of In-Training Assessment) process. At the end of successful SpR training, the General Medical Council awards the Certificate of Completion of Specialist Training (on the recommendation of the Specialist Training Authority) and doctors are then eligible to apply for Consultant posts.

### 3.2.3 European individual roles and models of care

***The Netherlands***

**Anaesthetic Nurse** In the Netherlands, Anaesthetics Nurses (AN see Glossary section 1.2) exist to monitor anaesthesia in the operating theatre. The title Anaesthetic Nurse and Anaesthetic Assistant are interchangeable in the Netherlands. Anaesthetic Nurses have been practising in the Netherlands for the past twenty years.

Consultants are present for the induction and reversal of anaesthesia, but crucially anaesthesia is not permitted in Holland in the absence of an AN. Each consultant will normally supervise no more than two operating theatres at once. Once trained, ANs work in a team comprising a scrub nurse, a circulating nurse, (see Appendix 18) the Consultant anaesthetist (supervising two operating theatres), a surgeon, and at the large university hospitals, an anaesthetic trainee who is supernumerary. The Dutch system does not have an equivalent role to the UK ODP. All AN work is centred on theatres. They do not provide support in ICU, obstetrics, pre-operative assessment, regional anaesthesia or pain management.

The tasks of the AN are:

- Setting up and checking the contents of the anaesthetic cart.
- Checking anaesthetic equipment.
- Collecting the patient and delivering them to theatre.
- Drawing up anaesthetic prescription drugs.
- Setting up IV infusion.
- ANs may, according to experience and local practice, pass a tracheal tube or laryngeal mask.
- Administer an agreed set of drugs within agreed patient parameters. ANs may adjust doses of agents, ventilation and pain relief, but make agreement to call for the assistance of the consultant should the patient's status move outside agreed physiological boundaries.
- ANs may undertake training of students.
- Ordering of drugs.
- Organise the maintenance of anaesthetic equipment.

- ANs do not administer any regional anaesthesia. They can monitor regional anaesthesia and under such circumstances consultants may supervise more than the standard two operating theatres. For example, a Consultant could supervise three or four operating theatres with patients undergoing regional blocks (RCA et al 2002b).

*Training programme* ANs undergo a training programme which varies between 36 months for school leavers or applicants without a nursing background to 30 months for those already qualified as nurses. Minimum entry requirements are the equivalent of several A levels at lower than university entrance grades. The AN training syllabus is set nationally by the Federation of Dutch Hospitals. The majority of the time in training is spent in practical instruction in the operating theatre with less than 815 hours teaching in theory. (Total programme duration 5015 hours.) Of these 815 hours, the theory training is almost equally divided between anaesthesia theory, general medical theory and "support," meaning pharmacology and anatomy (European Commission 2000).

For the first two years, trainees are always directly supervised by other qualified ANs or an anaesthesiologist. In the third year they are permitted to carry out carefully selected procedures under indirect supervision. (This does not include induction of or emergence from anaesthesia as these are always personally supervised by the anaesthesiologist.) Students compile a log book of their practical experience and the competencies gained which is countersigned by their trainer. At the end of their training, ANs take an examination to gain their qualification. Student ANs do not pay tuition fees, but hospitals receiving trainees make financial contributions to the training university.

Currently, revalidation after qualification is not necessary. ANs are expected to take part in continued professional development, which must be a minimum of two days per annum. All ANs take part in appraisal and significant event audits.

**Physician** Consultant supervision of NAs is normally on a ratio of 1:2. This may be extended for low risk, uncomplicated cases to 1:4. Consultants must be present for all induction of and emergence from anaesthesia. Even if a consultant is present to personally administer anaesthesia, he cannot go ahead without the AN who would act as the dedicated assistant to the physician.

*Training for physician* On qualifying from medical school, graduates may apply for one of 150-200 residencies in anaesthesia lasting five years. At the end of this training they are anaesthesia specialists and can supervise NAs.

### *Sweden*

**Anaesthetic Nurse** Medical anaesthetists and anaesthetic nurses developed at the same time in Sweden during the 1940s. They have always worked along side one another. Anaesthetic nurses are trained solely from a nursing background. The current ratio of anaesthetists to Anaesthetic Nurses (AN) in Swedish healthcare is approximately 1:2.5. Currently, there is competition for training places.

The ratio of supervision varies according to patient status, type of hospital, location and layout of theatre, location of hospital and experience of AN. The most common ratio is 2:1, but can be as many as 6:1. All complex/high risk cases and those for patients with high ASA status (3 and 4+) have consultant involvement. ASA 1 and 2 can be treated almost independently by ANs. All AN work is centred on theatres. They do not do pre-operative and post-operative visits, pain management, ICU or obstetric epidurals. Any two members of the anaesthetic team are present for induction. The team is comprised of an AN, a Consultant, a doctor in training and a nurse assistant who is there as the dedicated assistant to the person administering the anaesthesia. Since Consultants do not have any contractual time for paperwork and administration, presence of ANs allows them to carry out these duties within working hours. Often Consultants will carry out pre-operative assessments whilst supervising ANs.

Experienced ANs are often involved in the training and supervision of trainee doctors in teaching hospitals. In rural non-teaching hospitals, ANs have a greater degree of autonomy than in the large urban university hospitals. If working independently, ANs are responsible for their own actions, but are covered under employer indemnity. Anaesthetic departments often take on the day-to-day management of ANs, but they are ultimately responsible to the Head Nurse (Director of Nursing).

Duties of a AN include:

- Stocking and checking anaesthetic cart.
- Verifies patient status on arrival in theatre and evaluates anaesthetic management. AN may consult with a consultant if required.
- Site cannulas and non-invasive monitoring.
- Induce anaesthesia according to prescription (for ASA 1&2).
- Tracheal intubation.
- Maintain anaesthesia.
- Intravenous Regional Anaesthesia (IVRA) is the only regional block which can be performed by an AN.
- Cardiac arrest teams.
- Paramedic duties (RCA et al 2002b).

*Training* All ANs have a basic nursing qualification of three years before embarking on a one-year AN course. Some training programmes specify that candidates must have two years' post-qualification experience before undertaking the AN training. The course programme is set nationally and approved by the Department of Health. The course's modular format enables students to combine the AN course with modules from other courses or use as credits in a Masters programme. Training is 60 per cent theory and 40 per cent practical. Theory training includes human biomedicine, acute, intensive and peri-operative nursing and anaesthesiology. AN trainees are supervised and mentored by qualified ANs who have undertaken further supervisory training. In total, 13 out of 40 weeks are spent in hospital with the majority of this being in the

second half of the programme. ANs can gain financial assistance from their employers to pay for their training or obtain a loan.

**Physician** There exists very little regulation in anaesthesia in Sweden and there are no guidelines for the number of cases that may be simultaneously supervised by a Consultant. The guiding factor is complexity of cases. ASA 3 and 4 patients always have the direct care of a consultant. Consultants carry out all the pre-operative assessments often while also supervising a suite of theatres.

*Training for physician* Undergraduates join one of the six medical schools in Sweden. Following undergraduate training, trainee doctors have to complete a 21-month pre-registration placement. Once fully registered, they may apply for a five-year specialty training post. This qualifies the doctor to the equivalent of UK Specialist Registrar (SpR) 2 level. Further specialisation can then qualify as a senior consultant. Trainees can work in anaesthesia following registration without being on the five-year specialty training course. Time spent working in this way does not count towards the specialty training.

### *France*

**Nurse Anaesthetist** Specialist training for Nurse Anaesthetists (NA) existed since 1940s. Consultant anaesthetists are always present for induction and emergence from anaesthesia. NAs deal with predominantly ASA 1 and 2 patients, but more experienced staff do have involvement with emergency surgery and higher risk patients. Ratio for consultant supervision is usually 1:2.

The duties of NA are:

- Maintain and check equipment.
- General and local anaesthesia.
- Monitoring of patients during operations.
- Resuscitation.
- Reception of emergencies.
- Transport of ICU patients.
- Participate in research and training.
- Manage fluid and blood therapy.
- Analyse invasive and non invasive monitoring and act on results

  (European Commission 2000).

*Training* The training programme is only open to candidates with a nursing or midwifery qualification and two years post qualification experience. The training takes the form of a state registered diploma lasting two years. Approximately 12 per cent of training is theoretical and 88 per cent practical. Theoretical studies include anatomy, physiology, pharmacology, anaesthetic techniques, post-operative complications and emergency resuscitation. Practical training is divided into surgery, orthopaedics, transfusion, resuscitation, trauma, gynaecology, and haemodialysis. Trainees can spend two months in a practical specialty of their own choice. Trainee NAs are mentored by either a doctor or an experienced NA.

Qualification is by examination in the form of written and practical tests (European Commission 2000).

### 3.2.4 Comment

#### *Types of non-physician anaesthetist*

There are two distinct patterns of educational and professional background of trainees, their training and the role of non-physician anaesthetists in Europe and US:

**Type I** French and Swedish nurse anaesthetists and US CRNAs require that trainees have already completed a nursing qualification (graduate level) and have (or are preferred to have in Sweden) at least two years experience working in a hospital environment.

The training provides an academic qualification. While a third of training is carried out in hospital developing practical skills, the emphasis is on obtaining academic competencies in topics such as physiology and pharmacology. Training lasts between one year in Sweden and up to three years in the US.

Once qualified, the French and Swedish nurse anaesthetists mainly provide care for ASA 1 and 2 patients, while the care of higher risk patients almost always involves the consultant anaesthesiologist. In rural hospitals, Swedish nurses have a greater degree of autonomy. Supervision ratios are normally 2:1. The US has a broad spectrum of models of care from supervision ratios of 2:1 to independent practice for CRNAs. CRNAs can take future training to develop specialist skills in particular types of anesthesia such as cardiac and paediatrics. The US CRNA is the only practitioner who carries out pre-operative assessments and devises the anaesthetic plan.

**Type II** Holland and the US AAs take trainees with either the equivalent of 'A' levels in Holland, or with a degree for US AAs. This degree can be in any subject, though most trainees enter the profession with a science degree. In the US, at least, this is medical anesthesiologists' preferred model. Does the lack of emphasis on theoretical instruction serve to restrict the knowledge base of AA's and hence their power to be recognised as autonomous professionals?

Training in Holland is focused on practical skills with less than a fifth of training time devoted to theoretical knowledge. AA training is also technically focused. Training lasts between two and three years.

Supervision for AN and AAs is 2:1. Their work is centred on operating theatres and does not extend to obstetric analgesia, ICU, pain management or pre-operative assessment.

#### *Responsibilities of supervising medical anaesthetists*

RCA et al (2002b) highlighted the fact that consultants use their supervision time to carry out other tasks. For example, Swedish consultant anaesthetists do not have administrative time within their rota, but use time whilst patients are being

monitored for research, administration and carrying out pre-operative assessments. In US literature, this is not specifically stated.

US practice may differ from Europe. Alternatively, it may not be politically desirable to convey the impression that US anesthesiologists may be performing these activities at the same time as they are available for the supervision of CRNAs, as this might imply less attention to the patient. Anesthesiologists imply that their involvement makes nurse anaesthetists safer; if this involvement were seen to be less than optimal this would probably devalue this claim.

#### *Hospital design and organisation of staffing*

The models of care from Europe and the US do emphasise the importance of the layout of theatres. To carry out effective supervision, theatres need to be adjacent with a common recovery area, and to make best use of the supervision time of the Consultant, somewhere for the Consultant to work. However, in many hospitals in the UK, the anaesthetic departmental accommodation is geographically remote from the operating theatres and this provides another potential barrier to consultants adopting a more supervisory role. In all non-UK models, anaesthetic departments have a large measure of control over the operating lists. This enables them to match skills to patient need and effectively supervise.

Assistance for the anesthesia provider in the US is available from Anesthesia Technicians. They carry out equipment checks, prepare the anesthetic room and provide general assistance. Most of these examples do not have the equivalent of a UK ODP, assisting the anaesthesia provider. Supervision or assistance is normally required or available for induction of and emergence from anaesthesia. If assistance were required for the procedure they have to call for the consultant supervisor.

## *3.3 Barriers to and enablers of non-physician anaesthesia in the UK.*

The following section contains interview data, case study data and literature references to illustrate the barriers of and enablers to non-physician anaesthesia in the UK. We collected data from 23 interviews, plus 11 policy statements and four full case studies. Because of the large volume of written data, this section and the following section on skills and competencies are lengthy. To assist the reader a detailed contents is listed below. A similar list will precede the section on skills and competencies

### Summary of points for barriers and enablers

- Opinion on non-physician anaesthesia is not divided along professional boundaries. A broad range of opinions was expressed by all professional groups.
- Professional organisations, medical and non-medical, expressed remarkably similar views on non-physician anaesthesia. It is possible that multi-

disciplinary involvement in the NWW anaesthesia pilots Stakeholder Board has assisted in shaping this consensus.

- There exists a group of individuals, both physicians and non-physicians, for whom non-physician anaesthesia is a "step too far."
- There is no clear view of which non-physician anaesthetist model might be adopted in the UK and this caused concern (and confusion) among interviewees.
- The development of clinical nurse specialists (CNSs) in anaesthesia and other specialties, particularly pain management, is perceived as an indicator of future potential.
- Similarly, the development of non-physician roles which extend to tasks previously the preserve of doctors is viewed as an example of how non-physicians can successfully broaden their scope of work.
- The hierarchical nature of theatres has the potential to create difficulties for a new non-physician role which crosses some of the professional boundaries.
- "Tribalism" between the professions, which exists in all working environments, needs to be addressed.
- Theatre staff regard themselves, and are perceived by others, as a separate "tribe". This bond may be extremely valuable in bringing about change.
- Concern was expressed that non-physician anaesthetists may be recruited from the best qualified nurses and ODPs. A "creaming off" of the most highly trained staff for extended roles has already caused problems elsewhere in the NHS.
- The development of a non-physician anaesthetist role could, if created with a carefully constructed career pathway, encourage experienced non-physicians to stay in clinical work and potentially encourage new recruits to the NHS.
- Many expressed concern that, if not thoroughly considered, there existed the potential to create " a dead-end job". These concerns centred on potential for repetitive work in a very limited clinically setting and with little potential for professional development.
- Considerable cynicism was expressed about the drivers of change. Many commented on the place of EWTD, Modernisation Agency and the Government's political agenda. Many felt that it was going to happen and they would be obliged to comply.
- There is no clear opinion or evidence on potential costs of non-physician anaesthesia, though many felt that "it would not be cheap".
- Some anaesthetists feel that while monitoring uneventful anaesthesia on healthy patients, they could be doing something else. This includes utilising their skills and experience to help a sicker patient, research, training, carrying out pre-operative assessments and administration. The ability to be able to do these things while their patients were monitored by a trained individual was felt to be a measure which could reduce stress levels.

- Many non-physicians perceived that physician organisations would be opposed to the development of a non-physician anaesthesia role. The current opinion of the physician organisations (and their non-physician counterparts) need to be disseminated as widely as possible.
- Operationally, the largest challenge is to modify the organisation of theatre lists to enable the matching of anaesthetic skills to patient need and with it the culture of theatres as a "surgeons' workshop."
- Any development of a non-physician anaesthetist would need to consider the role's long term future.
- Cynicism regarding the motivation for the creation of non-physician anaesthetists needs to be addressed.

Aim 3 of the project was:

To explore barriers to, and possible enablers of, the redefinition of professional roles in anaesthetics in the United Kingdom

The information in this section is drawn from all three data streams:

- Opinion mapping (through interviews and organisational policy statements).
- Expanded literature review (principally comment and opinion).
- Case studies (interviews, documentary analysis and observation during site visits).

Full text policy statements are in Appendix .5. Full text case studies are in Appendix 6.

### 3.3.1. Role of the professional organisations

***Reality***

There is considerable similarity between the views expressed by the major UK organisations representing anaesthetic and other theatre staff.

Organisations representing physicians and non-physicians (see Appendix 4) working in theatres and stakeholders were asked to provide an organisational response to the following question:

*`What is your organisation's reaction to the possibility of a non-physician anaesthetist role being developed and implemented in the UK?'*

The National Association of Theatre Nurses (NATN) made the following comment:

*`The NATN recognises the need for the development of new roles for nurses in the area of anaesthesia. It is important that all the relevant bodies and associations would be involved in any new developments so that the development is truly multidisciplinary and one of teamwork. It is paramount that the patient is kept central to any future role development.*

*An expanded role in anaesthesia for nurses would provide a strong career structure for nurses to remain in clinical practice and could re-enforce a path for nurse consultants in the profession of nursing in this specialty.'*

Similarly the Association of Operating Department Practitioners (AODP) made the following comment:

`*The AODP welcomes the initiative to develop the roles of the non-medical members of the anaesthesia team and the opportunity that this provides for ODPs to cross existing professional boundaries and take on roles traditionally undertaken by physicians. The AODP recognises that anaesthesia services in the UK have an enviable reputation for quality and safety* and the primary objective must be to maintain these standards.'

This represents a recent shift of opinion, among the nursing and Allied Health Professionals' organisations, towards the development of such a role. Reilly et al (1996) states that:

`*we found no support from any national medical or nursing body for the introduction of nurse anaesthetists.*' (see section 1.7)

AAGBI guidelines (AAGBI [1996), AAGBI [1998)) have all stated that anaesthesia should remain a physician only service. This is based on their underlying conviction that this will ensure the highest standards of care.

`*We remain firmly of the opinion that to provide a first class anaesthesia service with high levels of patient safety, anaesthesia in Great Britain and Ireland should continue as a physician delivered specialty.*' (Anaesthesia Team, AAGBI,1998)

The AAGBI reflected the opinion of many of its members.

The statement made by the AAGBI, which we received in August 2003, implies a shift in opinion:

`*The Association is therefore agreeable to exploring new ways of practicing in anaesthesia to improve efficiency and flexibility with the proviso that patient safety is at all times maintained and that a medically qualified anaesthetist is responsible and in charge for all patients … a cautious exploration of the extent to which non-medically qualified personnel may assist in the process of anaesthesia under the supervision of a medically qualified anaesthetist is a constructive initiative."*

The Association statement goes on to outline what it perceives as some of the potential barriers to the creation of the role and pitfalls which may be encountered.

`*While the Association is happy to co-operate in these carefully controlled pilot initiatives it perceives many difficulties in the introduction of additional practitioners into the anaesthesia team with regards to career structure, integration with established staff groups, influence on the already reduced clinical opportunities for trainee anaesthetists and most importantly their acceptability to patient*s.'

The Royal College of Anaesthetists joined the Changing Workforce Programme to visit the USA, Holland and Sweden to investigate non-physician anaesthetist roles. Their report, published in December 2002, states:

*`the Royal College of Anaesthetists would wish to collaborate and play a major role in setting standards of training and the supervision of such staff (non-physician anaesthetists)'*

*`The College would be anxious to ensure that our current high standards are not compromised'*

The Royal College of Surgeons of England and the Ministry of Defence Medical Services Department expressed the view that they would follow the lead of the RCA.

***Perceptions***

Some interviewees expressed the perception that the physician organisations (RCA and AAGBI) would be opposed to any change in working practices. Interviewee 1 described the professional organisations as a potential barrier to any development of non-physician anaesthetists, but not an insurmountable one:

*`I would not view that as a complete barrier and should be some thing that can be overcome, if the political and cultural will is there to overcome it … it's more about how ready they are to embrace change.'*

Interviewee 4 expressed a similarly hopeful view:

*`More the Association than the College probably. I think that the College has woken up to the fact that this is coming … I think the Association have been very much more against it for longer. So they are going to be the biggest barrier,' but added `I think it's (the barrier) about to be overcome.'*

(This was noted in January 2003)

Interviewee 12 commenting on the shift of opinion said:

*`I mean traditionally the College, of course, would be dead against non-physician ... anaesthetists*.'

Interviewee 10 questioned the apparent shift in opinion from the RCA:

*`Five years ago it was very much "we're not having them" and then you hear of a report being done by the Royal College in association looking at non-physician anaesthetists and my concern is that it is purely a political cry to the Government to get the Royal College on side or in discussion with the Department of Health…and is related purely to manpower issues,' however `they (RCA and DOH) are receptive to the fact that it has to be done the right way and has to be shown that it's of benefit.'*

Interviewee 20 also commented on the enabling role of the College's shift of opinion:

*`If …the College takes a lead in this, they then give people like myself or people who do have alternative ideas, permission to say: "well, it's not actually such a terrible idea"'.*

*`I think if our College and Association are fully involved in it, that will allay some of the fears of medical anaesthetists… setting it up, saying how it will be run,*

*how the training will be done, who will be in charge, etc. I think if it was introduced without the co-operation of those two it would be doomed to failure*.' Interviewee 16.

### 3.3.2 Professional identities

***Tensions***

One interviewee perceived that anaesthetists would resent apparently less well trained individuals doing the same job.

`*I should imagine there would be an initial upset ... "you're not qualified and I am".'* Interviewee 18.

Perceptions about the specialty of anaesthesia as whole were expressed:

`*I have in mind the reaction of the specialty of anaesthesia in this country and I suspect that they will be very anti and I don't know whether it will be anti because of evidence or prejudice. Overall I think it will be very, very difficult to have this scheme accepted in the United Kingdom.'* Interviewee 13.

He continued:

`*I just think that they (anaesthetists) see anaesthesia as probably too young a specialty to be magnanimous enough to allow this development to take place and to give it a fair trial.'*

`*They (anaesthetists) feel very got at and I think this is just another way of getting at them – just to prove someone else can do their job and … I think that is the attitude that some of them are taking*.' Interviewee 16.

Concerns about front-line physicians reaction focused on the investment in terms of education and training into becoming an anaesthetist:

`*If I was an anaesthetist … I would probably look around me and think … if I've done all this training and I've had to put all this time in, how is it possible for somebody to come along and do part of my work and perhaps have less time in training? ... I can see that emotionally in terms of professional growth and professional input … this could be an issue.'*

Interviewee 14

`*I think that the biggest barrier is going to be … the taken for granted stuff around emotional investment in a job, and emotional investment in the status. Anaesthetists … have ...worked very hard to raise their status in … the operating theatre in terms of their relationship with surgeons, and that then … turning around and saying … work can be done by someone who hasn't got the same background ...may challenge that status.'*

Vickers (1995) raises the question:

*"for what can we claim to be the equal of other hospital specialists?"*

Interviewee 12 continued with a comment on the training background of physicians:

*`You come up against Consultant anaesthetists old and young, who have this strange idea that ... you have to have done six years of medical school, eight years of postgraduate training to be an anaesthetist because that is how it has always been, but that doesn't mean to say that that's how it's always going to be.'*

Views on how anaesthetic resistance might be vocalised were articulated :

*`a vocal number of anaesthetists who will not want to see the specialty eroded in this way, but I suspect that their views will not be expressed in that way. I suspect that they will use the patient safety argument which is always used in these circumstances.'* Interviewee 13.

One interviewee described their perception of grass roots anaesthetic opinion through experience:

*`we're struggling even with things like pre-assessment for them (anaesthetists ….I think to suddenly suggest that we have nurse anaesthetists would be a bit too far.'* Interviewee 7.

There has, however, been for some time a section of non-physician opinion which has been in favour of developing a non-physician anaesthetist role. Many of those interviewed who support this role are those who have witnessed or worked with European or US nurse anesthetists and are convinced of their competency and suitability for the UK operating theatre.

One contributor bemoaned the fact the fewer junior doctors in training get the opportunity to work in Europe and therefore are less likely to come in contact with non-physician anaesthetists and be able to form their own opinions based on experience.

Some pro-non-physician anaesthetist opinion was based on quality of outcome:

*`I'm very much a process driven person so I think the only thing that you've really got to be looking at is outcome… If I can do more work, more numbers with more better outcomes, then I don't see a nurse anaesthetist as a barrier to that, even working within their own limitations and I don't see them doing all the cases I do,*' said Interviewee 20 adding *`If this can be seen as "help" and it can been seen as something that is done properly, it is not as controversial as you might think.'*

Another interviewee (12) felt strongly that anaesthesia, especially cardiac anaesthesia, was replicable and predicable and thus ideal for non-physician anaesthetist roles:

*`if you do this and do that and do everything at the right time, you're going to be fine, and we're going to teach you what to do if things go wrong and I think that cardiac (anaesthesia) is perfect for teaching completely non-medical people how to look after patients.*'

Non-physician front line opinion has not uniformly been in favour of the idea of non-physician anaesthetist role. This view is reflected in a 1997 survey of theatre nurse opinion on the topic of non-physician anaesthetists. Some 45 per

cent of the 103 respondents to the survey when asked did they feel that theatre nurses could develop into nurse anaesthetists, answered in the negative. The feeling that this was a medical not a nursing role was expressed, as were reservations about the role. (Hind 1997). The 1996 Scoping study documented nurse resistance to the idea for several reasons, including legal and responsibility issues and lack of information about the non-physician anaesthetist role (Reilly et al1996) (see section 1.5.1).

Several of the non-physicians interviewed had either reservations about the wisdom of such a development or completely opposed it. Interviewee 21 felt:

*`it's very easy to take the helm when the waters are calm'*

but felt that the additional years of education and experience of doctors was vital for dealing with difficulties during anaesthesia.

Interviewee 10 commented on the shift in RCA position, but did not feel that front-line opinion had moved so quickly. While he felt that most anaesthetists were in favour of extending roles, actually administering anaesthesia was not comparable to other extended roles, such as the development of surgical assistant. Anaesthesia he commented, *`was not the same every time.'*

At one of the case study sites, several of the staff were absolutely opposed to the idea of non-physician anaesthetists. Anaesthesia, they argued, looks easy, but only appears so because of years of training, education and experience of the physician anaesthetist. Adverse events are rare, but when they do happen, the depth of knowledge and experience of the medical staff is necessary to deal with it. One contributor felt that non-physician staff embarking on such a role might not be fully aware of what they were getting in to.

Relationships between the professional organisations are now more harmonious than in the recent past and all the organisations sit on the Peri-operative Collaborative and have been involved in the development stage of the NWW in Anaesthesia pilots.

Bevan report (1987) suggested the creation of a single theatre practitioner who could provide support for anaesthesia, recovery and surgery the front-line staff in non-physician groups work closely together with a common set of skills and competencies and the ability to switch roles in the peri-operative setting. This was supported by the DoH and endorsed by 1998 AAGBI guidelines on Anaesthesia Team which support the idea of a single theatre practitioner.

Interviewee 1 made the following comment about potential jealousies which may arise between the professions and theatre colleagues in general.

*`I can see a rocky period to start with, some people being seen as upstarts, some people muttering: " I could do that, but I didn't get a chance."'*

*`if they came from perhaps a former theatre nurse or ODA, I can see "Who do they think they are"'* Interviewee 9.

Several interviewees, mainly medically trained individuals, were keen to stress that they felt that ODPs were particularly suitable for a non-physician

anaesthetist role. The European and USA title of `nurse anaesthetist' was refuted by several individuals across professional boundaries as they felt that it implied an exclusively nurse role.

`*what we can't allow is for ODPs to be left behind … once the barriers come down we're not going to allow … the nurses to go off and adopt this new role and the ODPs not to have that opportunity especially ... they would be equally good at it and there's probably more of them with experience in anaesthetics anyway.*' Interviewee 4

ODPs did express concern that nursing organisations may attempt to `hijack' the role and make it exclusively for nurses.

***Registration***

A potentially problematic issue is that of registration for ODPs. This is currently a sensitive issue as ODPs and nurses share theatre practitioner roles, but do not have equivalent registration. This issue was raised by almost every nurse interviewed.

At the time of investigation, ODPs have voluntary registration with the AODP. While this registration is technically voluntary, virtually all employers insist that their staff are registered. The AAGBI made recommendations in AAGBI (1988 ) and again in AAGBI (1998), that moves should be made to ensure that ODPs could obtain professional registration.

The Health Professions Council, launched in April 2003, agreed to arrange a mechanism for registration for ODPs from April 2004. ODPs were the 13th profession to be added to the HPC register and this gave them equivalent professional status to physiotherapists, radiographers, etc.

In its statement to our project, the AODP acknowledged the shortcomings of the current situation and the need for swift action:

`*The effective professional regulation of those participating in these new roles is crucial if patient safety is to be assured. The experience of the AODP demonstrates that it is very unlikely that new regulatory mechanisms can be put in place soon enough to cover these developments. The existing and, in the case of ODPs, developing mechanisms of regulation, must be used. There must be a concern that those not eligible for regulation via the AODP/HPC or NMC routes will be practicing without effective means of professional regulation and scrutiny.'*

This reflects a measure of the concern felt by many of the interviewees from within theatres about the lack of professional registration (beyond registration with AODP) which has persisted for many years.

Interviewee 2 raised the issue of the involvement of the RCA:

`The issue is who they would be accountable to. … I can see some problems with that, because if it's a nurse, they'll be responsible to the RCN, but are they also going to be responsible to the Royal College of Anaesthetists.'

Many of the interviewees both physicians and non-physicians accepted that the RCA would be ultimately responsible for the creation and maintenance of this role, but questioned how this would be managed.

`*The main thing, the biggest jump would be, especially for the ODP, is the sense of actual responsibility for what they are doing ….although everyone is accountable for their own actions, the ODP, especially for the ODP, is the sense of the actual responsibility for what they are doing.'* Interviewee 3

`*and so as the role becomes evolved we've got to define the organisational hierarchy that supports them professionally and everything else … they should be licensed and registered practitioners...with the necessary robust mechanisms for removing registration if there are problems … like with medicine, the course itself doesn't qualify you to do anything it's your registration that makes the difference*.' Interviewee 6

### 3.3.3 Perceptions of non-physician anaesthetist role

***Definitions***

This study revealed a lack of knowledge about existing European and American models of non-physician anaesthesia and a lack of clarity about the potential role in the UK.

The 1996 Scoping study (Reilly et al 1996) highlighted ignorance about the nature of non-physician anaesthesia within the NHS. Perceptions at that time were that individuals favoured the development of an anaesthetic nurse rather than a nurse anaesthetist. An anaesthetic nurse was envisaged as a development of current roles rather than a nurse anaesthetist which would be administering and monitoring anaesthesia.

One interviewee raised the issue of exactly what these staff would be employed as:

`*the NHS is not great at the moment. It has very fixed jobs …what are these people going to be? … I think that they should be something completely separate … they are really professions complementary to anaesthesia … That needs thinking about before you create these people who would be potentially title less and regarded as some sort of "odd-bod" technician and therefore resented by ev*erybody.' Interviewee 13.

`*At the moment there's only one way to the top of the clinical tree. That's to get a medical degree or through the appropriate College and become an accredited specialist, I can see a situation arising in the future years whereby there are several routes to that … I could see a range of career paths … the ideal would certainly be a nurse consultant for example would enjoy exactly the same professional rights and privileges as a medical consultant, just come by there by a different route. There has to be something that generates uniformity which would probably be the Royal Colleges throwing their doors open to non-doctors, and the nurse ... .or (if) ODA with the appropriate skills and background wanted*

*to become a Fellow of the Royal College of Anaesthetists, they could.*' Interviewee 6.

Several interviewees perceived that non-physician anaesthetists would be involved in apparently 'simple' work such as day case surgery, but interviewee 10 pointed out:

`*the non-physician anaesthetist is more likely to be doing the day case or short stay … which goes against national guidelines for day surgery where in order for day surgery to work, there should be a consultant surgeon or consultant anaesthetist with an interest in day surgery.'*

One interviewee (16) who had spent some time working in Sweden and had been impressed by the efficiency of the Swedish system of anaesthesia commented:

`*I thought - 'I'd like to do this.' I would much prefer to do this than be told, you know "Get in there and stay there for the whole day and do that" … I thought it looked very attractive.'*

`*it seemed to work very well - a lot calmer and a lot less frenetic.'*

`*if it is put across in the right way, every good doctor will be persuaded by something that works .. .the foreign models … suggest that you can … just look at it in terms of patient outcome, that it works.* Interviewee 20.

`*I don't think that good anaesthetists have any fear of nurse anaesthetists because we will always be more flexible and quicker … but that doesn't mean to say that the person who is slow and more deliberate, can't be utilised in order to get a good outcome*,' said Interviewee 20 adding `*I want them on 24 hours a day – it would give them nice varied jobs… I would put them in the back of an ambulance when we have transfers out of the hospital which is one thing at the moment which takes the most skilled person completely out of the loop….'*

Interviewee 2 favoured a 1:2 ratio for non-physician anaesthetists supervision, but pointed out:

`*you would have to have a backup system in place … there would be somebody free to come and give a hand if there were two problems at the same time … if you only ever use them (your backup ) once, it doesn't matter, you have got them in place.*'

Interviewee 4 saw room for two extended roles for non-physicians in anaesthesia: the idea of a `super assistant' who could place central line, monitoring and oversee the maintenance of anaesthesia and the more autonomous Dutch model of non-physician anaesthetists.

### *Current developments of extended roles for non-physicians*

The existence of non-physician experience and skills in the NHS has been a driving force behind the changes since the early 1990s. Since the early 1990s, non-physicians have taken on extended roles in many fields. Pain management

and pre-operative assessment and screening have been the most common extensions to non-physicians' role in anaesthesia.

The concept of advance nurse practitioners has been promoted in nursing for more than ten years and some of its proponents regard the development of non-physician anaesthetist role as a logical development of this trend.

`*I certainly think that roles in nursing have changed tremendously … I think where it has changed on the nursing side is maybe nurses being more involved in pain control, resuscitation and other projects like that, but I would say that probably this (anaesthetics) could be the next natural progression ….I feel that it's a natural progression for peri-operative nurses … I think that nurses have a great deal to offer in anaesthesia*.' Interviewee 5

Staff trained in pre-operative assessment work to strict protocols and guidelines. They have been shown to work more effectively than junior doctors, in that they order fewer unnecessary tests. They do, however, work more slowly. (Kinley et al 2001) The Papworth pilot showed that staff trained in venous cannulation and venous central line insertion were as effective as Specialist Registrars. (McKay et al 2000)

***Doctors' roles***

Non-physicians have also developed skills to undertake roles traditionally carried out by doctors in recent years. This skill development naturally feeds into the further development of non-physician anaesthetists roles.

`*I mean if you think of the things that nurses now do that used to be the doctors' remit only, you know from taking blood to putting up IVs ... so I think that increasingly the boundaries are becoming blurre*d.' Interviewee 7.

Nurses and ODPs also have expressed a resistance to taking on roles which may be seen as having been discarded by doctors because the tasks are not sufficiently interesting or rewarding. Resistance to the non-physician anaesthetist role could be borne out of preconceived ideas about the motivation for the role:

`*I suppose that it's people's understanding of the role … I think that you get that feeling that I've been asked to do something, to cut junior doctors' hours or for performance and maybe they don't want to do it*.' Interviewee 2.

Those who mentioned this issue felt that it was vital that any role development where tasks are being moved from a doctors' remit are voluntary and that those asking to undertake them are given a sense of ownership over the development of that role and its training.

`*One of the political things, if you keep them (anaesthetists) on the outside, they are never going to feel, and it's one of those overused words, ownership ….if these people (non-physician anaesthetists) are there to take over their (anaesthetists) roles,...the anaesthetists have to be involved, have to be, and it has to be credible…with their colleagues*.' Interviewee 7

In response to the Audit Commission report (1997) (see section 1.5.1), the *British Journal of Nursing* published comment on whether it was really desirable

for nurses to undertake roles which doctors no longer wanted which would in turn pull their role further away from the original concept of nursing. (Castledine1998).

The Audit Commission 1997 commented on the fact that junior doctors can administer anaesthesia under supervision after 12 weeks training. Robinson (1998) commented on the RCA guidelines which state that level 2 supervision is necessary following the introductory module. Level 2 supervision is having a trainer present in the operating suite to advise or assist. He felt that this and the fact that `much routine minor and intermediate surgery performed on fit patients does not require the presence of a fully trained consultant anaesthetist for the entire duration' enabled the specialty to consider the potential for ending the `closed shop' attitude. To recruit more consultants to carry out undemanding work was not an appropriate use of their talents when they could be concentrating on providing specialist care for those patients who needed it most.

The current situation in ICU was regarded by several interviewees as a role which could be built on for the non-physician anaesthetist role:

`*I've never quite understood why we allow patients who are unconscious, on ventilators, on all sorts of different drugs to keep them alive on intensive care units - they're looked after by nursing staff. They don't have a consultant anaesthetist by each bed and they're quite happy to have a nurse looking after the patient, but we are not happy to have a nurse or anyone else look after a patient in an operating theatre. It doesn't make any sense to me.'* Interviewee 12

***Future of non-physician anaesthetist role***

Both physicians and non-physicians expressed concerns about the future for that role.

`*what future does this role have … (would) that role be of sufficient interest to keep another generation of staff coming into that role and to sustain that role'* Interviewee 1

This interviewee continued to discuss how this role could be marginalised by making reference to rural nurse anaesthesia practice in the US and its restricted client base and working practices:

`*I can see that if the role was going to get sidelined, that is how it would get sidelined'*

`*they would be limited in what they are doing ... there are going to be a limited number of areas where they can work. They are going to be restrictive on the hours that they can work, the environment they are going to work in.*' Interviewee 10

`*BUT it is a very, very narrow field which you are putting people into and that means that if you are going to do this day in day out for the rest of their lives, they really want to be able to do it ….But the role itself would be routine, routine, routine plus they would be supervised … it's a narrow, narrow field and a narrow*

*expertise they are able to use. They are not going to do an emergency. They are just not going to do it, because you have to be able to train for years to do that and your knowledge has to be profound.*' Interviewee 3

Interviewee 2 also recognised the potential for the non-physician anaesthetist role to fail to live up to its promise:

`*From an individual's point of view, the person who is doing it might feel that they were given an opportunity, but then it sort of closed down ….people who go into it will see that it is going to move on, but a lot of these things have a block on it. This person doing it might feel like a glorified ODA, that there is no career structure, are you just going to be qualified and that's it. Or once you qualify are you going to be able to do small operations and then move on or is it 5 increments and nothing else. That is a big question*.'

In common with thinking on increasing specialisation of all fields:

`*people who develop too narrowly might find themselves with difficult employment prospects…practice changes we don't need these people any more, nowhere left to go*' Interviewee 6.

Concerns were expressed that the training for the role could potentially be so narrow that the role might have severely limited uses

`we've seen enough problems in the NHS of the erosion of generic skills…and the development of high level specialist skills" Interviewee 6.

`*but a new role should have the skills to be developed and not be restricted in certain ways'* Interviewee 1.

Interviewee 14 noted the challenges that non-physician anaesthetist role might bring:

`*it's going to involve people stepping out of their traditional professional cultures because otherwise they're just going to be re-creating this kind of assistant role rather than a new kind … of worker really.'*

One interviewee raised concerns about their perceptions of short term thinking:

`*I think that another barrier towards change would be if it's not clearly thought through, if it's put through quickly just to obviously solve an agenda I don't think that would be in the interest of anyone and I think that that could act as a barrier because if it isn't thought through properly it simply won't work for many reasons. ' Interviewee 5*

The increasing emphasis on academic training (as well as change in the NHS) was felt to have eroded clinical skills among nurses. It was felt by interviewee 10 that this would have an effect on anyone entering a non-physician anaesthetist training programme.

`*…taking someone straight out of nursing and saying, "Right, you're going to be a nurse anaesthetist" – that's not the answer … they've got to have an exposure to that environment ... to theatre environment or to surgical ward environment, before they can go into a training package.'*

The point was made that some of the extended roles currently in existence were struggling for lack of Continuing Professional Development (CPD) and this needed to be avoided for non-physician anaesthetists.

`*I think that at the moment that a lot of the extended roles are rather floundering on a lack of good quality CPD for these people*.'

***Supervision***

On creating too many guidelines:

`*I feel that we shouldn't be going to something that is too protocol driven … I think there comes a moment when they can actually get in the way … but if I could give you an example … If I ask a stupid doctor what the correct dose of profanolol is, he will say, one milligram to four milligrams per kilogram. And I would say, well actually I use it in very sick people and in children and so in fact… it varies by a factor of six. So the correct protocol should say – enough but not too much. What we then need to arm people with is telling them what is enough and what is too much and actually allowing them the freedom to do it properly.'* Interviewee 20

On anti-supervision:

`*is an anaesthetist going to sit there in his theatre with his feet up while somebody else does all the work ….there is no point in developing these roles if you don't give them some degree of independent practice without moving it away from …"this has to be signed off by a doctor" so you become some sort of high priest without which medicine can't carry on because your presence isn't really required … I find that a silly model and I can't see it working*.' Interviewee 6.

### 3.3.4 Culture of theatres

***Authority / hierarchy***

The question of authority of non-physicians is addressed by Hunt and Wainwright (1994), they comment that: `*Documents such as the UKCCs Code of Professional Conduct (UKCC1992a) and The Scope of Professional Practice (UKCC1992b) suggest a scenario in which nurses function with some degree of professional autonomy, but until nurses can achieve the requisite authority they will not be able to realise more than a fraction of the possibilities suggested by these documents.'*

Despite twenty years of unprecedented change in professional relationships, there remains a considerable element of the hierarchical culture which has dominated the NHS in the past. Professional boundaries of respect, duty and obedience still exist (and are in certain situations necessary, to enable life threatening events to be dealt with in the most efficient and effective manner). However, this hierarchical structure is perceived to be a distinct barrier to the creation of a non-physician anaesthetist role.

Interviewee 14 talked about challenging the hierarchical attitudes in theatres:

`*who's in charge of a theatre and who runs the theatre and it would require anaesthetists to be quite flexible in their approach and their thinking as well*'

Another interviewee discussed the hierarchy among non-physician staff and how the introduction of a non-physician anaesthetist role could create tensions:

`*Now if there was someone else – yet another grade in there as a nurse anaesthetist, there would be some cultural adaptations for that because there would be somebody acting in a capacity above what they were doing and there would be some difficulties with that initially.'* Interviewee 16

The relationships between the professions have undergone a huge shift in recent years. More doctors are coming into the profession who regard their role as one of many within healthcare, all of which have an equal value. The case study sites illustrate how well teams can work together if the members of that multidisciplinary team operate within a culture of mutual respect and trust while maintaining the chain of command.

Team working and multidisciplinary teams fostered by NHS were mentioned by one interviewee who felt that the development of a non-physician anaesthetist role would change the culture within theatres in this respect:

`*So we would all need to be good at delegating and managing because there would be far more of that than just walking in and saying – "Well I'm doing this.*" It adds another dimension to the job.' Interviewee 16

### *Separate tribe*

The existence of a theatre 'tribe' was raised by several individuals. Two elements to tribalism in theatres were highlighted: tribalism between the professional groups within theatres and between theatres and the rest of the hospital.

Like all professional groups, the groups within theatres – ODPs, nurses, surgeons and anaesthetists tend to flock together. Tribalism among the professions was cited as a possible barrier to the creation of the role:

`*Most people are tribal because they actually do think that they are the only people that do have the requisite skills and knowledge.'* Interviewee 7

Interviewee 20 commented on the tribalism of the professions and how that might be at the root of the resistance:

`*There is this thing within the profession whereby if you put any group of people who have been taught "this is the way to do it" in a room together, and you propose that there is another way, their natural inclination causes them to corral together and say "no way" and that's what I think the problem is.'*

### *Isolation of theatres*

The positioning of most modern theatre suites within the hospital leads to a physical isolation of theatre staff:

`*There's a natural isolation to work in a theatre.'* Interviewee 7.

Theatres are often situated in lower ground floors or basements or at the end of long corridors and remote from other hospital facilities. The theatre unit itself is isolating. Different protocols concerning admission, clothing and cleanliness apply, restricting the movement of theatre and other hospital staff. One interviewees commented that they felt that non-theatre staff felt positively uncomfortable when in the theatre suite and appeared to vacate the area as quickly as possible. Theatres are made up of small closed-off spaces (sterile areas and surgical areas) only open to a select few.. Theatre suites have separate coffee rooms. Staff wear a common uniform which usually makes no professional distinctions, spend virtually all of their day in the same area of the hospital and several have confessed to not knowing their way around the rest of their own hospital after as many as fifteen years service. All these factors contribute to making theatre staff a `tribe,' albeit composed of other smaller tribes.

The physical layout of theatre suites was viewed as a potential enabler and barrier to the creation of non-physician anaesthetist roles.

`*I think we need to look at the geographical outlay of theatres*.'. Interviewee 14.

The theatre team work together through stressful situations and become bonded by this. The teams are often social companions as well as work colleagues, as at case study site 2 (CS2), and this in turn builds a different kind of working relationship.

This tribal atmosphere in theatres could be a distinct advantage in the introduction of non-physician anaesthetists. If handled correctly and all team members are made to feel a sense of ownership, the tribe may adopt the role and take on collective responsibility for its success or failure. The CS2 case study provides an example of how tribalism can work in a positive way to bring about innovation. The cardiac team operates as a tribe within a tribe. They work within the theatres environment, but in their own work area. They have specialised staff and their own management structure. This managerial and operational isolation has afforded the team the ability to bring about change without having to engage the larger group (see Appendix 7).

Interviewee 18 felt that in theatres `the tribe' might group together to support a new role and aid its development.

***Conservatism***

Theatres were referred to as:

`*a deeply traditional place*' Interviewee 7.

When discussing conservatism in theatres interviewee 1 mentions that informal innovation is often acceptable in theatres, but

`*incorporating that change into established roles or ways of working becomes more difficult'* and continues `*There are people who will embrace small changes, but as soon as those changes become organisationally recognised, then people recoil in horror.'*

*`theatre staff generally can be quite conservative and resistant to change. It can be quite an innovative area at times which is why it is an enjoyable place to work, but at the same time can be very conservative, sometimes changes seem to go so far ….'* Interviewee 1.

Interviewee 6 replied when asked what may stand in the way of non-physician anaesthesia in the UK:

*`Medical conservatism. You can't do it without the support of the medical profession … it's very difficult to oblige somebody, supervise somebody where they have a fundamental objection to what they are doing.'*

### 3.3.5 Manifestations of resistance and acceptance

***Change management***

Those who resist change regardless of what that change might entail are among the most difficult of minds to sway. Binney and Williams (1995) call them `The Underground Resistance' because they commonly do not express their views, but will be positively obstructive and engage in anti change propaganda.

One interviewee highlighted the potential for a minority to prevent change:

*`I would have thought that more than 50 per cent of anaesthetists would be violently against this … there may only be 10 per cent that would actually speak out, but they would motivate the other 40 to50 per cent to get them over the 50 per cent mark.' Interviewee 13.*

*`Even if you have one person who doesn't agree or doesn't support because it is such a big next step ... you are going to lay yourself open to the department."* Interviewee 10.

Interviewees made suggestions, some based on personal experiences of how to overcome the difficulties which could be faced in bringing about change.

Interviewee 9 mentioned how change had been brought about at the trust by enlisting the assistance of a respected anaesthetist:

*`she came over and spoke to our head of department and sort of explained how it worked at her hospital and what lots of other people were doing and I think that was the key actually, hearing it from others in their own profession seemed to do more to persuade their opinion than hearing it from me'*

Interviewee 20 supported the idea that clinician will take their lead from other clinicians:

"*Consultants don't take leadership from their managers. They take it from their colleagues … I think the professional medical establishment has a key role to play in this. So I think that will give an environment in which people can feel that they can then start to experiment in.'*

One interviewee commented on the difficulties of being the first to experiment with new ways of working:

*`you need clinical champions and someone who is prepared to go first and say well we will pilot it and publish what they have done and get people involved and normally success breed success doesn't it? If someone's done it and it's working well and then they share it and someone else thinks "Hey, I'll have a go at that" and it sort of leads to innovators and early implementers before the rest come along* ' Interviewee 9.

Another suggestion to aid the acceptance of the role of non-physician anaesthetists was to broaden the remit beyond the high status environment of theatre:

*`there's … a massive status issue about the work done in theatre, but if anaesthetic work could be seen in the wider context of ... critical care and pain management, then it makes it easier to manage this change because … the status is diluted and you're moving the work outside the operating theatre and away from the spotlight of what is obviously quite a status related piece of work in theatre"* Interviewee 14.

One interview acknowledged the cultural barriers surrounding theatre work and suggested a method for overcoming this:

*`You never attack your culture head on, you attack the peripheral things … culture is a combination of all the other things so that if you tackle some of the other things … it would be really powerful in trying to breakdown some of the boundaries.'* Interviewee 7

Our four case studies illustrated that NHS staff involved in innovation have an instinctive understanding of how to facilitate change and create an inclusive environment. CS3 staff realised that spending time planning and ensuring the compliance of all members of the wider team would enable the role to flourish. CS1 involved physicians from specialities such as radiology, medicine, pathology and surgery from across the trust to be involved in the training of the Clinical Nurse Specialist (CNS). This ensured that physicians from outside the immediate team had a sense of ownership of the role, felt that they had a measure of control over the role and trusted in the capabilities of the CNS.

### *Consultant anaesthetists' stress*

Should non-physician anaesthetists be introduced, it was perceived that anaesthetists would be expected to supervise their work, training and education and most probably line manage these staff. While trying to alleviate work pressures felt by consultants are we in fact putting them under increased pressure? There is some anecdotal evidence, which often features on the US anaesthesia web based discussion forums, regarding high levels of stress related to the supervision of non-physician anaesthetists and the associated fear of litigation. Supervision of non-physician anaesthetists is regarded by some attending anesthesiologists as harder work than solo practice. The supervision creates more work in terms of physically moving from operating room to operating room throughout a list; increased mental pressure of dealing with several cases at once; increased paperwork and the stress of managing and

administrating an anaesthesia care team. The professional conflict in the US seems to exacerbate this situation.

In contrast, anaesthetists in Europe often use the time when patients are being monitored by AAs or ANs (see section 3.2.3) to carry out pre-operative assessments and consultations in offices adjoining theatre, moving back and forth between theatres and offices. Using this `free' time to push through more patients could be regarded as relieving some of the stresses of the job, relating to backlogs of work. This could however, could be a means of dealing with an ever increasing workload.

In the UK, anaesthetists are under pressure to deliver care not only in theatre, but in pain clinics, pre-operative assessment and screening clinics, trauma and ICU and HDU (see Glossary section1.2) and comply with training commitments for junior anaesthetists. New consultant anaesthetist appointments are generally driven by surgical service expansion, resuscitation management and accident and emergency, rather than anaesthetic service delivery. If consultant anaesthetists' time was reorganised so that they spent theatre sessions `supervising' rather than `doing,' this could allow time for some of this other activity to take place.

Interviewee 2 felt:

*`For the consultant anaesthetists, I would say that it was stress reducing, developing, allowing them more time for important things like research.'*

Another interviewee commented on the current stresses of the anaesthetic work in the UK:

*`we are so short of medical anaesthetists … there is one working in each theatre by themselves, unless they've got a trainee with them and if you want coffee or want to go to the loo or want your lunch or something – we are all ringing around, trying to get somebody to come and sit with our patients for five minutes whilst we nip out. And obviously one concentrates for hours and hours while you are doing that.'* Interviewee 16.

And continues*:`I think people are getting quite fed up with the pressure of work and beginning to think they would like to have some help really.'*

In this sense, the ability to supervise non-physician anaesthetists could be viewed as stress relieving as it might allow consultant staff to carry out other duties which remain undone whilst they sit monitoring uneventful anaesthesia.

Interviewee 10 felt that the introduction of non-physician anaesthetists would lead to a requirement for consultants to spend a proportion of their time matching skills to need :

*`The burden is on you to dictate … what they are capable of doing and what they are not capable of doing … I'd spend probably two or three hours of each day just trying to sort out their workload, which is a waste of my time*.'

### *Appropriate use of consultant skills*

Though rarely in print, some anaesthetists have acknowledged that:

`*quite a few anaesthetists find at least some their theatre work insufficiently challenging'*

because of the developments in the specialty in terms of agents and monitoring. (Vickers 1995).

This view was echoed by interviewee 13:

`*the number of simple anaesthetics that an anaesthetist must be called upon to do during their practice lifetime is vast and they get bored – you can see they are bored'*

`*there is a lot of boring – I say boring - a lot of non-active time in anaesthetics where you have to be very aware and you do have to keep your eye on everything … we end up with the situation of an extremely experienced consultant anaesthetist sitting with an exceedingly stable patient and somewhere else there is someone, either consultant or trainee in difficulty who really needs a hand…and we can't do it'* Interviewee 16.

Advances in monitoring and anaesthetic agents mean that procedures have more predictable outcomes than ever before (Audit commission 1997). Anaesthetists would argue that greater predictability has been brought about through better training and knowledge.

Anaesthetists spend around ten years in postgraduate training before obtaining a consultant post. Their skills are highly valued throughout acute care in dealing with the critically ill patient in trauma and ICU/HDU, pain, obstetrics, research and, of course, theatre work.

Interviewee 12 commented that for an anaesthetist to be present while a patient was on cardio –pulmonary bypass during open heart surgery was:

`*... a waste of a consultant anaesthetists' skills'*

It was suggested that if consultant time is freed to carry out other duties, consultant job satisfaction is likely to be increased and stress reduced because they have the time to do the work demanded of them.

`*anaesthetists could take a more over-arching view of life, a more umbrella role of life and perhaps rather than doing so many humdrum cases … there would be other areas they might turn their attention to'* Interviewee 13.

Some anaesthetists, however, expressed satisfaction with their current roles and did not see the introduction of non-physician anaesthetists as improving the situation. Interviewee 10 felt that supervision of non-physicians could be:

`*a fire fighting sort of thing, to sort problems out'*

and he did not see that as a positive move in terms of their own job satisfaction or stress levels. He regards the current situation as:

`*doing a job and you want to do it to the best of your ability'*

*`For me …, I very much enjoy hands on, doing the cases and being in control … I enjoy being there.'*

***Recruitment and retention***

Concern was expressed about where these staff might be recruited from:

*`because there is only a limited pool of staff and who is going to take those roles and whether that would cause further problems down the chain'* Interviewee 1.

*`there is a big sort of creaming off exercise in nurse specialists and nurse consultants and we are removing all the better ones before we have trained up the others to take their place'* Interviewee 16 and continues: *`So that at first might drain the numbers, but in time it might encourage more people to take up the profession.'*

***Legal***

There persists in the UK and US a physician perception that `the buck stops with doctors.' This has led to a level of stress associated with the supervision of non-physician anaesthetists in the US. Despite the fact that CRNAs (see section 3.2.1) are registered practitioners, physicians feel that they are culpable for the CRNAs actions.

Interviewee 2 summed up some of the fears expressed regarding clinical risk and potential for litigation:

*`there could be huge mistakes and litigation, if training and protocols were not right, we could have a huge disaster on our hands'*

*`people would have to be very sure about things like risk wouldn't they … you'd want to be quite clear that what you were doing wasn't going to lead you to litigation'* Interviewee 9.

Interviewee 14 questioned the perception that doctors have to take responsibility for everything:

*`I think we'd have to look at the whole notion of how doctors take responsibility for their work … because it seems to me that doctors will take responsibility for everything … and they don't necessarily need to because when you get a doctor saying "oh, I must do that because the buck stops with me," when you investigate that, there is no evidence for that whatsoever.'*

*`I think that people tend to hide behind these kinds of rumours and gossip and "the way things have always been done around here" kind of thing.'*

*`these people should retain their own professional identity ... it's an extension of an ODP role or an extension of a nursing role, but clearly their clinical practice will be the responsibility of the consultant body or the clinical director'* Interviewee 4.

The potential for the introduction of non-physician anaesthetists to fragment the continuity of care and lead to mistakes was expressed:

*`as we break up and fragment and specialise, and go onto shifts and working times and things like that we loose continuity, patient care and ... I see risks in breaking up that continuity … because breaking it up like that, insidious changes in patients' conditions often don't get spotted and so patients can deteriorate over periods of time without that ringing any alarm bells with anybody and that's the danger, that fragmentation and lack of continuity of care'* Interviewee 6.

### *Drivers for change*

The drivers for change were viewed by interviewees as both barriers and enablers of change. Barriers in the sense that they could be perceived by the workforce, both physician and non-physician, as ill founded motivation for change which might be driven through against the will and possibly better judgement of the workforce and enablers in that they provide funding and organisational support (eg,. the Modernisation Agency) or make the case for change apparent.

Interviewee 2's initial response in relation to driving factors was:

*`I think …. finance and getting numbers through theatres would be the defining factors if getting this through the NHS.'*

When asked about what the driving forces for non-physician anaesthetists might be, interviewee 4 replied:

*`getting more patients through the system … It's driven by the NHS Plan isn't it? The NHS plan is about waiting times and access … improving service to the patients including their access to the service.'*

The NWW anaesthesia pilot projects announced during the review were cited as a means of enabling non-physician anaesthesia to come about:

*`I think that initiatives … where you can test things out in a kind of pilot situation, iron out problems – it's not a kind of fait accompli, it's bounded and I think that if these things work, then I think anaesthetists will be the best promoters of this role if it actually works.*' Interviewee 7.

### *Cynicism*

Though hard to qualify in transcribed statements many of the comments on drivers for change were expressed in a cynical or weary manner. When asked what would drive change interviewee 13 stated:

*`Heavy government pressure and funding. A specific directive from the Department of Health that "this is how it's going to be" and perhaps some sweeteners for the specialists – it always helps.'*

Workforce pressures and the demands of anaesthesia services were regarded as a powerful driving force:

*`I mean just the general feel that … we can't continue, or anaesthetic practice, or work cannot continue as they are'* Interviewee 14.

Some cynicism regarding the motivation behind the creation of this role was expressed

`*I guess I am quite suspicious about whether (these) people (proposed non-physician anaesthetists) are sort of - a cheaper way of doing things*.' Interviewee 19.

And a fear that poor motivation and the desire for a `quick fix' could cause further barriers:

`*in a sense, we could be looking at a quick fix solution that might solve one problem now, but it doesn't actually solve it in the long-term and creates other problems in other areas in the short term'* Interviewee 1.

`*I don't think that it is a fix. I think in the long-term it may fix your manpower problem for a while but I think in the long term it would not benefit the NHS as a whole.'* Interviewee 10.

Questioning motivation of those involved in pilots:

`*If a department takes on a non-physician anaesthetist who needs training, you have to be clear what the goal is. Why are we doing it? Is it just because we get "x "thousands of pounds over three years and the opportunity to train somebody up and write the pilot site – "Aren't we wonderful!*"' Interviewee 10.

One interviewee raised the question of how patient focused care can be used as a device to increase influence of consumerism and reduce influence of professional groups within the NHS.

`*Patient as the "fifth columnist" and driver of change.*' Interviewee 2.

Some reservations about the creation of the role centred on fears about the perceived political motivation behind it, and the potential barriers that might arise because of these perceptions.

`*from a cynical point of view I would think that all these things are being done because of the European directive on junior doctors hours'* Interviewee 3.

`*I think that this is probably a political decision if they (non-physician anaesthetists) are going to come in*.'

Interviewee 13 sums up the challenge facing the NHS as regards the cynicism towards the motivations for change:

`*If one can only decouple the politics from the clinical necessity and the possible clinical benefits… that would be very helpful*.' Interviewee 13.

A more positive response to the challenge of change in the NHS included:

`*I think the fact that it would mean changing the system shouldn't stop it happening*.' Interviewee 2.

### *Costs*

AAGBI statement:

`*In addition it is unlikely that the introduction of these practitioners will have much effect on the problems of the European Working Time Directive as regards anaesthetic staffing nor a cheap option.'*

### *The patient*

One of the aims of the NHS Plan (2000) was to make the entire system more patient friendly, accessible and provide a better service for patients. In addition, healthcare staff accept that patient power is a growing movement:

`*I think the political environment is changing and patients' expectations at having things done in reasonable time and not having to wait is changing*.' Interviewee 16.

`*I think that the patient groups are getting stronger … Patients wanting to move through anaesthetic surgeries quicker, being more articulate about that, wanting greater access, wanting more of a say in the kind of service that they get and where they get it.'* Interviewee 14.

The Royal College Anaesthetists (RCA) carried out a survey for National Anaesthesia Day in 2002 which revealed that only 58 per cent of the public (MORI poll conducted February 2002) believed that anaesthetists were doctors.

This experience was re-iterated by one interviewee:

`*We did an audit once about patient satisfaction and anaesthetists and they (patients) weren't at all certain. The majority thought the anaesthetist was a doctor, but not everybody thought so*.' Interviewee 3.

`*I don't think patients mind as much, I think obviously people have to be given choices, but I think that you'll find that the patients don't mind as much*.' Interviewee 7.

`*A lot of the public don't realise that anaesthetists are doctors ….so I don't think they'd be too appalled or amazed. Perhaps some of them who knew … may ask questions, but I think really the public would be reassured by introducing them to the anaesthetic team.*" Interviewee 16.

Notions of patient satisfaction in anaesthesia are problematical because the patient is unconscious for much of the time they are in contact with the anaesthetist. Several commented that they felt that non-physician anaesthetists might be able to affect the patient experience in other ways. Non-physicians anaesthetists could assist by improving throughput and providing more staff who could provide a high level of continuity, from pre-operative assessment, through delivery of anaesthetic to perhaps even post operative care and out-patients follow up would fulfil the patient remit.

`*a better service, a better patient focused care, better on the touchy feely edges. By that I mean pre-operative visits and having more time to explain*

*things to patients, explain the various options and the procedures that they are going through.*' Interviewee 1.

Interviewee 6 describes the ideal in continuity of care which could be achieved:

`*If you are responsible for a patient 24 hours a day, seven days a week then you might as well do it now because you'll have to do it tomorrow if you don't and there's no incentive for assuming that it already has been done or it will be done because it's you, you know if it has been done and you're going to do it if it is required.'*

Interviewee 14 felt that the increased flexibility of anaesthesia services which could be brought about by this addition to the workforce would benefit patients in that fewer cancellations would be necessary due to staff shortages.

`*maybe enable patients to be more involved, …to be more involved, to appreciate and understand this pathway as well'*

Interview 4 regarded patient care as the only reason to create a non-physician anaesthetist role:

`*Patients have got to be the only reason that you're going to do it … I don't know whether you would increase quality by doing this, but what you mustn't do is reduce it in any shape or form, but you are probably increasing access to healthcare for people because you are improving the efficiency of operating sessions.'*

When the issue of patient choice was raised interviewee 4 made the following comment:

`*if you are giving people choice you are somehow saying that you are providing a lesser quality of service… you're giving them a choice of a good quality service or a poor quality service and that mustn't be the objective of this and if the service is going to be of a lesser quality then you shouldn't do it*.'

On the negative side one interviewee felt that too many people already visit patients pre-operatively and the non-physician anaesthetist could be just another member of staff carrying out similar work.

`*For surgery that morning they have to be seen by the ward nurse, the anaesthetist, house-man, consultant surgeon, the senior surgeon because the consent form has to be signed by them now. That's four or five people right off. This is someone who is coming into hospital for an operation, a little apprehensive. They have just arrived. They have to be weighed, they have to be changed … then you have all this rigmarole from theatre nurses, ODPs, nurse anaesthetists … doing pre-operative assessments – it is too much. Patients…don't even know who people are and they are being asked the same questions over and over again ... And yet they make all these protocols and guidelines, when in fact they are not looking at the patient, they are looking at their own agenda really and what they can do for themselves rather than looking at the poor patient in the bed. All the patient wants to be told is exactly what's going to happen.'* Interviewee 3.

One interviewee expressed the fear that the non-physician anaesthetist could be another person unable to fully answer the patients questions and queries:

`*Are they (non-physician anaesthetist) going to be able to explain? Are they going to be able to answer all my questions? Or am I going to be fobbed off because they don't know the answers?"* Interviewee 2.

### 3.3.6 Effects on existing staff and working practices

***Surgeons***

Theatre lists are drawn up according to surgical demands and anaesthetic services are expected to meet those demands.(section 1.5.5) The listing process goes through several sets of surgical hands before it arrives with the anaesthetists and then the theatre teams. Anaesthesia has virtually no input into the creation of lists.

This does not always have to be the case. CS1 showed how anaesthesia services can have a positive input. The Clinical Nurse Specialists liaise with anaesthetists and surgeons to arrange the day's trauma list and schedule additions to that list as the day progresses.

Surgeons work in one theatre for an entire session on patients they have chosen in an order they have dictated. This system was seen as a considerable barrier to the creation of non-physician anaesthetist role.

Interviewee 5 emphasised this point:

`*there would be a culture change ….for the surgeons who would be undertaking surgery and not all the time sitting with an (physician) anaesthetist and so … there would need to be some way of looking at ... how that change is coped with.*'

In Europe, the theatre lists are drawn up by the anaesthesiology team in conjunction with the surgeons. All members of the team move between theatres to ensure that those with the appropriate skills are treating the patients who require their attention. An effort to wrest some of this control from the surgeons would be necessary to enable non-physician anaesthetists to treat the appropriate patients.

Several interviewees discussed their views on how surgeons might feel and how that might affect the implementation of a non-physician anaesthetist role:

`*it's maybe also how surgeons view the role and how they would feel. They (non-physician anaesthetists) might have problems if the surgeon insists on having a consultant anaesthetist. "I'm not happy with one of these anaesthetising MY patients" and refusing to operate. Well what do you do?'* Interviewee 2.

`*there is always a problem between anaesthetists and surgeons if you get a very dominant surgeon and a rather gentle anaesthetist, then you get difficulties and the anaesthetist gets bullied ....I hope that there are less of those around now, but we could not be absolutely certain that that is the case.'* Interviewee 13.

***Management and operational***

To introduce the role of non-physician anaesthetist into UK theatres would require a huge shift in thinking about operating theatres. However, if theatre capacity was increased to create a 24-hour service or simply to meet the current demand more quickly, the provision of ward beds and ward staff would have to be increased at a similar rate.

`*If you have got the resources it may help to improve the turn over of patients. If you have got the resources, because you have to have the beds and you have to have the nurses to look after the patients in the beds and you have to have the monitoring equipment to look after the patients who are anaesthetised ….if you create something, you don't just create a job you create a whole scenario ….every job you create, creates five or six more.'* Interviewee 3

Current difficulties in theatres were highlighted:

`*we'd like to do additional activity to meet waiting lists or we've got emergencies or trauma patients backing up and we'd like to ... do them but we can't because there isn't an anaesthetist*.' Interviewee 9.

A shift in the responsibilities for creating theatres lists was seen to have the potential for ramifications beyond theatres by at least one interviewee:

`*In the future, your list would be provided with a non-physician anaesthetist. That surgeon may not have a say in putting that list together and that could cause … a knock on effect with all surgical services. Organisationally, for the department, that requires change.'* Interviewee 1.

The issue of line management and the non-physician anaesthetist role within the management structure of theatres was raised:

`*who would they report to? How would they fit into the organisation? Who would support them? ... Who would they actually have under them? I think you would have to look at the structure from all those levels.*' Interviewee 9.

Working patterns of non-physician staff in theatres are currently undergoing a re-evaluation. With the development of the theatre practitioner role, there has been a drive to standardise working hours and practices across the professional boundaries. This process is not yet completed and some concerns were expressed that adding another professional group might cause tensions.

Matching anaesthetic skills to patient need

The necessity of matching of anaesthetic skills to patient need was noted by several interviewees:

`*it's clearly got to be done to an acceptable standard of quality, as you devolve functions away from doctors you are becoming increasingly dependent on protocols, specifications for work and so it'll be important to make sure that the right sort of work is passed onto the right sort of people, both in terms of their abilities and their training and experience*.' Interviewee 6.

Several interviewees noted that to bring about adequate skill matching for anaesthesia, the creation of theatre lists would have to be either solely controlled by the anaesthetics department or that at the least they would have to have a considerably greater input into scheduling.

Interviewee 3 foresaw potential problems with scheduling for theatres with long established practices being unworkable:

`*I do not think that you could have on one list a quickie and biggie(a short operative procedure followed by a longer one) and a quickie and a quickie and so on. I don't think that would work. You would have too many people going in and out and also it would slow the list up … I think that there could be quite a logistical problem here.'*

***Recruitment and retention***

Several interviewees regarded the development of a non-physician anaesthetist role as a positive move to improving recruitment and retention. Firstly to attract people into anaesthetics:

`*it may help with recruitment, it may make anaesthetic work more attractive for a wide range of people'* Interviewee 14.

Secondly, the extension of non-physician roles and providing an alternative career path for non-physicians:

`*there would be staff benefits in terms of role development and diversity*' Interviewee 1.

`*providing those sort of jobs at the end of a nursing career, … may well enhance the careers structure … so that you can actually go further … That may encourage people who want a higher salary and to do something more interesting and to be a specialist and that may encourage more people to take up nursing'* Interviewee 16 .

`*might be enhancing their career and new opportunities'* Interviewee 2.

In addition, the non-physician anaesthetist role was viewed as a way to prevent the most talented and able theatre staff leaving clinical work because they have reached the top of their profession and their only available career progression was into management.

`*Had their (non-physician anaesthetist) role been a role in England when I was looking at my career developing, I'm sure I wouldn't be sitting here as a manager now … I feel as a professional, who has many years of experience in anaesthesia, I feel I have definitely got a lot to give … but it got to a certain stage in my anaesthetic experience … I couldn't go any further … I would have loved to have still been involved with patients in the clinical area, but I had nowhere to go*.' Interviewee 5.

Interviewee 20 proposed the idea of a single anaesthetic workforce which would include existing roles and the new non-physician anaesthetist role.

*`People can exist in what level they want, according to their own aptitude within the job, but they are essentially paid for the job and the responsibilities that they do. With a very senior person, actually giving anaesthetics and taking some responsibility for teaching ... The new trainees, who could be nurses or ODPs, could enter the system from within. I hope then … that we can actually get direct entry by fast tracking from science graduates.'*

*`I want to see them actually helping out the ODPs or nurses. So if we are short of them one day, they might actually work as an anaesthetic assistant.'*

*`we could end up actually depleting other professional groups if we and create this new role, which won't do us any good and we , I guess, we just create a war … what could happen … I guess is that we could actually create division within the profession of anaesthesia, if it's done wrong …. You could be creating monsters*" Interviewee 14.

***Supervision***

Several participants raised the issue of supervision for non-physician anaesthetists:

*`My immediate reaction is that they would have to be trained to a very high standard and also they would have to be supervised. I suppose it's important, just in general terms that they've got supervision certainly when it's new though, the obvious person would be from … the doctor anaesthetist."* Interviewee 3

Traditional roles and work patterns would have to be overcome if more distant supervision were to be utilised:

*`a lot of nurses are actually nervous about doing things and acting on their own initiative. They tend to be trained not to do that and find it quite difficult to start making decisions on their own without referring them upwards. Most doctors are trained to make decisions for everyone. Possibly we need to meet in the middle somewhere'* Interviewee 16.

One interviewee mentioned that doctors might find it difficult to let go and allow non-physicians to do the work:

*`doctors find it very hard to take their hands off a patient and to stand back and supervise from a distance, they have to be stuck in it, stuck in the work laying their hands on the patient and getting the trainees involved that way. Now this European model, as I understand it, requires the supervisor, the anaesthetist, to stand back completely and allow the new people to do the work and I think this raises a whole cultural issue about the whole nature of supervision in this country'* Interviewee 14.

At case study site three and four (CS3) and (CS4) the issue of trainers and supervision was raised. An interviewee felt that the quality of the trainers was paramount. They had to have the confidence in their own abilities and that of their trainee to be able to stand back from direct contact and allow the trainee to work.

***Training***

Interviewee 16 mentioned that training might:`*disadvantage the rest of the workforce'* and that this needed to be recognised and avoided. The training of junior doctors has changed radically since the Calman report in 1993 (Calman 1993).

`*You can't use doctors in training … they have needs of their own which as we shorten training that's going to get worse and worse*.' Interviewee 20

This has had an impact on all hospital departments' ability to deliver an out-of-hours service. One of the major motivating factors behind the CS3 innovation was the need to provide an out of hours service to obstetric anaesthesia without compromising junior doctor training.

A potential problem, which was highlighted by the RCA case study into the Dutch model of care (RCA et al 2002b), is that when every operating theatre has a junior doctor as well as a trainee non-physician, a competition for training opportunities arises. This can cause some frustration for those delivering and those receiving the training.

This situation may be partly alleviated by shared training programmes. Several interviewees mentioned that a modular training programme could include components common to physician and non-physician trainees. The case study at CS3 illustrated how simple co-operation can alleviate pressure on the opportunities for training. The Obstetric Anaesthetic Assistant liaised with junior medical staff to organise a rotation of theatres so that both parties could gain the experience they required.

Interviewee 16 commented that changes in junior doctors teaching has slowed down the speed of through put in theatres, but felt that the introduction of non-physician anaesthetists might enable change:

`*I think if we could put the workforce back in to do some of the simpler things … we could actually start to speed things up again.*'

### 3.3.7 Lessons from the US

One major perceived barrier to the introduction of non-physician anaesthetists, and especially to calling these new staff 'nurse anaesthetists,' comes from UK professional understanding of anaesthesia in the US. Several interviewees and policy statements state that they wished to avoid the professional conflicts between anesthesiologists, Certified Registered Nurse Anesthetists (CRNA)s and more recently Anesthesiology Assistants (AAs) (see section 3.2.1) and hospital management, which have troubled US anesthesia in the past thirty years. We have summarised the key issues below, illustrating how some of the problems are unique to the US healthcare system and the lessons which may be learned from that situation.

Torgersen (1994) quotes a survey carried out by St Paul Fire and Marine Insurance (in conjunction with the AANA and the Council on Public interest in Anesthesia) which states that

*`CRNA / physician relationships (the majority of which are CRNA/anesthesiology relationships) were a leading source of workplace stress and dissatisfaction among CRNAs ….The climate is competition not collaboration.'*

The existing professional conflict in the US between non-physician and physician anesthetists has been cited as a consideration in introducing non-physician anesthetists in the UK (Reilly 1996) and is still perceived as a pitfall to be avoided (AAGBI policy statement). While the inter-professional conflict is not universal in US hospitals and is also seen in other specialties in the US (for instance, obstetrics) there exists sufficient tension for the organisations representing the professional groups to devote a significant amount of energy and resources into promoting their specialty's particular viewpoint.

There are several reasons why the situation in the US is unlikely to be replicated in the UK, but there are relevant lessons to be learned from their problems.

### *Differences between the US situation and the UK*

There are three main reasons why the UK is likely to be different from the US.

**History** Nurse anesthesia developed early in the US. Religious sisters working in the pioneering church hospitals took on the role of nurse `sister' anesthetists. In time, this was taken on by lay professional nurses. Only since the health care reforms of the 1960s have anesthesiologist numbers have grown sufficiently for physicians to claim the specialty for their own. Since the 1980s, the numbers of anesthesiologists have equalled and then exceeded the number of CRNAs practicing in the US (Abenstein and Warner 1996).

(For UK history and current practices see sections 1.5.1 and 3.2.2)

**Finance and the hospital system** There are four main types of healthcare provision in the US: Veteran's Health Care Administration; Health Maintenance Organisations; private institutions; and public hospitals.

In 1965, President Lyndon B Johnson introduced the Medicare/Medicaid billing system, which is divided into two parts. Part A for hospital services, bed costs, heating, theatre overheads, etc, and Part B for physician costs. Hospitals are eager to keep their part of the bill as low as possible and thus appear financially competitive with neighbouring hospitals. Hospitals often do not directly employ their physician staff, but merely contract out the work to group practices. In anesthesiology, these practices commonly employ CRNAs as part of an Anesthesia Care Team (ACT). Much of the conflict between the professional groups seems to stem from changes in the past fifteen years to the billing regulations. Up to the late 1980s, it was lucrative for anesthesiologists to employ CRNAs to work alongside them in their group practice. The Medicare/Medicaid system gradually cut the amount paid to the anesthesiologist for the supervision of CRNAs until it was at a 1:1 ratio. (Cromwell 1999) This, in turn, made it less appealing for anesthesiologists to supervise. They had to deal with all the administrative problems of employing staff, arranging payroll and the supervision of CRNAs at work, but felt they were no longer gaining the financial rewards. As a result, some group practices made CRNAs redundant, leaving reluctant

hospitals to employ the CRNAs. In some cases anesthesiolgists decided to work solo. (For UK system see Background 1.5.1)

**Professional** The professional organisations representing both groups, American Society of Anesthesiologists (ASA) and American Association of Nurse Anesthetists (AANA), respectively, are politically active and highly motivated. They engage in large-scale public relations campaigns. They both lobby the Federal and State legislatures to campaign for their particular cause. The Bettin (1999) article illustrates the ability of both organisations to run lobbying and public relations campaigns over a sustained period.

As well as the professional conflict between CRNAs and anesthesiologists, the relationship between CRNA and AA is not ideal. Anesthesiologists created the AA role with the intention of developing a dedicated assistant. The introduction and promotion of this third role within the anesthesia team has created an additional aspect to the conflict. The tension now not only exists between medically and non-medically trained personnel, but between non-medical staff as well. AAs are promoted by ASA as their assistant of choice. AAs are not licensed to practise independently and cannot bill separately for their services. The AANA is actively opposing moves to extend the practice of AAs. For instance, in June 2003 the AANA took out a full-page advertisement in the Department of Defense newspaper for military personnel and families in Europe, `*Stars and Stripes*.'. The advert urged against the introduction of AAs to military hospitals on the grounds that they were less well trained and ultimately posed a risk to patient safety.

Currently, AAs are only allowed to practice in eight states, but the ASA is campaigning to acquire with a view to equalising practice rights for AAs with those of CRNAs (but crucially not to permit independent practice.) In States where they are permitted to practise, AAs and CRNAs work alongside each other, usually on identical contracts.

**Other relevant factors**

*Handling of evidence* The handling of evidence about provider safety in the US appears to have considerable influence on the inter-professional conflict. Methodologically limited studies on provider safety are published despite their shortcomings because of the paucity of evidence (Abenstein and Warner 1996, Miller 1996). Studies not specifically on this topic are referenced to illustrate differences in effectiveness between physician and non-physician anaesthesia. (Silber 1992, Silber 2002). Many studies refer back to much older studies (Becholdt 1980, Beecher and Todd 1954, Forrest 1981)

A commonly quoted article which typifies the conflict between the professional groups in the US is Abenstein and Warner's 1996 article in *Anaesthesia and Analgesia*, `Anesthesia providers, patient outcomes and costs.' This article is based on a report for the Minnesota Department of Health. This article, and the reaction to it, typifies some of the attitudes and opinions entrenched in the hospital system in the USA.

*Independent practice* CRNAs' ability to compete for work in anesthesia with the anesthesiologists is at the root of the professional conflict in the US. In the absence of evidence on safety, effectiveness and cost-effectiveness, it is impossible to draw a distinction between antipathy towards to CRNAs from the specialty of anaesthesiology (or towards AAs from CRNAs) because of a fear of inadequate training and abilities or the fear of the threat to their livelihoods from a competitor in the market. Until high quality evidence exists on provider safety it would be difficult to determine whether independent practice of CRNAs is to be avoided.

Surgeons, once broadly supportive of CRNAs, are now committed to reducing influence of scope of practice bills for increasing non-physician autonomy. This applies not only to CRNAs, but all non-physician practitioner groups. (Bacon 2002)

*Lack of anesthesiologist involvement in training of CRNAs* Anesthesiologists opted out of involvement in CRNA training in the late 1970s. Before that point, CRNAs and trainee doctors had undertaken some of their training together and anesthesiologists had been involved in the development of training programmes and the regulation of standards. When numbers of trainee doctors grew dramatically in the 1970s, CRNAs' places in medical schools were handed over to doctors. (Gunn 1996) At the same time, the role of AA was being developed as a technical assistant to the anesthesiologist. Anesthesiologists are now involved in the development of training programmes for AAs.

This break with the medical profession in training development (anesthesiologists are involved in the practical training of both groups) has led to criticism of the quality of CRNA training programmes by the medical profession. CRNA training has undergone a series of reforms as a result with 19 schools closing and being replaced with new ones (Cromwell 1999). Training for CRNAs is now at Masters level, in part, to counter criticism levelled at the training by the medical establishment.

*Professionalism* The professional organisations representing CRNAs and anesthesiologists have assisted in creating strong professional identities for their members. Both organisations have highly regarded journals, excellent web pages filled with news, professional information, education and training information and are involved in organising continued professional development for their members.

Despite a high level of tension nationally between these professional groups, the majority of individuals work together in an effective and professional manner. This is necessary to allow job satisfaction and safe and effective care for the patient. This should be encouraged in the UK.

### 3.3.8 Comment on barriers and enablers

The interview opinion mapping did not aim to produce a representative sample of views but the broadest range of views possible. Some factors can be both barriers and enablers. It is worth mentioning that we would urge readers to

consider the subjective nature of interview and case study comments and to not take any one comment out of context, but rather to consider the whole report.

The NHS Modernisation Board Annual report 2003 outlines the aim of modernisation: `*The NHS Plan sets out a vision of a patient-centred service designed around the needs and aspirations of patients. It describes an NHS which offers patients real choice and involvement and gives them fast and convenient access to high quality health and social care services.'* Department of Health (2003)

These two goals of improving access and maintaining quality might ultimately conflict. One interviewee suggested that the decision facing anaesthesia is whether they can see the creation of the non-physician anaesthetist role as a trade off:

`*An anxiety … expressed as a fear of diluting the quality of care. One way of looking at that is – if there are so few of us, could a few patients get very high quality care but have to wait ages for it? Would it perhaps be better to dilute that care down slightly and have everybody access it quicker? People who really need physician anaesthetists get them and the more simple cases, not get them as long as there is supervision available. It's learning to look at the whole population rather than the patient you are treating at the time*.' Interviewee 16.

***Cross professional opinion***

A range of opinions on non-physician anaesthetists was expressed by all professional groups and was not confined by professional boundaries, position within that profession or involvement in extending non-physician roles. Those involved as stakeholder leaders were more in favour of non-physician anaesthetists, but still held concerns about the manner of the development of the role. Four members of the expert group were interviewed as stakeholder leaders, the remaining being nominees of their organisation. Opinion among those involved in innovations in peri-operative care was divided between the enthusiastically in favour and the vociferously against. However, there was no consensus among medically qualified interviewees either for or against the introduction of non-physician anaesthetists. Similarly, nurses, ODPs and managers expressed a wide range of views. It was impossible to predict an individual's response by their professional background.

Some of those involved (medical and non-medical) in extending roles for non-physicians were opposed to the non-physician anaesthesia practice in the UK on the grounds of safety, quality and professional interest.

Common to all groups was a sense of caution in relation to the potential introduction of this role. Reservation centred on several factors. Firstly, on the motivation behind the move to create this role. Political drive and the on-going modernisation of the NHS were perceived as poor motivations for such a major upheaval. In some cases, individuals' perceptions of the motivations for change were expressed as a fatalistic attitude: ¬*It's going to happen anyway.*'

Concerns were expressed by all groups about the manner of implementation. All interviewees were aware of the particular sensitivities, such as professional protectionism and the complexities of theatre organisation and management, surrounding this issue and realised that if handled incorrectly the implementation process could jeopardise the entire project. In connection with this, the necessity for organisational change to enable the implementation concerned some interviewees. Some felt that a culture shift within operating theatres would be necessary and this change would not come easily or quickly.

The interviews revealed a lack of a clear understanding of how non-physician anaesthetists function in Europe and America. Some interviewees, particularly those who had experience of working abroad had detailed knowledge, but very few of those who had not worked outside Britain had a clear idea of models of non-physician anaesthetist care.

***Perceptions of organisational opinion***

Interviews indicated that many perceived that the medical professional organisations could be a potential barrier to the creation of non-physician anaesthesia. This perception is not borne out by the current policy statements. Both the RCA and the AAGBI are open to investigating the potential of non-physician roles within a framework of pilot studies. Both organisations highlighted the current staffing situation in UK anaesthesia and the resulting need to be creative about ways of dealing with this situation. Both medical and non-medical organisations expressed the need for caution in developing a non-physician anaesthetist role. This caution related to aspects of selection, development of training programme and the remit of the role itself. Several organisations (the MoD and the Royal College of Surgeons of England) were happy to follow the lead of the RCA in all matters relating to non-physician anaesthesia.

The medical anaesthetic organisations' policy statements illustrate a significant shift in opinion since the last major study on this topic (Reilly et al 1996). At that time, the AAGBI (1996) was absolutely opposed to the introduction of non-physician anaesthetists in the UK on the grounds of safety and quality. Reilly et al (1996) also found little support for non-physician anaesthesia among front line clinical staff. Those who had expressed interest in the idea were either mistaken about the definitions of non-physician anaesthesia (Reilly et al 1996 found that it was commonly perceived to be an assistant role) or were few and far between.

While this research has been taking place, the NWWA pilot sites have been developed. The pilot sites have brought together a Stakeholder Board comprising representatives of the professional groups in anaesthesia to act as a central decision making forum for New Ways of Working in Anaesthesia. The creation of these pilots and the formation of the Stakeholder Board could be considered to have had an influence on policy statements of the organisations involved. They are all already pro-actively involved in developing new ways of working and their policies reflect that openness to change. In this respect our subject of study has changed during the course of the project.

Crucially, all interviewees felt that the non-physician anaesthetist role would not be implemented without the support of the RCA and AAGBI.

***Professional identities***

No one particular professional group excluded another group from consideration for this role, but preferences were evident in the interviews. During the interviews it was possible to gain an idea of the preferences each professional group had for candidates for this role. In looking at existing professional groups, medical anaesthetists mentioned ODPs as a good model to develop without ever excluding nurses. Nurses talked about how their profession could develop into a non-physician anaesthetist role, citing the US and European models which have nursing qualifications as a prerequisite. ODPs also mentioned the suitability of their profession to develop. One individual was concerned that because the title of 'nurse anaesthetist' was used in US and Europe and many of the staff are obliged to have nursing qualifications as a prerequisite, that the UK non-physician anaesthetist role might be claimed exclusively by nurses and was eager that this be avoided.

Many of the nurses, ODPs and managers commented that there would be significant consultant resistance to non-physician anaesthetists practising and interviewee 13 queried whether this would be on the grounds of `evidence or prejudice.'. It can be deduced that a perception exists among nurses, ODPs and managers that some anaesthetists will resist any change to practice.

***Reservations***

All professional groups expressed reservations about implementation and training for non-physician anaesthetists. Nurse and ODPs, though not exclusively, were particularly keen to emphasise their concerns over creating a role without a future. Some perceived that there was a real danger that a non-physician anaesthetist role would be created in isolation, without thought for its relationship to other roles and outside the career structure of theatres. Several also mentioned concerns over creating too limited a role, which would lead to undemanding repetition and boredom.

***Potential effect on existing staff***

Concerns were expressed that the creation of another specialist role may drain experienced staff away from areas where shortages already exist. Of particular concern was any movement of staff from ICU, where nurse shortages are acute. Interviewees also mentioned the possibility of creating of a shortage of training opportunities for junior doctors and other theatre staff.

The potentially most problematic issue raised was that of a necessary change in the way theatre operating lists are put together to accommodate the matching of anaesthetic skills to patient need. This would entail anaesthetic departments taking sole or majority control of the creation of these lists away from surgical departments. As a result, surgeons would have to be more flexible in their working patterns and locations to accommodate the use of non-physician anaesthetists. This change has a potential knock-on effect on the provision of

surgical services beyond the operating theatres. Should surgeons give up control of the operating lists, the change in practice has the potential to affect out-patient clinics, ward rounds and administrative time.

### *Resistance factors*

The boredom of everyday anaesthetic work was expressed by several interviewees. This is a phenomena rarely mentioned beyond the specialty. Vickers (1995) does mention that some aspects of the work of anaesthetists are insufficiently challenging. Several interviewees felt that monitoring uneventful anaesthesia was not a productive use of highly trained anaesthetists time. This view was also expressed by some of the case study participants. The frustration of working in the confines of theatres without access to email or telephones or the ability to get a snack or go to the toilet while monitoring stable patients were also expressed. At least one interviewee, however, noted how much they enjoyed their work and did not relish the prospect of supervising others.

Interviewees and case study participants mentioned the debate over whether supervising other staff is a stress-reducing or stress-increasing activity. While some cited the ability to do `other things' while supervising, others felt that the additional mental and administrative pressure would make their working life more difficult.

Cynicism and change fatigue are important factors which will have to be overcome by any role development. Cynicism particularly centred on some of the drivers for change (ie, the Modernisation Agency), costs and the drive to reduce waiting lists. Expression of cynicism and change fatigue were not limited to those opposed to the creation of non-physician anaesthetists in the UK.

### *Perceptions of non-physician anaesthetist role*

At least two interviewees commented that they felt a non-physician anaesthetist role was enabled by the work done by ICU nurses. They care for unstable patients while supervised by consultants. However, ICU does differ from anaesthesia in that there is no surgical intervention taking place and the ICU patients in the care of nurses are often quite physiologically stable.

Interviewees did discuss their concerns about patient perceptions and the issues surrounding patient choice in anaesthesia.

### *Why do people comment on US situation?*

Several interviewees and policy statements stated a desire to avoid the conflict found in the US. The conflict in the US is based on professional protectionism in terms of practice and finance. The situation has been exacerbated by Medicare/Medicaid payment methods (Cromwell 1999). In recent years, hospital management, AAs and surgeons have been drawn into the conflict between CRNAs and anesthesiologists. The private healthcare market in the UK is currently relatively small and it is unlikely that non-physicians and physicians will be competing for business in this area. Interviewee perceptions, generally, either do not foresee or do not favour the development of an independent practitioner

in anaesthesia in the immediate future. Since neither the financial nor practice setting resemble the US, the aspects of the conflict are unlikely to be replicated. However, it is important to learn from US mistakes. The development of respectful working relationships at front-line and organisation level is vital.

### *Comment case studies*

While we made four case study site visits we did investigate 13 sites in total. Since there was no non-physician anaesthesia taking place in the UK at the time of the study we made visits to sites whose work in extending non-physician roles or developing training programmes might inform our work.

The projects we did visit demonstrated a pattern linked to their success:

**Individual talents** Each of the studies illustrated the importance of individual personality types in developing innovation.

**Communicators** The leaders and originators of the innovation displayed the ability to communicate their aims and goals clearly, verbally and in writing. This ability was vital in gaining the acceptance and trust of colleagues and patients.

**Motivators** These innovators were able to enthuse their colleagues and peers and to motivate all members of the team to become involved and have ownership of the projects. Their enthusiasm for their work and its potential to change working lives and patient care was tangible at all the sites. The teams did not stop at gaining the support of those directly involved but made successful attempts to gain wider involvement of clinical teams. This enabled consensus and support, both practical and moral, within their trusts.

**Team constructors** The sites visited had constructed project teams with wide experiences, different and divergent talents and a broad range of personal skills. What all members of all the teams had in common was their ability to communicate their goals clearly and with enthusiasm and considerable experience in a clinical setting. Many had worked in the same hospital for many years. The construction of these teams was no accident. Each of the sites had carefully considered the types of people and particular skills which would be necessary to fulfil each role within the team.

**Natural Managers** The teams at CS1, CS2 and CS3 had taken some time to consider the management of the change they were instigating. They followed well-documented change management methodologies, but those who were questioned about this had not undertaken study of change management. Their personal skills, combined with a considerable knowledge of their specialties and workplaces, meant that they were able to bring about change and deal with difficulties effectively.

**Planners** The teams from CS1 and CS3 had taken great care to plan the implementation and development of their innovation. This planning involved written proposals, discussion with colleagues, involvement of external organisations including the MA, CWP, NHSU and the National Operating Theatre and Pre-operative Assessment Programme, as well as national professional organisations such as the RCA and AAGBI.

### *Motivating Factors*

The factors which motivated CS1, CS2 and CS3 to bring about their innovations were generally the same, but with a different emphasis at each site.

**Patient care** Interviewee at CS1 stated '*doing it for the patient, there is no other real reason to do it'*

**Staff development** CS2 were particularly keen to develop their role as they felt it would provide increased job satisfaction for their staff, improve their skill base and increase retention of staff. Similarly, CS1 and CS3 were keen to use existing skills and develop new competencies in valued staff.

**Working lives** CS1 highlighted the issue of improved working lives. An interviewee mentioned that the PEP role enabled staff to not only treat more patients, more efficiently, but also enabled the trust to reduce the amount of 'out-of-hours' working. This reduction in night time call outs had a positive effect on the working lives of doctors in theatres.

**Service delivery and training** All sites were concerned about developing improved levels of service delivery in terms of patients and training of junior doctors. This was particularly highlighted by CS3. The provision of epidural services has a knock-on effect on the provision of training junior doctors. CS1 and CS2 were eager to improve their ability to treat patients efficiently and effectively.

**Sites not visited** The sites which we investigated but did not visit illustrated several points:

- Theatres remain a conservative environment. Those wishing to instigate development struggled to gain acceptance.
- The influence of AAGBI guidelines cannot be underestimated.
- Willingness and enthusiasm are not enough. Any developments must have support of colleagues and governing bodies.

### *Keys to future non-physician pilots*

The case studies were extremely useful in enabling understanding of the factors which might be important in the development of non-physician anaesthesia. While none of these cases were implementing non-physician anaesthesia, their process of development, training, problem solving and management could provide key lessons for the future.

Paramount to the success of these innovations was the personal skills of those involved. All had excellent communication skills, and management ability, are respected in their workplace and the wider health community and were able to enthuse those around them. The personal skills of the teams enabled them to develop a consensus of support within their workplace. While not always unanimous (CS3), there was no resistance from colleagues which prevented the extended role from taking place. Well constructed and well led teams were central to the development of extended roles at the case study sites. Each member of the team was selected for their abilities. All team members were

clear about what their role entailed and their place in the team. Mutual trust and respect were keys to the efficient functioning of the teams as this facilitated open and frank discussion on clinical, organisation and training issues. CS1, CS2 and CS3 had not been without their set backs in terms of creating consensus, obtaining funding and developing training, but all exhibited a 'have a go' attitude. This enabled them to continue to develop consensus, seek out new sources of funding and modify and adapt training to gain the required outcomes. This positive attitude was in part borne out of the belief that the extended roles had the potential to bring about real improvements in working lives, training and development, recruitment and retention and patient care.

## *3.4 Skills and competencies*

### Summary of Key points

- It is difficult to judge the required skills and competencies for a non-physician anaesthetist role when the scope of that role is currently ill defined.
- There exists a wide variation in perceptions of what a non-physician anaesthetist role should or might encompass. However, it was generally felt that this would be a role requiring practical skills.
- While opinions sought, saw the necessity of theoretical training in the basic principles of anaesthesia, it was generally felt that the emphasis for the training programme should lie in practical experience.
- Using European and American models as an example, theoretical training should be no more than 50 per cent of the training programme.
- Modular training was regarded as a possible means to enable the training of individuals with differing levels of knowledge and experience and to enable specialisation within the training. European training programmes (see Appendix 17) provide an example.
- If based on European and US models, the training programme would be in the range of two years for candidates from existing clinical roles and up to five years for a graduate with no previous clinical experience or knowledge.
- In selecting candidates for the non-physician anaesthetist role, clinical experience should be valued alongside academic achievement. It was felt by some that too much emphasis on academic achievement in selection or training could deter potentially excellent candidates for the role and disenfranchise existing theatre staff who might like to develop their career potential.
- Competency based assessments should be carried out throughout training. These competencies should be not only practical skills but also personal abilities and the ability to `think critically.'
- Training programmes should be hospital based with input from an academic institution.

- The training should be determined following the creation of a clear definition of the role and its boundaries and the setting of desired outcome measures.
- Both interviews and policy statements express the opinion that the Royal College of Anaesthetists should be the guiding organisation in the creation of the training programme. The training should be developed utilising a multi-disciplinary team.

## Introduction

Interviewees were asked for their views on the skills and competencies required of any future non-physician anaesthetists in the UK and how a training programme might be constructed. Opinions and examples were also taken from case study visits and from published material.

This section, however, does not aim to offer a definitive plan for a training programme, but instead hopes to represent the views prevalent among stakeholder professions, front line staff and those involved in innovation in peri-operative care.

Full text policy statements are in Appendix 5.

Full text case studies are in Appendices 6 and 7.

## 3.4.1 Definition of non-physician anaesthetist role

### *Scope of non-physician anaesthetists*

Variations in perceptions on the level of academic achievements and abilities required for the role hinges on the individual's perceptions about the potential autonomy and the breadth of the role's remit.

Interviewee 14:

*`I think it's all guess work at the moment and you could ask any number of people and they would all have different picture in their head … The whole thing is still in peoples' heads and people have any number of thoughts about where this person might sit … in the pecking order of anaesthesia as well.'*

Many of those interviewed did not have a completely clear view of what the role might entail. Those perceptions varied greatly from a comparison to a nurse consultant role with a high level of autonomy to heavily supervised anaesthetic assistant role.

### *Tasks*

Also in doubt was what might be expected of non-physician anaesthetists in the UK. Interviewee 2 stated:

*`I don't know what they are going to do. I think that it could vary considerably. If you are talking about someone who is going to be assisting an anaesthetist, that's probably going to be very different ... from someone who works in day case.'*

#### *Why define the role?*

Some interviewees felt that it would be best to go ahead and define the role once it was up and running:

`*if you wait for the role to be defined before you start, who's going to define it? Anaesthetists who know what they want? Nurses and ODPs who know what they want to do on their agenda? The outcome of some sort of political negotiations which mightn't be what the organisation needs or wants?*' Interviewee 6.

To do this, the interviewee stated that the personal qualities of the candidates would be of utmost importance as they would have to have the status to try and potentially fail:

`*so with relatively few people to start with you suck it and see and see how far you can go and don't lock yourself in with detail … if at any point this looks like a muddle we're going to stop, tear it up and start again … and … get out without anybody losing face*'

### 3.4.2 Knowledge, skills, attitude and judgement

#### *Flying analogy*

General anaesthesia is often likened to flying an aircraft. Take-off is likened to induction of and landing to emergence from anaesthesia. In aviation, these are the most difficult and dangerous parts of flight. Interviewees referred to this analogy making several points.

`*Most anaesthetics are like a flight, it's take-off and landing that are tricky … most places (in Europe) would have a consultant there ... when the patient is waking up and at the beginning … but for the middle bit I don't see why you can't train somebody specifically to look after ... the patient*.' Interviewee 12.

Interviewee 20 extended the analogy to highlight the importance of preparation and monitoring:

`*What happens on the ground and before take-off is very, very important, but in the end, the time when pilots make an error that results in a crash is when they are actually in the air*.

#### *Knowledge*

Theoretical knowledge in European training ranges between 20 and 50% of training. Most training is practical instruction in the clinical setting.

Several interviewees commented that the skills base and training must be derived from the desired outcomes of competency and safety.

`*you would need them (non-physician anaesthetists) to be competent and safe and have the knowledge and skills to deliver that role … anatomy and physiology ... pharmacology and all the drugs side and the whole thing about patient assessment and monitoring'* Interviewee 9.

Other outcomes such as improved patient care and unified care pathways were considered.

When interviewee 4 realised that the non-physician anaesthetist role might include prescribing their opinion on the need for pharmacology training within an academic background altered:

`*Nurses, more and more have to be trained to degree level and they don't prescribe so you could argue that if you are actually going to give them greater "powers" … they are going to have to have some kind of pharmacology background.*'

***Judgement***

Interviewee 4 raised the issue of science graduates without clinical experience being accepted on training programmes as mentioned in the RCA /CWP report (RCA et al 2002b). He commented that they would need to have or obtain a level of understanding about general clinical care and the patient experience:

`*It's fine, you can bring somebody who has got the technical science background, but I think what's more important is an understanding of what anaesthesia is all about in terms of practical aspects of its delivery … and coupled with that, most importantly ... is the ability to understand the care needs of the patient undergoing anaesthesia.'*

This interviewee introduced the idea that non-physician anaesthetists would have to have a certain level of self-knowledge and be able to make judgements about their own actions:

`*People talk very much about tasks for competency, things like intravenous access, airway management, circulatory support, but ... I think that it is assumed, or maybe not thought about whether or not tasks have to be related to insight into themselves in terms of strengths and weaknesses and also problem solving, decision making, ability to be firm, use of language.'* Interviewee 14.

Biddle (1994) argues that CRNAs need to foster the development of critical thinking. He asserts that the CRNA training programme should also be an education in how to think. He describes his aspirations as:

`*Institutions of higher learning should have provided each of us with a broad knowledge base and the capacity to be critical, honest, sceptical, open-minded and humane in our professional and personal encounters.'*

Biddle feels that this ability is crucial to anaesthesia because of the nature of the questions posed in anaesthesia practice. Problems posed are rarely simple and rarely have a definitive answer. Anaesthesia, requires the ability to decide which of the possible "right" answers is objectively superior.

***Skills***

Interviewees felt strongly that this was a practical job and would require practical training in the following areas:

**Technical Ability** `*you need to be fairly well read on the equipment … and … able to fix that fairly quickly*' Interviewee 21.

**Manual Dexterity** One participant illustrated the need for manual skills with examples from theatre work:

`*This type of work, it's about hand eye co-ordination … Manual dexterity is very important because you could have somebody who is extremely academic and knows it backwards, but when it comes to actually some of the technical aspects, like intubating someone or placing cannulas and so on, is that unless they have the technical ability to do that, they will be fairly hopeless*. Interviewee 4.

One suggestion for the selection process involved `manual dexterity checks' as were once common place on entry to dental school (Interviewee 13).

Interviewee 16 mentioned:

`*simulator training would be wonderful in anticipating disaster or how you manage sudden disasters'*

**Competency based** Very strong opinions were expressed in favour of competency based training from all groups.

`*Really, it's not about the education and skills, but about competencies that are needed for the job they are undertaking … we need to think about what job, what tasks these people are undertaking and therefore what they are going to need to have to do the job.*' Interviewee 1.

`*it is much more important that we produce people who can do what is expected of them ….training people on the job in a situation whereby you … give them the requisite skills which you test against competencies'*

Competencies are not merely technical abilities but also include personal skills:

`*The competency to be able to deal with a difficult surgeon who won't do what you ask them to do.*' Interviewee 20.

The case study sites visited utilised competency based training to develop extended roles in anaesthesia. All the case studies illustrate how competency based training can be an effective tool in development of a role. Developing practical skills in the workplace and having these assessed at regular intervals enabled staff to gain skills and practical experience. The CS1 and CS3 case studies also illustrated how developing skills in the workplace also gave opportunity to develop other competencies including the ability to deal with detractors, patient management skills and decision making skills. (see Appendix 7).

***Attitude***

Two interviewees succinctly summed up the comments of many others in stating the required personal qualities:

`*self assured, confident but not overly, somebody who has good practical skills and a lot of common sense … calm in a crisis … good communicator. These are*

*the qualities that make a good theatre practitioner and therefore would make a good anaesthetic practitioner'* Interviewee 21.

`*In terms of their sorts of attitudes, you need people who get on with people – people with good interpersonal skills, people with commitment – (all the normal sort of) reliability and conscientiousness,"* Interviewee 13.

### 3.4.3 Desired personal qualities for candidates

Interviewees were asked what personal qualities they would look for in the first group of potential non-physician anaesthetists.

#### *Communication*

Communication skills were considered vital by many of the interviewees.

Communication with patients:

`*they could be talking to people who might be very vulnerable, very frightened, who are about to be anaesthetised'* Interviewee 2.

#### *Change instigators*

Since this group would be the first in a new and controversial role, some thought they would have to have particular skills as change instigators:

`*The (is) first group of people (non-physician anaesthetists) … are probably going to get questioned by lots of people, not just patients, but colleagues ….to be able to explain their new role … they are going to have to be able to bridge that gap*." Interviewee 2.

`*They're going to have to do a lot of convincing colleagues. This would be a very new role so for them to be accepted they're going to have to sort of fit in and work with the old style workforce… they're going to have to be quite brave hearted.'* Interviewee 9.

The fact the first group of non-physician anaesthetists would be breaking new ground led several people to comment on the personal skills required in this situation. Interviewee 9 stated:

`*you need clinical champions and someone who is prepared to go first and say well we will pilot it … get people involved'*

`*I think that they're going to have to be able to … realistically deal with change ... I think that they are going to have to be quite tangible characters and be able to function under a large degree of stress*.' Interviewee 5.

The delicate political and professional situation that will be encountered by this potential new breed for professional was considered by interviewee7:

`*there has to be a kind of political … and emotional intelligence*'

`*you have to have the interpersonal skills to manage that fairly, potentially `conflictual,' sort of relationship*"

***Leadership***

Several commented that since this role would be a new one, leadership and innovation skills would be vital:

`*somebody who can really challenge the status quo and empower others, move ... push boundaries. It's all marked up in kind of leadership, competence … leadership styles. I think that's what we'd be looking for in these people. They are not going to be quiet little mousy folk that just kind of go "yes doctor, no doctor*"' Interviewee 7.

The idea that the first group of non-physician anaesthetists would face challenges of all kinds was common among interviews:

`*someone who's outgoing, somebody who is assertive, who is able to stand their corner when facing say for instance a surgeon or another anaesthetic colleague*' Interviewee 14.

***Commitment***

Interviewees commented that individuals entering this role must be committed to continuing professional development. Interviewee 2 commented:

`*there needs to be some evidence that they haven't just qualified, but that they have actually gone on to develop their own training or helped train others. This might sound trite, but some don't. Not everybody does that'*

Interviewee 16 stated that they would like to see evidence of some history of being proactively involved in developments in care:

`Perhaps innovated something on the ward, even something quite small to prove that they've got the impetus to self start and do something … People who self start – there was somebody who self started intravenous administration of anti-emetics on one ward and had a training package for it, and then spread it to other wards. Someone like that has the spark of innovation to get on with something.'

***Enthusiasm***

Using an example from one of the trainees at the case study sites, interviewee 16 highlighted that an eagerness to undertake the role was vital:

`*an attitude that (she) wants to do it and that (she) wants to learn*'

***Anaesthetic experience***

Interviewee 20 contrasts what he viewed as two types of anaesthetists in an attempt to describe the talents which he would look for in a non-physician anaesthetists:

`*there tend to be two different sorts of anaesthetists: the very, very pernickety and thinks about 555 things that may go wrong. Have long list of them, check them all out, very thorough and gets good results ….on the other side, you have*

*an individual who is actually very responsive and able to spot problems coming and act accordingly'*

The interviewee favoured the latter type which he describes as a `do-er.'. In thinking about who he would recruit he commented:

`*I would take people out of a theatre environment because I think once you are in that environment it starts to become obvious whether you are a do-er, and I think we want do-ers.'*

This interviewee continued to support his feeling that non-physician anaesthetists must have experience in a clinical environment as their personal characters would have already been proved:

`*I would … select people who have been successful in what is a quite stressful life in theatres or intensive care … where they have proper habits, which help prevent danger, but when danger occurs, they are able to think straight.'*

One interviewee (18) commented that a certain type of person chooses to be an anaesthetist and she would look for a similar type of person for the non-physician anaesthetist role. She summarises, what she regarded as the qualities possessed by a good anaesthetist:

`*They seem to be a certain breed on their own'*

`*They can just be on a level with them (the patients)'*

`*They communicate with the patient'*

`*Communicates through the patients to colleagues'*

An often made comment was that candidates for the role must have the ability to realise when they require assistance:

`*if you're not experienced you tend to lack clinical confidence and if you're not experienced and you don't lack confidence you've got a problem, or your organisation has'* Interviewee 7.

***Undesirable attributes***

At least one interviewee mentioned that it would be necessary to avoid recruiting people who wanted to be `mini-doctors' and that this should be done at the interview stage.

Another interviewee stated:

`*(a) postgraduate qualification is ridiculously over-qualified. These people should go away and do medicine if that is what they want to do'* Interviewee 20.

A fear was expressed that those wanting to go into this role might be doing so in ignorance of the potential pitfalls in anaesthesia:

`*I am concerned that people who might want to go the extra (non-physician anaesthetist role) – don't actually understand the implications of what they are actually about to do*.'

`*My concern is that people are going to go there, some of them, I'm not saying all of them, some of them are going to prove themselves and put themselves and ultimately their patients at risk.*' Interviewee 10.

Some commented on the need for a rigorous screening process as part of selection. Several interviewees commented on generally undesirable types who may apply for this kind of role, without being specific to any particular problem:

`*There is probably a lot of people out there who technically can do it, but whether they are the right people to do it is another* matter.' Interviewee 1.

Similarly,

`*I think you have got to be so careful about who you get to do it and, on a cynical level, the people that are most keen are often the least suitable.*' Interviewee 4.

No-one specifically excluded any particular professional group from being considered as candidates for the role. Interviewee 16 commented that since it was likely that any training was likely to be assessed on a competency base then:

`*if they can't do it, they won't be competent and then you won't be able to pass the exam. If you can do it, you can'*

All nurses interviewed and several others mentioned that while some felt that to take people `off the street' that is, individuals without previous clinical qualifications or experience, would be an option, and an extended training programme would be necessary.

### 3.4.4 How should the training be determined?

There was a strong feeling from both interviews and case studies that training programmes exist that have been proven to work and may be adapted for this role:

`*I don't know that we'd find it that difficult actually because we (anaesthetists) train our own anaesthetists and I don't know why we would find it that difficult to train Nurse Anaesthetists or Physician Anaesthetists or Critical Care practitioners.'* Interviewee 16.

CS3 has successfully re-modelled and adapted the administration of epidurals section of Obstetric Anaesthetists Association training programme for its Obstetric Anaesthetic Assistant training programme. This package was originally designed to be undertaken by postgraduate medical anaesthetic trainees. This was completed in conjunction with their own training programme.

Those who had a clear idea about the constituents of a training programme were certain that the involvement of the Royal College of Anaesthetists was essential:

`*It's got to be determined by a sort of multi disciplinary team with people like educationalists or whatever on it , but led by anaesthetists.'* Interviewee 13.

A different slant on RCA involvement was expressed by interviewee 6:

*`not trying to separate the theoretical knowledge from the practical skills which is why I think it's a good idea for place like the Royal Colleges rather than academic institutions to lead on this'*

Gunn 1998 discusses the criticism levelled at CRNA training by the ASA. Anesthesiologists are not involved in the development of CRNA training programmes. CRNA training is criticised by anesthesiologists in terms of its length and its ability to instil the breadth of knowledge needed for the job. This failing in the US must be avoided here and could be done so by involving the RCA and the AAGBI from the role's inception. Several policy statements also recommend that the Royal College of Anaesthetists be the lead for any training programme.

As well as involving the Royal College one interviewee felt that it was important to create a multidisciplinary steering group in conjunction with academic institutions to guide the development of the training programme:

`*In put...would be needed in terms of nursing, ODP practice is necessary and obviously anaesthetic practice would be important, but unless there's an educational structure to pull that together, then something would be missing.*' Interviewee 5.

This view was also expressed in policy statements from NATN, AODP, RCS and AAGBI, CWP and WDC and NPSA (see Appendix 5 ).

Several clinicians, particularly those involved in education, felt that training should take place on hospital sites, but with links to academic institutions.

Modular training was suggested by several interviewees. Interviewee 9 visualised a training programme with core modules based on the competencies based on desired outcomes.

Interviewee 16 envisaged the modular format as a means of dealing with trainees with differing levels of ability and experience:

`*Or maybe people who have worked in recovery could by-pass some of it or it could be broken into modules and if it could be proved that you could put in an intravenous cannula and support an airway, then you didn't have to do that bit ... you could accept them from varying areas: if you accept people from recovery, they've got a bit of a head start… perhaps you'd have to have two different entry points.*'

CS3 envisaged a core set of modules which would provide a basic training which could be supplemented with additional modules in `specialist' subjects. This modular training would form part of the development of a peri-operative practitioner, who could work at a entry level across the peri-operative field, but would be able to obtain specialist skills in anaesthesia, pain management, ICU, pre-operative assessment, etc.

This comment also highlights a suggestion that any future training programme would probably have to have several entry points to accommodate the candidates with varying levels of ability and experience.

One interviewee suggested that training be driven by desired outcomes:

`*you could look at the outcome you wanted and sort of work backwards from that'* Interviewee 9.

The need for the role and its training to be developed within protocols and guidelines was only mentioned by one interviewee:

`*well I think nowadays you can't manage without protocols and guidelines very easily. I think there would have to be some general guidelines – some reasonably broad protocols for it to be accepted nationwide'* Interviewee 10.

However, CS1, CS2 and CS3 had avoided creating rigid protocols for practice as part of their training programmes. An interviewee at CS1 commented that protocols `stifle intelligent thinking.'

***Academic knowledge vs experience***

The debate between the merits of academic achievement and experience was the dominant issue raised by the interviews. An element of this theme was the overwhelming impression from all but a few interviewees that clinical education had swung too far in favour of academic training and had lost the crucial link to experience in the work place. It was felt that newly qualified clinical staff fell short of the experience levels of staff qualifying in the recent past.

`*Nurses you are getting out of the system now have had less experience on the ward than say 10 years ago*.' Interviewee 10.

There was also a sense of sadness and regret that this was the case. This feeling also focused on the fact that many capable individuals were being excluded from the professions because of their lack of academic ability when it was felt that practical skills were more use in the work place. The feeling was expressed that in recent years, the health professions have over `academicised' their training at the expense of other attributes:

`I'd prefer experience ….I think one of the problems we've had in health care of late, the past decade or maybe longer, is that we tend to devalue experience and over value training.'

The drive for Master's level education for advanced nurse practitioners, though instigated by central policy makers, was felt to be borne out of a need to `formalise the profession' and to legitimise nursing roles. One interviewee felt that academic training was a `means to an end.'.

A certain level of cynicism about the role of academic institutions in health professions training was expressed.

`*What I am very, very scared of is this - ….once the universities get their teeth in it, they start making changes to the core*.' Interviewee 20.

The debate on the merits of academic education versus experience based training has two elements:

- Whether academic achievement or experience is preferable in the selection of candidates for the role of non-physician anaesthetists.

- Whether the focus of training for the role of non-physician anaesthetists should be theoretical or practically based.

***Academic vs Experience for candidates***

**Anti-academic** Many individuals interviewed expressed the opinion that previous Bachelor level academic qualifications would not be essential to this role. This opinion was supported by the following arguments:

Firstly that intelligent thinking was more important than actual achievements:

`*an ability to recognise and respond to unusual situations and to think constructively'* Interviewee 20.

Other interviewees characterised the idea of intelligent thinking as common sense:

`*Nursing and medicine, in particular,…emphasise the academic intellectual aspect of practice at the expense of things like interpersonal skills, common sense, training, experience things like that … skills that are best defined as common sense are possessed by an awful lot of people who don't necessarily have high academic level skills so it could well be that you can develop to be a person who can function well at a high clinical level, as well as a doctor, without an insistence on those academic qualifications.*' Interviewee 6.

Secondly, that this role would be

`*the development of a skill as opposed to the development of a particular intellectual approach*' (Interviewee 6) and would therefore not require an academic qualification as a starting point.

Interviewees supported the idea that experience is an important attribute in candidates. This is illustrated by interviewee 16 who commented:

`*I think considerable experience in the health service, ie, several years post qualification.'*

One interviewee gave a different perspective on the conflict between academics and experience:

`*People … maybe academically are very good, but when it comes to the practicalities of the job, they just over estimate their capabilities and I think that can be a very dangerous route to go down.*' Interviewee 21.

Representatives from all the groups stated that to place too much emphasis on academic achievement would exclude or deter able candidate:

`*I don't think an academic qualification should be part of it. In fact some of the people that I believe are capable of doing this may be put off by it*.' Interviewee 20.

**Combination of academic and experience** Many had a balanced view of the needs for academic education and experience. This interviewee valued the two equally:

`*From my own experience, from a theatre background, obviously academic abilities are important, but there are existing staff around that are educated to a relatively low academic standard, but have got so much experience, practical skills which could be developed.'* Interviewee 1.

Similarly,

`*It's having the underpinning knowledge for the role … I think it's very important that you get the appropriate balance there between the technical competence and the underpinning knowledge.*' Interviewee 4.

One interviewee felt to set rigid levels of experience, as well as academic achievement ,would have an excluding effect:

`*I think that when you start to try and set these artificial boundaries, like three years experience, you know jumping through … hoops ... it cuts out people who would otherwise have an aptitude …. Experience … it's one of those things my colleagues get hung up on ... "you can't go and work in Intensive Care straight from finishing nursing school". Well, why can't you? … I think it's the individual that has to be assessed.'* Interviewee 7.

Interviewees who had a perception that the non-physician anaesthetist role would be that of an independent practitioner were definite that entry level must be at least at degree level

This view was illustrated by interviewee 5:

`*I think we're looking at an extended practitioner and it's sitting along the ... remit of the consultant nurse .. .so ... post registration experience of three years before access, being a masters programme would be my preferred route.*

**Status of academic achievement** Others saw that a balance between academic achievement and experience was necessary for reasons of acceptance within the anaesthetic community:

`*I can see that in some ways that to give it the status that it's going to need, that you are going to have to have some professional qualifications. Or are you going to say that x years experience is equal?*'. Interviewee 2.

This issue was raised by Interviewee 14 as a driving force behind academic achievement as a basis for training:

`*some of the rationale for that (degree level entry), that I've heard, are that this would provide credibility for the role because they would need to be able to function alongside their medical colleagues'*

**Pro-academic** Some did feel strongly that an academic education would provide the `breadth' of knowledge required for a non-physician anaesthetist role:

`*Anaesthetics very often looks to be terribly easy … but if something occurs, in order to be able to deal with that you have to have a WIDE knowledge base and a DEPTH of knowledge and a lot of experience.*'

`*I don't think that experience is an important issue because if they have the foundation of knowledge, then they can be taught … a technical role.*' Interviewee 3.

International Federation of Nurse Anesthetists (IFNA) sample curriculum for Nurse Anesthetists states that minimum entry requirements should be:

1 Completion of a nursing education program of at least 36 months in length.

2 Nursing experience of at least one year preferably in an acute care setting.

The inclusion of nurse education program indicates that a degree level education must be achieved prior to acceptance on the course.

European models offer alternative entry routes. (see section3.2.3 or www.europa.eu/). The system in the Netherlands, for example, allows nurses with a degree to take a shortened course, whereas those directly from school (the equivalent of `A' level school leavers) can take a much longer course.

In the US, Certified Registered Nurse Anesthetists (CRNA see section 3.2.1) programmes require a first degree in nursing and two years acute experience. AA programmes will take graduates from any subject, though humanities graduates are rare (around one or two per intake of 25-30 students) (see Emory University web page at www.anaesthesiology.emory.edu/PA_program/statistics.html).

***Academic vs Experience for training programme***

Since many perceived this role to be a technical one, experience, common sense and manual skills would be valued above academic achievements in candidates. Training for the role should not follow and academic route, but rather be an `apprenticeship.'

Interviewee 20 commented:

`*I think what we are here talking about, are physician's assistants and so that's an apprentice role.'*

Similarly, interviewee 3 stated:

`*people can be taught a technical role, which is really what this is going to be. This is going to be a technical function'*

The American and European model of Masters level training was cited on several occasions:

`*we'd be looking at an individual that's focusing and practising at a senior level and will be involved in analysing intricate situations … in America ... the programmes are at masters level and it's the same in France*' Interviewee 5.

Another interviewee felt that:

`*if you take this (role) to its logical conclusion, what you're actually talking about is the same ideas of a Nurse Consultant role, because it is somebody who is educated to Masters level, who works autonomously, you know pushes the boundari*es' Interviewee 7.

Training to Masters level was not felt by some to be an ideal model on the grounds that it was over qualification for what is perceived to become a technical role.

`*Because the thing is, if you are going to train people to higher than a degree then, in actual fact, they should do medicine*.' Interviewee 3.

Another interviewee (21) felt that an overqualified practitioner could face `friction.'

The American model of training exists at Master's level as a minimum. CRNAs can potentially to have (depending on where they choose to work) a large degree of clinical independence. Their training programme has developed to this level to counter criticism levelled at CRNAs from anesthesiologists (Gunn 1996).

### 3.4.5 Assessment

Many of the interviewees were clear that they felt that the assessment should be competency based. However,

`*you probably shouldn't test the competency until someone has done enough of something'* Interviewee 6.

Opinion varied on the time needed to complete a training programme. Several who mentioned this point were clear that the time should not be fixed. Using the flying analogy, interviewee 20 referred to training as `flying time' and that a minimum number of flying hours should be undertaken before attempting to pass a competency test and a maximum number of hours after which tests must be passed.

`I don't think that it should be compulsory to reach a certain standard by a certain time. … I think it varies with people's confidence and attitude to risk rather than their practical skills, quite honestly.' Interviewee 16.

`*This (training) would inevitably go at a slower pace (than SHO training). It would have more paperwork and it would be more controlled … I think it might take three years to get somebody to a basic stage where they could be allowed to do everything on their own, but you might allow them to do certain things before that time. Just like we do with the SHOs.'* Interviewee 16 (For a definition of SHO see Appendix 19 and for details of their training see section 3.2.2).

Perceptions of the total time required to complete a training programme varied between `*18 months for a good candidate*' (Interviewee 20) to five years for someone training without previous training and experience (Interviewee 6).

Training time varied if trainees were to be taken from both experienced and inexperienced backgrounds:

`*we'll take them off the street, but then obviously your training programme would have to be very much longer and thorough. If you've got someone who was say a theatre nurse or an ODA, you'd obviously ... have a much shorter programme*" Interviewee 9.

All the case studies utilised training logs to monitor the progress of trainees. Details of procedures carried out and competencies gained are recorded in these. The logs are submitted to the training supervisors as part of on-going assessment. At CS3 the Specialist Obstetric Anaesthesia Assistant also kept a reflective diary of her experiences. This contained information about how each new experience affected her development in the role and provided source material for her formal assessments with her trainers.

### 3.4.6 Comment

***Skills and competencies***

As mentioned in barriers and enablers (section 3.3) a key feature of the interviews was the participants' lack of clarity about exactly what the role of non-physician anaesthetist would entail, what their scope of practice would be, and what level of autonomy they would have. Interviewees' perceptions are coloured by their opinion on what exactly the role of non-physician anaesthetist might be. Some interviewees did have an idea of what they felt the role could involve and based their comments on a fairly fixed model while others made various comments based on several suggested models. Some interviews were apparently contradictory. However, since interviewees were not given the questionnaire before hand, some interviewees developed an idea of the role as their discussed it. (Interviewees drawn from the expert group did have an opportunity to see the questionnaire).

Interviewee 14 sums this up:

*`I think it's all guess work at the moment and you could ask any number of people and they would all have different picture in their head.'*

**Policies** It was felt by non-physician organisations and NHS agencies that the RCA should lead on any project to develop a role and an accompanying training programme.

**From interviews** Also of concern was the development of the training programme. This was felt to be a potential stumbling block on two levels. First, that a poorly designed training programme would not create the skills necessary to enable safe non-physician anaesthesia. Secondly, that the programme could be `pitched too high' and would be `doomed to failure.'

While the current lack of a clearly defined role for non-physician anaesthetists sometimes made it necessary for interviewees to qualify their statements on training and recruitment, all interviewees had strong opinions on what kind of individual should be appointed to such a role, what aspects were vital to the training programme and how the training programme should be constructed. In terms of selection, necessary requirements were: personal qualities, such as communication skills; 'team players'; and the ability to deal with conflict and stressful situations.

Opinion varied widely about the level of previous experience which would be necessary for this role. Some felt several years critical care experience was a

sound starting point while others were prepared to consider the possibility of training individuals 'off the street' . However, for the first group of trainees all preferred the option of experienced staff.

For the training programme itself, many expressed concerns about increased emphasis of theoretical training away from the work place (often described as `over-academicising'). It was felt that for this role, a more competency-based and practice-based approach would be necessary to provide the practical skills core to the practice of anaesthesia. This training would be accompanied by theoretical training away from the work place, with possibly a proportion undertaken in conjunction with junior doctor training. Some interviewees did express the desire to see a MSc level training.

The concept of modular training was mentioned by several of the interviewees with the view to having a `jump on – jump off' style training with various starting points depending on the candidates existing training and experience and with an initial qualification point, but having the option to continue studying, enabling career development.

A major concern expressed about a non-physician role by non-physicians, both those opposed to the idea and those in favour, was the potential for the role, if not properly thought through, to become mundane and in effect `a dead end job'. One interviewee mentioned the experience of developing surgical assistants and how the first individuals working in this role quickly became bored with carrying out the same procedure all day everyday. This led to a reconsideration of the scope of the role.

Interviewees expressed detailed opinions about what kinds of personnel would be best suited to the non-physician anaesthetist role, the types of training required and the desired competencies for the qualified member of staff. Almost all of those interviewed felt strongly that, in general, training for non-physician staff has become `over-academicised' and the NHS has suffered as a result in terms of the practical skills and experienced possessed by newly qualified staff. Non-physician anaesthetist training, it was hoped, would have a strong focus on attaining practical competencies backed-up by a sound theoretical knowledge of the basis of anaesthesia, pharmacology, physiology and anatomy. Competencies were thought to include not just clinical skills, but personal skills such as communication skills and dealing with confrontation. Previous academic achievement was not felt to be as important a factor when looking at candidates for the non-physician anaesthetist role.

The training programme and general development of the role was felt to fall within the responsibility of the RCA.

**Case studies** *Training* CS3 utilised and adapted existing training programmes to create a tailor-made training programme. The gradual role development at CS1 has enabled them to build a training portfolio which they now hope to license for use. CS2 is in the process of formalising their training programme. All the training programmes were made up of practical and theoretical elements with a strong emphasis on obtain competencies in all areas of work including the development of personal skills (including communication with patients,

colleagues and the wider health community and dealing with difficult situations) vital to their extended role.

CS1 and CS3 combined the training for the role with that of the junior doctors. This was done for two reasons. First, to overcome potential difficulties creating a shortage of training opportunities for both parties. CS3 trainee arranged a training rota with the junior doctors in the department outlining which procedures were taking place and which of them needed to gain that experience. CS1 trainees worked along side junior doctors when developing consultation and assessment skills. Secondly, the junior doctors gained the opportunity to develop their supervisory skills and the trainee gained the benefit of experience from a colleague who 'went more at their pace' Interviewee at CS2 (see Appendix 7)..

*Supervision* All the sites visited commented on their methods of supervision and the importance allowing trainees the freedom to try out their skills. CS3 and leaders mentioned that this was a particularly vital skill. None of the sites were particularly keen on implementing strict protocols for the work of those in extended roles, but preferred to enable the staff to make their own decisions based on `intelligent thinking,' detailed understanding of their area of work and the confidence to know when to ask for assistance. Protocols were disliked because of their 'bureaucratic' nature and their tendency to 'stifle intelligent thinking'.

## *3.5. Comment*

### Expert Group

In the project protocol we proposed to set up an Expert Group made up of individuals with an interest in the topic. Our thinking was that this group could provide contacts for the case studies and opinion mapping, provide links to grey literature and quality assure the search protocol. Though not specifically mentioned in the protocol, their involvement in quality assuring the whole project was implied.

The Expert Group was comprised of leaders of professional organisations or their representatives, representatives of patient groups, policy makers and individuals with experience of studying non-physician anaesthesia. The majority of members of the expert group were contacted at the protocol stage. The few remaining were contacted and asked to participate at the start of the project in October 2002. Representatives of at least one professional group (RCN) were invited to attend, but were unable to attend any of the meetings. However, they did make contributions by email and were included in all correspondence.

The Expert Group were invited to meetings (November 2002, March 2003 and July 2003) held in Manchester. At these meetings, members were invited to make comments on the various stages of the project, from initial literature search protocols, case study and opinion mapping strategy, to first and second draft reports. In addition, the members were asked to provide assistance in

making contact with potential case study sites and interviewees for opinion mapping.

In relation to this project, the Expert Group were successful in providing links for opinion mapping and case studies. While the group was not able to provide large numbers of contacts to the case studies, the information provided did either directly or indirectly assist all of the case study investigations.

The group was able to provide contacts for interviewees for opinion mapping. Since our intention was to interview leaders of professional organisations who would also be represented on our Expert Group it is essential that we consider possible bias engendered by this relationship. Even if the professional leaders were not involved in our expert group, they would by their position have been made aware of our work.

Making personal contact with the leaders of professional groups through the Expert Group, proved useful in securing policy statements from those organisations. Organisations which were unable to attend the Expert Group meetings did not submit a statement for the project.

The group's knowledge of the field of anaesthesia was particularly valuable to the researcher. Since she had no clinical education and no experience of working in theatre environment, the group's knowledge of the clinical and non-clinical aspects of anaesthesia was valuable. The meetings of the Expert Group assisted this process by enabling face-to-face contact and the opportunity to network. This was also assisted by attending national conferences organised by some of the professional groups at the start of the project.

The expert group provided a highly valuable network of contacts within anaesthesia.

# Section 4 Recommendations for policy, practice and research

## *4.1 Implications for policy and practice*

1 We recommend that any practical developments in this field should include simultaneous, rigorous evaluation using a broad range of robust measures of clinical process and outcome, as well as indicators relating to activity, access targets and cost. Some of these measures are still in need of development (see 'recommendations for research' below). Furthermore, theatre information systems, as currently structured, may not be able to provide the sort of data required. The quality of data collection must be of the highest standard and further investment may be needed.

2 The NHS Plan (2000) states that we should improve access to services but maintain the quality of that the service:

*'The vision of this NHS Plan is to offer people fast and convenient care delivered to a consistently high standard. Services will be available when people require them, tailored to their individual needs.'* NHS Plan (2000)

While enhancing access and improving quality are both laudable aims, they can potentially conflict. High-quality services may not always be available whenever and wherever required. When an extra potential limitation is imposed by offering patient choice, in this case by allowing them to choose between a doctor and a non-physician anaesthetist, matters are complicated still further and the practical delivery of services becomes even more difficult.

This will need to be thought through.

3 The case studies illustrate that any development of non-physician roles involves a considerable amount of planning and preparation. A great deal of consideration went into team and candidate selection, design of the training packages, and obtaining the consensus of professional colleagues at local and national level. One of the case studies implemented their extended role in stages with specific aims for each stage to facilitate a gradual process of change. Any future development of the non-physician anaesthetist role in the UK should carefully consider the length of time necessary to carry out the organisational planning, development of training and selection of staff as well as the process of change management.

4 The introduction of the new role is potentially threatening to the professional status of anaesthetists, surgeons and existing non-medical theatre staff. Resistance to the introduction of non-physician anaesthetists may be manifest through concerns over risk and safety. While these concerns are justified to some extent, they also act as a 'surrogate' for unexpressed anxieties about, for instance, job security and professional status. The delicate handling of professional issues will be essential.

5 Theatres do not exist in isolation. Any change of practice in anaesthesia will have ramifications on other departments, especially theatres and surgical

services. The responsibility for making the new role 'work' is thus shared across a number of stakeholders.

6 Hospital design has a large influence on staffing needs. This is especially relevant to critical care areas. Single operating theatres away from the main critical care area (theatres/Intensive Care) are not satisfactory places for inexperienced staff to be working. Conversely, a large site of theatres would allow greater flexibility of anaesthetic staffing. Developing this theme further, great gains can be made by physically bringing together many of the areas where anaesthetists work. Hospitals that have been designed to bring theatres, delivery suite, Accident and Emergency and Intensive Care close together have benefited from this.

7 It will be important at the early stages of developing a non-physician anaesthetist that a practitioner with mental flexibility is created. The balance between theoretical knowledge/academic aptitude and practical instruction in training needs to be considered to facilitate this. Many of our interviewees felt that high academic standards would disenfranchise many competent and capable potential candidates. Though many extended non-physician roles make use of protocols and guidelines for practice, these can be seen as restrictive and may not be suited to the unpredictable nature of anaesthesia. While developing such a practitioner without protocols and guidelines for practice may be against common practice and the wishes of some anaesthetists, it is important that any future non-physician anaesthetist has the knowledge, training and ability to act as circumstances dictate. However, the implications of this need to be thought through.

8 Concerns exist about where this new practitioner will reside in terms of registration and accountability. Since it is likely that some future non-physician anaesthetists will come from both nursing and ODP backgrounds, ODP registration with the Health Professions Council will create a parity with other established health professions. Candidates who come from other backgrounds (for instance, non-clinical science graduates) would have no existing professional registration and could perhaps be registered through the same route as ODPs..

9 It will be important in designing and implementing this new role to be clear about what is meant by supervision, both in terms of physical proximity and possible ratios of physician to non-physician staff (see section 3.1.2).

## *4.2 Recommendations for research*

1 It would not be feasible to carry out a randomised controlled trial of relative safety of providers in anaesthesia using death as an outcome. Because of low rates of major adverse incidents in anaesthesia, an unrealistically large cohort would be required. Estimates from Martin Sheridan (1996) predict that a cohort of 2-5 million would be required. Other approaches might be preferable, for instance:

- Rigorously conducted case-control studies.

- Focusing specifically on anaesthesia for sicker patients (ASA physical status 3, 4 and 5; see Glossary). If patients are fit pre-operatively, their risk of major adverse events is much lower. By selecting patients with a higher baseline control event rate, the difference in providers may be more apparent. However, while this is conceptually appealing, it is unlikely that less trained practitioners would be allowed to care for more complex patients in practice. Furthermore, this study could not be conducted in the UK for a number of years if UK-trained practitioners are to be included.

- In addition, consideration should be given to establishing a national anaesthetic database. This has been attempted in some European countries and could be adapted for the UK. We recommend the funding of a smaller-scale pilot initiative as soon as possible.

2 Soliciting patients' views on the anaesthetic experience is a potentially fruitful source of evaluation data. Conceptually this has to be limited in anaesthesia as the patient is often unconscious for much of their contact with the anaesthetist. Existing methodology for obtaining patients' views and satisfaction needs to be adapted and developed to address this deficiency.

3 As we have pointed out, it is impossible to 'modernise' anaesthetic services in isolation. There is a close relationship between surgical and anaesthetic activity. Matching anaesthetic skill to surgical demand (timing, patient complexity, etc) is vital both for patient safety and efficient use of theatre and other resources. We strongly recommend an urgent review of existing methods and the development of a framework to guide this process in practice. This should be addressed as a matter of urgency as the success of any future non-physician anaesthetic practitioner is likely to be affected by this. Methods of managing surgical waiting lists and options for constructing operating lists would also benefit from formal critical scrutiny to assess current practice and offer possible alternatives.

4 We recommend methodological work into possible measures of evaluating the quality of anaesthetic care (see section 1.5.6 for fuller discussion and shortcomings of existing methods). This would be useful both to underpin the evaluation of new roles and to provide means of robust quality assessment in anaesthesia (an area of medical work where evidence based guidelines are frequently not available). In particular, some agreement on the assessment of process (instead of simply focusing on outcomes) would be helpful.

5 An accurate and sensitive economic model should be constructed which would allow the economic consequences of the introduction of non-physician anaesthetists in the UK to be modelled. Variables should include basic salary, degree of supervision, out-of-hours work, extent to which non-physician practitioners replace existing medical anaesthetic staff, etc. This would allow predictions of the costs involved to be made.

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# *Appendices*

## Appendix 1

Subject Number:

Interview No:

Consent Form

Title of project: Exploring professional boundaries in anaesthetics.

Please initial boxes below.

1 I confirm that I have read and understand the information sheet dated..... (version .....) for the above study and have had the opportunity to ask questions.

2 I understand that my participation is voluntary and that I free to withdraw at any time, without giving a reason.

3 I understand that the interview data may be looked at by regulatory authorities where it is relevant to my taking part in this research. I give permission for these individuals to have access to these.

4 I agree to take part in this study.

| | | |
|---|---|---|
| ..... | ..... | ..... |
| Name of participant | Date | Signature |
| ..... | ..... | ..... |
| Name of person taking consent (if different from researcher) | Date | Signature |
| ..... | ..... | ..... |
| Researcher | Date | Signature |

*1 copy for interviewee; 1 for researcher*

*Version 1, 17th October 2002*

# Appendix 2

Morecambe Bay Hospitals Trust

Royal Lancaster Infirmary

Ashton Road

Lancaster

LA1 4RP

**Exploring professional boundaries in anaesthetics**

**Funded by the NHS National Co-ordinating Centre Service Delivery and Organisation R&D**

**Information Sheet for Participants**

**Stakeholders**

As part of our research project into the possible advantages and disadvantages of creating non-physician anaesthetists in the United Kingdom, we wish to carry out interviews with stakeholders to explore their opinions of the current professional boundaries and of any future development of non-medical roles in anaesthesia. These will take the form of a semi-structured interview in which the researcher will follow a prepared line of questioning.

It would be helpful if the interview could be tape recorded for later analysis, but this will not be done against your wishes. You may, of course, decide to switch off the tape recording at any time during the interview, without giving a reason. If you choose, you may withdraw entirely from participation in the research project.

Information given to us will be treated with complete confidentiality and your identity will be protected. As with all research, the Ethics Committee and other monitoring and regulatory bodies, including the funding body, have the right to direct, confidential access to our data for verification purposes and by signing the consent form you are authorising such access.

If you want to know more, or there are any other problems, please ask the researcher or get in touch with Dr Andrew Smith, Department of Anaesthetics, Royal Lancaster Infirmary.

Tel: 01524 583517 email: andrew.smith@rli.mbht.nhs.uk

*Version 2, 10th January 2003*

# Appendix 3

Morecambe Bay Hospitals Trust

Royal Lancaster Infirmary

Ashton Road

Lancaster

LA1 4RP

**Exploring professional boundaries in anaesthetics.**

**Funded by NHS National Co-ordinating Centre for Service Delivery and Organisation R&D**

**Information Sheet for Participants**

**Case Studies**

As part of our research project into the possible advantages and disadvantages of creating non-physician anaesthetists in the United Kingdom, we wish to carry out interviews with individuals involved in the development and implementation of extended roles in anaesthesia. From these interviews we would hope to gain information on developments which have taken place in your work place, any issues raised during the implementation of change and evaluation of the possible advantages and disadvantages of the new way of working. These will take the form of a semi-structured interview in which the researcher will follow a prepared line of questioning.

It would be helpful if the interview could be tape recorded for later analysis, but this will not be done against your wishes. You may, of course, decide to switch off the tape recording at any time during the interview, without giving a reason. If you choose, you may withdraw entirely from participation in the research project.

Information given to us will be treated with complete confidentiality and your identity will be protected. As with all research, the Ethics Committee and other monitoring and regulatory bodies, including the funding body, have the right to direct, confidential access to our data for verification purposes and by signing the consent form you are authorising such access.

If you want to know more, or there are any other problems, please ask the researcher or get in touch with Dr Andrew Smith, Department of Anaesthetics, Royal Lancaster Infirmary.

Tel: 01524 583517 email: andrew.smith@rli.mbht.nhs.uk

*Version 2, 10th January 2003*

# Appendix 4

## *Policy Statements*

### Organisations contacted for policy statements

1 Cumbria and Lancashire Workforce Development Confederation
2 Royal College of Surgeons of England
3 Royal College of Anaesthetists
4 National Patient Safety Agency
5 Ministry of Defence, Defence Medical Services
6 International Federation of Nurse Anaesthetists
7 Changing Workforce Programme
8 National Association of Theatre Nurses
9 Association of Operating Department Practitioners
10 Association of Anaesthetists of Great Britain and Ireland
11 British Anaesthetic and Recovery Nurses Association
12 European Academy of Anaesthesiologists
13 Royal College of Nursing
14 Association of Surgeons

# Appendix 5

## *Policy Statements*

Cumbria & Lancashire NHS
Workforce Development Confederation

3 Caxton Road, Fulwood
PrestonPR2 9ZZ
Tel: 01772 221426/7
Fax: 01772 221433

2nd July 2003

Ms Marie Kane
Research Fellow
Morecambe Bay Hospitals NHS Trust
Royal Lancaster Infirmary
Ashton Road
Lancaster LA1 4RP

Dear Ms Kane

**Exploring professional boundaries in anaesthetics**

Members of the Confederation recognise that the future development of the workforce cannot be addressed simply by continuing to 'do what we have always done'. The predicted available supply of clinical staff entering the service and historical methods of working will not be sufficient to enable us to meet future service demands. Consequently there is a need to consider new roles and new ways of working, and develop strategies to ensure that patients receive the care they require from an appropriately educated and skilled workforce.

The Workforce Development Confederation therefore supports the development and testing of new roles such as the non-physician anaesthetist, which have the potential to increase flexibility and capability within the local workforce, whilst maintaining high standards of care.

Yours sincerely

Juliette Swift

Clinical Development Manager

The Royal College of Surgeons of England

35-43 Lincoln's Inn Fields, London WC2A 3PE
W: www.rcseng.ac.uk

Professional Standards
Contact: Vicky Preston
Direct Tel: 020 7869 6034
Direct Fax: 020 7869 6030
Direct Email: vpreston@rcseng.ac.uk

15 April 2003

Ms Marie Kane
Research Fellow
Morecombe Bay Hospitals NHS Trust
Royal Lancaster Infirmary
Ashton Road
Lancaster LA1 4RP

Dear Ms Kane

**Exploring Professional Boundaries in Anaesthesia**

I am writing further to Mr Hugh Phillips' letter sent to yourself on 6 February 2003. Mr Phillips wrote that the Royal College of Surgeons of England did not have a policy or defined position on the issue of exploring professional boundaries in anaesthesia but its view would be influenced by the Royal College of Anaesthetists. He also let you know that it would be discussed at the next meeting of the Professional Standards Directorate.

The Professional Standards Directorate meeting has since taken place and the Committee agreed with Mr Phillips that the lead in this area should be the Royal College of Anaesthetists. The Committee also commented that it was important to promote healthcare developments, whilst keeping within the highest possible standards of care.

I hope this is of some help – please let me know if you have any further queries.

Yours sincerely

Vicky Preston

Vicky Preston
Administrator, Professional Standards Directorate

*Advancing Surgical Standards*
Registered Charity No. 212808

**Royal College of Anaesthetists**

THE ROLE OF NON-MEDICALLY QUALIFIED STAFF IN THE DELIVERY OF ANAESTHETIC SERVICES

As part of their workforce development initiatives, the Changing Workforce Programme of the NHS Modernisation Agency, received a number of submissions from interested Trusts to pilot the use of non-medically qualified personnel in the delivery of anaesthetic services. Through their representation on the Board of the Modernisation Agency, the Royal College of Anaesthetists felt it important at an early stage, to be part of the consultation process of proposals for such a fundamental change in UK anaesthetic practice. This was on the basis that any development in this area should be led by the specialty, in consultation with the Department of Health, rather than in a fragmented and ad hoc way, by individual Trusts or Workforce Development Confederations. As a result, representatives of the College and the Department of Health's Changing Workforce programme undertook a series of fact-finding visits to the USA, Holland and Sweden, to gain a balanced view of the place of non-medically qualified anaesthesia assistants in the various healthcare systems.

This report is the result of those visits. It has been discussed and endorsed by College Council and by the Changing Workforce Programme. It has been circulated to, and discussed by Council of the Association and Anaesthetists who will be seeking views from their members. Both Councils will be represented on the Steering group, which will take this proposal forward. . It has also been circulated, in restricted numbers, by the Changing Workforce Programmes, to those Trusts, who registered their interests in developing a pilot programme for the development of non-medical roles in anaesthesia.

While some may find the suggestion of the use of non-medically qualified, anaesthesia assistants unacceptable, College Council felt that it would not be representing our specialty fairly and responsibly if it did not at least consider the proposal and ensure that the College was involved at the outset with any developments, such as the design of training programmes. This could include the need to look at the provision of care during the whole course of peri-operative care and pain management.

We would urge you to read at least the introductory pages, if not the reports of individual visits and not to take isolated sentences or suggestions out of context. The College is not recommending any specific course of action, but has tried to take a balanced and realistic view, understanding that these findings will obviously suit the situation in some trusts more than others. They may provide one of a number of possible solutions to the impending workforce crisis in anaesthesia and the likely changes in working patterns, resulting from the implementation of initiatives such as the European Working Time Directive.

(The report referred to in this statement is available at www.rcoa.ac.uk/dload/Role_of_non-medical_staff.pdf )

Contact with RCA asked us to use this statement which accompanies Simpson et al (2002) report.

**Response from NPSA to Research Project on Professional Boundaries in Anaesthesia – the Non-Medically Qualified Anaesthetist**

**Ian Woods, NPSA Clinical Advisor in Anaesthesia**

The current study assessing the use and possible benefits and disadvantages of non-medical anaesthetists has requested a view from the NPSA on this issue. The background and standpoints of the professional staff involved in this area have already been canvassed and incorporated in the report. This response and view will therefore centre on the concerns of the NPSA for changes in patient safety which may ensue from the implications of this work.

The potential for non-medical staff to administer and reverse anaesthetic drugs, to safely use airway management techniques and equipment, and to correctly use and interpret patient monitors during surgery, has been explored and used in locations outside the UK. However, because of the unique risks posed to patient safety by anaesthesia, changes to the way in which personnel are trained and employed to carry out this work must be closely scrutinised. Although deaths solely attributable to anaesthesia appear to have steadily decreased over the last 50 years, there is little evidence to suggest that there has also been a decrease in critical incidents.

This brief response focuses on the needs of the patient who may have an anaesthetic conducted upon them by a non-medical anaesthetist. Whatever the reason for the use of these staff, it should be clear that their use is not detrimental to patient safety, and that patients are completely aware and informed as to the manner in which there care is organised.

Whatever the background and nature of training of personnel administering anaesthesia, the patient involved should always be aware of the implications and limitations of that carers abilities. The following safety criteria should always be considered and fulfilled prior to anaesthesia.

- Patients should be confident that the anaesthetic technique proposed is appropriate for their surgery and their existing condition. These factors should be comprehensively assessed and verified during the pre assessment period.
- Patients should be confident that staff are not practising beyond the limits of their competence, and that in the event of any unexpected incidents or difficulties, appropriate senior assistance is available in a timely way.
- The training of all staff involved in the administration of anaesthetics should include the use of adverse incident notification and investigation systems.
- Appropriate induction and familiarisation procedures must be in place for all staff, and in all locations.

- Staff involved in the administration of anaesthesia should have a formal appraisal and review system as part of their employment.
- Staff administering anaesthetics should have the training and ability to obtain detailed informed consent, including the skill to assess and explain the risks presented to individual patients.
- Staff should be able to demonstrate competency in handling known potential critical incidents.
- Formal accreditation and registration should reassure patients as to the competence of anaesthetic staff.
- Staff involved in the administration of anaesthetics have a responsibility to be aware of all national and local safety and hazard alerts relating to their practice.
- Appropriately skilled assistance should be available to the anaesthetist, whatever their background training.
- Clarification of the lines of clinical responsibility and communication is crucial for safety.

Ian Woods

CSA Anaesthesia

NPSA

September 11th 2003

MINISTRY OF DEFENCE
**Defence Medical Services Department**
St Giles' Court, Room 750, 1-13 St Giles' High Street, LONDON WC2H 8LD
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(Direct Dialling) 020 7807 0470
Facsimile: 020 7807 8805

***From Surgeon General***
***Surgeon Vice Admiral I L Jenkins CVO QHS FRCS***

DMSD/765/1/3/2 (234/03)

Marie Kane
Research Fellow
Morecambe Bay NHS Hospitals Trust
Anaesthetic Department
Royal Lancaster Infirmary
Ashton Road
Lancaster
Lancs
LA1 4RP

8 July 2003

Dear Marie Kane

**EXPLORING PROFESSIONAL BOUNDARIES IN ANAESTHETICS**

I apologise for the fact that it has taken my Department such a long time to respond to your letters[1] [2] inviting us to comment on the possibility of a non- physician anaesthetist's role being developed and implemented in the United Kingdom.

The reason why I have been obliged to delay in responding is that my principal adviser in anaesthetics has been deployed in Iraq and has only recently returned.

The Defence Medical Services has considerable interest in the potential for non-physician anaesthetists being developed but has obvious reservations regarding their training, professional development and maintenance of clinical currency. Potentially they have application in anaesthetics, intensive care, resuscitation, aeromedical evacuation and pain relief in defence medicine but I am acutely aware that these developments can only be made

[1] Letter dated 7 April 2003
[2] Letter dated 24 June 2003

1

in tandem with Department of Health policy and the deliberations of the Royal College of Anaesthetists.

Were such a potential to come to fruition then the Defence Medical Services would obviously wish to contribute.

Yours sincerely,

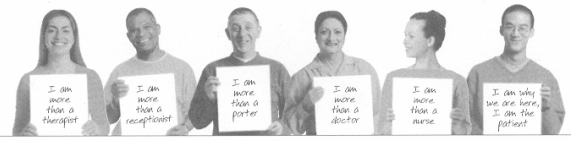
2


***IFNA Statement***

The International Federation of Nurse Anesthetists (IFNA), as the international voice for nurse anesthetists, supports the development of nurse anesthesia education and practice world wide. The IFNA is an Affiliate Member of the International Council of Nurses (ICN) and recognized Nursing Partner in the World Health Organisation (WHO). Nurse Anesthesia is an advanced nursing practice for individuals that have completed a basic nursing educational program and a specific post-basic nurse anesthesia educational program. Nurse anesthetists are prepared and utilised in many countries throughout the world to provide, or assist in the provision of cost effective quality anesthesia services to patients. Anesthesia services are not limited to technical aspects and the nursing background is essential for providing safe and quality anesthesia care to the public. The IFNA can provide assistance to any country officials or appropriate organization or institution desiring to develop and/or implement a nurse anesthesia educational program and/or nurse anesthesia scope of practice.

Pascal Rod

President of the International Federation of Nurse Anesthetists




NHS

Changing Workforce Programme

Ms Marie Kane
Research Fellow
Morecambe Bay Hospitals NHS Trust
Royal Lancaster Infirmary
Ashton Road
Lancaster
LA1 4RP

7 April 2003

Dear Ms Kane

Thank you for your letter of 10 March to Mary Moore about exploring professional boundaries in anæsthesia.

The Changing Workforce Programme is supporting the NHS and associated organisations in testing and implementing new ways of working to improve patient care, tackle staff shortages and increase the job satisfaction of staff. This includes developing roles to support doctors, nurses, anæsthetists and other health care professionals.

The Programme therefore welcomes the innovative development of a non-physician anæsthetist role.

Yours sincerely

Anne Hackett

Anne Hackett
Care Protocols Manager

CWPF05

The National Association of Theatre Nurses

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Marie Kane

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30th July 2003

Dear Marie

Re: Expanded Nursing Practice in Anaesthetics

I am happy to provide a statement from the National Association of Theatre Nurses (NATN). This is an issue that as an Association we are providing representation on a working party at the Changing Workforce Programme. We expect this to be a project that will have increasing relevance to perioperative nurses, as they are ideally placed to work in expanded roles in the area of anaesthetics.

In the 1930's the Royal College of Nursing gave comment to the debate regarding nurses being anaesthesia providers.

"Nurses should be given the chance to succeed in anaesthesia."

Royal College of Nursing, 1930.

During the two world wars nurses took an active part in the administration of anaesthesia. In the post war period anaesthesia became a purely medical specialty and this fuelled the discussion as to the suitability of the nurses' role in anaesthesia.

The Royal College of Nursing held the view that nurses did have a place within this specialty but this did not develop further at that time.

Healthcare is now in the midst of continued modernisation and facing great challenges than ever before; with the increased demand for surgical procedures and the anaesthesia services that are required to support this work. The question of non-medically qualified anaesthesia providers is again being discussed as one way of finding a solution in manpower planning for the increased demand in anaesthesia for patients.

The NHS Plan, in the year 2000, outlined that nursing roles can be redesigned and reviewed to ensure that these service demands are met. As already suggested, the possibility of an expanded anaesthetic role offers several opportunities for nurses working in the area of perioperative care.

Nurses have strong potential to take forward opportunities to enhance and expand their roles to contribute as a valuable part of the healthcare team and this has become extremely relevant in anaesthesia with the service demands.

The NATN recognises the need for the development of new roles for nurses in the area of anaesthesia. It is important that all the relevant bodies and associations would be involved in any new developments so that the development is truly multidisciplinary and one of teamwork. It is paramount that the patient is kept central to any future role development.

An expanded role in anaesthesia for nurses would provide a strong career structure for nurses to remain in clinical practice and could re-enforce a path for nurse consultants in the profession of nursing in this specialty.

The following issues must additionally be taken into account before expanded roles are considered:

- A competency framework
- Regulation and registration
- Insurance and liability
- Standards of practice
- Ethical codes
- Educational standards
- Audit standards
- Patient involvement and transparency
- Robust supervision
- Clear accountability

NATN would support the development of expanded roles in this specialty with the above conditions being satisfied.

I hope this information will be of value for your project.

Please contact me if you require any further information.

Yours sincerely

Melanie van Limborgh

Chairman

The National Association of Theatre Nurses

cc C Allan, Chairman, Anaesthetics and Recovery Forum, NATN

***The Association of Operating Department Practitioners***

***Policy Statement on non-physician anaesthetists***

The AODP welcomes the initiative to develop the roles of the non-medical members of the anaesthesia team and the opportunity that this provides for ODPs to cross existing professional boundaries and take on roles traditionally undertaken by physicians. The AODP recognises that anaesthesia services in the UK have an enviable reputation for quality and safety and the primary objective must be to maintain these standards.

However it is clear that the traditional ways of providing anaesthesia services will not be able to keep pace with the increasing demands being made. The NHS Plan has set demanding targets for patient access at a time when changes to medical training, working times regulations and the broadening role of anaesthetists in acute care has significantly diminished capacity. New ways of delivering the service are therefore essential if patients are to have access to health care in a timely manner.

ODPs are well placed to take on these new challenges and some of the new initiatives are likely to just formalise and regulate what has until now been ad hoc practice in some settings. We believe that it is important to set national standards for the new roles, including nationally recognised training schemes. It is appropriate that these are developed by the Royal College of Anaesthetists, in partnership with the professional bodies whose members will be undertaking the new roles, including the AODP.

Much has been learned from the experience of other countries in developing these roles and those trained overseas will help to kick start the initiative here in the UK. However, the future shape of the service should develop in a way that meets the particular needs of the UK Health Services, using practitioners trained and developed in this country.

The effective professional regulation of those participating in these new roles is crucial if patient safety is to be assured. The experience of the AODP demonstrates that it is very unlikely that new regulatory mechanisms can be put in place soon enough to cover these developments. The existing and, in the case of ODPs, developing mechanisms of regulation, must be used. There must be a concern that those not eligible for regulation via the AODP/HPC or NMC routes will be practicing without effective means of professional regulation and scrutiny.

Finally, the AODP strongly believes that the high standards maintained in UK anaesthesia owe much to the working concept of 'The Anaesthesia Team' and this principle must be sustained at all costs. It is essential to ensure that sufficient numbers enter the ODP profession to compensate for those whose practice develops beyond the traditional roles.

Bill Kilvington FAODP, President

***ASSOCIATION OF ANAESTHETISTS OF GREAT BRITAIN AND IRELANDNON – PHYSICIAN INPUT TO THE ANAESTHETIC SERVICE IN THE UK.***

Since its inception in 1932 the Association of Anaesthetists of Great Britain and Ireland has successfully promoted the highest possible standards for anaesthetic services for all patients in these islands

Anaesthesia in the United Kingdom has been provided solely by medically qualified physician anaesthetists and is highly respected throughout the world. The Association believes that anaesthesia is a medical act and requires supervision by a medically qualified anaesthetist. The Association, however, some years ago introduced the term “Anesthesia Team” to acknowledge that the provision of anaesthesia is a complex interplay between physicians, nurses and operating department practitioners (ODPs). The Association has achieved recognition for the principle for properly qualified assistance being present whenever patients are anaesthetised. There has been an evolution of responsibilities of members of the anaesthesia team particularly in the pre- and post –operative period. Until now, however, during the intra-operative period there has been an insistence that a medically qualified anaesthetist should be present with the patient at all times although assisted by another appropriately trained professional. This standard achieves a first class service.

The Association, however, recognises that increasing workload and current manpower predictions suggest that it is unlikely that service demands on anaesthesia, in theatre, intensive care and pain management will be achieved without fundamental changes to the structure and process of medical care in the UK.

The Association is, therefore, agreeable to explore new ways of practicing in anaesthesia to improve efficiency and flexibility with the proviso that patient safety is at all times maintained and that a medically qualified anaesthetists is responsible and in charge for all patients. Although evidence regarding outcome is conflicting, in many countries the service provided by physician anaesthetists is augmented by the utilisation of non-physician practitioners, in the main ‘anaesthetic nurses’. The Association has grave concerns about the introduction of non-physician anaesthetists into the UK in a wholesale uncontrolled manner, but accepts that recent proposals from the Royal College of Anaesthetists and the NHS Changing Workforce Programme to pilot and assess extended roles for non medical practitioners in the anaesthesia team is a sensible way forward. While the Association would not welcome the disruption to patient care which would follow the introduction of independent non-physician practitioners competing with medically qualified anaesthetists as practiced in the USA, a cautious exploration of the extent to which non medically qualified personnel may assist in the process of anaesthesia under the supervision of a medically qualified anaesthetist is a constructive initiative. The Association is represented on the National Stakeholders Board, which is currently supervising this initiative over a limited number of pilot trusts with Consultant Anaesthetists taking the lead at each site. Within the half dozen sites envisaged at the moment, roles will

develop, limits to practice and requirements for supervision defined and in conjunction with the National Health Service University (NHSU) a curriculum and assessment process prepared for the future training of such practitioners if the system is successful. In some pilot centres this process will commence with the introduction of imported practitioners from existing systems overseas and it will be necessary to ensure that their standards are satisfactory and that they are closely supervised. A careful audit of outcomes and any problems will be essential. While the Association is happy to co-operate in these carefully controlled pilot initiatives it perceives many difficulties in the introduction of additional practitioners into the anaesthesia team with regards to career structure, integration with established staff groups, influence on the already reduced clinical opportunities for trainee anaesthetists and most importantly their acceptability to patients. In addition, it is unlikely that the introduction of these practitioners will have much effect on the problems of the European Working Time Directive as regards anaesthetic staffing nor be a cheap option.

In summary, the Association of Anaesthetists acknowledges that change is required within the NHS to meet the increasing demands placed upon it. The Audit Commission stated that anaesthetists are involved with the care of over 60% of hospital patients. Within the anaesthesia team, the Association is willing to examine extending the roles of non-medically qualified practitioners. The current initiative of carefully controlled pilots of this potential change in practice is a sensible way forward. At all times patient safety must be paramount and this should be ensured by requiring that these extended roles within the anaesthesia team are always under the supervision of a medically qualified anaesthetist. If successful this proposal may well increase the anaesthetic workforce, improve flexibility and target skills more appropriately. It is, however, only one of many more fundamental, and pressing reforms that are required in the NHS to ensure that patient care continues to be safely and appropriately delivered – the most important of which the Association believes is the restructuring of the acute hospital services to reduce the wasteful requirements for multi-site emergency services.

**Peter G M Wallace**

**President AAGBI**

# Appendix 6

## *Case Studies not visited*

### Extubation

#### *Scottish Paediatric Centre*

This project was first suggested in Summer 2002. The theatre education officer for this hospital was carrying out an assessment of the working practices of the recovery team. As part of this assessment, it was suggested that recovery staff may wish to further develop their roles to carrying out the removal of endotracheal tubes. Recovery staff currently remove laryngeal masks. This hospital employs multidisciplinary theatre staff and therefore the recovery staff could come from either an ODP or nursing background.

The theatre team, including the consultants are committed to non-physician role development. The theatre education officer and senior nurse were in the process of developing a protocol when in September 2002 AAGBI issued guidelines for "Immediate Post Anaesthetic Recovery". These guidelines stated:

"The removal of tracheal tubes from patients in the recovery room is the responsibility of the anaesthetist."

The consultant body were, quite reasonably, not prepared to continue with its support of the project in direct contradiction to guidelines. The anaesthetic team were still keen however, to continue to develop skills in the department and are currently considering other projects.

At the time of writing these projects are still in the development stage.

### Pre-operative assessment

#### *Hospital in SE England*

This SE England hospital's modernisation manager put together a bid to develop a pre-operative assessment programme. The aim of this bid was to develop staff skills and improve efficiency in pre-operative assessment. However, she was unable to gain consultant support for the project and it was subsequently abandoned. The hospital has now received funding for development of a surgical nurse role and therefore not relevant to our study.

Pre-operative assessment has a high profile currently due to the work of the National Pre-operative Assessment Programme. Case study 1 (CS1) contains an element of pre-operative assessment in the role of Nurse Consultant in Emergency Care. It was felt that a visit to yet another site which was carrying out pre-operative assessment would have yielded little new information.

## Cardiac Arrest Team Skills

***Midlands Hospital***

This hospital received funding from the Changing Working Lives programme to develop ODP skills so that they were able to participate on cardiac arrest teams. This development would have involved training in life support, insertion of intravenous cannula. This role was suggested to facilitate greater flexibility on cardiac arrest teams, develop staff skills and to enable more efficient responses to cardiac arrest calls. Unfortunately, key senior staff were not happy with the proposal and the pilot was not developed.

Instead, ODPs were trained to use the image intensifier in the operating theatre. The hospital had purchased a new image intensifier, but did not have the radiographers available to operate it on a regular basis. As a result, this very expensive piece of machinery was standing idle. A number of ODPs undertook a day release course in conjunction with a local college of higher education. The process of training is still under way.

## Defence Medical Services

Contact with the armed forces was suggested by the funders. Following the 1998 review of defence medical services (web refwww.mod.uk/issues/dms/), military hospitals are now fully integrated with the NHS and consequently military staff adhere to the same working practices and clinical governance guidelines as all other NHS staff. The possibility of conflict in Iraq during the first six months of the project and the resulting heightened security made it difficult to make contact with military personnel.

We did, eventually, make contact with a naval anaesthetist just before he departed for the Gulf. He explained that the military always plan for the worst case scenario, that is, heavy troop/civilian casualties together with heavy medic casualties. Staff would only work outside their normal roles in the most extreme situations, but more common was “often the prevention of boredom, not people working outside their expertise”.

We also spoke with a Territorial Army anaesthetist who added that in extreme battlefield conditions involving high casualties, a radical triage system would be implemented, treating only those that were thought to have a good chance of survival. In this way, staff would remain working within the boundaries of their normal professional roles.

## Cannulation and intubation

***An Anglia Hospital***

This hospital was part of the Professional Roles in Anaesthesia Pilot Study to train non-physicians in venous cannulation and endotracheal intubation. This pilot study was carried out in response to the Scoping Study 1996, which had shown that these duties were frequently carried out by theatre nurses and ODPs

who had been informally trained. The intention of the pilot was to carry out formalised training and evaluation of the role. The pilot project evaluation showed that there was no difference between Specialist Registrars in anaesthesia and the newly trained Anaesthetic Assistants in their performance of these duties. Unfortunately, the Trust lost all its newly trained staff to other trusts and did not have funds or the will to continue with training new staff. We were unable to obtain any of the original documentation about the project.

## Sedo anaesthesia

### *London Hospital*

This contact was provided by the SDO R&D as a possible link to new ways of working in anaesthesia. We contacted this South East Consultant Urologist to ask if the method of "sedo anaesthesia" he used was undertaking any part of an anaesthetists work. He replied that it was a method of sedation "using sedation and anaesthetics and does not really involve anaesthesia" and was in keeping with the Royal College of Surgeons of England guidelines on sedation by non-anaesthetists 1993.

## Non-physician anaesthetists working in the UK

We located one non-physician anaesthetist working in the UK. He was currently employed as ODP, in the private sector. He was not using his non-physician anaesthetist skills to extend his current role as an ODP.

# Appendix 7. Case studies

## *7.1 Case Study 1 (CS1)*

Midlands Hospital

17th April 2003

### Peri-operative Emergency Care Team

| | |
|---|---|
| Clinical Lead, Consultant Anaesthetist | A |
| Nurse Consultant, Peri-operative Emergency Practitioner | B |
| Former Clinical Lead, Consultant Anaesthetist | C |
| Representative of junior medical staff | D |

***Timetable***

| | |
|---|---|
| 8.30am | Meet B and tour working areas in wards, theatres etc |
| | Shadow B during morning's work. |
| 11.00am | Discuss audit work, training programme and publications. |
| 12.30noon | Interview and discussion with A. |
| 1.30pm | Lunch. |
| 2.00pm | Interview and discussion with D. |
| 3.00pm | Interview and discussion with C. |
| 4.45pm | End visit. |

***Aims***

1 To investigate the why this innovation came about.

2 To describe the role of peri-operative emergency practitioner.

3 To investigate how this innovation was implemented and to look at how and why it has evolved in the years since its inception.

4 To investigate the training for this role and how it was devised.

5 To gather evidence and opinion on if the innovation has been successful.

6 To gather evidence on its effectiveness, cost effectiveness and safety.

7 To ascertain whether lessons from CS1 experience could be applicable to non-physician anaesthetists.

8 To gather opinion on non-physician anaesthetists in the light of CS1 experience of extending non-physician roles in anaesthesia

### *Background*

CS1 Trust was created on 1st April 1993. It comprises of two hospitals, CS1, a 550-bed District Hospital, and a hospital for the elderly consisting of two 28-bed wards with associated Day Hospital and 40 places for out-patient facilities.

CS1 is a medium/large district general hospital with teaching trust status in conjunction with nearby University Medical School. The hospital itself is, like most hospitals in the NHS, a mixture of old and new buildings, though most of it dates from the last fifty years. Major works of modernisation are currently taking place including a diagnostic and treatment centre due to come on-line in 2005.

CS1 serves a population of 450,000 north of a major UK city. The social and economic status of the residents in its catchment area is very varied: from very affluent areas to the more deprived. The general population of the area CS1 serves is 977,87 (at the 2001 census www.statistics.gov.uk/census2001) and the average age is 36 as compared to the national average of 39. This area has a higher than average level of unemployment and an above average population of people in ethic groups. Due to its location, CS1 is under two Strategic Health Authorities (SHAs) and serves 8 different Primary Care Trusts (PCTs).

CS1 site has 10 theatres in total. There are two day case theatres on the ground floor along with a suite of six main theatres which are used for ENT, orthopaedics, general surgery and urology. The hospital has dedicated day case and short stay wards. On the first floor there are an additional two theatres, one of which is a dedicated emergency theatre and the other is utilised for cardio-vascular operations. All theatres are used as flexibly as possible.

### 1 Why did this innovation come about?

This innovation developed in 1998 out of a clinical need within theatres. Initially the role was envisaged as a theatre trouble-shooter and problem solver. The team had realised that poor patient preparation and optimisation were causing a considerable number of delays to emergency theatre lists. (For a description of optimisation and practice of emergency theatres see section 1.7.5) The team carried out an investigative audit of delays to emergency theatre which confirmed their suspicion that a sizeable proportion of delays were caused by poor patient optimisation. B was, at that time, in the process of undertaking a MSc. The Trust Board were persuaded to undertake short term funding of a pilot post with the aim of reducing out-of-hours emergency theatre work (CS1 classifies out-of-hours as 10pm to 8am). The results of the pilot were to be incorporated into B's MSc dissertation. The implementation of this role showed positive results after only 3 of the 6 months of the pilot and it became obvious that the role held the potential for a more extensive role for B. In aiming to reduce delayed and cancelled operations and optimise the use of emergency theatres, it was possible that more direct patient benefits could be gleaned in terms of better patient optimisation and reduced length of stay.

### 2 Describe the role of peri-operative practitioner (PEP)

The current role of peri-operative practitioner in theatres has developed over the last four years. In addition to the Nurse Consultant (NC) role there is a Clinical

Nurse Specialist (CNS) in post. In terms of peri-operative emergency care their roles are identical.

The role encompasses the following within an advanced practice nurse framework:

- Co-ordinate emergency and trauma patients through the pre-operative period in conjunction with theatres
- Assist on-call anaesthetic and surgical teams in the assessment and prioritisation of patients
- Where appropriate, initiate investigations on patients and report to relevant clinician
- Co-ordinate with theatre and ward managers to ensure appropriate use of time and resources within trust's provision for emergency and trauma surgery
- Identify the skills set and terms of reference required for the PEP role ensuring that they reflect the individual holistic needs of patients undergoing emergency surgery

During the case study several hours were spent shadowing B whilst carrying out normal duties. The session consisted firstly of a visit to the emergency theatres to check the emergency theatre list for that day. There were four patients on that list. Whilst in theatres, B made a point to visit the consultant Anaesthetist on-call and the consultant Anaesthetist in the neighbouring cardio-vascular theatre. As it happened, the cardio-vascular list for that day had been cancelled at the last minute and the theatre team were now free to undertake any emergency surgery as necessary. B, along with the SHO D, set about making pre-operative assessments on the patients on that list. I accompanied B to the consultations. The peri-operative emergency care team use a clinical data collection form to supplement the normal anaesthetic assessment form. B checked patient details of illness, allergies, history of previous anaesthetic problems and a patient history. B also examined the airway, measured blood pressure and heart rate. If necessary, investigations including chest x-rays were be ordered. The clinical data collection form has a section for optimisation plan. In this B could recommend drugs to be added to the patient's prescription. In addition to taking a clinical history, B spent quite some time with each patient describing the surgical procedure they would be undergoing, the anaesthetic to be administered and answering any questions with care and understanding.

The clinical data collection form was then taken to the theatre team and a detailed hand over took place. B detailed all his findings, highlighted his reasoning and explained his actions if any.

The other part of B's day to day work involved organising the placement of emergency patients into available theatre slots. This involved liaising with anaesthetic teams, surgeons, theatre management and ward staff. The majority of this organisation was done on a face-to-face basis, though some preliminary arrangements were made over the telephone.

**3 Describe how the role is implemented and how and why it has developed over the years since its inception**

***Clinical***

There are no written guidelines or protocols for the peri-operative team. It was felt that the introduction of protocols would "stifle intelligent thinking". Instead the team aimed for a competency and skills based education which would provide the "tools to solve problems"(A). B commented that the lack of protocols allows "honest discussions" between PEP and medical staff to solve problems. In addition, it was felt that in developing protocols another layer of potential resistance would be created and "bureaucracy prevents change" A. Rather, it was felt that the role should be allowed to evolve in the workplace under watchful leadership and supervision of the peri-operative team.

The role continues to develop. Future role developments include the introduction of a limited list of drugs and therapies which can be prescribed directly by the PEPs. This list would include oxygen, fluids, anti-biotics, glucose and drugs to deal with gastric reflux. The ability to prescribe this group of drugs will ensure that the PEPs are able to immediately implement treatment and optimisation programmes for patients awaiting surgery. The prescribing will be enabled by licensing through the department rather than through Patient Group Directions. In addition, the peri-operative care team plan to develop a femoral nerve block service for fractured neck of femur patients. The blocks will be carried out by the PEPs. The process of making PEP referrals to cardiology and respiratory medicine is likely to be formalised in the near future. Both these developments represent an extension into the work of anaesthetists.

***Operational***

The Peri-operative Emergency Care Team has recently restructured itself. For the first few years of its life there was a joint clinical lead between surgery (1 representative) and anaesthesia (2 representatives). The team now has one anaesthetic clinical lead, which is planned to be a rotated post. This is intended to reflect the increased anaesthetic focus of the team. The team plans to integrate all aspects of nurse led services into the peri-operative team. This would include the critical care outreach services, pain management and admission and discharge services.

**4 The training for this role and how it was devised**

In the last year, a formal training programme has been written up for the benefit of the expanding team. This was based on the training programme undertaken by B. This programme was developed by the whole team including anaesthetists and surgeons and physicians from other specialties. Cardiac physicians, respiratory physicians and radiologists were involved to provide some of the training and to assess competencies. A conscious decision was taken to source the training within the trust. This would ensure that valuable personal relationships were forged between the trainee and clinicians from all specialties

and that a wide spectrum of clinicians had a sense of ownership of and involvement in the development and training for the role.

The training is a three-month supernumerary programme. Month one consists of orientation to gain an understanding of why peri-operative care influences actions in anaesthesia. Following this, six to eight weeks are spent learning the assessment process by accompanying both consultants, SpRs and SHOs to cardiac and respiratory clinics and general medical wards. B felt that it was often better to spend time with the SHOs and SpRs than consultants as they were more inclined to work at a similar speed. The "pay off" for the junior doctors was that, whilst the PEP was training, the PEP ordered and carried out the patient investigations for the junior doctors in return for their time spent teaching. This creation of reciprocal personal relationships within the trust was to prove valuable for the future work of the PEP. By the end of month two, the individual trainee begins work under supervision.

Throughout the programme, fortnightly formative assessments are carried out by the Nurse Consultant to develop training aims for the following few weeks based on the trainee's perceived learning needs. In addition, monthly assessments by the lead clinicians take place. At the end of the training period, a full assessment is carried out by the whole Peri-operative Emergency Care Team. At any stage, the trainee may request that particular sections of the training be enhanced or added to if they feel additional learning is required.

B had previously worked in Accident and Emergency department and thus had a detailed knowledge of trauma practice. The team wanted to ascertain if the training programme they had devised was transferable to individuals from any nursing background, and still provide the trainee with the same skills and competencies at the end. The new CNS came from a peri-operative nursing background. The CNS's training, completed in March 2002, has been equally successful and there are now plans to license the training programme for the healthcare market.

**5 What made the innovation successful**?

*a) Personal qualities* The personal qualities of the innovators in this role are key to its success. Disparaging comments have been made to the team in the past that the success of the role is down to the "cheeky chappie" factor. This is to grossly misrepresent the many talents that all the innovators have brought to the role.

**i Communication skills**

The ability to be an effective communicator at all levels within the health care environment is vital to an innovative role of this kind. Firstly, these individuals have communicated what their role is about and instilled confidence in the role and themselves from their work colleagues, thus gaining their trust and respect. Secondly, they have been able to communicate effectively with patients. Amongst the qualities possessed by the PEPs is the ability to make personal contact with all staff across the trust. These relationships are key in getting operations re-scheduled and getting emergency patients allocated to the end of elective theatre lists.

Finally, once the role is established they have communicated their findings to the wider healthcare community.

**ii Innovators**

The role of peri-operative care practitioner has been a role in development throughout the five years of its existence. This development is very much due to the individuals involved and their desire to bring about a more effective service and to improve patient care. Throughout, the team has striven to find new ways of working and constantly develop and innovate. All members of the team appear committed to developing and bringing about innovations, the latest of which is their plan to develop a femoral nerve block service and PEP prescribing.

**iii Change champions**

Change in the NHS is not always welcome. Despite the improvement in service delivery in terms of out-of-hours theatre work and length of stay, CS1 has been criticised for its role development in peri-operative care. Comments include "where are the HOs, they should be doing this", to "what you learnt in three months took me five years" (from comments made to PEPs). It takes a particular kind of courage to stand before your peers and present findings which some will be uncomfortable with and which may incite hostility in others. The team's determination, rigorous methods and proven success have enabled them to face down these critics and now have several imitators across the UK.

*b) Training and education* The training programme aims to provide candidates with confidence, competence and experience to act independently.

The acquisition of experience was considered vital to the training programme and plenty of opportunity to do this was made possible. A felt that the "knowing that something is wrong is the cornerstone" to good patient assessment and the ability to determine this could be achieved through skills, competence, confidence and most of all experience.

CS1 have repeated the success that they had with B in their appointment of a CNS. In the interview selection procedure the peri-operative team were most interested in the personal skills of the candidates. Academic qualifications and clinical experience were of lesser importance. The CNS was recruited with a different work history to B, but the training was equally successful.

*c) Organisational support and management* Initially, the project team consisted of two anaesthetists, a surgeon, theatre management and the PEP. The team worked together in all aspects of the role's development and were able to effectively support the PEP in their training and in the day-to-day operation of the role.

Generally, there was a lack of resistance to the role from physicians and non-physicians. Some physicians and non-physician staff did harbour doubts about whether a non-physician could be competent. Initially the team worked around these individuals and once the value and success of the project was

demonstrated the resistors came on board. The low levels and short lived resistance meant that the project team had a huge amount of support from colleagues for their work. The advantages of the role were quickly apparent and this added to the support from the workplace.

Following the initial stages, the project was able to attract funding from CIBA 2 and the Modernisation Agency. This continued across several contracts until the trust took up funding of the role in 2002.

*d) Planning and evolution* The team spent several months before beginning each stage of the project in planning and establishing ownership amongst the clinical staff. This ensured that each stage had a clear set of aims and objectives and a good idea of how these were going to be achieved. Spending time establishing ownership of the role meant that training could be provided in-house, vital personal contacts between departments were created and compliance amongst staff was achieved.

The role has developed gradually over a number of years. At each stage, clear outcome criteria have been defined. As each stage was completed and established a new goal was set for the role. This has enabled the team to develop at a steady pace with achievable goals at every stage.

*e) Culture* The theatre staff at CS1 aim to do the best for the patient as quickly as possible and for themselves to go home feeling that they have done some good. Staff are willing to stay the extra hour after their list has finished early to fit in an emergency patient because they know that they are helping the patient and that perhaps ultimately saving a colleague from having to work unnecessarily in the middle of the night. If one member saves another from having to work out of hours, that colleague will probably do the same for him in the future. Thus, a reciprocal relationship with the department is created.

Surgical staff do not insist that 'their patients' are necessarily treated by them. As long as the job is done competently all are happy. All staff express concerns freely and engage in open discussions about treatment options etc.

*f) Information*

**i Documentation**

The peri-operative team has developed a simple form to supplement the usual pre-operative anaesthetic assessment form. This form is completed by the PEP when assessing the patient. The form acts as a prompt to the PEP and as an excellent means of 'handing over' the patient to the anaesthetic team. The assessment form does not go immediately into the patient notes, but goes directly to the consultant anaesthetist after the PEP has recounted all the patient information and any action taken. The form later rejoins the patient notes when the notes arrive in theatre with the patient.

**ii Importance of hand over**

The team all communicate freely and are comfortable with having open discussions about treatment plans across professional boundaries. The peri-operative practitioners take responsibility to ensure that vital information about patients is communicated to all members of the team.

**iii Evaluation**

The entire project has been systematically subjected to audit and evaluation through its development. These audits have been used to improve practice, highlight areas of weakness and to inform future developments as well as illustrating the benefits of the service to Trust management.

**Iv Dissemination**

The team has widely disseminated their findings both within the hospital and in the wider health community, through hospital bulletins, published articles and presentations at conferences.

*g) Ownership* All staff appear have a sense of ownership and involvement in what the role aims to achieve. This has been partly brought about by the fact that a large number of specialty groups have been directly involved in the training and development of the role. This sense of ownership can also be attributed to the fact that the role has quite obviously made a difference quite quickly and is a useful addition to the peri-operative team. Because everyone has faith in what the role is trying to achieve (and can see that it is meeting its aims) everyone is happy to be a part of the system. There is a feeling that the PEP and CNS belong to everyone and are there to help. Their role is valued and they value everyone else's role.

*h) Respect and trust* Respect between the professional groups in theatres at CS1 is integral to the success of this role. The consultants in anaesthesia and surgery completely trust the PEPs to carry out their duties. The PEPs communicate, in detail, all the findings from the pre-operative assessments and highlight any areas of uncertainty. Everyone is clear about what their role is and where the professional boundaries lie.

*i) Barriers to success* Trust management had to be convinced of the value of the role. Initially, funding was provided from external sources (ie Modernisation Agency, CIBA2). The Trust did not acknowledge that it would have to commit to concurrent funding if they wanted this role to continue. Cost-effectiveness and safety of the role had to be demonstrated to the trust to secure this funding.

## 6 Cost-effectiveness, effectiveness and safety

As mentioned earlier, this project has been subjected to audit and evaluation through its development with the aim of evaluating its clinical and operational impact on the service. Evaluations and audits were focused on specific outcomes linked to the aims of each stage of the role's development. Key improvements in effectiveness between 1999 and 2001 include:

*a) A reduction in the delays experienced in emergency theatre* Overall reduction of delays by 21% and a specific reduction of delays caused by poor patient preparation of 48%. In addition, delays due to unavailability of surgeon or anaesthetist were reduced by 30.3% and 29.3% respectively.

*b) Redistribution of patients* This figure rose to 10.2% of total of emergency surgery cases whilst the overall number of surgical cases rose by 4.5%.

*c) Out of hours operating* On-call operating time has been reduced by 30% as has the number of patients treated out of hours.

*d) Length of stay* A reduction of 52% in the number of patients whose operations were delayed to the following day. 97% of minor operations were carried out within 24 hours as opposed to 83% the previous year. This meant that fewer patients were occupying beds overnight which may have been required for sicker, more elderly patients. Of the patients assessed by the PEP, 94% had their operation completed on the same day and the median time from diagnosis to surgery was reduced from 12 to six hours.

*e) Theatre utilisation* Between 1996 and 2000 theatres activity rose by 17% yet the Peri-operative Emergency Team managed to increase theatre utilisation from 37.2% to 73%.

*f) Safety* Limited collection (200+ patients) of data on mortality and morbidity for fractured neck of femur shows a mortality rate of 5% for those seen by the Peri-operative Emergency Care Team as compared to a trust wide rate of 14% and national rate of 17%. The team have published these findings in peer-reviewed journals. The references are not mentioned here for the sake of anonymity.

**7 Lessons from CS1 for non-physician anaesthetists**

*a) Training programme* Whilst some members of the team had reservations about a non-physician anaesthetist role in the UK and did not see B's role as comparable, their training programme does illustrate some lessons for a future non-physician anaesthetist role.

A commented that "nurses have the initiative drilled out of them". One of the team's aims was to put back that initiative. This was achieved through the competency based training and practical experience. This impetus was supplemented by the role's lack of formalised protocols and guidelines. A felt that the absence of protocols drives "intelligent thinking".

*b) Communication* In the initial planning stage and at each stage of development, the team ensured that the consultant body was involved and given ownership of the project. This was done by involving consultants in the training for the role, communicating the team's aims and disseminating information about their successes.

Communication and personal skills of the individuals in the extended roles and their project teams are crucial to the innovation. In B, the team were fortunate to have an excellent communicator in terms of personal contact and report writing. B's ability to involve all colleagues and to communicate effectively on a day-to-day basis is crucial. Additionally, the team communicates within itself formally and informally, to highlight potential problems, solve those which have arisen, suggest changes and create innovations.

*c) Innovators* The CS1 experience illustrates that innovation is particularly successful when led and executed by a particular type of individual. All members of the team who were available on the day of the visit were highly enthusiastic

about their work in general and particularly in the development of the role. They created the role "not just to go and talk at conferences" but because that they felt that they could actually make a difference to patient care and to the efficiency of their own working lives.

The team are not afraid of change and appeared to have a dislike of bureaucracy and its stifling effect on innovation. A used the example of protocols and guidelines. A stated that the project had avoided creating protocols, because if you create a written piece of work, you have to circulate it for approval. This in turn affords individuals the opportunity to object and create barriers to innovation. He felt it was better to "just do it" and ensure that the team is available to provide support.

*d) Evaluation* Throughout the role's development rigorous evaluation of the effectiveness, cost-effectiveness and safety has taken place. This has had several effects. Firstly, the evaluation has served to illustrate the role's effectiveness and safety to colleagues within and external to the trust. Its effectiveness has enabled the team to overcome any opposition to the role. Secondly, the evaluation has demonstrated the team's scientific approach and enabled them to learn from the results of their evaluations to continue to develop the role.

**8 Opinions of Peri-operative Emergency Care Team on non-physician anaesthetists**

*a) Clarity of aims* Concern was expressed over the lack of clarity of the scope of the role of non-physician anaesthetist. Several different models were mentioned, but the current lack of clarity was a worry.

*b) Dead end job?* Fears over the future of a non-physician anaesthetist role were expressed. It was felt that the role could be self-limiting and following an initial period where everything was new and exciting, the role could become very repetitive and limited to a set area of work, ie ASA grade 1&2 patients for particular types of surgery.

The practitioners themselves would be limited in the hours that they work and the kind of work they do. Their additional training would mean that in turn the practitioners would be entitled to increased wages.

*c) Perceptions of anaesthesia* A fear that anaesthesia is often perceived as easy was expressed. It was commented that because anaesthesia so often is trouble free, that some may thing that it is easy. This perception belies the fact that a large amount of experience and knowledge contributes to making the anaesthesia look easy. A commented that perhaps some of those applying for training non-physician anaesthetist post might not know what they were letting themselves in for. A commented that adverse events are rare but they do happen and any non-physician anaesthetist has to be prepared for them.

*d) Keen for developments* Whilst some members of the team had grave reservations about the potential non-physician anaesthetist role, others welcomed the development. It was viewed as a natural progression of the developments that have taken place in non-physician roles over the last ten

years. B used the example of his own role to demonstrate that successful extended roles were possible and that the non-physician anaesthetist role was no different.

*e) Who will do the role?* Concern over where this workforce will come from were voiced. One member of the team felt that it would be "robbing Peter to pay Paul" and that any development in the workforce would lead to shortages elsewhere.

*f) Perceptions of non-physician anaesthetist training*

- Minimum of three years on the job training based in hospital but with day release for academic study
- Academic study should include physiology, pharmacology, etc to undergraduate standards
- In terms of "A" level standards, the highest grade would not be expected. Those with As and Bs should go for medical school entry
- The team as a whole thought that it would be acceptable to try the role, evaluate and see what the results are. The debate will not go away until this is done

*g) Evaluation* Evaluation would be key to the non-physician anaesthetist role to demonstrate that safety and effectiveness were maintained and to highlight potential problem areas.

## *7.2 Case Study 2 Thames Valley*

29th April 2003

### Cardiac Anaesthesia Team

| | |
|---|---|
| Consultant Anaesthetist, Chair Division B. | L |
| Cardiac Theatre Manager | M |
| Senior Cardiac Theatre Sister | N |
| Senior Cardiac ODP | O |
| Consultant Anaesthetist | P |

***Timetable***

9.30am Meet with M. Discuss role, training programme and future developments.

10.30am Meet N and O discuss role and views on non-physician anaesthetists.

1.00pm Lunch.

1.30pm Meet with P for informal discussion.

2.15pm Summary discussion with M.

3.00pm End.

L was unavailable on the day of the visit, but was later interviewed by telephone.

***Aims***

1 To investigate the why this innovation came about.

2 To describe the role of non-physician staff in cardiac theatres.

3 To investigate how this innovation was implemented and to look at how and why it has evolved in the years since its inception.

4 To investigate the training for this role and how it was devised.

5 To gather evidence and opinion on how successful this innovation has been.

6 To gather evidence on its effectiveness, cost-effectiveness and safety.

7 To ascertain whether lessons from CS2 experience could be applicable to non-physician anaesthetists.

8 To gather opinion on non-physician anaesthetists in the light of CS2 experience of extending non-physician roles in anaesthesia

## Background

CS2 is part of a Trust which is comprised of four hospitals in the Thames Valley area. This hospital is the largest, with 790 beds and provides A&E, surgery, medicine, paediatrics, obstetrics and gynaecology and cardiac services. CS2 is a teaching hospital with links to University Medical School and a School of Health Care.

The CS2 serves a population in the immediate area of just short of 135,000 with a population average age of 35 as compared to the national average of 39.

There are six anaesthetists working in cardiac theatres, two ODPs (one of which is a long-term filled agency post), two anaesthetic nurses (one of which is a long-term agency filled post) and one newly recruited anaesthetic nurse (due to start work on 1st May 2003).

CS2 has a theatre suite, situated on the lower ground floor of one of its two tower blocks, which contains ten operating theatres. The operating theatres are arranged in a quadrangle connected by adjoining corridors. Three adjacent theatres are used exclusively as cardiac theatres. The hospital does not have any dedicated day case theatres.

For historical reasons the cardiac theatres are financially and organisationally separate from the rest of the theatre department. The cardiac theatres have their own manager and non-physician staff who support theatre clinical staff who work exclusively in cardiac theatres. Four of the consultant anaesthetists are dedicated to cardiac work with the remainder carrying out duties across theatres. SHOs spend six-week rotations in cardiac anaesthesia. Cardiac anaesthesia is a specialisation for SpRs and they spend 12-month rotations as SpRs or as Research Fellows.

### 1 Why did this innovation come about?

The creation of the extended role was influenced by both the desire for increased service delivery and efficiency and the development of non-physician staff skills. Around ten years ago the cardiac team were dealing with particularly high levels of throughput. Non-physician staff had expressed an interest in developing new skills and physicians felt, that because of increased service demands, it would be useful if the non-physician staff could be trained to assist with the anaesthetic preparation of patients. This would assist in speeding up the preliminary stages of anaesthesia and the preparation for surgery and therefore speed up the list as a whole. This move coincided with cardiac theatres decision to recruit dedicated theatre staff rather than sharing staff from the general theatres pool. Since cardiac procedures tend to be relatively lengthy and often uneventful for the anaesthesia team, it was felt that the additional roles for non-physicians would improve job satisfaction and in turn increase recruitment and retention prospects.

### 2 & 3 The role of non-physician staff in cardiac theatres and how it has evolved

The current role includes:

- IV cannulation
- Drawing up drugs
- Insertion of central venous and arterial lines
- Endotracheal Intubation
- Urinary catheterisation

The non-physician staff are frequently asked to assist with procedures outside theatres where staff may be having difficulties. Within theatres, the staff are available to give advice on techniques to junior doctors, should they require it. Paramedic staff attend cardiac theatres for their regular update sessions and are taught these procedures by the non-physician and physician staff.

*Non clinical developments* In the last few years, in addition to the practical skills in the extended role, each non-physician member of the cardiac anaesthesia team has adopted an additional role beyond their duties in theatre. Staff take responsibility for one of the following areas: policy and operation control; audit; education; equipment; and haematology. This part of the role aims to include staff in the operational management of cardiac theatres and to take responsibility for the issues which effect them in their designated area. This, in turn, is part of a wider development of theatre staff to increase job satisfaction, ownership, operational efficiency, clinical effectiveness and to improve the economic efficiency of the department.

The possibility of rolling out the whole of this extended role to general theatre staff has been mooted. This would improve skill base and increase the pool of staff available to work at short notice across all theatres. A difficulty may arise in that in order to maintain competencies all staff would have to carry out a specified number of procedures over a given time period. High levels of repetition of tasks currently takes place in cardiac theatres due to the small number of staff and the volume of work. General surgery would not regularly require the procedures carried out in the extended role and therefore staff would be less able to maintain competence in these skills.

**4 Training programme**

The training of the initial group of staff took place in-house. Physician members of the cardiac anaesthesia team taught practical skills to the non-physician staff. These were carried out under close supervision until a prescribed level of competence had been achieved. This was supplemented by attendance on a two day cardiac study day, ALS courses, pharmacy training. As well as teaching practical skills, the physicians aimed to highlight the problems that non-physicians might encounter and how to deal with them. Once a formal assessment of practical skills had been completed, the staff were given a certificate of competency issued by the department.

Recently, the cardiac team has made moves to formalise the training programme. This has, in part, been prompted by the recruitment of a new member of nursing staff. From January 2003, all non-physician staff have been compiling an activity log of the procedures that they have carried out. These logs will be used to establish a base line for the frequency of repetition of tasks that

will be required to maintain competencies after initial training. A formalised training programme is currently being compiled. Both non-physician and physician staff are in the process of developing an outline programme. Initially, anaesthetist and non-physician will develop their ideal programme and the best of both will be combined.

The new member of staff would be supernumerary until they have achieved the desired level of competency and confidence in the extended role. New members of staff only undertake the extended duties in cardiac theatre if they wish. Regular formalised appraisals of progress and assessments of competencies will be undertaken throughout training to help to highlight and rectify any problem at an early stage.

**5 Effectiveness**

*a) Audit* M has carried out informal audits of operation timings. He has calculated that the work carried out by non-physician staff in assisting the anaesthetist with the preparation of the patient has allows the unit to put through approximately 50 extra patients per year.

The department is funded of six WTE non-physician staff, but is currently operating, and has been for sometime, with only five WTEs. M felt that this has become possible, because the extra skills of the staff have enabled them to work more efficiently.

*b) Haematology* O has the operational responsibility for blood usage in cardiac theatres. Blood products costs account for 36% of the total cardiac theatres budget, therefore financial efficiency is vital to the department. O's work has involved additional training in the interpretation of tests and the operation of blood products equipment. Cell salvage, blood sparing agent, iron strategies etc are all part of O's workload. O has also been involved in the introduction of Safe Track, Blood Track, Safe Release system, which went on line in May 2003. This is a brand new service for the NHS which aims to reduce the wastage of blood products by allowing theatre staff to issue their own blood products from a unit in the operating theatre department. Instead of requesting blood from pathology lab, blood is issued by group type only from a location in the department. Currently, the ratio of blood product wastage is 2:1. CS2 aim to get their wastage down to 1:1.

**6 How successful has this innovation been?**

*a) Stability* This department has experienced a remarkable level of stability in staff. Two members of non-physician staff have been in post for over ten years each. In the last ten years, there have only been two consultant anaesthetist appointments to cardiac division. Agency staff too have remained in post for long periods of time. This has meant that the staff are able to build up a high level of experience and practical skills. P commented that it is doubtful that they could have kept the extended role going if the consultants had to take time out of service delivery to train new staff every year.

*b) Retention of staff* Two of the original members of staff who trained in the role are still in place. In addition, the cardiac team has long-term agency staff

which it has trained in the role. All the non-physician staff interviewed stated that they felt that the extended role gave them greater job satisfaction, more time to devote to patient care and formed an integral part of their continued professional development. Further development of the role to include operational management has enhanced job satisfaction and created the opportunity to develop new managerial skills. Both N and O felt very enthused by their management roles as well as the clinical side of their work. M felt that this kind of development meant that more nursing staff might feel inclined to stay in nursing rather than leaving for managerial positions.

*c) Competency* The high level of throughput and small numbers of staff undertaking the work means that all staff carry out a large number of these procedures. This high level of repetition ensures a high level of practical competency and develops confidence. With this confidence and experience, comes the ability to identify and deal with problems at an early stage. These abilities in turn contribute to the mutual trust felt within the team.

d) *Professional Trust and Respect* The cardiac anaesthesia team is a relatively small team working in a discrete area. This separateness along with the personnel stability has meant that the cardiac anaesthesia team has been able to build up a high level of mutual respect and trust. In addition to their long-standing work relationships, the team members have social contact outside work. All consultants are confident that the non-physician staff are capable and comfortable with the roles assigned to them. Non-physician staff are sure of their position and role within the team and happy to express any concerns. The issue of trust extended to the fact that the non-physicians acted as a "double check" for the physicians on issues such as drawing up drugs. Non-physician staff mentioned that they felt that they were "treated as equals" in cardiac theatre.

*e) Culture*

**i** Value of staff outside theatres

The skills developed by cardiac theatres staff are valued throughout the critical care environment. Staff are called on to assist in ICU and in acute care settings with the siting of central venous catheters and arterial cannulae. Non-physician staff also contribute in the regular update training of paramedic staff.

The non-physician staff felt that their additional practical skills were seen as an asset to the department and hospital as a whole. The management skills developed over recent years have given staff the opportunity to interact with other hospital departments face to face. O's role in implementing ground breaking haematology service innovations has increased her personal profile and that of cardiac theatres.

**ii** Compliance general theatre team

Non-physician members of the cardiac team felt that there was a low level of "jealousy" from other non-physicians and that the cardiac staff with their additional roles in and out of the theatres, were considered by the rest of the theatre staff as more "high powered", but there appeared to be no acrimony. N and M also felt that the cardiac staff were perceived as "happy

to go one step further" and were perhaps more inclined to push the boundaries. The physician members of the general theatre team had no objections to the extended role and could see its value for the cardiac theatre setting. The role has been in place for so long it was difficult to uncover perceptions from the general theatre team as it was viewed as being very much "the norm" at CS2. The extended role has the complete backing of all the consultants in the cardiac service.

**iii** Strong management

The team is lead clinically by L and operationally by M. Both have firm ideas about the future of the department and the extended role of non-physicians. Both these, in addition to the consultants in cardiac anaesthesia, are highly supportive of their staff and keen to promote their good work. Education and professional development are viewed as part of the day-to-day system. The cardiac theatres department has an advantage in that it is financially and managerially separate from the rest of theatres and therefore is able to assert its autonomy.

*f) Formalisation* Although the extended clinical role has been in place for some years, recent moves to formalise the training have strengthened the importance of that role. The development of a formalised training programme utilising all members of the team in its development appears to be strengthening the bonds of mutual respect and continuing to develop the professional abilities of the non-physician staff.

*g) Other developments* The further development of the extended role beyond strictly clinical areas has served to increase confidence, improve independent thinking amongst the staff and promoted a sense of ownership of the service. All staff are capable of dealing with operational problems and finding solutions which are appropriate to their way of working. This model is being considered by the theatre department as a whole as a means of increasing cost-effectiveness and efficiency as well as bringing benefits in terms of recruitment and retention.

*h) Aim of extended role* The aims of the extended role have remained simple and focused throughout the existence of the role. Its aims were and remain to develop the skills and therefore the job satisfaction of the non-physician theatre staff to thereby increase efficiency of cardiac theatres, which in turn would improve the quality of the patient experience. In not setting overly ambitious objectives the team has been able to achieve their aims and then to gradually develop the role.

### 7 Lessons for non-physician anaesthetists from CS2

*a) Culture* There are four key elements to the positive culture that exists at CS2: trust, respect, equality and acceptance. The cardiac team at CS2 have created a culture of mutual trust and respect, born out of working together in a close-knit team for many years. All members of the team – physician, non-physician and management – communicate as equals and regard each other's roles as equally valuable.

In the same way, every member of the team is confident of their role in the team and how that role interacts with other team members. The whole theatre team accepts the extended role for non-physicians in cardiac theatre. Any doubts that may have existed when the role was created have long disappeared as the non-physicians have proved the worth of their extended role.

*b) Training* CS2 has been successful in training staff to carry out anaesthetic procedures competently and safely. It has achieved this through a combination of practical training supported by theoretical knowledge. Using the consultant staff within the Trust to provide the practical instruction ensures that the medical body have a sense of ownership of and a say in the quality of care provided by the non-physician staff. In ensuring that the training programme is reactive to the needs of the trainee, through regular assessments, the CS2 is creating an atmosphere where the trainee can develop whilst protected by the department.

*c) Aims* The extended role at CS2 has clearly defined aims which were developed by the team as a whole and thus fully understood by all members. These aims were simple and achievable. The role was allowed to gradually develop at an incremental pace over several years. The focus of the aims – patient care, service delivery and professional development – was "owned" by the staff and this ensured that they were successful in achieving those aims.

**8 Opinion on non-physician anaesthetists**

*a) Reaction*

- Staff at CS2 were generally in favour of the introduction of non-physician anaesthetists but raised the following questions:
- How long will staff shortfall last?
- How long will it take to train staff?
- Some staff felt that the non-physician anaesthetist role was a natural progression for non-physicians and would increase job satisfaction and thereby increase retention of clinical staff to clinical roles
- If the training for the role had been focused on academic achievement it was felt, by some, that this would deter able staff from applying

*b) Candidates*

- It was felt that particular personal skills would be required to enter a non-physician anaesthetist role
- A candidate would have to have a strong personality able to withstand criticism, have the ability to work alone in a team setting, have a "get on with it" attitude and be assertive enough to know when to stick to their principles
- Academic qualifications were felt to be less important than both experience and personal qualities in choosing candidates for a non-physician anaesthetist training post
- Candidates would need to have some experience, though how much was not quantified, in a critical care setting

- Trust between the non-physician anaesthetist and the rest of the team was felt to be an essential component of the role

*c) Training*

- Essential part of the theoretical training for a non-physician anaesthetist would be pharmacology, physiology, anatomy
- The remainder of the training should consist of the development of competencies in the practical skills, knowledge and confidence

 

## *7.3 Case Stud y Report 3*

East Midlands Hospital

6th May 2003

### Project Team

| | |
|---|---|
| Consultant Anaesthetist and Lead Project Clinician | E |
| Consultant Anaesthetist and Lead Obstetric Clinician | F |
| Obstetric Anaesthetic Assistant | G |
| Consultant Midwife and Non-physician lead | H |
| Representative of Changing Workforce Programme | J |

***Timetable***

| | |
|---|---|
| 8.15am | Meet team and tour maternity theatre suite. |
| 8.30am | Meet with E, Consultant Anaesthetist. |
| 10.00am | Meet with G, Obstetric Anaesthetic Assistant. |
| 11.00am | Meet H, Midwife Consultant. |
| 12noon | Meet with F, Consultant Anaesthetist. |
| 1.00pm | Meet with F and J, Changing Workforce Programme. |
| 2.00pm | End. |

***Aims of case study***

1 To investigate why this innovation came about.

2 To describe the planned role of obstetric anaesthetic assistant.

3 To look at how this innovation has been implemented

4 To investigate the training for this role and how it was devised.

5 To gather evidence and opinion on how successful this innovation has been so far.

6 To gather evidence on its cost-effectiveness, effectiveness and safety.

7 To ascertain whether lessons from the CS3 experience could be applicable to non-physician anaesthetists.

8 To gather opinion on non-physician anaesthetists in the light of CS3 experience of extending non-physician roles in anaesthesia.

***Background***

Case study 3 (CS3) is an approximately 1000-bedded acute teaching hospital on the north side of a major city. The hospital is a Trust in its own right. It is a centre of medical teaching for a major university medical school and works closely with the nearby trusts in clinical and educational planning issues. The

hospital serves a population of 650,000 and a wider population of 2 million for the specialist services it provides.

The hospital is on an extensive site and is made up of a collection of low-rise buildings, the oldest of which is one hundred years old. A central corridor connects the main building with the maternity unit.

The anaesthetic department has no difficulties in recruiting trainees and as a key part of the Regional School of Anaesthesia it is commonly heavily oversubscribed by applicants for its SHO and Registrar training posts. Special study modules in anaesthesia are favoured by undergraduate students from the local university, many of whom go on to apply for positions there later in their careers.

The maternity department replaced an earlier, the victim of asbestos blight. It is a seven-year-old purpose built structure approximately 300 metres from the anaesthetic department and main theatre suite (which contains ten theatres, plus smaller radiography and endoscopy suites). The maternity department has two theatres, one of which is designated as the emergency theatre. The department delivers mothers of approximately 5600 babies per annum with the nearby trust delivering 3500.

Five consultant anaesthetists have responsibilities in obstetrics. On two of the three 'shifts' per day there is a full theatre team consisting on one consultant, two theatre nurses, one ODP/anaesthetic nurse and two recovery nurses, plus nine midwives. Trainee anaesthetists are normally allocated only to the first two of these three 'shifts'. There is a tension between what is expected of the trainees as 'service' providers and their overall training needs in other aspects of anaesthesia. This tension is at the heart of why CS3 is exploring alternative provision of the epidural service.

**1 Why did this new role come about?**

Three reasons initially:

- F has a connection with the Obstetric Anaesthetists' Association (OAA) and contributes to the annual Controversies in Obstetric Anaesthesia meeting. This event involves a debate on a contentious, often hypothetical, issue. He and E had debated this issue for some time and in 1999 F proposed the motion that midwives should be allowed to administer analgesic epidurals to patients in labour. This led to a lively and interesting debate. The issues raised by this debate have contributed to the development of the project.
- E, member of the Council of the Royal College of Anaesthetists (RCA), was party to a growing concern that the pressure of providing epidurals for pain relief out-of-hours not just in this CS3's maternity unit, but nationwide, was depriving the junior doctors of obtaining broader clinical experience The amount of practical experience obtained by junior doctors in training becomes less as the amount of time they spend on service in the maternity unit and intensive care units takes up an increasing proportion of their working week – as dictated by European Working Time Directives.
- This project is developing training modules for peri-operative care. The NHSU, due to be formally launched in Autumn 2003, will be the corporate

university for the NHS providing training and education for all staff. E has been involved in the development of training programmes in peri-operative care and this involvement and interest has fed into the obstetric anaesthetic assistant project at CS3. Although CS3 project slightly pre-dates the NHSU's collaborative work with the RCA it may well provide a module within a broader peri-operative practitioner framework.

After some time considering the issues, E and F put together a project team consisting of an obstetrician, a Consultant Midwife and an external member. The team set about creating a discussion document which outlined the rationale behind the role. This document states that currently, and for the foreseeable future, there exists a huge service demand for anaesthetic services confounded by several factors. A significant burden of the demand for anaesthetic services is derived from obstetrics. There are several choices in dealing with this issue including:

- abandoning or reducing elements of service (a 'fall back scenario').
- reducing the quality of aspects of service to which the team would not wish to be party.
- carrying on with the current methods of responding to events as they arise, increasing service perhaps at the expense of training (which they see as the 'muddle through' route to chaos).
- Seeking alternative providers of the service (their favoured option for part of the obstetric service).

The team felt that the best way forward was to implement a training programme as

"a feasibility project and the document produced is to feed further debate: it is not expected to be reviewed and implemented at a local level." From Obstetric Anaesthetic Assistant Project Governance document.

E stated that the team was "not thinking too much " about what might happen should the evaluation of the project turn out to be positive, but if the evaluation showed the innovation to be applicable nationwide, then as a spin off it would be considered at a local level.

**2 & 3 Describe the planned role of obstetric anaesthetic assistant and how this role is being implemented**

In recruiting, the project team was keen to secure one candidate from a midwifery background and one other from a different non-physician professional group. Despite two advertisements, no midwives applied. One member of the team felt that this was partly due to the intentionally vague job description and how it had been advertised. The project appointed one nurse and one ODP.

Funding had already been obtained from the Changing Workforce Programme (CWP). The role of this agency is to assist clinicians and managers within the NHS to develop and implement new ways of working. Whilst the initial impetus for the project was not to reduce working hours of junior doctors, the

investigation of whether such a reduction was possible became one of the project aims.

At the time of the case study visit the first trainee, G, had just completed the initial stage of her training and was beginning her practical experience on the wards and in theatres. The researcher was unable to observe G at work partly for this reason and also because of the unpredictability of service demands in obstetrics.

The aims and implementation plans for the role have been documented in detail by the team. Below is a summary of a more detailed job description:

*Clinical*

- Provide high quality, credible and authoritative anaesthetic support in obstetrics
- Maintain recognised standards of practice
- To understand and apply a patient centred care approach
- To develop reflective practice
- Recognise and take appropriate responsibility for the administration of treatment and medicines as prescribed in accordance with agreed protocols, local policies and procedures, specifically but not exclusively with respect to epidural analgesia in labour
- To understand the use of and safety issues surrounding equipment used and ensure safe practice according to guidelines
- Maintenance of patient records

*Professional*

- Be pro-active in obtaining and maintaining the knowledge and skills necessary for the role. To develop and expand the role as necessary
- Assist with changes needed to support this role and facilitate effective and safe practice
- Ensure patient dignity, confidentiality, safety and privacy
- Exercise professional accountability and recognise the implication of decisions taken
- Demonstrate the awareness of boundaries and personal limitations
- Keep records of training and participate in audit
- Ensure Health & Safety policies adhered to

*Communication and Team Working*

- Effective communication with patient, relatives, staff and all agencies relating to care of the patient
- Inform and report back to project team on all relevant factors in patient care
- To recognise the need for discretion over potentially controversial aspects of this project, recognising that it is primarily an evaluation issue
- Recognise the significance of the role and act as an ambassador

- Contribute to working culture to encourage flexible team working and effective evaluation of the role
- Be willing to assist the project team after the completion of the evaluation

The role is being implemented in two stages. To reduce pressure on both the trainees and trainers, it was decided that the two candidates should under go their training sequentially. The first candidate commenced training at the end of March 2003 for a six-month period and the second is due to undertake the new role from September 2003. For the duration of the training period the candidates will be seconded from their current roles as recovery nurse and ODP in general theatres, respectively. At the end of the project, they will return to their jobs in theatres, with the provision that they will be free to assist with project activities after the end of the project. The trainees are to be directly supervised by consultant anaesthetists whilst at work and their performance will be monitored both locally and externally by the Obstetric Anaesthetists Association.

E and F have undertaken the role of sponsor for the trainee. Whilst the trainee is responsible for their own conduct, E and F have undertaken responsibility in terms of ensuring that the trainee has adequate training and supervision to be carrying out their duties. The Trust has assumed indemnity for the role. In addition H acts as supervisor and mentor.

**4 How was the training for this role devised?**

The training programme was based on the three principles of attitude, knowledge and skills. E and F adapted the training programme for obstetric epidurals for trainee anaesthetists as developed by the OAA.

The key objectives of the training programme are

*Attitude*

- Demonstrate rapport with patients
- Demonstrate rapport/good working relationships with staff
- Respond appropriately to requests
- Respond appropriately and in a timely manner under stress

*Knowledge*

- Advanced Life Support (ALS), airway management with modifications for late pregnancy
- Pain relief for labour, efficacy, indications and contra-indications
- Anatomy of the spine and the variability of surface anatomical landmarks
- Maternal physiology in late pregnancy
- Effects of epidural anaesthesia on maternal cardiovascular and respiratory function
- Pain pathways for labour pain and relative sensitivities of nerves to local drugs
- Dermatomal levels, assessing the block, determining an inadequate block and management of inadequate block

- Understand when to request more experienced assistance when having difficulty siting an epidural catheter
- Understand the effects of sympathetic blockade in later pregnancy
- Recognition and management of poor performing blocks
- Theory of recognition of life-threatening complications and the understanding and ability to initiate management
- Understand dangers of untested epidural catheter and limitations of aspirational test
- Knowledge and understanding of Confidential Enquiry into Maternal Deaths
- Recognition of major dural puncture and familiarity with protocol for treatment of post-dural puncture headache
- Understand causes and management of adverse events during labour
- Basic practical knowledge of anaesthetic pharmacology

*Skills*

- Ability to use appropriate analgesic technique
- Assessment and preparation of the patient, including good consultation skills and informed consent
- Give correct information
- Aseptic preparation of epidural trolley
- Ability to establish intravenous access and begin intravenous infusion
- Position patient appropriately
- Insert epidural catheter
- Perform aspiration test and respond to result
- Administer test dose according to protocol
- Ensure adequate function of epidural and respond appropriately if not functioning adequately
- Understanding of the management of hypotension and blood pressure
- Monitor onset of analgesia and respond to adverse effects
- Keep records of analgesia
- Request a doctor to write up appropriate intravenous therapy and prescribe top up as necessary
- Leave clear contact details

*Nursing framework*

To ensure that the trainee remains within the professional framework laid down by the NMC, the trainee is completing a package of nursing competency documents, which contains modules on communication and core competencies. Some of this work crosses over with the “medical” training stream, but requires different documentation.

*Assessment*

These objectives will be assessed by summary assessment by the trainers, by attendance on relevant courses, i.e. ALS, pharmacology courses etc and by written work, MCQs and an evaluation of epidurals carried out. G is developing her own case study assignments as a means of expressing her knowledge of pharmacology, physiology, anatomy and technical skills. These will translate into three 800-word essays on anatomy, complications and management of obstetric epidurals and knowledge of the
Confidential Enquiry into Maternal Deaths. G, along with supervision from E and F, will develop a 30 question MCQ for the programme based on her experiences of the project and focusing on what she feels are the important training issues.

Throughout the project G is keeping a logbook detailing all the practical training she undertakes, countersigned by the senior clinician involved. In addition, with the aim of developing reflective practice G has kept a diary of her experiences and reactions.

Summary assessment of practical skills, theoretical knowledge and personal skills will be carried out on a regular basis, formally and informally by the consultant anaesthetists. A formal external assessment will be carried out by a consultant anaesthetist from Leicester. In addition, probably two months from the end of the training period, G will undergo 360-degree appraisal in collaboration with the midwives.

*Practical Training*

G spent the first few weeks of the secondment trying to alter her way of clinical thinking. G spent the time moving between general theatres gaining practical experience of airway management, intubation and other anaesthetic procedures. To achieve this she liaised with the Specialist Registrars. This prevented overcrowding in theatres by having too many people looking for the same training opportunities. In addition, G spent some time in maternity department with the midwives, shadowing their role and speaking with them about their views on the project.

At the time of the case study visit G had just completed a first successful ‘epidural’ and was hoping to spend some more time in theatres that week.

*Theoretical training*

The focus for the development of the theoretical knowledge required for the post has been self-directed learning. G is aiming for the level of knowledge with respect to obstetric epidural anaesthesia attained by an SHO in anaesthesia. At the moment, one day per week has been set aside for study over the six-month training period.

Whilst the overall aims of the training remain unaltered, the programme has sufficient flexibility to adapt to the need of the trainee. These needs will be highlighted by regular formal and informal assessments

**5 How successful has the project been so far and why?**

*a) Communication and team working* The team as a whole has succeeded in communicating their aims to their colleagues within the Trust. The project has

been in the developmental stage for almost a year and each stage of the development has been scrupulously documented. Where necessary, team members have taken the time to discuss issues of concern with their colleagues one–to-one and in small groups. G spent several days shadowing the midwives and using this opportunity to engage in frank and open discussion regarding the issues surrounding the project role. E commented that H has been "positively and quietly convincing the midwives".

The team realises it has made mistakes and thinks it is 'big' enough to listen to and to adapt to criticism as it goes along. Just before the case study visit, a letter had been sent to all the consultant anaesthetists informing them that G was about to begin the practical clinical stage of her training. This letter provoked a negative response from three consultant colleagues. Feeling that this reaction could have been avoided almost entirely had a more personal approach to communicating information been adopted, E set about arranging face-to-face meetings with his consultant colleagues.

The team are aware of the particular personal qualities possessed by each member and are using these talents creatively. They are: F, an international and national leader in Obstetric Anaesthesia as well as a local figure; E is a Council member of the College of Anaesthetists and is Chairman of its Professional Standards Committee, and tries to handle diplomatic issues. H, consultant midwife, liaises with the Royal College of Midwives and is also a Graduate in Law; G, the trainee, is an experienced Recovery Room nurse who the rest of the team regard as its greatest strength.

*b) Compliance* The team accepts that the project is touching on highly sensitive issues and there will be varying levels of acceptance, amongst clinical staff, of what they are trying to achieve. The team realise that whilst some individuals may be swayed in their opinions, some may not and to try to force the issues would be counterproductive. When faced with negative views on the project from their colleagues, G commented that she has not tried to change the minds of those individuals. Instead she has tried to "convince them of the reality" of what she is doing and allow them to reconsider their views.

This method of encouraging workplace change is well documented (Senge 1990, Senge 1994). When questioned, the team felt that their handling of the project was born out of instinctive management skill rather than based on any particular organisational change methodology.

Key to the development of this role has been liaising with the RCA, AAGBI and the NMC. The RCA adopted a policy consistent with their Charter that requires them to protect patients: no outcome that would accept a reduction of current levels of safety would be acceptable. The AAGBI subscribes to the concept of an anaesthetic team delivering a Physician lead service. The NMC have been involved in securing the roles position within the nursing framework. The team have utilised their professional contacts to enable the project to overcome these hurdles.

*c) Team working and co-operation* The whole team appear to work very well together. Put together E, F, G, and H have worked at their trust for over 50

years, and deal with each other as equals. They deal with incidents rather than worrying about whose fault it was. The issue of communication with colleagues as mentioned above is a case in point.

The team are aware that their project has organisational implications on the rest of theatres. Whilst G spent time in general theatres for the first few weeks of training she endeavoured to ensure that her training rota did not clash with that of the junior doctors in training. Several of the juniors appreciated her efforts and reciprocated by working with G to arrange mutually beneficial rotations in the theatres.

*d) Personnel* When recruiting staff the project team considered that the attributes of intelligence and good attitude were the most vital to the role.

In G, the team have chosen a particularly able and intelligent first candidate for the role. Both E and F commented on G's exceptional ability in developing the practical skills required for the role. Also evident is G's enthusiastic, "can do " attitude. F complimented G on her fervour to acquire more knowledge and experience. Rather than be discouraged by new and possibly intimidating experiences, G has displayed an eagerness to try, and faced with difficulty try again. E commented that G is an ideal trainee as it is better "to have to gently restrain than to have to constantly urge".

G's enthusiasm is possible because of her confidence in the consultant leads. The anaesthetic leads are both highly respected and experienced individuals. Both have a long experience of training junior doctors. G feels that she is in a very safe learning environment, where she can be allowed to undergo new experiences without fear that she or the patient will come to harm.

H is a very able and experienced nursing mentor and is constantly endeavouring to protect the professional interests of the trainees. E has an increasing respect for her strengths.

*e) Training* The team have put together a comprehensive and achievable training programme. In developing this tool, they have utilised and adapted existing programmes. This ensures that the training is tried and tested (though for in some cases a different professional group) and that development time is not wasted.

The training programme has the flexibility to allow the trainee to self-direct their learning and where necessary to further adapt and add to modules. Since this trainee is the first to go through the training, this flexibility within the programme allows the team as a whole to react to the trainee's educational and training needs.

Self-directed learning affords the trainee the opportunity to develop "independent thinking". One of the aims of the training programme is to enable non-physicians to acquire the ability to make informed clinical decisions and react appropriately to situations without instructions from a physician colleague.

G mentioned that the reflective diary has been particularly useful when contemplating difficult situations she has encountered and realising how she

dealt with those events. Also the diary has been a source of encouragement when considering positive experiences.

The team remains cautious about the outcome of the training programme. Whilst G has proved to have had a positive reaction to the training programme, it remains possible that the programme may have to be adapted for other candidates because of their specific learning needs. The team is conscious of this and has put in place procedures to react.

*f) Aims of the project* The team have made it clear throughout that the project has a limited remit. Their aim is to carry out a feasibility and evaluation study of obstetric anaesthetic assistant role. By creating clearly defined aims, the team have contributed to ensuring the compliance of the professional bodies. In such a sensitive and controversial area, limiting the scope of the role makes acceptance by professional bodies and colleagues more achievable.

Similarly, in focusing on a small number of objectives, the team have increased their chances of success. The team has been quite clear that they are not planning beyond the end of the project. Firstly, this might pre-judge their findings and secondly to look further ahead might distract the team from the project in hand.

Whilst in discussion with the team members it was clear that not only did the project have several different sources of inspiration from within the team, but also the team members all had a slightly different view of the project. Whilst some of these perceptions were not identical it was obvious that all members of the team were aware of the opinions of others and accepted them as valid. The team's ability to accept divergent aims within the team and include these in the group objectives is a fundamental quality in achieving success.

## 6 Evaluations

During the case study visit, the team was visited by J, the external assessor, representing the Changing Workforce Programme. J was visiting to assist the team in developing evaluation tools for the project. Following discussions with H, it was felt that a straight-forward assessment of the time between the request by the patient for epidural analgesia and the time that the epidural was performed would be inappropriate. Evaluating the role on the dural tap rate was also felt to be unlikely to yield useful results as this rate is understood to remain between 2% for difficult epidurals and trainees under minimal supervision and 0.26% for experienced practitioners. Instead, the team are looking at comparing consultant and non-physician trainee statistics for the number of attempts required to site a catheter, quality of lock, re-orientation, ease of insertion and incidents of parasthesia.

Other evaluation tools are in the process of being developed.

## 7 Lessons for non-physician anaesthetists

*a) Communication* Communication has been the keystone to establishing this project. The team have been able to clearly communicate their aims and objectives to internal and external bodies through written documentation and

face-to-face contact. In communicating their plans the team have exploited their wide range of professional contacts and utilised the considerable diplomatic and arbitration skills of their experienced staff. Throughout the project development and implementation the team has striven to involve all professional groups in the process.

Though the team spent quite some time in the development stage, getting consensus from the professional groups involved, F commented that in retrospect, perhaps even more time should be devoted to this stage of the process.

The team has learnt that when dealing with such a sensitive issue, face-to-face communication can be a powerful tool. Such an approach would be valuable when developing and implementing non-physician anaesthetists.

*b) Training programme* The team has successfully developed a training programme which combines practical and theoretical study in workable proportions by utilising existing programmes. This has been carefully integrated with the nursing framework documents.

In developing self-directed learning and reflective practice for the trainee role, the team has encouraged independent and intelligent learning processes. This independent thinking is encouraged by the existence of guidelines for the operation of the role rather than protocols. The training programme, through regular assessment, is able to adapt to the needs of the trainee.

*c) Compliance* The team has been realistic in understanding that varying levels of compliance are acceptable in any changing environment. This pragmatic response has ensured that the team have identified where each of their colleagues lie on a compliance scale and collaborated with them appropriately.

*d) Limited aims* The team has carefully limited the aims and objectives of the project. This ensures focus on that which can be achieved and compliance from colleagues trust wide and externally.

*e) Staff selection* The team was clear in the development stage about what kind of individual they were looking for. Intelligence and attitude were rated highly. Their selection has, so far proved a success. These qualities allow the individual to self-direct both their practical and theoretical learning and ensures that they have the personal skills to fulfil the “attitude” section of their training.

The confident trainer will “show and rescue when necessary”. All the project leads are experienced and confident.

*f) Culture* As well as having “can do” thinking staff, the anaesthetic department at CS3 has some evidence of an innovative culture. The department is also involved in a pilot to develop non-physician skills in cardiac anaesthesia.

**8 Opinion on non-physician anaesthetists**

All members of the team were in favour of the idea of developing non-physician anaesthetist practice in the UK for the following reasons:

Nurses have been encroaching on traditionally medical roles for a number of years and the development of non-physician anaesthetists would be a logical continuation of that trend. Surgical assistants (First Assistant in surgery) and nurse endoscopists had reduced concerns within the medical profession and more individuals were open to the idea

Intensive care medicine was felt to be have very much in common with "...but for very sick patients", where a team of highly trained nurses cared for a number of patients supervised by a consultant

For these reasons, the positions held by some of the medical professional bodies was felt to be no longer "logically tenable" and they would have to respond to the pressure for change

One individual also felt that much of the anaesthetic workload was "routine medicine" which involved a high level of practical skills and could be ably performed by non-physicians

Nurses work, by nature, in a practical way and are trained to recognise when they need to ask for help and do this often more readily than a junior doctor and this role would suit nurses

It was felt that a non-physician anaesthetist role would be developed in a "matter of time"

*Barriers* One member of the team commented that a significant proportion of resistance from within anaesthesia was likely to come from the younger doctors. Since doctors in training rarely get the opportunity to be seconded in Europe and the US as part of their training, they often lacked the experience of working with non-physician anaesthetists which their older colleagues had gained

Also, it was noted that the younger anaesthetists would "have to live with" non-physician anaesthetists and the consequences for a much longer period and they were therefore keen to maintain the status quo

The development of a training programme and recruitment of large number of staff required was felt to be a potential barrier to success as this part of the implementation was viewed as a huge endeavour

The control of surgical lists by the surgeons and the intervention in the creation of those lists by several other parties was felt to be a potential barrier. Whilst it was thought that surgeons might give over the control of the emergency lists to anaesthetists, other lists might be more problematical

*Candidates* Experience of working in an acute setting was thought to be vital to the role. Five years experience was mooted as a minimum standard

Academic qualifications were not felt to have the same weight as experience

Confidence and competency were felt to be vital attributes for the role

*Training programme* It was felt that the training programme should include:

- Airway management
- IV access

- Practical skills

plus

- Pharmacology
- Physiology
- Physics

| Advantages | Disadvantages |
|---|---|
| Overcome staff shortages | If non-physician anaesthetist protocol driven, they are likely to have a very slow turnover |
| "Spread medical anaesthetists a little further" | Cost effectiveness doubtful |
| Reduce the "boredom and keep the exciting bits" | |
| Improved career and pay prospects | |
| Recruitment and retention – stop the loss of the best non-physician staff | |

## Update

September 2003

The Obstetric Anaesthetic Assistant project lead telephoned the researcher to update on the progress of the project.

### *Practical Experience*

G has carried out over 50 epidurals and has passed a practical assessment carried out by an external assessor. In terms of her practical abilities the team are satisfied.

### *Academic achievement*

More problematic has been the requirement to complete three written assignments and a series of MCQs. E felt that G had identified difficulties that non-physicians might have in dealing with the volume and complexity of knowledge required and the complexity of dealing with academic projects. However, G's attitude was such that she will continue to work on her academic projects beyond the end of the six-month training period. When these have been successfully completed she will be formally validated. An oral exam has been recommended by the external assessor who will review the academic projects

### *Do differently next time?*

This has led the team to reconsider the training for the next candidate. They have decided that the second candidate will undergo the training programme on a part time basis over a longer time period. This would allow her the time to

develop the skills necessary for acquiring, compiling and synthesising the theoretical knowledge to accompany her practical experience.

***Consensus***

When the initial visit took place the team were still dealing with developing a consensus amongst medical and non- medical colleagues to the implementation of the role. Of the four consultant anaesthetists working with the project, two gave their unequivocal support, one equivocal support and one was not involved in the project at all. Gaining acceptance from the midwives was dealt with either by G or H.

***The next steps***

E aims to get funding from the Trust to keep G working one day a week as an Obstetric Anaesthetic Assistant over the next year, but this is by no means certain. Both E and F have tried to divert other limited funds to the project. Without this, G is at risk of losing her skills, even if the original aim of the project, 'feasibility', is proved. E is aware that nationally the development of similar models for critical care practitioners are about a year behind the work which has been done at CS3.

***Evaluation***

G underwent a formal assessment on her practical skills by an external assessor.

G had no dural taps.

Only one epidural presented her with problems, which were resolved with difficulty by F.

The team are looking to develop a model which would illustrate how the introduction of the role of Obstetric Anaesthetic Assistant would affect the department's ability to deliver service and training to junior doctors during day time hours only. The model would include three levels of service to both patients and trainees.

Level I - able to deliver service to patients and training

Level II – able to deliver service to patients, ability to deliver training compromised

Level III – both ability to deliver service to patients and training compromised.

The local RCA tutor is monitoring any potential reduction in training opportunities for anaesthetists.

The team will be reviewing the project in late October.

## *7.4 Case Study 4*

### Hospital in UK Capital

13th May 2003

Senior Lecturer in Dental Sedation K

***Timetable***

9.30am Arrive and initial discussion with K.

10.15am Investigate training programmes.

11.15am Tour dental laboratories and watch undergraduates carry out sedation.

Discussion with dental colleagues.

12.15am Discussion with K.

***Aims***

1 To investigate why this practice came about.

2 To describe the role of non-anaesthetist staff in sedation.

3 To investigate how sedation is conducted and how it has evolved since its introduction.

4 To investigate the training for this role and to describe how it was devised.

5 To gather evidence and opinion on how successful this practice has been.

6 To gather evidence on its effectiveness, cost-effectiveness and safety.

7 To ascertain whether lessons from dental sedation could be applicable to non-physician anaesthetists.

8 To gather opinion on non-physician anaesthetists in the light of CS4 experience.

***Background***

CS4 is part of one of the largest hospital trusts in the country serving over 750,000 people in London. The hospital is part of a larger trust which works closely with a school for the training of medical, dental and allied health professionals.

The trust and its medical education programme underwent a major merger in 1998

**1 How did this practice come about?**

*Recent History* Until the 1990s, dental general anaesthesia (GA) was the commonplace in community dental practice. Dentists both administered GA and conducted the dental procedure. Dentists were always assisted by a trained assistant, either a dental nurse or another qualified dentist. Due to publicity regarding deaths of patients under general anaesthesia in dental surgeries, particularly small children, public perceptions began to change and the acceptability of the practice became questioned within dentistry and anaesthesia.

In 1990, the Poswillo report on General Anaesthesia, Sedation and Resuscitation in dentistry (Poswillo et al 1990) was the instigator of change in this area. It was the first report to suggest that general anaesthesia in dentistry should be restricted, with the majority of cases being referred to secondary care. This was followed by the RCA report in 1999, which recommended that GA should be only carried out in primary care under specific circumstances (RCA 1999). Sedation and local analgesia are recommended as suitable options. This effectively removed support for GA in general dental practice and acted as a practical ban through the loss of support of the General Dental Council (GDC). The 2000 report, a Conscious Decision (Donaldson et al 2000), drew a line under GA in general dental practice making a complete ban effective from 31st December 2001 and restricting dental GA to hospital settings with critical care facilities.

Options left to general dental practitioners for pain and anxiety relief were either local anaesthesia or conscious sedation using a variety of methods.

**2 & 3 What is the role of the non-anaesthetist dentist in sedation, how is sedation carried out and how has it evolved since its introduction?**

*Sedation* The General Dental Council defines conscious sedation as:

*"A technique in which the use of a drug or drugs produces a state of depression of the central nervous system enabling treatment to be carried out, but during which verbal contact is maintained throughout the period of sedation. The drugs and techniques used to provide conscious sedation for dental treatment should carry a margin of safety wide enough to render loss of consciousness unlikely."*

*"The level of sedation must be such that the patient remains conscious, retains protective reflexes and is able to understand and respond to verbal commands."*

General Dental Council, May 1999

Dental sedation can be achieved through either the oral or intravenous administration of sedative drugs or the inhalation of sedative gases and suggestion.

Sedation techniques described below are carried out by the dentist. The dentist is always assisted by a trained colleague, either a dental nurse or a fellow dentist.

*Inhalation sedation* Patients may be sedated using Relative Analgesia or as it is more often known Inhalation Sedation. This technique uses sub-anaesthetic concentrations of nitrous oxide gas to produce a state of relaxation in the

patient. This is complemented by the use of meditative suggestion by the dental sedationist.

Nitrous oxide is not very potent and therefore carries a wide safety margin. In the correct dosages, it has very few cardio-vascular side effects. Recovery from analgesia is almost instantaneous. Once nitrous oxide is stopped patients are given at least two minutes of Oxygen and the Nitrous Oxide is quickly expelled from the body. This technique is commonplace, and is especially useful for needle phobic patients.

*Oral and intravenous sedation* Oral and intravenous sedation utilise pharmacological methods to achieve sedative effects in patients. Drugs from the benzodiazepines group such as diazepam and temazepam had been used in sedation practice for some years. When midazolam was introduced its sedative effects combined with its high level of reliability, low side effects, ability to titrate and predictable and speedy recovery made it the drug of choice and resulted in increased interest in sedation techniques for dentistry. The drugs which had been previously used for sedation had much longer recovery times and less predictable outcomes in terms of the sedative effects on the patient.

**4 Investigate the training for this role and how it was devised**

*Training: Undergraduate level* Undergraduates have been obliged to study a module on sedation and special care dentistry for the last twelve years. It is included as part of the undergraduate programme as the GDC feel that it is a core skill, regardless of whether the dentist goes on to use it on a regular basis once qualified.

Undergraduate training is based on the recently reviewed GDC guidance from August 2002, Murray et al (2002). The review considered the changes in dental anaesthesia since the previous review. Sedation and general anaesthesia section is now called pain and anxiety control.

The training specifies that students should study:

*"102. The value and range of behavioural non-pharmacological methods of anxiety management must be emphasised."*

*"104. All dental students must have a range of practical experience in the administration of inhalation and intravenous conscious sedation including assessment and preparation, care under treatment, and recovery and discharge of patients receiving conscious sedation……Dental students should graduate with a full recognition of their limited experience in the use of conscious sedation techniques and of the necessity for postgraduate study and instruction in such forms of pain and anxiety control.*"

Murray et al (2002)

*Outline of CS4 undergraduate programme*

*Aims*

- To recognise the importance of careful case selection and treatment planning for patients receiving treatment under conscious sedation

- To provide experience of carrying out dental treatment under conscious sedation

*Objectives*

At the end of the course the student will be able to:

- Demonstrate an understanding of the pharmacokinetics and pharmacodynamics of sedation drugs
- Recognise the indications and contraindications to sedation
- Discuss the assessment, selection and treatment planning of patients requiring sedation
- Describe and explain the advantages and disadvantages of oral, intravenous and inhalational sedation techniques
- Describe the operation and use of equipment used for the administration of sedation and physiological monitoring devices
- Demonstrate an understanding of the significance of changes in physiological variable before, during and after sedation
- Recognise the importance of safe recovery and appropriate discharge criteria
- Demonstrate competence in carrying out dental treatment under sedation
- Recognise, explain and demonstrate the immediate management of common complications associated with sedation

CS4 undergraduate study programme (2002)

Training is carried out on a 90% competency and 10% theory basis.

*Postgraduate Level: Study of sedation* Sedation in dental primary and acute practice has become more commonplace. Increasing interest in providing sedation services is evident from the increase in demand for postgraduate courses run by Guy's. Short courses (2-3 day improving skills or refresher) have doubled in size in the last two years and the nine-month-long diploma course is over subscribed by a factor of ten, despite its £3000 price tag.

*Diploma*

The diploma course consists of four days teaching plus six months of two clinical sessions a week and self directed learning programme. Assessment for the diploma is by short project report. The course is made up of four modules:

- Applied basic science
- Intravenous sedation techniques
- Inhalation sedation techniques
- Management of complications

*Objectives*

- Self motivation and the ability to learn and think critically
- An ability to evaluate and analyse scientific evidence
- A good knowledge of this area of dentistry

- An understanding of a basic range of research methods
- Communication skills relevant to this area of dentistry
- Competency in appropriate skills

CS4 training programme for both under graduate and postgraduates emphasises the need for repetition and the experience this affords. K felt that this repetition and increased level of experience leads to competence. Competence coupled with experience and knowledge creates confidence.

**5 How successful has this practice been?**

Due to the ending of GA in dentistry sedation is becoming increasingly popular as a means of dealing with anxious or phobic patients. Demand for postgraduate training at CS4 illustrates this increase in demand. Similarly, courses on dental sedation run by the Society for the Advancement of Anaesthesia in Dentistry (SAAD) are consistently popular.

Sedation provides a means by which the extremely anxious and special needs patients may undergo dental procedures safely and without causing undue distress to the patient. With sedation, these procedures can take place in the familiar surroundings of a dental surgery, often removing the need to attend an acute facility and experiencing all the attendant stresses. Failure to attend is a factor in the treatment of the anxious patient and measures which increase the likelihood of attending an appointment can only be beneficial.

The training for sedation at CS4 is guided by the following:

Repetition leads to experience leads to competence leads to confidence.

DC feels that this guiding principle has resulted in successful training for both undergraduate and postgraduates.

**6 Effectiveness**

At Guy's, in the last 12 years approximately 30-40,000 sedatives have been administered by both qualified staff and students under supervision without major incident. K put this excellent success rate down to the titration regime used at Guy's.

**7 Lessons for non-physician anaesthetists**

K felt that the philosophy behind the training in sedation at CS4 could provide a sound basis for the training of non-physician anaesthetists. It was felt that training based on theoretically knowledge enforced by repetition. The ensuing experience would result in confident and competent practitioners. In this way, practical skills and experience are valued.

K felt that the selection of trainers is crucial to the training process. Trainers must possess sufficient experience to be confident of their own skills and abilities. Patience and a calm attitude are vital in trainers. K felt that the ability "to walk away" and allow trainees to gain experience without overbearing supervision is crucial to the trainees development.

### 8 CS4 opinion on non-physician anaesthetists

*a) Reaction* It was felt that non-physician anaesthetists are common in Europe and US, so it is evident that it can be done. However, it was felt that anaesthesia in the UK would resist, more because of prejudice than evidence.

Anaesthetics is too young a specialty to feel comfortable enough with its position in medicine to allow the non-physician anaesthetist role to be trialed.

*b) Barriers* Though it was suggested that probably 50% of anaesthetists would have grave reservations about the introduction of non-physician anaesthetists, probably only a minority of 10% would vocalise their views. This minority vocal group was felt to have sufficient influence to prevent any change coming into place.

*c) Enablers* Governmental pressure, perhaps accompanied by some kind of sweetener for the specialty, may force the introduction of non-physician anaesthetists.

Shortage of anaesthetists would make the implementation of the new role necessary. It was questioned whether the shortage of anaesthetists was a long-term issue or likely to be resolved in a number of years by measures already taken by the specialty to increase training places.

*d) Qualities required*

Human biology knowledge

Manual dexterity

Attitude –

- A commitment to the new role
- Interpersonal skills
- Not loners, but prefer team players
- Not people who want to be “mini-doctors” and want more out of job than is on offer.
- Interest in anaesthesia, pharmacology etc
- An academic background was not felt to be an important attribute.

*e) Training* Training for non-physician anaesthetist role should be provided by a multi-disciplinary team led by anaesthetists. Training should be to the equivalent to the level of training and education attained by SHOs. An “apprenticeship” model was preferred as it would provide the necessary knowledge, experience and assessment of skills. The programme should be 90% competency based and 10% theory.

It was felt that careful selection of the anaesthetists leading the training was vital. It would be necessary to select consultants with a certain level of experience and confidence in their own abilities who could have a positive, encouraging effect on their trainees. The ability to remain calm in stressful situations as a trainer is a vital attribute.

Dentists involved in sedation could be involved in developing a future training programme in sedation. Dentists are familiar with pitfalls in training and could act as a balance between any extreme viewpoints.

It was felt that there was a potential for the training programme to be "doomed to failure". The training could too easily "overburden "non-physician anaesthetists with theoretical information. It was felt that the main thrust of the theoretical training should be in minimising anaesthetic risk and dealing with complications that occur as a result of anaesthesia.

*f) Organisational change* Organisationally, any trust undertaking the training of non-physician anaesthetists would have to consider how to arrange the opportunities for training without having a detrimental effect on the training of junior doctors.

Salary scales and employment issues were thought to be an organisational issue that would have to be dealt with. The non-physician anaesthetist's place in theatres staffing structure would have an effect on their relationships with their colleagues. It was suggested that the non-physician anaesthetists should perhaps be a new category of Allied Health Professional.

| **Advantages** | **Disadvantages** |
|---|---|
| More staff in the pool | Patients not as closely supervised by senior staff |
| Lower costs | Assessment of patients would remain the responsibility of anaesthetists. |
| Development of role could lead to extra staff in pain management ICU, etc | Not going to be politically acceptable. Surgeons and anaesthetists don't always get along. How much harder would it be for a non-physician anaesthetist? |
| | Dentists feel that criticism directed towards them by the anaesthetists has been particularly vicious. Would non-physician anaesthetists be subjected to the same? |

# Appendix 8

**Interview questionnaire - stakeholders**

Target group

Staff involved in intraoperative care - medical and non-medical

Theatre managers, workforce managers (training, education & development), NHS agencies (CWP, WDC, Modernisation Agency), Professional associations, governing bodies of professional groups, patient liaison.

ID code, ID job type

- How do you feel about the creation of a non-physician role?

  Positive thoughts Negative thoughts
- What factors might act as barriers to the creation of non-physician role?

  Non medical professionals / Medical Profession / Political / Organisational / Psychological /patients
- What factors might act as enablers to the creation of a non-physician role?

  Non medical professionals / Medical profession / Political / Organisational / Psychological / patients
- Presuming staff are to be trained for the role after appointment, what minimum standards would be required of candidates for such a post in terms of:

  knowledge / skills / attitude / experience / qualifications
- How should the training for this role be determined?

  What should the focus of the training be?

  To what level should staff be trained?

  (Equivalent to other staff or academic qualification?)
- What do you see as an ideal workforce model?
- What organisational changes do you feel would have to take place in order for this new role to be implemented?
- What do you see as the potential advantages and disadvantages of a non-physician anaesthetist role?

# Appendix 9

**Interview questionnaire – Case Studies**

Target group

Staff involved in extended anaesthetic roles for non-physicians.

Get background of introduction of new roles. How long in action? Was this individual one of the originators?

- What obstacles had to be overcome to implement this role? (In development and at present)
  *Non medical professionals / medical professionals / political / organisational / psychological / patients*
- What factors assisted in the implementation of this role? (In development and at present)
  *Non medical professionals / medical professionals / political / organisational / psychological / patients*
- What minimum standards do you look for in candidates?
- How was the training for this role determined?
- What organisational changes had to take place in order for this role to be implemented?
- Who led the changes?
- How long did it take for these changes to be accepted within the organisation? (If at all)
- What do you see as the advantages and disadvantages of this extended role?
- With your experience in extended roles in mind, what is your immediate reaction to the idea of non-physician anaesthetists?

  Positive Negative
- Should this role be introduced, how do you feel your experience could inform that process?

  *Barriers / enablers / organisational / political / professional boundaries / psychological / patients*

# Appendix 10 Literature search protocol for databases

## *10. 1 Medline Search Protocol*

All searches limited to publication year 1990-2002

| | | |
|---|---|---|
| 1 | (explode anesthesiology/all subheadings in MESH) | 5015 |
| 2 | (explode anesthesia/all subheadings in MESH) | 44046 |
| 3 | Anaesthes* in ti | 32001 |
| 4 | (nurse-anesthetists/all subheadings in MESH) | 1076 |
| 5 | (physician-assistants/all subheadings in MESH) | 838 |
| 6 | (health-manpower/all subheadings in MESH) | 1481 |
| 7 | (health-personnel/all subheadings in MESH) | 6979 |
| 8 | (nursing/all subheadings in MESH) | 7722 |
| 9 | (operating-room-technicians/all subheadings in MESH) | 248 |
| 10 | non*physician near an*esthe* | 13 |
| 11 | (nurse an*esthetist*) | 1084 |
| 12 | (patient-care-team/all subheadings in MESH) | 20597 |
| 13 | (operating department practitioner ) | 1 |
| 14 | (patient-care-team near an*esthes*) | 0 |
| 15 | explode health-facilities/all subheadings in MESH | 171456 |
| 16 | (explode treament-outcome /all subheadings in MESH) | 147456 |
| 17 | (health-services-administration/all subheadings in MESH) | 1447 |
| 18 | (organization-and-administration/all subheadings in MESH) | 691 |
| 19 | (hospital-patient-relations/all subheadings in MESH) | 1366 |
| 20 | (hospital-physician-relations/all subheadings in MESH) | 739 |
| 21 | (explode patient-care-management/all subheadings in MESH) | 176602 |
| 22 | (explode health-care-quality-access-and-evaluation/all subheadings in MESH) | 1571567 |
| 23 | (explode quality-of-healthcare/all subheadings in MESH) | 1432428 |

| | | |
|---|---|---|
| 24 | Outcome-and-process assessment (Healthcare)/ all subheadings in MESH) *not* | 7375 |
| 25 | (cost* adj effective*) | 5425 |
| 26 | (economic near evaluation) | 2008 |
| 27 | (explode healthcare-economics-and-organization/ all subheadings in MESH) *not* | 389676 |
| 28 | (explode risk/all subheadings in MESH) | 235389 |
| 29 | (intraoperative-complications /all subheadings in MESH) | 10044 |
| 30 | (risk management in ti) | 887 |
| 31 | (risk near (management in ti)) | 1642 |
| 32 | (risk near (assessment in ti)) | 3878 |
| 33 | (risk near (factor* in ti)) | 22080 |
| 34 | (an*esthe* complication*) | 327 |
| 35 | an*esthe* near provider | 134 |
| 36 | outcome* near provider* | 1004 |
| 37 | (explode education/all subheadings in MESH) | 169327 |
| 38 | (explode professional-competence/all subheadings in MESH) | 24345 |
| 39 | (education near nurse an*esthetist*) | 288 |
| 40 | (education near non*physician) | 20 |
| 41 | (explode interprofessional relations/all subheadings in MESH) | 14019 |
| 42 | (negotiating/all subheadings in MESH) | 1940 |
| 43 | (professional-patient relations/all subheadings in MESH) | 4982 |
| 44 | (communication-barriers/all subheadings in MESH) | 1423 |
| 45 | (public-opinion/all subheadings in MESH) | 5074 |
| 46 | (group-processes/all subheadings in MESH) | 2674 |
| 47 | (interviews/all subheadings in MESH) | 7632 |
| 48 | (cost-benefit-analysis) | 21671 |
| 49 | (cost-effectiveness-analysis) | 6 |
| 50 | (costs-and-cost-analysis) | 11933 |
| 51 | (explode cooperative-behavior/all subheadings in MESH) | 3788 |
| 52 | (collaborati* near professional) | 756 |
| 53 | (cooperati* near professional) | 287 |
| 54 | #1 OR #2 OR #3 | 55604 |

| | | |
|---|---|---|
| 55 | #4 OR #5 OR #10 OR #11 OR #14 | 1922 |
| 56 | #6 OR #7 OR #8 OR #9 OR #12 OR #13 | 36687 |
| 57 | #54 OR #56 | 91990 |
| 58 | #57 AND #55 | 800 |
| 59 | #15-#53 (OR) | 1879889 |
| 60 | # 58 OR #59 | 634 |

## *10.2 Cinahl Search Protocol*

| | **Search Terms** | **No of Hits** |
|---|---|---|
| All searches limited to publication year 1990-2002 | | |
| 1 | (Explode anesthesia/all topical subheadings/ all age subheadings in de) | 3248 |
| 2 | (Explode anesthesiology-service/all topical subheadings/all age subheadings in de) | 58 |
| 3 | (advanced-practice-nurses/all topical subheadings/ all age subheadings in de) | 1193 |
| 4 | (clinical-nurse-specialists/all topical subheadings/all age subheadings in de) | 2279 |
| 5 | (nurse anesthetists/all topical subheadings/all age subheadings in de) | 824 |
| 6 | (explode anesthetists-/all topical subheadings/all age subheadings in de) | 853 |
| 7 | (operating-room-personnel/all topical subheadings/ all age subheadings in de) | 496 |
| 8 | (physician-assistants-/all topical subheadings/all age subheadings in de) | 1256 |
| 9 | (health-manpower/all topical subheadings/all age subheadings in de) | 239 |
| 10 | (anesthesiolgists/all topical subheadings/all age subheadings in de) | 236 |
| 11 | (nurse-anesthetist*) | 838 |
| 12 | (non*physician near an*esthe*) | 12 |
| 13 | (advanced-practice-nurse*) | 1246 |
| 14 | an*esthe*in ti | 2749 |
| 15 | (explode health-services-administration/all topical subheadings/all age subheadings in de) | 226847 |
| 16 | (health-care-reform/all topical subheadings/all age subheadings in de) | 3603 |
| 17 | (clinical near effective* in ti) | 447 |
| 18 | (management near effective* in ti) | 468 |
| 19 | (cost* near effective* in ti | 1262 |
| 20 | (economic near evaluation in ti) | 69 |
| 21 | cost-benefit-analysis | 2870 |
| 22 | cost –effective*-analysis | 0 |

| | | |
|---|---|---|
| 23 | (explode costs-and-cost-analysis/all topical subheadings/all age subheadings in de) | 12728 |
| 24 | (economic-aspects-of-illness/all topical subheadings/ all age subheadings in de) | 581 |
| 25 | (economic-value-of-life/all topical subheadings/ all age subheadings in de) | 31 |
| 26 | (explode health-resource-allocation/all topical subheadings/all age subheadings in de) | 1439 |
| 27 | (health-resource-utilization/all topical subheadings/ all age subheadings in de) | 781 |
| 28 | (health-services-needs-and-demand/all topical subheadings/all age subheadings in de) | 1623 |
| 29 | (strategic-planning/all topical subheadings/all age subheadings in de) | 1356 |
| 30 | treatment outcome* | 14194 |
| 31 | (risk near management in ti) | 688 |
| 32 | (risk near assessment in ti ) | 554 |
| 33 | (risk management/all topical subheadings all age subheadings in de) | 2001 |
| 34 | risk factor* near an*esthe* | 177 |
| 35 | (risk-factors/all topical subheadings/all age subheadings in de) | 14924 |
| 36 | (risk-assessment/all topical subheadings/all age subheadings in de) | 2759 |
| 37 | (explode patient safety/all topical subheadings/all age subheadings in de) | 7012 |
| 38 | (intraoperative-complications/all topical subheadings / all age subheadings in de) | 367 |
| 39 | (an*esthe* complication*) | 72 |
| 40 | education near nurse-anesthetist* | 12 |
| 41 | (education/all topical subheadings/all age subheadings in de) | 7550 |
| 42 | (clinical-supervision/all topical subheadings/all age subheadings in de) | 154 |
| 43 | (collaboration/all topical subheadings/all age subheadings in de) | 4570 |
| 44 | (interprofessional-relations/all topical subheadings/ all age subheadings in de) | 2826 |

| | | |
|---|---|---|
| 45 | (intraprofessional-relations/all topical subheadings/ all age subheadings in de) | 2556 |
| 46 | (professional-practice/all topical subheadings/all age subheadings in de) | 2032 |
| 47 | (professional-autonomy/all topical subheadings/all age subheadings in de) | 959 |
| 48 | (explode group-process/all topical subheadings/all age subheadings in de) | 29128 |
| 49 | (attitude-to-health/all topical subheadings/all age subheadings in de) | 3122 |
| 50 | (patient-satisfaction/all topical subheadings /all ages subheadings in de) | 5331 |
| 51 | (empowerment/all topical subheadings /all age subheadings in de) | 1909 |
| 52 | (morale/all topical subheadings/all age subheadings in de) | 352 |
| 53 | (paternalism/all topical subheadings/all age subheadings in de) | 195 |
| 54 | (collaborati* near professional*) | 1629 |
| 55 | cooperati* near professional* | 254 |
| 56 | #1 or #2 or #14 | 4470 |
| 57 | #4 or #7 or #8 or #9 or #10 | 4472 |
| 58 | #3 or #5 or #11 or #12 or #13 | 2062 |
| 59 | #15 - #54 (or) | 275313 |
| 60 | #56 or #57 | 8756 |
| 61 | #58 and #60 | 640 |
| 62 | #61 and #59 | 377 |

## *10.3 Embase Search Protocol*

| | | |
|---|---|---|
| 1 | All searches limited by year of publication 1990-2002 | ***Hits*** |
| 2 | explode anesthesiology/all subheadings in SU | 1130 |
| 3 | explode intraoperative period/all subheadings in SU | 12625 |
| 4 | anesthesia/all subheadings in SU | 14609 |
| 5 | explode anesthetist/all subheadings in SU | 2070 |
| 6 | sedation/all subheadings in SU | 9941 |
| 7 | an*esthe* in ti | 29216 |
| 8 | explode health-care-personnel/all subheadings in SU | 87563 |
| 9 | nurse* adj an*esthe* | 207 |
| 10 | non*physician near an*esthe* | 9 |
| 11 | physician assistant* | 331 |
| 12 | patient-care-team* | 0 |
| 13 | health-care-system/all subheadings in SU | 11082 |
| 14 | hospital-organization/all subheadings in SU | 754 |
| 15 | clinical* effective* | 2907 |
| 16 | management near effective* in ti | 592 |
| 17 | explode economic-evaluation/all subheadings in SU | 42052 |
| 18 | cost near effective* in ti | 4340 |
| 19 | cost-benefit-analysis | 12030 |
| 20 | cost-effectiveness-analysis | 23878 |
| 21 | costs-and-cost-analysis | 0 |
| 22 | explode health-care-quality/all sub headings in SU | 251196 |
| 23 | explode risk-assessment/all subheadings in SU | 57113 |
| 24 | explode risk-benefit-analysis/all subheadings in SU | 8130 |
| 25 | explode risk-factor/all subheadings in SU | 90476 |
| 26 | explode risk-management/all subheadings in SU | 4684 |
| 27 | risk* near an*esthe* | 2313 |
| 28 | treatment-outcome* | 123711 |
| 29 | operative-complication* | 1302 |
| 30 | an*esthe* complication* | 2803 |
| 31 | patient-care/all subheadings in SU | 27224 |
| 32 | public-relations/all subheadings in SU | 553 |
| 33 | professional-practice/all subheadings in Su | 4712 |
| 34 | collaborati* near professional* | 204 |
| 35 | safety/all subheadings in SU | 17155 |
| 36 | complication/all subheadings in SU | 6029 |

| | | |
|---|---|---|
| 37 | mortality/all subheadings in SU | 63081 |
| 38 | morbidity/all subheadings in SU | 29483 |
| 39 | general-aspects-of-disease/all subheadings in SU | 452 |
| 40 | explode cooperation/all subheadings in SU | 5214 |
| 41 | health-survey/all subheadings in SU | 12861 |
| 42 | nurse-training/all subheadings in SU | 326 |
| 43 | education/all subheadings in SU | 19545 |
| 44 | nursing-education/all subheadings in SU | 791 |
| 45 | patient adj safety | 719 |
| 46 | outcome* near provider* | 604 |
| 47 | #8 or #9 | 215 |
| 48 | #1 or #2 or #3 or #5 or #6 | 57335 |
| 49 | #4 or #7 or #10 or #11 | 87640 |
| 50 | #12 - #45 (or) | 541963 |
| 51 | #47 or #48 | 142639 |
| 52 | #46 and #50 | 180 |
| 53 | #51 and #49 | 79 |

## *10.4 HMIC Protocol*

| | *Search Term* | *No of Hits* |
|---|---|---|
| 1 | anaesthesia in DE | 291 |
| 2 | an*esthe* in ti | 422 |
| 3 | anaesthetist | 51 |
| 4 | consultant in DE | 79 |
| 5 | nurse in DE | 3012 |
| 6 | non*physician near an*esthe* | 1 |
| 7 | non*physician | 18 |
| 8 | anesthesiologist* | 6 |
| 9 | health-manpower in DE | 304 |
| 10 | manpower near shortage | 21 |
| 11 | nurse an*esthetist* | 8 |
| 12 | anaesthetists in DE | 80 |
| 13 | anaesthesiology in DE | 65 |
| 14 | nursing-practice in DE | 2265 |
| 15 | health-professions in DE | 181 |
| 16 | anaesthetic-nurses in DE | 8 |
| 17 | effectiveness in DE | 6193 |
| 18 | clinical effective* | 1595 |
| 19 | cost-effectiveness in DE | 2723 |
| 20 | cost-benefit-analysis in DE | 731 |
| 21 | economic-evaluation in DE | 800 |
| 22 | cost-effectiveness-analysis | 2 |
| 23 | cost-benefit-analysis | 731 |
| 24 | organisation in DE | 368 |
| 25 | administration in DE | 2315 |
| 26 | health-service-reform in DE | 1467 |
| 27 | outcome in DE | 2635 |
| 28 | outcome near provider | 25 |
| 29 | an*esthe* near provider | 2 |
| 30 | treatment outcome * | 114 |
| 31 | risk in DE | 3164 |
| 32 | risk-management in DE | 914 |
| 33 | risk-analysis | 7 |
| 34 | safety in DE | 6126 |
| 35 | patient* safety | 124 |

| | | |
|---|---|---|
| 36 | risk near management in ti | 388 |
| 37 | risk near assessment in ti | 238 |
| 38 | quality-assurance-in –health-services in DE | 2133 |
| 39 | strategic-planning in DE | 1906 |
| 40 | resources in DE | 1723 |
| 41 | education in DE | 13778 |
| 42 | nurse-education in DE | 124 |
| 43 | nurse-training in DE | 517 |
| 44 | continuing-professional-development in DE | 74 |
| 45 | interpersonal-relations in DE | 361 |
| 46 | professional-autonomy in DE | 39 |
| 47 | collaborati* near professional | 292 |
| 48 | audit in DE | 4935 |
| 49 | quality-assurance in DE | 2705 |
| 50 | quality-of-patient-care in DE | 4838 |
| 51 | patient-outcome in DE | 1586 |
| 52 | roles- in DE | 1522 |
| 53 | workload-analysis in DE | 63 |
| 54 | skill-mix in DE | 496 |
| 55 | training in DE | 4541 |
| 56 | NHS- in DE | 19010 |
| 57 | #6 or #7 or #11 or #14 or #16 | 2297 |
| 58 | #1 or #2 or #13 | 556 |
| 59 | #3 or #4 or #8 or #9 or 12 or #15 | 687 |
| 60 | #58 or #59 | 1157 |
| 61 | #57 and #60 | 20 |
| 62 | #17-#55 (or) | 71352 |
| 63 | #61 and #62 | 8 |

# Appendix 11

## *Unavailable articles*

1 Author not listed, *Tar Heel Nurse.* 1998. `Proposed HCFA rule changes would affect nurse anaesthetic practice', 60(3): 9

2 Author not listed, *AARC Times* 2000. `RC Currents anesthesiologist directed care.', 24(9): 67

3 Joswick, J. 1998. *A description of anesthesia personnel characteristics in the US Army,* thesis .US Army Nurses Corp: Uniformed Services University of Health Sciences

4 Kremer, M. 1997. *A study of clinical decision making by certified nurse anesthetists*, thesis,

No other information available.

5 Wade, R. 1998. *A description of the practice pattern characteristics in small, medium and large teaching and non teaching hospitals in the US Air Force*. USAF Nurse Corp: Uniformed Services University of Health Science

Abstract obtained from Internet.

6 Wiggins, A.R. 1998. *A description of the management characteristics of anesthesia care in small, medium and large teaching and non teaching hospitals in the US Navy*. US Navy Nurse Corp: Uniformed Services University of Health Sciences,

Abstract obtained from internet

Library services at MBHT searched the following sources in an attempt to retrieve the above articles:

Library Information Health Network North West

British Medical Association (BMA) library

Liverpool University Library Holdings

Combined On-line Public Access Catalogue (COPAC) - On-line catalogue of UK university libraries.

British Library

Internet using Google search engine. (This provided abstracts for no.s 5 & 6 through the web page for the Uniformed Services University of Health Sciences - www.usuhs.mil).

In addition the research attempted to trace a report cited by Cromwell 1990 produced as an internal study into the cost-effectiveness of anaesthesia care

models within Kaiser Permanente. Both Kaiser Permanente and the author were contacted in an attempt to locate the report, but this was unsuccessful.

Abenstein and Warner 1996 refers to HMOs preference of anaesthesia care teams. The authors were contacted to ascertain their source which was revealed not be documentary evidence.

# Appendix.12 Articles excluded after retrieval for study n= 74

| | Author (date) | Context | Study type | Reason for exclusion |
|---|---|---|---|---|
| 1 | No author listed (1998) | US | | Unavailable article. |
| 2 | AANA web site Cost Effectiveness (2003) | US | Comment/ review | Review of surveys on cost effectiveness |
| 3 | No author listed (2000) | US | | Unavailable article. |
| 4 | Abdellah (1997) | US military | Perceptions | Description of challenges facing the development of advanced nurse practitioner role |
| 5 | Allen (1991) | UK | Opinion | Out of date opinion. |
| 6 | Baladier (2000) | France | Perceptions | Description of the importance of mentors/supervisors in theatre setting. Personnel and training issue. |
| 7 | Baxter (1993) | UK | News item | Background information only. |
| 8 | Beardshall (1996) | UK Veterinary | Letter | Discussion of changes in practice to allow veterinary nurses to take on some of the roles traditionally performed by veterinary surgeons |
| 9 | Bell (1998) | UK | Letter | Repetition of opinions |
| 10 | Bird (1999) | UK | Qualitative Study | Patient perceptions of pre-operative assessment. |
| 11 | Blumenreich (1998) | US | Letter | Repetition of opinions. |
| 12 | Bodenheimer (1999) | US | Comment | Repetition of opinions. |
| 13 | Booth (1996) | US | Policy | Description of development and statement on sedation policies. |
| 14 | Capron (2000) | International | News | Description of introduction of nurse anaesthesia training in Palestine. Repetition of |

| | | | | |
|---|---|---|---|---|
| | | | | information. |
| 15 | Callahan (1994) | US | Comment | Repetition of opinions |
| 16 | Carr (1998) | UK | Letter | Repetition of opinions |
| 17 | Carlisle (1996) | UK | News/opinion | Nursing association views, out of date and repetition. |
| 18 | Catchpole (1991) | US | Review | Review of research carried out by nurse anaesthetists. |
| 19 | Clabby (1998) | UK | Letter | Repetition of opinion |
| 20 | Clayton et al (2000) | US Military | Perceptions | Recruitment issues. |
| 21 | Clergue (1999) | European | Survey | French practice survey. No new information. Little on non-physicians. |
| 22 | Crawforth (2002) | US | Closed claims study | Obstetric incidents. No denominator, thus impossible to evaluate. |
| 23 | Cukr et al (1998) | US | Perceptions | Psychiatric nurse practitioner. Not relevant |
| 24 | Fallacaro (1996) | US | Survey | Geographic distribution of CRNAs. Repetition of data. |
| 25 | Fallacaro (1998) | US | Survey | Geographic distribution of CRNAs. Repetition of data. |
| 26 | Fleming (1991) | US | Review and study | Study looking at adverse events. No robust statistical data by provider type. |
| 27 | Glod and Manchester (2000) | US | Survey | APN prescribing patterns. Does not cover CRNAs |
| 28 | Grasso (1998) | US | Thesis | Abstract only. Recruitment and retention. |
| 29 | Guyton and Eichhorn (1996) | US | Comment | Repetition of opinion. |
| 30 | Haritos and Shumway(1995) | US Military | Policy | Minimum entry requirements. Repetition of information. |
| 31 | Henry and McAulliffe (1999) | International | Survey | Survey of international nurse anaesthesia. Repetition of |

| | | | | |
|---|---|---|---|---|
| | | | | information. |
| 32 | Hillier and Van Nest (2001) | UK | Study | Gastroenterology. Not relevant to anaesthesia. |
| 33 | Hirter et al (1995) | US Military | Perceptions | Discussion on importance of vigilance. Repetition. |
| 34 | Howie (1998) | US | Closed claims study | Types of anaesthesia and providers. No denominator, thus impossible to evaluate. |
| 35 | Jack (2002) | UK (Dentistry) | Letter | Discussion on dental sedationists. |
| 36 | Johnstone (1994) | US | Survey | Repetition |
| 37 | Jordan et al (2001) | US | Closed claims study. | Malpractice claims. No denominator, thus impossible to evaluate. |
| 38 | Joswick (1998) | US | Thesis | Unavailable |
| 39 | Kelly-Wood (1991) | US | Thesis | No useable data. |
| 40 | Kremer (1997) | | | |
| 41 | Klein (1997) | US | Comment | Repetition of opinion. |
| 42 | Larson et al (2001) | US | Closed claims study | Respiratory incidents. No denominator, thus impossible to evaluate. Good data on causes of accidents. |
| 43 | Lester (1994) | US (Military) | Study of Perceptions | Delphi study on future role of CRNAs |
| 44 | Maccario (1995) | US | Letter | Response to Johnstone (1994) which was excluded. |
| 45 | Mastropeitro et al (2000) | US | Survey | Highly flawed. Biased. No value. |
| 46 | Mauleon et al (2002) | US | Phenomeno graphic Study | Perceptions and experiences of nurse anaesthesia. Not answer research questions. |
| 47 | McAuliffe (1997) | Internation al | Conference proceeding | Proceeding detailing discussion on nurse anaesthesia philosophy. |
| 48 | McAuliffe et al (2000) | Internation al | Survey | International survey on practice and research. Repetition. |

| | | | | |
|---|---|---|---|---|
| 49 | Meyer et al (1998) | US | Study | Cost comparisons for dilatation and curettage procedure focusing on delivery variations. No valuable data by provider. |
| 50 | Milde (1998) | UK | Comment | Repetition |
| 51 | Moody and Kremer (2001) | US | Closed claims study | Malpractice claims. No denominator, thus impossible to evaluate. |
| 52 | Muller and Waas (1997) | German | | |
| 53 | Nicol (1999) | UK | Audit | Audit against guidelines for sedation by non-anaesthetists. |
| 54 | O'Dowd (2001) | UK | News item | Repetition |
| 55 | Oakes et al (2002) | US | Pilot Study | Not answer research questions. |
| 56 | Orkin (1995) | US | Perceptions | Data and opinion repeated elsewhere. |
| 57 | Ormond-Walshe and Newham (2001) | UK | Perceptions | Comparison on CNS and APN roles. |
| 58 | Ouellette and Caulk (2000) | International | Review | Historical review of IFNA. |
| 59 | Park (1990) | US | Risk factors | Non by provider |
| 60 | Petty et al (2002) | US and Australia | Review | Review of two closed claims databases and one self reported database. No denominator in articles. |
| 61 | Pike (2002) | UK | Editorial letter | Reply to Jack (2002) |
| 62 | Preston (1996) | UK | Perceptions | Opinion on whether US model could work in UK. Repetition |
| 63 | Rod (1999) | Europe/International | Comment/ Letter | Response to letters. Opinions expressed elsewhere. |
| 64 | Shumway and Del Risco (2000) | US | Survey | Practice types. |
| 65 | Silber et al (1995) | US | Risk factors | Non by provider types |
| 66 | Sperhac and Strodtbeck (1997) | US | Perceptions | Role definition of APN in US |
| 67 | Sterling and McNally (1999) | US | Survey | Practice of doctorally prepared nurses. (APN) |
| 68 | Stromberg et al (2001) | Sweden | Survey | Nurse anaesthetists clinical perceptions. |

| | | | | |
|---|---|---|---|---|
| 69 | Wade (1998) | US (Military) | Thesis | Unavailable |
| 70 | Waugaman and Lu (1999) | US | Survey | Nurse anaesthetist ethnicity and the relationship to career and professional socialisation. |
| 71 | Weinger et al (1994) | US | Methodological study | Task analysis not provider comparisons. |
| 72 | Wiggins (1998) | US (Military) | Thesis | Unavailable |
| 73 | Wraith (2001) | UK (Dentistry) | Editorial | Comment on sedation by nurses. |
| 74 | Zetterlund (2000) | Norway | Comment | No information on nurse anaesthetists. |

# Appendix 13 Data collection forms

This is an example of the forms used for data collection. There is a different form for each publication type. All forms collect the same basic information.

**Health Evidence Bulletins - Wales: Questions to assist with the critical appraisal of a systematic review**

**[including at least one randomised controlled trial] (Type I evidence);**

**[including at least one non-randomised intervention study] (Type III evidence); or**

**[of observational studies] (Type IV evidence)**

Adapted from the CASP questions (taken from Oxman AD et al. Users' guides to the medical literature. VI How to use an overview. Journal of the American Medical Association. 1994; 272(17): 1367-1371) and Barker, JM. Project for the enhancement of the Welsh Protocols for Investment in Health Gain. Project Methodology. Cardiff: Duthie Library. UWCM, 1996.

Paper details Authors:

Title:

Source:

A/ What is this review about and can I trust it. Screening questions.

| | **Yes** | **Can't tell** | **No** |
|---|---|---|---|
| 1. Is the review relevant to the needs of the Project? | continue | | discard |
| 2. Did the review address a clearly focused issue?<br>In terms of:<br>• the population studied<br>• the intervention given<br>• the outcomes considered. | | | |
| 3. Did the authors look for the appropriate sort of papers? | | | |

Did the studies address the review's question and have an appropriate study design?

Is it worth continuing?

---

**Detailed questions**

| | Yes | Can't tell | No |
|---|---|---|---|
| 4. Were the important, relevant studies included?<br><br>• Databases searched, reference list follow-up<br>• Personal contacts, unpublished work<br>• Non-English publications<br>• Are the inclusion, exclusion criteria stated? | | | |
| 5. Did the authors assess the quality (rigour) of the included studies? | | | |
| 6. If the results of the review have been combined, was this reasonable?<br><br>• Were the studies sufficiently similar in design and results?<br>• Are the results of included studies clearly displayed?<br>• Are the reasons for any variation in the results discussed? | | | |

**B/ What did they find?**

| | |
|---|---|
| 7. What is the overall result of the review?<br><br>Include a numerical result with the confidence limits if available. | |

**C/ Are the results relevant locally/to me?**

| | Yes | Can't tell | No |
|---|---|---|---|
| 8. Can the results be applied to the local population?<br><br>• Cultural differences?<br>• Genetic differences?<br>• Differences in medical practice? | | | |
| 9. Were all important outcomes considered? | | | |
| 10. Is any information provided which could help you decide whether the benefits are worth the harms/costs (financial and otherwise)?<br><br>Summarise the cost information below, if available: | | N/A | |
| 11. Accept for further use as Type I, III or IV evidence? | | Refer to Team Leader | |

**Comments:**

**Draft Statement (if appropriate):**

(Remember to include the relevant target group (age range, sex etc.); the measured outcomes/benefits with quantitative information if available; and the Health gain notation.

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n=74

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# Appendix 15 Web references

## *Organisations*

American Academy of Anesthesiology Assistants

www.anesthetist.org/default.php

American Association of Nurse Anesthetists

www.aana.com/

American Society of Anesthesiologists

www.asahq.org/

Association of Anaesthetists of Great Britain and Ireland

www.aagbi.org/

Association of Anaesthetists of Great Britain and Ireland – junior doctors forum

www.aagbi.org/gat_juniordoctors03.html

Association of Operating Department Practitioners

www.aodp.org/

British Anaesthetic and Recovery Nurses Association

www.barna.co.uk

British Gastroenterology Society

www.bsg.org.uk/

Department of Health

www.doh.gov.uk/

European Academy of Anaesthesiologists

eaa.euro-anaesthesiology.org/

Gasnet web page for anesthesiologists

www.gasnet.org/societies/apsf/index.html

General Dental Council

www.gdc-uk.org/

Health Professions Council - Formerly the Council for Professions Supplementary to Medicine

www.hpc-uk.org/about_us/cpsm.htm

Institute of Managers

www.ihm.org.uk/home.cfm

International Federation of Nurse Anesthetists

www.aana.com/about/ifna.asp

Modernisation Agency

www.modern.nhs.uk/

National Association of Assistants in Surgical Practice

www.naasp.org.uk/aboutnaasp.shtml

National Association of Theatre Nurses

www.natn.org.uk/

Nursing and Midwifery Council

www.nmc-uk.org

Society for the Advancement of Anaesthesia in Dentistry

www.saaduk.org/

Royal College of Nursing

www.rcn.org.uk

World Health Organisation

http://www.who.int/en/

## *Management issues*

Department of Health document on developing roles in NHS

www.doh.gov.uk/cno/liberatingtalents.htm

Three-year NHS plan

www.doh.gov.uk/planning2003-2006/index.htm

Department of Health and Social Security for Northern Ireland

www.dhsspsni.gov.uk/

European Working Time Directive and implications for NHS

www.doh.gov.uk/workingtime/index.htm

Kaiser Permenente Web page – Health Maintenance Organisation in the US

www.dor.kaiser.org/index.html

Modernisation Agency

www.modern.nhs.uk

New Zealand Department of Health

www.moh.govt.nz/moh.nsf

Skills for Health came into being in April 2002 as a new independent organisation to develop the skills of the workforce of the health sector

www.skillsforhealth.org.uk/

Statistical database, including workforce surveys

www.statistics.gov.uk/census2001/default.asp

Library information

www.sosig.ac.uk/

IMRAD

www.commons.ucalgary.ca/natsci/page04a.htm

National Co-ordinating Centre for Service Delivery and Organisation R&D

www.sdo.lshtm.ac.uk/

# Appendix 16 Sources for training

## *European*

European Union Specialist Nurse Training Programmes

Based on a study by the Internal Market Directorate General of the European Commission. (Reference XV/98/09/E)

www.europa.eu.int/comm./internal_market/en/qualifications/

## *International*

General information about nurse anaesthesia and links to international professional organisation websites

www.infa.info

## *United States of America*

US programmes for CRNAs

This provides details of training programmes, accreditation, membership of the professional organisation and educational institutions, some with direct web links

www.aana.com

United States United Services University

www.usuhs.mil/

Case Western University Anesthesiology Assistant Programme

www.anesthesiaprogram.com/

Emory University Anesthesiology Assistant Programme

www.emory.edu/

## *Postgraduate Training for UK doctors*

www.rcoa.ac.uk/training/index.asp

## *Training for UK nurses and ODPs*

Lists qualifications, training centres and career options. Some direct links to training institutions

www.nhscareers.nhs.uk

Ministry of Defence web page with details of career in Defence Medical Services

www.army.mod.uk/careers/healthcare

Lists all the training centres of ODPs across the UK, some with direct web links to the institutions training programme

www.aodp.org/trainingcentres/html

# Appendix 17 Definitions of other roles

## *Scrubbed Practitioner*

The title of this role is derived from the fact that this member of the team is "scrubbed-up" to enable them to come in direct contact with sterile equipment and the operating field.

The title is often abbreviated to scrub.

Duties include:

- Check equipment
- Double check consent
- Oversee patient positioning
- Assist surgeon with preparation and draping of patient
- Connect and equipment (e.g. diathermy)
- Passing instruments
- Facilitating smooth operating
- Check numbers of swabs and instruments at beginning and end. (This procedure is carried out in conjunction with the circulating practitioner carrying out the double check. Usually, the scrubbed practitioner, if fully qualified, will take ultimate responsibility for this check.)
- Apply dressing to wounds

### Extended roles

- Positioning of patient. This may be under direct supervision of the surgeon or unsupervised
- Retracting tissues
- Cutting sutures and suturing
- Making incisions
- Holding instruments (e.g. laparoscopic camera)

## *Circulating practitioner*

The title of this role is derived from this practitioner's main role, which is to move around the operating field and facilitate smooth running of the procedure.

Duties include:

- Cleaning
- Maintaining adequate stocks of equipment and disposables
- Checking equipment
- Assisting in positioning of patient
- Assisting with positioning of diathermy
- Facilitate smooth running of procedures
- Fetch/Carry/Predict/Respond
- Record Keeping
- Post-operative cleaning

## *Recovery Practitioner*

This role is designated to deal with the patient after the end of the surgical procedure and during their recovery from the anaesthetic. Recovery takes place in a designated area adjacent to theatres

- Monitoring
- Removal of laryngeal mask airways
- Administration post-operative drugs
- Reporting patient condition to anaesthesia
- Handover of patient to ward staff
- Checking wounds/post-operative condition drains etc
- Removal of cannulas
- Report patient condition to surgeon
- ITU/HDU role. Occasionally, patients requiring ITU/HDU care will be admitted to recovery whilst a bed is found for them. Recovery staff will provide continuous support at a higher level and intensity than normal. Different drugs may be administered and recovery staff may be expected to use invasive monitoring techniques

## *Anaesthetic Practitioner*

- Preparation and checking of equipment
- "Check in" of patient, negotiating the handover from ward to theatre
- Psychological support of patient
- Application of monitors
- Assist anaesthetist with (but not actually carry out) cannulation
  Airway management
  Positioning
  Insertion of anaesthetic blocks
- Supplying controlled drugs
- Decontamination of equipment
- Transfer of patient to theatre
- Maintaining adequate stock of consumables

### Extended role

- Cannulation
- Airway management, intubation, insertion of laryngeal mask airways
- Drawing up of drugs
- Short term monitoring (e.g. whilst anaesthetist administers local analgesic block whilst patient still anaesthetised or whilst anaesthetist called to recovery)

## *Surgical Assistants*

Surgical assistant is practitioner working both in and out of the operating room who undertakes intervention either under direct, indirect or proximal supervision.
http://www.naasp.org.uk/aboutnaasp.shtml

# Appendix 18: Grades of medical staff in UK

## *Pre-Registration House Officer PRHO*

One year position for newly graduated. Consists of a rotation between medicine and surgery, or medicine, surgery and general practice. There are plans that in the future anaesthetics will be added as an option to this first year's training.

PRHOs are supervised at level I.

## *Senior House Officer SHO*

Post undertaken following successful completion of PRHO year. SHOs can join three-year rotations in a particular specialty or six months in specialties of their interest. Alternatively, SHOs can join a General Practice Vocational Training Scheme (GPVTS) of three years comprised of six-month placements in specialties of their choice with a view to entering general practice.

## *Specialist Registrar SpR*

Having completed a three-year rotation in chosen specialty and the relevant examinations junior doctors may apply for a five-year post rotating between hospitals within a region. Following the successful completion of this rotation and examinations candidates are eligible to apply for

## *Non-consultant Career Grades*

These are sometimes known as Staff Grade, Trust Grade or Associate Specialist. They are individuals who have completed training, but do not take up consultant posts.

## *Consultant*

Senior medical post in UK NHS. Has responsibility for training junior doctors (in teaching hospitals) departmental management and research.

## Disclaimer

This report presents independent research commissioned by the National Institute for Health Research (NIHR). The views and opinions expressed by authors in this publication are those of the authors and do not necessarily reflect those of the NHS, the NIHR, the NIHR SDO programme or the Department of Health. The views and opinions expressed by the interviewees in this publication are those of the interviewees and do not necessarily reflect those of the authors, those of the NHS, the NIHR, the NIHR SDO programme or the Department of Health

## Addendum

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