Chapter 1
Essentials of infection control

WHY DO WE NEED INFECTION CONTROL IN DENTISTRY?

Dentists are exposed to a wide variety of potentially infectious microorganisms in their clinical environment. The transmission of infectious agents from person to person or from inanimate objects within the clinical environment resulting in infection is known as *cross-infection*.

The protocols and procedures involved in the prevention and control of infection in dentistry are directed to reduce the possibility or *risk* of cross-infection occurring in the dental clinic, thereby producing a safe environment for both patients and staff.

All employers have a legal obligation under the Health and Safety at Work Act 1974 to ensure that all their employees are appropriately trained and proficient in the procedures necessary for working safely. They are also required by the *Control of Substances Hazardous to Health* (COSHH) *Regulations 2002* to review every procedure carried out by their employees which involves contact with a substance hazardous to health, including pathogenic microorganisms. Employers and their employees are also responsible in law to ensure that any person on the premises, including patients, contractors and visitors, is not placed at any *avoidable risk*, as far as is reasonably practicable.

Thus, the concept of the risk of cross-infection is an important one in dentistry. We do not deal in absolutes, but our infection control measures are directed towards reducing, to an acceptable level, the probability or possibility that an infection could be transmitted. This is usually measured against the background infection rate expected in the local population; i.e. the patient or dental operative system is placed at no increased risk of infection when entering the dental environment. Infection control guidance in dental surgery has developed from an assessment of the evidence base, consideration of the best clinical practice and risk assessment (Figure 1.1).

How we manage the prevention of cross-infection and control the risk of spread of infection in the dental clinic is the subject of this book.

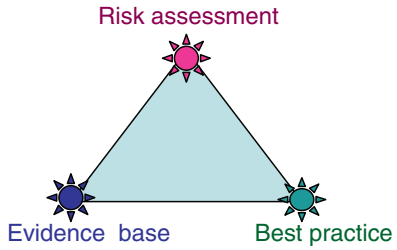

Figure 1.1 The basis of the development of infection control guidance in dental surgery.

RELATIVE RISK AND RISK PERCEPTION

Risk has many definitions and is perceived by the dental profession and the public in different ways which can have an impact on the perception of the public and dental staff as to how safe it is in the dental clinic. For example, risks which are under personal control, such as driving a car, are more acceptable than the risks of travelling by aeroplane or train. Thus, the public often perceives travelling by car to be safer than by air even though the accident statistics do not support this perception. Unseen risks such as infection and particularly those with frightening consequences such as AIDS or MRSA are predictably most alarming to the profession and the public. Risks can be clinical, environmental, financial, economic or political, as well as those affecting public perception and reputation of the dentist.

What makes risks significant? There are a number of criteria which make risks significant and worthy of concern:

- Potential for actual injury to patients or staff
- Significant occupational health and safety hazard
- The possibility of erosion of reputation or public confidence
- Potential for litigation
- Minor incidents which occur in clusters and may represent trends

Understanding what is implied by the term *hazard* is important when we consider the control of infection. This may be defined as a situation, or substance, including microorganisms, with the potential to cause harm. Thus, risk must take into account not only the likelihood or probability that a particular hazard may impact on the patient or dental staff but the severity of the consequences if it did impact on people.

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
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RISK ASSESSMENT AND THE MANAGEMENT DECISION-MAKING PROCESS

It is the role of managers of dental practices to manage risk. The Management of Health and Safety at Work Regulations 1999 requires employers to carry out a risk assessment as an essential part of a risk management strategy. Infection control is an application of risk management to the dental clinical setting.

Risk management involves identification, assessment and analysis of risks and the implementation of risk control procedures designed to eliminate or reduce the risk.

Risk control in dentistry is a single-tier approach in which all patients are treated without discrimination as though they were potentially infectious. This approach was previously referred to as *universal precautions* and has been replaced by *standard precautions* which treat all body fluids, with the exception of sweat, as a source of infection and include a series of measures and procedures designed to prevent exposure of staff or patients to direct contact with infected body fluids. Specifically, dental health care workers (HCWs) should provide barriers to exchange of blood, saliva and gingival fluid between operator and patient and patient and operator.

Decisions made within an organisation, and within practice, should take into account the potential risks that could directly or indirectly affect a patient's care. If risks are properly assessed, the process can help all health care professionals and organisations set their priorities and improve decision-making to reach an optimal balance of risk, benefit and cost. If dental teams systematically identify, assess, learn from and manage all risks and incidents, they will be able to reduce potential and actual risks, and identify opportunities to improve health care.

Risk assessment has the following benefits for delivery of dental health care:

- Strives for the optimal balance of risk by focusing on the reduction or mitigation of risk while supporting and fostering innovation, so that greatest returns can be achieved with acceptable results, costs and risks
- Supports better decision-making through a solid understanding of all risks and their likely impact
- Enables dentist to plan for uncertainty, with well-considered contingency plans which cope with the impact of unexpected events and increase staff, patient and public confidence in care that is delivered
- Helps the dentist comply with published standards and guidelines
- Highlights weakness and vulnerability in procedures, practices and policy changes

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
BLBK122-Pankhurst 9781405161626 January 12, 2009 20:22

HOW TO PERFORM A RISK ASSESSMENT IN A DENTAL PRACTICE

A risk assessment in dental practice involves five stages:

1. Look for the hazards
2. Decide who might be harmed, and how
3. Evaluate the risks arising from the hazards and decide whether existing precautions are adequate or should more be done
4. Record your findings
5. Review your assessment periodically and revise it if necessary

Stage 1: Look for the hazards

- Divide your work into manageable categories
- Concentrate on significant hazards, which could result in serious harm or affect several people
- Ask your employees for their views; involve the whole dental team
- Separate activities into operational stages to ensure that there are no hidden hazards
- Make use of manufacturers' datasheets to help you spot hazards and put risks in their true perspective
- Review past accidents and ill-health records

Stage 2: Who might be harmed?

- Identify all members of staff at risk from the significant hazard
- Do not forget people who only come into contact with the hazard infrequently, e.g. maintenance contractors, visitors, general public and people sharing your workplace
- Highlight those persons particularly at risk who may be more vulnerable, e.g. the young, people with disabilities, inexperienced or temporary workers and lone workers

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
BLBK122-Pankhurst 9781405161626 January 12, 2009 20:22

Stage 3: Evaluate the level of risk

- The aim is to reduce all risks to a low level
- Determine for each significant hazard if the remaining risk, after all precautions have been taken, is *high*, *medium* or *low*
- Concentrate on the greatest risks first
- Examine how work is actually carried out and identify failures to follow procedures or practices
- Need to comply with legal requirements and standards
- The law says that you must do what is reasonably practical to keep your workplace safe

A numerical evaluation of risk can be made to help prioritise the need for action and allow comparison of relative risk. *Risk* is equal to *severity* multiplied by *likelihood*. Assign a score of 1–5 for each, with a total value of 16–25 equating to *high risk*, 9–15 to *medium risk* and >8 to *low risk* (Figure 1.2).

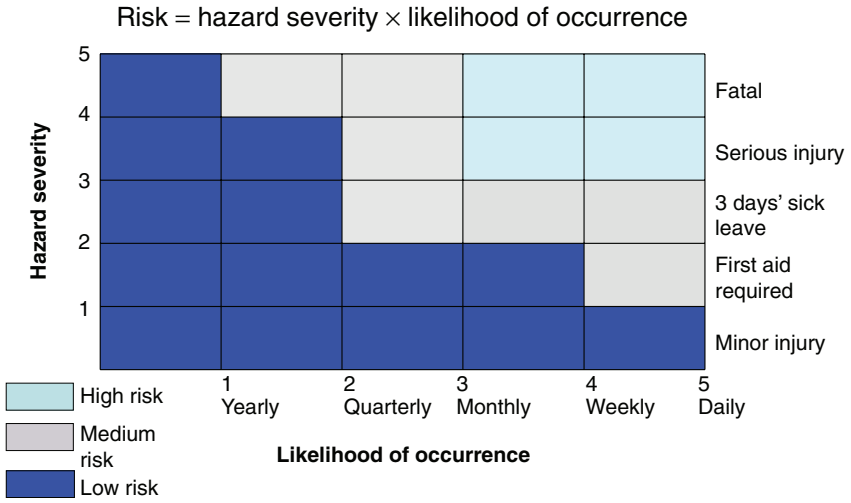

Figure 1.2 Graph showing how hazard severity and likelihood of occurrence are related to risk.

Stage 4: Record your findings

Record the significant findings of your assessment and include significant hazards and important conclusions.

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
BLBK122-Pankhurst 9781405161626 January 12, 2009 20:22

Information to be recorded:

- Activities or work areas examined
- Hazards identified
- Persons exposed to the hazards
- Evaluation of risks and their prioritisation
- Existing control measures and their effectiveness
- What additional precautions are needed and who is to take action and when

Stage 5: Review your assessment

Risk assessment is a continuing process and must be kept up to date to ensure that it takes into account new activities and hazards, changes in processes, methods of work and new employees.

You must document your findings but there is no need to show how you did your assessment, provided you can show that a proper check was made and you *asked who* might be affected, and that you dealt with all the obvious significant hazards taking into account the *number of people* who could be involved, that the precautions taken are reasonable, and that the remaining risk is low.

HIERARCHY OF RISK MANAGEMENT CONTROL

Following a risk assessment is necessary to implement a plan to control the observed risk. The plan of action must set out in priority order what *additional controls are necessary*, and aim to reduce risks to an acceptable level and comply with relevant legal requirements. You must also establish a reasonable time scale for completion and decide who is responsible for taking the necessary action.

There is a hierarchy of control options which can be summarised as:

- Elimination (buy in services/goods)
- Substitution (use something less hazardous/risky)
- Enclosure (enclose to eliminate/control risks)
- Guarding/segregation (people/machines)
- Safe systems of work (reduce system to an acceptable level)
- Written procedures that are known and understood by those affected

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
BLBK122-Pankhurst 9781405161626 January 12, 2009 20:22

- Adequate supervision
- Identification of training needs and implementation
- Information/instruction (signs, handouts, policies)
- Personal protective equipment (PPE)

These control measures can be applied as judged appropriate following the risk assessment, taking into account the legal requirements and standards, affordability and the views of the dental team.

INFECTION CONTROL AND THE LAW

Laws relating to infection control can arise from legal acts and orders from the individual county or as European Union Directives. A distinction must be made between *regulations* and *approved codes of practice* and *advice*.

Regulations are laws, approved by the national legislative body. In the UK, regulations that govern infection control come under the *Health Act 2006* and the *Health and Safety at Work Act*. This applies to regulations based on EC Directives as well as national regulations. The Health and Safety at Work Act and general duties in the management regulations are goal setting and give employers the freedom to decide how to control risks which they identify. However, some risks are so great or the proper control measures so costly that it would not be appropriate to leave the discretion on the employer to decide what to do about them. Regulations identify these risks and set out specific actions that must be taken. Often these requirements are absolute – to do something without qualification by deciding whether it is reasonably practicable.

Approved codes of practice (ACP) offer practical examples of good practice. They give advice on how to comply with the law by, for example, providing a guide to what is 'reasonably practicable'. For example, if regulations use words like 'suitable and sufficient', an ACP can illustrate what this requires in particular circumstances. ACP have a special *legal status*. If employers are prosecuted for a breach of health and safety law, and it is proved that they have not followed the relevant provisions of the ACP, court can find them at fault unless they show that they have complied with the law in some other way. The 'hygiene code', the full title being the Code of Practice for the Prevention and Control of Health Care Associated Infections (HCAIs), is an example of an ACP which was published under the *Health Act 2006* legislation. This code sets out criteria according to which managers of 'NHS organisations' are to ensure that patients are cared for in a clean environment where the risk of HCAI is as low as possible. In this context, a dental practice is an example of an NHS organisation, and must seek to comply with the ACP. If it fails to comply, then

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
BLBK122-Pankhurst 9781405161626 January 12, 2009 20:22

enforcement notices can be served to make improvement mandatory. Examples of a duty set out in this ACP, which is guided by the recommendations outlined in Chapters 5 and 7, include:

- Adequate provision of suitable hand-washing facilities and antibacterial hand rubs
- There are effective arrangements for the appropriate decontamination of instruments and other equipment

This ACP also emphasises that NHS bodies must comply with all relevant legislation such as the Health and Safety at Work Act 1974 and COSHH regulations.

LEGAL ACTS UNDER WHICH DENTAL PRACTICE IS CONDUCTED

The Health Act 2006

The Health Act 2006 is the latest update of health legislation which is applied in the UK. This lays out the framework for the provision of health care and the responsibilities of the various bodies and professionals tasked with the delivery of health care including dentists. (Further information can be found at http://www.dh.gov.uk/en/Publicationsandstatistics/Legislation/Actsandbills/DH_064103.)

The Health and Safety at Work Act 1974

Employers have a duty under the law to ensure, 'so far as is reasonably practicable', the health, safety and welfare of their staff and members of the public at their place of work. This legislation is periodically updated and the *Management of Health and Safety at Work Regulations 1999* made more explicit what employers are required to do to manage health and safety. In particular, this act required employers to look at what the risks are in their workplace and take sensible measures to tackle, i.e. to carry out risk assessments as discussed above. It is the duty of the employer to *consult with staff* on matters which may impact on their health and safety at work including:

- Any change which may substantially affect their health and safety at work, e.g. in procedures, equipment or ways of working

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
BLBK122-Pankhurst 9781405161626 January 12, 2009 20:22

- The employer's arrangements for getting competent people to help him/her satisfy health and safety laws
- The information you have to be given on the likely risks and dangers arising from your work, measures to reduce or get rid of these risks and what you should do if you have to deal with a risk or danger
- The planning of health and safety
- The health and safety consequences of introducing new technology

The duties of employers under this law include:

- Making your workplace safe and without risks to health
- Ensuring plant and machinery are safe and that safe systems of work are set and followed
- Ensuring articles and substances are moved, stored and used safely
- Providing adequate welfare facilities
- Giving the information, instruction, training and supervision necessary for the heath and safety of staff and the public (http://www.hse.gov.uk/pubns/law.pdf)

Control of Substances Hazardous to Health Regulations 2002

The law requires employers to control exposure to hazardous substances to prevent ill health. They have to protect both employees and others who may be exposed by complying with the COSHH regulations. COSHH is a useful tool of good management which sets basic measures, with a simple step-by-step approach, that employers, and sometimes employees, must take which will help to assess risks, implement any measures needed to control exposure and establish good working practices.

Note that hazardous substances include not only chemicals such as mercury, solvents and the materials used in dentistry, but also biological agents such as bacteria and other microorganisms.

The regulations require risk assessment to be made on all the materials used in dental practice and further information can be found on the web at http://www.hse.gov.uk/pubns/indg136.pdf.

The Reporting of Injuries, Diseases and Dangerous Occurrences 1995

Reporting accidents and ill health at work is a legal requirement. The information enables the health and safety executive (HSE) and local authorities to identify where and how risks arise and to investigate serious accidents. As an employer, a person who is self-employed, or someone in control of work premises, you have legal duties under the Reporting of Injuries, Diseases and Dangerous Occurrences (RIDDOR) 1995 that require you to report and record some work-related accidents by the quickest means possible. You must report deaths, major injuries and an injury which results in the employee or self-employed person being away from work or unable to perform their normal work duties for more than three consecutive days. Thus, the dental surgery must be an environment where we positively encourage accident reporting by all of the dental team. (Further information on reporting accidents can be found at http://www.hse.gov.uk/riddor/index.htm.)

The Pressure Systems Safety Regulations 2000

Because autoclaves are pressurised vessels and are potentially explosive, they come under legal requirements to be tested annually to ensure safety and also for insurance purposes. The Pressure Systems Safety Regulations came into force in 2000. Users and owners of pressure systems are required to demonstrate that they know the safe operating limits, principally pressure and temperature, of their pressure systems and that the systems are safe under those conditions. They need to ensure that a suitable written scheme of examination is in place before the system is operated. They also need to ensure that the pressure system is actually examined in accordance with the written scheme of examination. These safety tests are also required for insurance purposes (http://www.hse.gov.uk/pubns/indg178.pdf).

PUBLISHED STANDARDS AND GUIDANCE

Standards and guidance relating to infection control are set and can be obtained from a number of sources such as:

- *Health and Safety Executive* is a regulatory body with the responsibility to promote better health and safety at work, provide an information and advisory service, and submit proposals for new or revised regulations and approved codes of practice (www.hse.gov.uk)

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
BLBK122-Pankhurst 9781405161626 January 12, 2009 20:22

- *Medicine and Health Products Regulatory Agency* (formerly Medical Devices Agency) ensures that medicines and medical devices work and are acceptably safe (http://www.mhra.gov.uk)
- *The National Institute for Health and Clinical Excellence* (NICE) is an independent organisation responsible for providing national guidance on the promotion of good health and the prevention and treatment of ill health specifically for HCWs as well as guidance on the use of new and existing medicines, treatments and procedures within the health service (http://www.nice.org.uk/)
- *Department of Environment, Food and Rural Affairs* gives advice on chemicals and waste disposal, which is discussed in Chapter 10 (http://www.defra.gov.uk/Environment/index.htm)
- *British Dental Association* provides advice on infection control through their infection control advisory sheets for members, which have been a useful source of guidance to dentist in the UK (http://www.bda.org/)
- *General Dental Council* (GDC) is a professional organisation which regulates dental professionals in the UK and maintains standards in dental practice in the interest of patients by emphasising training and competence. The GDC, for example, has advised dentists to:
  - 'Find out about laws and regulations which affect your work, premises, equipment and business, and follow them'
  - 'Provide a good standard of care based on available up-to-date evidence and reliable guidance' (http://www.gdc-uk.org/)

Policy

The arms of government, outlined above, dictate policy which is published in the form of strategic documents which they seek to implement. These policies are often the result of special advisory bodies such as the Spongiform Encephalopathy Advisory Committee (SEAC; http://www.seac.gov.uk/).

When the Department of Health agrees on a strategy, it cascades this down to those local organisations which are tasked with implementation such as a local health authority. Health service circulars and letters of the chief dental officer are used to communicate with the people in the dental profession and these can be accessed on the websites of your local area.

Procedures

Recommendations on procedures which are undertaken in dental practice are in the forms of device bulletins, health technical memorandum (HTM) and

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
BLBK122-Pankhurst 9781405161626 January 12, 2009 20:22

model engineering specifications, which provide essential information if we are to keep up to date with what would be considered good practice.

Device bulletins

Device bulletins are produced by the Department of Health and contain guidance and information on medical devices of a more general management interest. They are written as a result of experience gained from adverse incident investigations, contacts with manufacturers and users, and device evaluations. Bulletins are often written in response to adverse incidence where there is a need to communicate changes in practice following from the experience gained when an incident has occurred (http://www.mhra.gov.uk/Publications/Safetyguidance/DeviceBulletins/index.htm).

Health technical memorandum

These publications give advice and guidance on specific health care topics and set out recommendations for good practice. An example of an HTM is HTM 01-01, the first part of the Decontamination Series, which has a major impact on dental practice in the UK. This HTM provides guidance on choice, specification, purchase, installation, validation, periodic testing, operation and maintenance of the sterilisers. The dental profession has been working towards implementing the recommendations of this HTM and that of the more recently published HTM 01-05, and the practices and procedures covered in Chapter 7 are based largely on these recommendations.

Model engineering specifications

Model engineering specifications give detailed information on equipment, its use and maintenance, etc., and are used as a source of reference by engineers who the dentists will have to employ to test and validate, for example, the autoclaves and thermal washer-disinfectors used in dental practice, which are discussed in Chapter 7.

Implementation

The implementation of policy and procedures has to be monitored at the local level and this has been incorporated into *quality assurance* and *clinical governance*. *Clinical governance* has been introduced as a new approach to quality improvement in the NHS within the UK, with the aim of measuring and improving quality of care. Governance incorporates existing activities such as clinical audit, education and training, research and development, and risk

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
BLBK122-Pankhurst 9781405161626 January 12, 2009 20:22

management. Thus, many of the activities related to infection control and prevention are monitored and assessed when applying clinical governance to the dental practice. Clinical audit is a useful tool which can be very effectively applied to infection control, and indeed making a comparison of our activities against the standards outlined in the sources discussed above is required when conducting an audit, which is an integral part of our practice to improve standards of care and safety.

Further information on clinical governance and its relationship with clinical and managerial approaches to the quality of care can be found in a paper by Buetow and Roland (1999; http://qshc.bmj.com/cgi/reprint/8/3/184).

TEAM APPROACH TO PREVENTION OF INFECTION

It is now accepted that a team approach is required in dentistry to improve the care which we deliver to our patients. The advantage of teamwork is that teams would:

- Utilise the skill mix within the profession by using the talents of the whole dental team
- Allow the whole dental team, not just dentists, to give their best to NHS dentistry
- Help to improve quality and cost-effectiveness

The emphasis on developing dental teams by the GDC has resulted in the publication of *Developing the Dental Team* (2004) and a new register for professions complementary to dentistry (PCD) to include dental nurses, technicians, clinical dental technicians, orthodontic therapists as well as dental hygienists and therapists.

A team is more than just a group of people working together; it has been defined as:

> A small number of people with complementary skills who are committed to a common purpose, performance goals and approach for which they hold themselves mutually accountable.

Infection control of necessity requires a team approach and each member of the team must have complementary skills and share the common purpose to ensure safe practice. 'For the team to function effectively there must be clear goals shared by the team, good communication between the team members, with clear, fair leadership and an open climate based on respect and absence of a blame culture'. This will encourage staff to feel confident and safe to treat patients with potentially infectious disease and express their concerns on

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
BLBK122-Pankhurst 9781405161626 January 12, 2009 20:22

infection matters and thus contribute to the improvement of service delivery. Generally, teamwork improves job satisfaction, increases the sense of being valued and encourages a collective responsibility for the delivery of service.

Effective leadership is an important constituent of the dental team and they must provide a clear vision of the standard of excellence which the team is seeking to achieve and communicate this to the members of the team. This is best achieved by ensuring that there is adequate training for dental nurses (dental care professionals (DCPs)), hygienist, receptionists, etc., in infection control and that there are regular clinical management meetings within the practice. Meetings are required to allow communication between the team members and for risk assessments to be made as new problems arise. There is evidence that busy dental practices do not have regular structured team meeting built into their routine, and particularly in the rapidly developing field of infection control these meetings are essential.

Communication is essential if the members of the dental team are to report accidents and feedback their opinions, reservations and fears regarding infection control policy and conditions of work in the dental practice. Individuals must not be discouraged by the perception of 'failure' if they report accidents or incidents.

It is useful to consider what the causes of human failure are, as human error is one of the greatest reasons for breaches in infection control practice. Failure is usually caused by either:

- *Errors in knowledge* where the HCWs did not know what they were suppose to do to, for example, the importance of safe disposal of sharps and the prevention of transmission of infection by aerosol in the clinic
- *Errors in skills* where the HCWs did not have sufficient training to, for example, carry out procedures such as decontaminate an instrument or use a scalpel safely

There may be an environment in the dental surgery which due to poor organisation and failure in management is conducive to personal failure and errors. The reduction of human error is therefore closely related to good practice management and to having an effective team.

Human error can be minimised by improving job design, i.e. ensuring that everyone knows his or her duties and has the skills to accomplish the tasks; preventing boredom by job rotation and job enrichment; and multi-skilling – which gives the HCW new challenges and maintains interest and pride in 'a job well done'.

Lastly, encouraging staff participation in decision-making and making them a valued member of the dental health care team will reduce errors, and if they occur they will be quickly corrected and be unlikely to reoccur.

P1: SFK/UKS P2: SFK/UKS QC: SFK/UKS T1: SFK
BLBK122-Pankhurst 9781405161626 January 12, 2009 20:22

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