

## National Unit Specification: general information

**UNIT** Prevention of Infection (Intermediate 2)

**CODE** DM5P 11

### COURSE

#### SUMMARY

This Unit is designed to develop knowledge and understanding of the causes of infection, the ways in which infection enters the body, the spread of infection and the ways in which the body fights infection. This is complemented with the knowledge and understanding surrounding antiseptic, sterilisation, disinfection procedures and disposal of infected material.

This Unit is an optional Unit in the *National Certificate Group Award: Early Education and Childcare (Higher)* but is also suitable for candidates wishing to study the Unit on its own. The Unit is suitable for candidates who wish to gain employment, or may already be employed, in the early education and childcare sector working under supervision. They may wish to progress on to higher level early education and childcare qualifications. It is also intended that the generic nature of this Unit will facilitate its use by candidates studying a variety of subjects.

#### OUTCOMES

1. Describe the main groups of pathogenic organisms which currently cause disease in the UK.
2. Explain the entry of pathogens into the body and spread of infection.
3. Explain how the spread of infection can be prevented.

---

### Administrative Information

**Superclass:** PH

**Publication date:** August 2005

**Source:** Scottish Qualifications Authority

**Version:** 01

© Scottish Qualifications Authority 2005

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this unit specification can be purchased from the Scottish Qualifications Authority. The cost for each unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

## **National Unit Specification: general information (cont)**

### **UNIT**      Prevention of Infection (Intermediate 2)

#### **RECOMMENDED ENTRY**

While entry is at the discretion of the centre there are a variety of prior learning experiences which are relevant to candidates wishing to undertake this Unit.

They may also benefit from having attained one of the following, or equivalent:

- ◆ Standard Grade at General level in any relevant subject
- ◆ A Course or Unit in Care at Intermediate 1
- ◆ Courses or Units in any relevant subject at Intermediate 1
- ◆ SVQ or SVQ Units at level 2 in a related subject.

#### **CREDIT VALUE**

1 credit at Intermediate 2 (6 SCQF credit points at SCQF level 5\*)

*\*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

#### **CORE SKILLS**

There is no automatic certification of core skills or core skills components in this Unit.

## **National Unit Specification: statement of standards**

### **UNIT        Prevention of Infection (Intermediate 2)**

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit Specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

#### **OUTCOME 1**

Describe the main groups of pathogenic organisms which currently cause disease in the UK.

##### **Performance Criteria**

- a) Describe each of the main groups of pathogenic organisms.
- b) Describe the signs and symptoms of an example of each of the main groups.
- c) Describe the signs and symptoms of HIV and Hepatitis B and C.

#### **OUTCOME 2**

Explain the entry of pathogens into the body and spread of infection.

##### **Performance Criteria**

- a) Describe common sources of infection.
- b) Explain how pathogens enter the body.
- c) Describe how HIV and Hepatitis B and C can enter the body.
- d) Describe the body's immune response to infection at a basic level.

#### **OUTCOME 3**

Explain how the spread of infection can be prevented.

##### **Performance Criteria**

- a) Describe the main ways in which the spread of infection can be prevented.
- b) Describe procedures for the use of a named disinfectant, a named antiseptic and a named sterilising procedure.
- c) Explain the correct circumstances under which a disinfectant, antiseptic or sterilising agent should be used.
- d) Describe current local procedures for disposing of infected or contaminated material.

### **EVIDENCE REQUIREMENTS FOR THIS UNIT**

Written and/or recorded oral evidence is required to demonstrate that the candidate has achieved all Outcomes and Performance Criteria. A holistic approach to assessment across outcomes should be taken.

The evidence for this part of the Unit should be obtained under controlled, supervised conditions and should last no more than one hour thirty minutes. A single question paper with both extended and restricted response questions, such as illustrated in the National Assessment Bank item for this Unit, could be used. This should be taken on completion of the Unit. Achievement can be decided by the use of a cut off score. In the event of the candidate not achieving the cut off score another instrument of assessment should be used.

## **National Unit Specification: statement of standards (cont)**

### **UNIT**      Prevention of Infection (Intermediate 2)

#### **Specific advice**

Outcome 2(a): a minimum of **three** sources of infection from the Appendix to the Statement of Standards should be assessed.

Outcome 2(b): a minimum of **three** routes of spread and entry from the Appendix to the Statement of Standards should be assessed.

Outcome 3(b): a minimum **of three** measures from the Appendix to the Statement of Standards should be assessed.

## National Unit Specification: support notes

### UNIT Prevention of Infection (Intermediate 2)

This part of the Unit Specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

#### GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

##### Outcome 1

It is important not to over elaborate this outcome as this is like a new language to many candidates. It is important to use specific examples of topical interest to assist candidates' learning. This outcome is to ensure that candidates become familiar with the main groups of pathogens that they are likely to encounter in their vocational area. Protozoa are not specified in the Appendix to the Statement of Standards but could be taught if it was felt that they were relevant. It was felt that although protozoa are important in terms of world disease levels, candidates are less likely to come across them in the UK.

##### PC (a)

###### Bacteria

The formation of bacterial spores should be covered since this knowledge is required in Outcome 3 when sterilisation procedures are discussed. Candidates should be taught that bacteria are microscopic, single celled and exist all around us. Some are pathogenic but most are harmless with the potential of becoming pathogenic. We need both harmless and pathogenic bacteria to live in harmony for our own wellbeing. Under favourable conditions bacteria can divide every 10 minutes, producing large numbers quickly. This causes problems in infection. They feed and excrete through their cell walls. Feeding often involves the bacteria producing enzymes which digest the tissue to give them food. This explains why bacterial infections often cause red, damaged tissue and soreness. They can also pass toxins into wounds, e.g. tetanus, while some can form spores. These spores are very difficult to destroy and can survive in the environment for many years. Antibiotics can be used to control bacteria but recent years have seen the growth of resistant strains such as MRSA.

###### Viruses

They are smaller than bacteria. They cannot reproduce by themselves and must hijack living cells in order to make new viruses and to live. They are unaffected by antibiotics, and difficult to kill because they are often hiding inside host cells. There are few safe, effective anti-viral drugs (most just keep the disease where it is at and not kill it). The main method of control is vaccination.

###### Fungi

These cause several common skin infections. There are two main types; yeast-like fungi such as thrush and filamentous fungi (moulds) such as athlete's foot and ringworm. They produce enzymes that digest the tissue they are living on. This causes the characteristic redness and soreness.

###### Parasites

Most animal parasites are large enough to see with the naked eye. Worms, insects and mites could be covered.

All pathogens need four things to grow – time, food, warmth, moisture.

##### PC (b)

Common examples of pathogens from all four groups in the Appendix to the Statement of Standards should be looked at. In addition, examples could be chosen according to the vocational area that candidates will be working in. However, HIV and Hepatitis B and C should be covered as viral disease by all groups of candidates.

## National Unit Specification: support notes (cont)

### UNIT Prevention of Infection (Intermediate 2)

Childcare candidates could look at bacterial meningitis, chickenpox or measles as a viral infection, ringworm, oral thrush or thrush on a baby's bottom as a fungal infection and head lice or threadworms as an animal parasite and scabies as a parasitic mite.

Healthcare candidates could look at MRSA as a bacterial infection, winter vomiting virus, thrush as a fungal infection, and scabies as a parasitic mite.

Catering candidates could include Salmonella, E Coli and Listeria as bacterial infections, colds as viral infections, housefly as a means of infection spread by animals, and scabies as a parasitic mite.

Hairdressing and Beauty candidates could look at impetigo as a bacterial disease, warts as a viral disease, ringworm as a fungal disease, and head lice as insect parasites.

#### Outcome 2

PC (a): Sources of infection should include other people. This could either be due to contact in the active stages of an infection, or due to contact with symptom-less individuals known as carriers. Carriers may be asymptomatic because the infection is in its incubation period, or because the pathogen is kept in check by the immune system, e.g. typhoid. Air may carry infected water droplets or airborne spores. Animals can be a source of infection, e.g. mosquitos can carry malaria, salmonella can be caught from pet reptiles, ringworm from handling guinea pigs, toxicariasis from dog's and cat's faeces. Contaminated food and water are a major source of infection, especially where people do not have access to clean water supplies. Raw poultry is often contaminated with salmonella. Contaminated objects that carry infection may include:

- ◆ children's toys
- ◆ nappies
- ◆ potties
- ◆ dough
- ◆ water
- ◆ baking
- ◆ work surfaces and utensils in the kitchen
- ◆ bedpans and soiled dressings in a care environment
- ◆ environmental sources of infection such as soil are additional examples of fomites.

PC (b): Pathogens are spread by: direct and indirect contact which include hand to hand; droplet infection; infected tissue; in faeces; via indirect contact with contaminated objects; through sexual contact (close skin contact in genital area and/or exchange of body fluids); from mother to foetus in the womb.

Routes of entry include: inhalation of infected droplets; ingesting pathogens on food in water or on contaminated fingers; through breaks in the skin (injection, abrasions, burns, cuts, animal bites); in utero from mother to foetus; through sexual openings; through the eyes and ears; through urethra.

HIV and Hepatitis B and C viruses exist in body fluids such as blood, semen and vaginal fluid. In addition, the Hepatitis B and C virus is found in vomit, urine and saliva, ie in all body fluids. Both viruses are spread by sexual contact due to the exchange of body fluids in utero and blood-to-blood contact (via infected needles, contaminated blood transfusions, tattoos and piercing with infected equipment). In the 1980s in Scotland these two infections were traditionally spread among injecting drug users and gay men. However, it is increasingly being spread through heterosexual contact.

## National Unit Specification: support notes (cont)

### UNIT Prevention of Infection (Intermediate 2)

This may be a good opportunity to tell candidates about other sexually transmitted diseases such as Chlamydia (bacteria-like microbe), Gonorrhoea (bacteria), Syphilis (bacteria) and genital warts (virus). These have recently been in the press and very much on the increase. They do not hear about them at school or in general life. Teachers and lecturers could discuss them if they felt it was relevant to the candidates.

The Hepatitis B and C virus is more robust than the HIV virus and, unlike HIV, is spread by all body fluids so can be spread by sharing toothbrushes and razor blades. Needle stick injuries in hospitals are an important route and spread of Hepatitis B and C.

PC (d): Candidates should learn about the body's first line of defence; the physical barrier created by intact skin, ear wax, tears and eyelids for the eyes, hairs in the nose, cilia and mucus in the lungs, acid in the stomach, flushing of the bladder with urine, acid pH in the vagina.

If infection does manage to get into the body then the body's second line defences such as the inflammatory response should be discussed. The discussion of the role of white blood cells should be kept simple. A simplified version should name two types of white blood cell; phagocytes which engulf germs and lymphocytes which produce antibodies to fight pathogens. Antibodies should be described as a system of labelling foreign antigens that should not be in the body and is a way of clumping foreign cells before they are destroyed by the phagocytes. The immune system makes specific antibodies which have the right shape to lock on to a particular antigen. Antigens and antibodies fit together perfectly like a key in a lock. After the infection has been quashed, memory cells remain in the body which remember how to make that particular antibody. If the same antigen invades the body at a future date, the memory cells rapidly make millions of antibodies which destroy the pathogen before it has the chance to do any damage. There is no need to mention B cells and T cells though lecturers could include them if they felt it was appropriate and would not confuse the candidates.

#### Outcome 3

PC (a): The following could be discussed as means of preventing the spread of infection:

- ◆ personal cleanliness; especially hand washing techniques
- ◆ clean water
- ◆ sewage treatment
- ◆ fresh air
- ◆ isolation of infected individuals
- ◆ vaccination (especially for Hepatitis B, tetanus and for childhood illnesses)
- ◆ good diet, medication
- ◆ use of condoms (especially for HIV, Hepatitis B and C and other sexually transmitted diseases)
- ◆ food hygiene procedures (sell by dates, correct storage, reheating policy, correct handling)
- ◆ good hygiene techniques appropriate to their chosen field of work, eg. for childcare candidates disposal of used nappies, potty contents; for health care workers the techniques involved in not spreading infection from patient to another, disposal of contaminated materials, bed washing and general ward cleanliness; for hairdressing candidates, cleanliness of equipment such as combs and scissors, disposal of hair and wet towels.

PC (b): Candidates should be taught the difference between sterilising and disinfecting an object and appreciate when it is appropriate to use each type of method. The difference between sterilising agents, disinfectants and antiseptics should be explained. Disinfectants kill most pathogens and reduce germs to safe levels, although they do not kill bacterial spores. This is adequate for most

## National Unit Specification: support notes (cont)

### UNIT Prevention of Infection (Intermediate 2)

purposes. Antiseptics are a sub-set of disinfectants. They also reduce germs to safe levels but are mild enough to use on skin and hair. Of the three procedures, only sterilisation will kill all pathogens (including bacterial spores) and leave the object completely germ-free. The only circumstance when sterilisation is essential is when the object to be used may penetrate the skin or body cavities, e.g. surgical implements, tattooing equipment, ear piercing equipment. Being viruses, HIV and Hepatitis B and C are killed by disinfection using undiluted bleach and by sterilisation.

PC (c): Candidates should look at a range of common disinfectants and antiseptics. Different dilutions and immersion times are required for different products. Sterilisation procedures covered could include UV radiation and gas sterilisation. Candidates may find labelling of products confusing, e.g. steam sterilisers and sterilising tablets sold for baby's bottles do not sterilise, they disinfect. However, this is perfectly adequate, as even a new baby can cope with a small number of pathogens. Discussion could be included on the use of antiseptics. These are now felt to delay healing and are not encouraged by the hospitals. Also discussion could include the over use of disinfectants, eg the new range of kitchen cleaners. It is felt that these will cause super bugs in the future. We have used washing up liquid and simple detergents in the past and this was felt to be enough.

PC (d): Candidates should investigate current procedures adopted by their local hospitals, local authority, the local, private or voluntary sectors. Most hospitals have charts showing the colour codes of their disposable sacks. Local Authorities have rules for disposal of infected material and sharps. Nurseries will have rules for disposal of used nappies.

The student will need to read the guidelines issued by their employer, as it is the employee's duty to read and adhere to them, as it is the employer's to produce them. They are for the safety and health of the customer, child or patient and the employee.

### GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

In delivering this Unit there should be a balance between teacher/lecturer presentation and candidate centred learning. Outcomes 1, 2, and 3 can be explored using a variety of methods:

- ◆ Small group exercises
- ◆ Case studies
- ◆ Worksheets
- ◆ Individual research including the use of relevant web-sites, some are mentioned below
- ◆ Video/audio material
- ◆ Practical workshops
- ◆ Use of text books, periodicals and journals
- ◆ The use of crosswords and quizzes can help candidates learn the difficult vocabulary.

#### Outcome 1

A simple experiment can be carried out to grow bacteria and fungi on agar plates. Swabs can be taken from walls, desks, windows, shoes, sinks, dish cloths, tea towels or ordinary hand towels and then plated onto petri dishes. The plates should be sellotaped and left at room temperature for a week or so. After this time, most plates will have grown a variety of colonies. From this, candidates can see that bacteria and fungi exist all around us. Most of the colonies will consist of harmless microbes, but a minority may be pathogenic. Lecturers should refer to the Microbiology in Schools Advisory Committee (MISAC) for safety advice relating to this experiment (see [www.biosci.org.uk/misac](http://www.biosci.org.uk/misac)). Many standard text books will provide useful diagrams and information about pathogens. The Meningitis Research Foundation ([www.meningitis.org](http://www.meningitis.org)) provides useful leaflets and other materials.



## **National Unit Specification: support notes (cont)**

### **UNIT        Prevention of Infection (Intermediate 2)**

#### **Outcome 2**

The approaches to teaching could involve collecting examples of reported infection, producing charts and posters and using newspapers and the internet. A great deal of information is available through the Health Education Unit, Meningitis Trust. Much of the detail in PC (d) is required to be given in a handout format as it is often too complicated in text books.

#### **Outcome 3**

Candidates should discuss examples relevant to their vocational area of choice. All student groups will benefit from an emphasis on preventing food poisoning. Candidates can discuss real examples of outbreaks of disease and how they can be prevented, e.g. SARS, E.Coli, kitchen hazards, (ROSPA) contains much useful material. NHS Scotland (formerly Health Education Board Scotland) has commissioned a booklet on food poisoning which is available free in small quantities or by purchase. It can be used with question sheets or case studies as a returnable resource. This could include salmonella for child care candidates - recent years have seen outbreaks in Edinburgh nurseries. Discussion over communal tasks could take place, eg. use of sand, water, dough and cookery.

Outcome 3 (b) and (c) can be taught by a combination of theory and practical demonstrations. If UV 'hand washing' kits are available these can illustrate the importance of effective hand washing. Various disinfectants and antiseptics can be purchased and candidates asked to identify uses, dilutions and immersion times for each. For Health Care candidates a visit to the Sterilising Unit of the local hospital gives candidates the chance to see commercial autoclaves. Otherwise a simple pressure cooker can be used to illustrate sterilisation. Hairdressing or Beauty candidates could investigate the UV sterilisers frequently used in salons. Nowadays a lot of equipment is disposable which makes it safer for patients but increases costs and disposal problems. Child care candidates could look at different options for bottle disinfection (called 'sterilisation' by the manufacturers) and their merits.

### **GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT**

The assessment for this Unit is laid out clearly in the Evidence Requirements section of the Statement of Standards of this specification. The standard to be applied is exemplified in the National Assessment Bank item for this Unit. If a centre wishes to design its own assessments for this Unit, they should be of a comparable standard. As indicated, question paper based assessment should be carried out under supervision and should last no more than one hour and thirty minutes.

A holistic approach to assessment across outcomes and other Units, where appropriate, should be taken.

### **CANDIDATES WITH ADDITIONAL SUPPORT NEEDS**

This Unit Specification is intended to ensure that there are no artificial barriers to learning or assessment. The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative Outcomes for Units. For information on these, please refer to the document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (SQA, 2004).

## **National Unit Specification: Appendix to the Statement of Standards**

### **UNIT**      Prevention of Infection (Intermediate 2)

#### **OUTCOME 1**

The four main groups of pathogens to be covered are:  
bacteria; viruses; fungi; small animal parasites.

PC (a) Animal parasites: worms, mites and insects should be covered.

#### **OUTCOME 2**

PC (a): Sources of infection taught should be:  
other people, air, animals, food and water, contaminated objects (fomites).

PC (b): Routes of entry taught should include:  
inhalation; ingestion; in utero; through breaks in the skin; through natural body openings such as the sexual openings and urethra.

Note that some small animal parasites and some fungal infections will not actually enter inside the body, but will attach themselves to the skin or hair of the person and live 'on' rather than inside them.

PC (d): Candidates should learn about the body's first line of defence and second line defences, such as, the inflammatory response, phagocytosis, the production of antibodies and memory cells.

#### **OUTCOME 3**

PC (b): The range of methods covered should include:  
stringent hand washing, vaccination, food hygiene procedures, basic hygienic practices and the use of condoms for sexually transmitted disease.