

### INFECTION CONTROL IN ANAESTHESIA

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#### MEMBERSHIP OF THE WORKING PARTY

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To be reviewed in 2005

### SUMMARY

- A named consultant in each department of anaesthesia should liaise with Trust Infection Control Teams and Occupational Health Departments to ensure relevant specialist standards are established and monitored in all areas of anaesthetic practice.
- (2) Precautions against transmission of infection between patient and anaesthetist or between patients should be a routine part of anaesthetic practice. In particular, anaesthetists must ensure that hand hygiene becomes an indispensable part of their clinical culture.
- (3) Anaesthetists must comply with local theatre infection control policies including safe use and disposal of sharps.
- (4) Anaesthetic equipment is a potential vector for transmission of disease. Insufficient care has been applied in the past in decontaminating and sterilising items for reuse.

Policies should be documented to ensure that nationally recommended decontamination practices are followed and audited for all reusable anaesthetic equipment.

- (5) Single use equipment should be utilised where appropriate but reusable items should be processed by a central sterile supplies department.
- (6) A new bacterial/viral filter should be used for every patient and a local policy applied to the reuse of breathing circuits in line with manufacturer's instructions.

- (7) Appropriate infection control precautions should be established for each anaesthetic procedure to include maximal barrier precautions for the insertion of central venous catheters, spinal and epidural procedures and any invasive procedures in high risk patients.
- (8) All anaesthetists should be aware of the risk of occupational transmission of serious communicable diseases. Close liaison with the Occupational Health Department is required to ensure appropriate vaccination and regular assessment of immune status for TB and HBV.
- (9) A clearly documented procedure to obtain urgent 24 hour medical advice and supervision must be available following any possible exposure to a serious communicable disease.

### INTRODUCTION

In 1988, 1992 and 1996 the Association published guidelines on the occupational hazards posed to anaesthetists by blood borne viruses. Since then members have sought advice on a number of emerging problems concerning infection control in anaesthetic practice including single use medical devices, the use of filters in anaesthetic circuits, the appropriate care of laryngoscopes and the implications of Prion diseases. Hospital acquired infection (HAI) is a major current concern and there have been a number of recent proposals and initiatives to reduce its incidence (1-6). Council of the Association established this Working Party to provide advice for members on infection control in anaesthesia practice excluding critical care. In addition to Association Officers and Council members representation included the Royal College of Anaesthetists, the Hospital Infection Society and the Medical Devices Agency.

### **GENERAL PRINCIPLES**

Healthcare providers have responsibilities under the Health and Safety at Work etc Act 1974 and the Control of Substances Hazardous to Health (COSHH) Regulations to ensure the health and safety of their employees and others (including visitors and patients) and to control and manage the risk of infection.

Trust Chief Executives are accountable for ensuring care delivered within each Trust meets relevant standards. Trusts should have Infection Control Committees and Infection Control Teams responsible for preparing policies and monitoring compliance with appropriate standards. A microbiologist should be designated to advise on microbiological aspects of decontamination and sterilisation. A named consultant in each department of anaesthesia should liaise with the Infection Control Team and the Occupational Health Department to ensure relevant specialist standards are established and monitored in all areas of anaesthetic practice.

#### Environment

Hospital environmental hygiene encompasses a wide range of routine activities that are important in the prevention of HAI. The hospital must be visibly clean and acceptable to patients, visitors and staff. Statutory requirements must be met in relation to safe disposal of clinical waste, laundry and linen.

Operating theatres and associated areas should be designed and maintained to the standards defined in Health Building Note 126. Microbiological commissioning and monitoring of operating theatre suites should adhere to national recommendations.

#### **Routine Precautions**

Anaesthetists will be involved in the care of patients who carry infection which may not be obvious or readily identifiable. Precautions against transmission of infection between patient and anaesthetist or between patients should be a routine part of anaesthetic practice. "Universal" barrier precautions including gloves, fluid resistant mask, face shield and gown have been recommended for routine use with all patients (7) but recently the concept of "standard precautions" plus the adoption of additional safeguards for specific procedures in individual patients has been proposed (8, 9, 10).

Preventative measures should be based on the likelihood of an infectious agent being present, the nature of the agent and the possibility of dispersion e.g. splashing. A standard set of precautions should be established for every invasive procedure (see later) with additional risk assessment of each patient to determine extra and specific precautions that may be appropriate.

### Hand Hygiene

Hand mediated transmission is a major contributing factor to cross infection (11) Effective hand decontamination immediately before every episode of direct patient contact will result in significant reduction in the carriage of potential pathogens and decrease the incidence of preventable HAI (12). Despite consistent advice staff often neglect hand hygiene when caring for patients.

At the start of every session or episode and when visibly soiled or potentially contaminated, hands must be washed with liquid soap and water. When there is no soiling, the Hand Hygiene Liaison Group now advocates that staff should use an alcohol-glycerol hand rub between patients or activities (13) as this is effective and quicker (14).

Trusts should ensure that sinks, soap and alcohol-glycerol hand rubs are conveniently placed to encourage regular use. Watches and jewellery should be removed at the beginning of each clinical session before regular hand decontamination begins. Cuts and abrasions must be covered with waterproof dressings which must be changed as appropriate.

# Anaesthetists must ensure that hand hygiene becomes an indispensable part of their clinical culture.

#### Gloves

Sterile gloves must be worn for invasive procedures and contact with sterile sites. Non-sterile gloves must be worn for contact with mucous membranes, non-intact skin and all activities that carry a risk of exposure to blood, body fluids, secretions and excretions.

Gloves should be worn as single use items. They should be put on immediately before an episode of patient contact and removed as soon as the activity is completed. Gloves should be changed between patients and between different procedures on the same patient. Gloves must be disposed of as clinical waste and hands should be washed or decontaminated following the removal of gloves. It has been demonstrated that 98% of anaesthetists' contact with patients blood could be prevented by routine use of gloves (15).

Gloves of an acceptable quality must be available in all clinical areas. Latex free gloves must be available for use for staff or patients who have allergies.

#### **Face Masks**

The use of face masks to reduce post-operative wound infection has been questioned (16,17). Masks with a face shield, however, must be worn when there is a risk of blood, body fluids, secretions and excretions splashing into the face and eyes. Masks must also be worn by anaesthetists when carrying out a sterile procedure under full aseptic conditions (see later). If worn, masks should not be taken down to speak and should be changed if they become damp or contaminated.

The Working Party is aware that the wearing of masks remains an area of contention in many Trusts and conflicting evidence may be cited (18, 19). Local protocols should be agreed after discussion with all parties. If requests to wear masks are made courteously it is not a matter that should be allowed to disrupt relationships in operating theatres.

#### **Theatre Caps**

Disposable head gear is worn by theatre staff in most UK operating theatres although there is little evidence of the effectiveness of this except for scrub staff in proximity to the operating field (20). Hats, however, must be worn in laminar flow theatres during prosthetic implant operations and it is the Working Party's view that their general use should continue.

#### **Theatre Suits / Overgowns**

The skin of staff working in the operating theatre is a major source of bacteria dispersed into the air. Clean theatre suits should be available for all staff in theatre. Full body fluid repellent gowns should be worn where there is a risk of extensive splashing of blood, body fluids, secretions and excretions. Sterile gowns should be worn when invasive procedures are undertaken.

Contaminated clothing should be changed and safely discarded into an appropriate receptacle at the earliest opportunity.

There is little evidence to show that wearing surgical attire outside the theatre and returning to the theatre without changing increases surgical wound infection rates. The Working Party, however, endorses the National Association of Theatre Nurses recommendations that all personnel should change into outer clothes or wear a fastened overgown when leaving the theatre environment (21) if only to emphasise the necessity for "theatre discipline" and allay perceived concerns of patients and visitors. Local policies should be agreed and Trusts must ensure adequate provision of appropriate clothing.

#### **Shoes and Overshoes**

Special footwear should be worn in the operating department and cleaned if contaminated or after every use. Trusts should ensure that a system for cleaning theatre footwear is in place in each theatre suite. Plastic overshoes may increase bacterial contamination of floors (22) and in addition hands become contaminated when overshoes are put on or removed. Their use is not recommended.

#### Movement in the Theatre Complex

To reduce airborne contamination, general traffic in and out of the operating theatre itself should be kept to a minimum. Doors should be kept closed where possible to ensure the efficiency of the ventilation system.

Moving a patient on their bed to the operating theatre may increase the bacterial floor count but it is claimed that this is of little significance if bed linen is changed prior to transfer (23). The use of separate trolleys from ward to transfer area and transfer area to table has not been shown to have benefit (24) although this practice pertains in many operating areas.

If entering the operating theatre itself visitors should change into theatre suits and wear designated footwear.

#### **Order of Patients**

There should be a written hospital policy requiring accurate printed theatre lists to be available prior to the scheduled date. "Dirty cases" i.e. patients likely to disperse microbes of particular risk to other patients should be identified prior to surgery and theatre staff notified. These patients should be scheduled last on an operating list to reduce risk. Where this is not possible the Hospital Infection Society (HIS) advises that a plenum ventilated operating theatre should require only 15 minutes before proceeding to the next case following a "dirty" operation (9). The most probable routes for transmission of infection between successive patients are airborne or on items and surfaces that have had patient contact. Appropriate cleaning of the operating theatre between all patients should be undertaken.

Whenever there is visible contamination with blood or other body materials the area must be disinfected with Hypochlorite (according to local protocols) and then cleaned with detergent and water. Floors of the operating room should be disinfected at the end of each session.

#### Safe Use and Disposal of Sharps

In the UK 16% of occupational injuries occurring in hospitals are attributed to sharps injuries. These are predominantly caused by needles and are associated mainly with venepuncture, administration of IV drugs and recapping needles. These should be preventable by adhering to national guidelines and agreed standards (6, 25, 26) :-

- Sharps must not be transferred between personnel and handling should be kept to a minimum
- Needles must not be bent or broken prior to use or disposal
- Needles and syringes must not be disassembled by hand prior to disposal
- Needles should not be recapped or resheathed
- Used sharps must be discarded into an approved sharps container at the point of use
- The sharps container should be sealed and disposed of safely by incineration when about two-thirds full
- Blunt aspirating needles should be used for drawing up drugs
- Needle protection devices may reduce needlestick injuries but require further evaluation before widespread use can be advised (27)

#### **Preventing Contamination of Drugs**

Drugs and fluids require safe handling by anaesthetists who should follow local protocols for preparation and administration to prevent contamination.

Syringes and needles are sterile single use items and after entry or connection to a patient's vascular system or attached infusions a syringe and needle should be considered contaminated and used only for that patient. A syringe must not be used for multiple patients even if the needle is changed. Prior to use, prepared syringes and needles should be stored in a clean container to avoid contamination. After use or at the end of the anaesthetic all used syringes with needles should be discarded into an approved sharps container. Care must be taken when drawing up drugs. Single use ampoules should be discarded after the required amount of drug is drawn up and not reused for subsequent patients. Each time multiple use vials are punctured the rubber bung should be cleaned using an aseptic technique. They should be discarded immediately if visibly contaminated. Drugs should be disposed of in accordance with local pharmacy policies.

All infusions, administration sets or items in contact with the vascular system or other sterile body compartments are for single patient use. An aseptic technique should be used when preparing infusions and breaks/taps in lines should be kept to a minimum. Injection ports should be maintained with a sterile technique, kept free of blood and covered with a cap when not in use.

# Section 4

#### ANAESTHETIC EQUIPMENT

Items of anaesthetic equipment may become contaminated either by direct contact with patients, indirectly via splashing, by secretions or from handling by staff. Contamination is not always visible and all used pieces of equipment must be assumed to be contaminated and disposed of or, if reusable, undergo a process of decontamination.

#### **Single Use Equipment**

Where appropriate, single use disposable equipment will remove the difficulties of reuse and decontamination procedures. The use of such equipment is to be encouraged. There are problems, however, of cost, storage and disposal of single patient use devices and for certain pieces of equipment there is no feasible disposable alternative. The balance between single use as against reusable equipment will require local determination based on risk assessment of patients safety, available facilities and cost.

#### Decontamination

Decontamination is a combination of processes including cleaning, disinfection and/or sterilisation used to make a reusable item safe to be handled by staff and safe for further use on patients. Effective decontamination of reusable devices is essential in reducing the risk of infection. "Guidance on Decontamination" prepared by the Microbiology Advisory Committee provides guidelines for the safe reprocessing of medical devices (28). Few departments of anaesthesia have had an active interest in developing effective infection control policies (29). It is recommended that each department identifies a designated consultant who, in conjunction with the appropriate bodies in their Trust will develop specific guidelines for anaesthetic practice which satisfy national recommendations and that these are audited on a regular basis.

Where possible all reprocessing of contaminated equipment should be undertaken outside the clinical environment and preferably in central decontamination units or Sterile Supplies Departments (SSD) (30). Automated cleaning methods provide advantages over manual methods including efficient reproducible processes which can be controlled and validated. They also protect staff from exposure to chemicals and micro-organisms. Trusts are now required to have efficient monitored decontamination procedures in place and the use of local processes in theatre suites should be phased out. Where local washer disinfectors or sterilisers are still required, staff must be properly trained, proper records must be kept and the process must satisfy national guidance (31, 32).

#### **Decontamination Processes**

**Cleaning** - removal of foreign material from an item. This usually involves washing with a detergent to remove contamination followed by rinsing and drying. All organic debris e.g. blood, tissue or body fluids must be removed before disinfection or sterilisation, as its presence will inhibit disinfectant or sterilant contacting microbial cells. Cleaning prior to sterilisation is of the upmost importance in the effectiveness of decontamination procedures in reducing the risk of transmission of CJD (see later).

**Low Level Disinfection** - kills most vegetative bacteria (except TB and endospores), some fungi and some viruses e.g. sodium hypochlorite, 70% alcohol, chlorhexidine.

**High Level Disinfection** - kills vegetative bacteria (not all endospores), fungi and viruses. With sufficient contact time (often several hours) these high level disinfectants may produce sterilisation e.g. glutaraldehyde, peroxyacetic acid.

**Sterilisation** - kills all bacteria, fungi and viruses. A sterile item should be completely free of all micro-organisms e.g. autoclaving. (but see prions later).

#### **Risk Assessment**

The choice of equipment and/or the level of cleanliness/disinfection/ sterility required of reusable items may be assessed against the risk posed to patients of transmission of infection during any procedure in which the equipment is employed. It has been proposed by the Microbiology Advisory Committee that three levels should be considered :-

- (1) High Risk device will penetrate skin or mucous membranes, enter the vascular system or a sterile space - requires sterilisation.
- (2) Intermediate Risk device will be in contact with intact mucous membranes or may become contaminated with readily transmissable organisms - requires high level disinfection or sterilisation
- (3) Low Risk device contacts intact skin or does not contact patient directly low level disinfection/cleaning

### **Infection Control Policy**

#### **Anaesthetic Masks**

Although normally in contact with intact skin these items are frequently contaminated by patient secretions and have been implicated in causing cross-infection between patients (33). In addition the process of disinfection currently employed in most theatres in the UK is ineffective and permits the persistence of potentially pathogenic micro-organisms on anaesthetic masks between patients (34, 35). It is recommended that these items are disposable for single patient use or are sterilised between patients.

#### **Airways and Tubes**

Although on the above risk stratification these may be viewed as "intermediate risk items" there is evidence that they are often contaminated with transmissable organisms (36). They are also frequently contaminated with blood (37) indicating that mucous membranes are often breached during insertion. It is recommended that oral, nasopharyngeal and tracheal tubes are provided on a single patient use basis.

Manufacturers recommendations require reusable laryngeal mask airways to be resterilised for a maximum of 40 uses. Whatever process of cleaning/decontamination is employed proteinacious material may remain attached to largyneal masks (38) and with the recognised resistance of prions to the sterilisation process the development of inexpensive disposable laryngeal masks or alternative airways will be of considerable benefit.

#### **Catheter Mounts - Angle Pieces**

It is recommended that these items are single patient use.

#### **Anaesthetic Breathing Systems**

The Association has previously recommended that "an appropriate filter should be placed between the patient and the breathing system (a new filter for each patient)". This has been challenged on the basis of cost effectiveness and also the lack of randomised evidence of benefit. However, reports that Hepatitis C (HCV) may be transmitted via anaesthetic breathing circuits (39) and the emergence of multiple resistant tuberculosis justifies the Association's advice to continue using a new bacterial/viral filter between each patient and the breathing system. Although it appears that pleated hydrophobic filters have a better filtration performance than most electrostatic filters the clinical relevance of this has yet to be established (40, 41).

Until 2001 manufacturers of disposable anaesthetic breathing circuits supplied these as non-reusable items. In practice most UK departments of anaesthesia in conjunction with the use of a new filter for each patient used these circuits for more than one patient or for more than one operating session. In 2000 the MDA re-emphasised the clinical and legal implications of reuse of devices labelled for single use and the Association firmly supports their recommendations. In the interim a number of suppliers in the UK have shown that anaesthetic circuits may be safely reused and are now marketing circuits with instructions which permit reuse for a period of up to one week if a fresh bacterial/viral filter is used with every patient. Departments may follow the manufacturer's recommendations of use up to seven days but to ensure consistency in the infection control process the Working Party recommends that circuits are disposed of when the anaesthetic machine and monitors are cleaned (see below). If visibly contaminated or used for highly infectious cases (e.g. tuberculosis) the circuits should be safely disgarded. No attempt should be made to actively reprocess these items.

#### **Anaesthetic Machines**

Routine sterilisation/disinfection of internal components of the anaesthetic machine is not necessary, if a bacterial/viral filter is used between patient and circuit. Manufacturers cleaning and maintenance policies should, however, be followed and ventilator tubing, bellows, unidirectional valves and carbon dioxide absorbers should be cleaned and disinfected periodically. All surfaces of anaesthetic machines and monitors should be cleaned on a daily basis with an appropriate disinfectant or immediately if visibly contaminated.

#### Laryngoscopes

As with anaesthetic face masks, laryngoscopes are known to become contaminated during use. Current practices of decontamination and disinfection between patients are frequently ineffective leaving residual contamination which has been implicated as a source of cross-infection (42, 43, 44). Blades are also regularly contaminated with blood (45) indicating penetration of mucus membranes which places these items into a high risk category. Proper cleaning of laryngoscope blades is of great importance prior to decontamination/sterilisation particularly of residue around light sources or articulated sections. New purchases should be of a design that is easy to clean. Although repeated autoclaving may affect the function of laryngoscopes (46) the Working Party recommends that reusable laryngoscope blades should be resterilised by SSD between patients. Plastic sheaths may be used to cover blades and handles to reduce contamination but a number of inexpensive single use laryngoscope blades of improving design are now available and their use is to be encouraged although traditional blades should be available at all times in case difficulty is encountered.

Laryngoscope handles also become contaminated with microorganisms and blood during use and they should be regularly washed/disinfected and, if suitable, periodically sterilised by SSD.

Anaesthetists should show great care when handling laryngoscopes, wear gloves during intubation and place used instruments in a designated receptacle to prevent contamination of pillows and drapes.

#### Fibreoptic Laryngoscopes / Bronchoscopes

These are expensive items which to date cannot be autoclaved. Decontamination is dependent on sufficient contact time with high level disinfectants and it is particularly important that the washing and cleaning process removes all tissue residue from the lumens. Decontamination is best achieved by an automated system. National guidelines for care of these instruments have been provided by the Medical Devices Agency (MDA) (47).

With the uncertainty of the future implications of Creutzfeld Jakob Disease (CJD) these items should have a unique identifier which should be recorded at every use to permit future tracing.

#### Bougies

Reuse of these items has been associated with cross-infection (48, 49). Manufacturers recommend that gum elastic bougies may be disinfected up to 5 times between patients and stored in a sealed packet. It is preferable that alternative single use intubation aids are employed when possible.

#### **Surface Monitors**

Local policies should be in place to ensure that all equipment that touches intact skin or does not ordinarily touch the patient at all is cleaned with a detergent at the end of the day and whenever visibly contaminated. This includes non-invasive blood pressure cuffs and tubing, pulse oximeter probes and cables, stethoscopes, electrocardiographic cables, blood warmers etc. and the exterior of anaesthetic machines and monitors. Items such as temperature probes should be for single patient use.

#### **Oxygen Masks and Tubing**

Single patient use.

#### **Resuscitation Equipment**

Single patient use or resterilised between patients according to manufacturer's instructions. All training equipment should be handled similarly.

# Section 5

### **PRION DISEASES**

Prions are small proteinaceons particles which are recognised to cause Transmissable Spongiform Encephalopathies; of recent concern particularly because of the development of variant CJD (vCJD) in humans. vCJD appears to be caused by the same prion that results in BSE in cattle and a number of national committees including the Spongiform Encephalopathy Advisory Committee (SEAC) and the Advisory Committee on Dangerous Pathogens (ACDP) have made recommendations concerning prevention and management (50).

Both vCJD and the originally identified sporadic CJD result in progressive neurological symptoms and death within months of the onset of symptoms. There are a number of uncertainties about diagnosis, transmission and incubation periods. In both types of CJD the highest concentrations of prion protein occur in the brain, spinal cord and posterior eye. With vCJD, abnormal prion protein has been detected at post mortem in the appendix, tonsils, spleen and gastrointestinal lymph nodes.

Prions are resistant to deactivation by most sterilisation procedures and they are small enough to reside in the microscopic crypts on the surface of stainless steel. There is no satisfactory way of sterilising equipment at present ; heat sterilisation techniques may not be totally effective and may result in some congealing of tiny quantities of protein in the microscopic crypts on stainless steel. However, standard washing techniques reduce the concentration of prions in an exponential fashion so that after 10-20 cycles of washing and decontamination it is thought that infectivity may be effectively diminished to negligible levels. Flexible fibreoptic endoscopes present particular problems as these cannot be autoclaved and prions are not deactivated by glutaraldehyde or peroxyacetic acid. Sodium hydroxide and sodium hypochlorite may be effective but only in concentrations and contact times which may have a detrimental effect on instruments (51).

#### Anaesthetic Management of Known Cases of CJD (52)

Patients known or suspected to have CJD include those with symptoms which have been diagnosed as CJD or are strongly suggestive of CJD. The clinical diagnosis may not be confirmed until post mortem. Patients at risk include those who have received hormone derived from human pituitary glands and recipients of human dura mater grafts. Tissues which contain the greatest risk of transmission of prion proteins are the brain, spinal cord and posterior eye.

In order to prevent cross infection, fully aseptic procedures should be used and single use disposable instruments should be used whenever possible. Standard precautions against transmission of infection (e.g. waterproof gown, gloves and mask with eye protection) should always be used by all staff.

If a patient does not have a definitive diagnosis of CJD but there is a strong suspicion on clinical grounds, all surgical and reusable anaesthetic instruments should be quarantined and not used on any other patient until a definitive diagnosis has been made. In the event of confirmation of CJD in a patient who has undergone surgery, dentistry or endoscopy the instruments if not already quarantined must not be reused and advice should be sought from the Infection Control team.

#### **Tonsillectomy and Adenoidectomy**

Because prions have been detected before the onset of neurological disease in reticulo-endothelial tissues in vCJD the Health Departments issued circulars in 2001 implying that tonsillectomy was a particular risk of spreading vCDJ and advised that single use instruments were to be introduced for tonsil surgery. Since then it appears that disposable diathermy equipment may be unsatisfactory and further advice from the Department of Health in England has been to recommence the use of reusable surgical instruments for routine T & As. This is a confused situation and clearly definitive advice is awaited.

From the anaesthetic viewpoint it is desirable to continue to use either disposable equipment or where such equipment is not available protect equipment from contamination by tonsillar tissue :-

- If an LMA is employed it should not be reused. If considered necessary a single use disposable LMA should be used or if tracking of equipment can be guaranteed, an LMA which has previously been resterilised on a number of occasions approaching the maximum recommended should be used and thereafter discarded
- Alternatively, the trachea may be intubated using a single use endotracheal tube. The laryngoscope blade used must be either single use or if a metal blade is required it must be covered by a disposable, transparent plastic sheath. Preferably the laryngoscope handle should have similar protection. If reusable items are used they should be fully decontaminated and autoclaved
- If bougies or other intubation aids are required these should be of a single use type

#### Non-tonsillectomy Surgery

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Risk assessment undertaken by SEAC suggests that where tonsillectomy is not undertaken the risk of contamination of either a laryngoscope blade or an LMA is extremely low. Prions are not detectable in saliva and it is thought that the passage of the LMA cuff over the tonsillar bed will not result in significant contamination. Unless further advice is issued by the DoH anaesthetists should not change their current anaesthetic practice.

# INFECTION CONTROL PRECAUTIONS FOR ANAESTHETIC PROCEDURES

Carrying out procedures in an operating theatre does not pose a lower risk of infection than other hospital locations and the risk of infection depends on the procedure and on the level of barrier protection rather than the surrounding environment (53).

#### **Maximal Barrier Precautions**

Maximal barrier precautions involve full hand washing, the wearing of sterile gloves and gown, a cap, mask and the use of a large sterile drape (54). The skin entry site should be cleaned with an alcoholic Chlorhexidine gluconate solution or alcoholic Providone-iodine solution (55). The antiseptic should be allowed to dry before proceeding.

Certain invasive anaesthetic procedures require this optimum aseptic technique :-

- Insertion of central venous catheters
- Spinal, epidural and caudal procedures

The Working Party is aware that many anaesthetists do not employ this level of asepsis for 'one-shot' spinals or epidurals but believes when central neural spaces are penetrated full aseptic precautions are required.

Comprehensive guidelines have been prepared for insertion and maintenance of central venous catheters (56) and are commended to all anaesthetists.

#### **Other Barrier Precautions**

Certain invasive procedures do not require full barrier precautions as above but nevertheless demand appropriate aseptic techniques. Such precautions involve the wearing of sterile gloves and use of small drapes although similar attention is required to hand washing and skin preparation. These procedures include :-

- Peripheral regional blocks
- Arterial line insertion

Peripheral venepuncture or intra-muscular injection in routine patients will involve handwashing, non-sterile gloves and skin preparation with propyl alcohol. Peripheral intravenous catheters are a significant source of nosocomial bacteraemias (57) and care is required.

#### **High Risk Patients**

Certain patients may be especially vulnerable to infection e.g. immunocompromised or offer particular high risk of transmitting infection e.g. TB, HIV. For the immunocompromised, maximal barrier precautions are required for all invasive procedures and similarly where there is a high infection risk, staff should concentrate not only on preventing cross infection between patients but in protecting themselves by ensuring compliance with all precautions.

### **OCCUPATIONAL HEALTH ASPECTS**

Anaesthetists are at risk of occupational acquired respiratory and blood borne infections. The principle risk from the former route is tuberculosis (TB) and from the latter blood borne viruses such as Human Immunodeficiency Virus (HIV), Hepatitis B (HBV) and Hepatitis C (HCV). Adopting precautions against occupational transmission is of vital importance in anaesthetic practice (58) as is knowledge of the General Medicine Council's advice to doctors in dealing with serious communicable diseases (59).

#### **Exposure Prone Procedures and Anaesthesia**

An "exposure prone procedure" is one where there is a risk that injury to the health worker may result in exposure of a patient's open tissues to the blood of the worker. These procedures include those where the worker's gloved hand may be in contact with sharp instruments, needle tips or sharp tissues inside a patient's open body cavity, wound or confined anatomical space where the hands or fingertips may not be completely visible at all times. Such procedures must not be performed by infected healthcare workers with a serious transmissable disease.

Procedures performed routinely by anaesthetists during the course of their clinical work do not fall within this definition. Anaesthetists do not normally use sharp instruments inside body cavities or open wounds. Their hands are visible and although anaesthetists may put their fingers into patients mouths during the course of their clinical work there is no evidence that injuries occur. The likelihood of an anaesthetist's blood contaminating a patient's blood is very small indeed. Thus in general the procedures undertaken in anaesthetic practice are not considered exposure prone procedures (60).

#### Vaccination

Departments of anaesthesia in conjunction with Occupational Health Services should ensure that all their staff are immunised against TB and HBV and know their immune status. Most British anaesthetists will have received BCG vaccination against TB but if in doubt, should have immunity assessed by occupational health before exposure to patients with active TB. If knowingly exposed formal notification of contact should be made and medical referral made if respiratory symptoms occur.

All anaesthetists should be immunised against HBV. The vaccine is safe and effective. A small percentage of people do not mount an adequate antibody response. Thus screening should be carried out 2-4 months after the vaccination course has been completed. A booster should be given to non-responders. If the antibody response remains inadequate consideration should be given to the use of Hepatitis B Immunoglobulin (HBIG) in the event of innoculation injury involving a known or suspected HBV positive patient. In view of the short term nature of immunoglobulin prophylaxis (approximately one month) this procedure should be considered with each subsequent occupational exposure. The need for booster vaccinations should be in line with local and national guidelines.

#### Post-exposure Management for Blood Borne Viruses

The major risk of infection from blood borne viruses results from percutaneous inoculation. Other possible routes of infection are exposure to open wounds or non-intact skin and splashing of infected material into the mouth or eyes. Blood contamination of intact skin is not considered a risk provided it is removed by washing with soap and water as soon as possible.

Following inoculation injury the puncture should be encouraged to bleed by squeezing the surrounding area. The wound should be thoroughly washed with soap and water. Splashes into the eye should be washed immediately with sterile eye wash solution or clean water. Splashes into the mouth should be irrigated with copious volumes of clean water.

Any incident involving occupational exposure of a member of staff must be recorded and an accident report form completed and reported to Trust management in line with local policies. It is important to have identified a medical advisor who can be consulted for advice in the event of occupational exposure. All Trusts should have well publicised guidelines in place and anaesthetists should know who to consult should occupational exposure occur. That person should be knowledgeable and totally trusted to preserve confidentiality and be available on a 24 hour basis. This may be provided by an Occupational Health physician, microbiologist, virologist or Infectious Diseases physician.

It is important that contact be made rapidly within one hour of exposure. In conjunction with the medical advisor the anaesthetist will then be able to plan a course of further action. This will involve a risk assessment based on the degree of exposure, the estimated infectivity of the patient and the rapid adoption of protective measures e.g. Hepatitis B immunoglobulin or anti-HIV drugs (61).

#### The Anaesthetist with a Serious Transmissable Disease

Any anaesthetist who has any reason to believe that they may be infected with a serious transmissable infectious disease must seek appropriate diagnostic testing and advice. Should infection be confirmed the individual must be under regular expert medical care (62).

An anaesthetist who suspects infection must be assured of complete confidentiality when seeking medical advice. Assistance may be available confidentially within their own hospital but may be sought at a centre elsewhere which has appropriate experience. Alternatively, an anaesthetist may contact the Association anonymously where advice will be available through the well established and proven Sick Doctors Scheme.

An infected anaesthetist must seek expert advice about the extent to which their clinical practice should be modified. The UK Health Departments have set up the UK Advisory Panel for Health Care Workers Infected with blood-borne viruses (UKAP) to advise specialist occupational health physicians and other physicians caring for healthcare workers. Although there are reports of transmission of HIV from infected healthcare workers to patients the risk is small. In addition as anaesthetic practice is not normally viewed as involving "exposure prone procedures" it may be possible for an HIV positive anaesthetist to continue in clinical practice.

It is essential that in these circumstances the anaesthetist :-

- · has sought and is following advice about his/her practice
- is under regular medical supervision
- is familiar with the guidance of the GMC
- understands the routes of occupational transmission of HIV
- practices cross-infection precautions routinely

An anaesthetist who knows or has good reason to believe that a colleague has or may have a serious communicable disease and is practising in a way which places patients at risk must inform an appropriate person in the employing authority or relevant regulatory body. Wherever possible the colleague should be informed prior to any information being passed on (59).

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